

Sustainable rural development:

What is the role of the agri-food sector?

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**Sustainable rural development:  
What is the role of the agri-food sector?**

**Edited by  
Martin Petrick and Gertrud Buchenrieder**

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Halle (Saale), June 2007

*Martin Petrick and Gertrud Buchenrieder*



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## **CONCEPTUAL ISSUES**



## RURAL-URBAN INTERLINKAGES AND REGIONAL DEVELOPMENT

*FLEMMING JUST\**

### ABSTRACT

The paper discusses the need for broadening the approach in rural research from a narrow endogenous and sectoral point of view to a broader regional approach with an eye on exogenous factors and place-based or territorial strategies. With Denmark as empirical case it is shown that the globalisation process and the knowledge economy have created stronger regional disparities within the last decade, and that this tendency seems to continue. An answer to refute the problems is a stronger emphasis on regional strengths and cross-sectoral collaboration.

**Keywords:** Endogenous, neo-endogenous, Denmark, rural and regional development.

### 1 INTRODUCTION

In the days of planning euphoria in the 1950s and '60s, there was a strong belief in macro economics and its possibilities for developing peripheral areas and underdeveloped countries. W. W. ROSTOW and other development researchers were in clover with their focus on investment rates and other exogenously given factors' influence as developmental factors (ROSTOW, 1960).

Alongside macro economic stimuli, Western countries pursued a sectoral policy, both economically and politically, giving strong segmented interests in agriculture, industry, shipbuilding and other industries' easy access to legislation and huge subsidies. Most extremely, the sectoral approach has dominated agriculture and not least the Common Agricultural Policy in EEC/EU.

Since the middle of the 1980s this dominating top-down policy has been supplemented with a new approach putting focus on local resources. One the most prominent rural sociologists propagating an endogenous developmental strategy with emphasis on internal resources, has been Professor JAN DOUWE VAN DER PLOEG from Wageningen University in the Netherlands. He has defined it in this way:

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*'Endogenous development patterns are founded mainly, though not exclusively, on locally available resources, such as the potentialities of the local ecology, labour force, knowledge, and local patterns for linking production to consumption.'* (LONG, VAN DER PLOEG, 1994, pp. 1-2).

Most rural research and practice in Europe focus on endogenous relations (multi-functional agriculture, rural entrepreneurs, improved living conditions in rural areas, local amenities etc.) as the way of securing development or just a pleasant life for the actual inhabitants. The argument in this paper is that there is a need for strengthening another pillar in rural research and action, a pillar that to a higher degree considers rural economy in its close interrelationship with and dependency of urban economy (knowledge production, industry, service, culture, institutions). Bringing matters to a head, the argument will be that one of the most important ways of stimulating rural development will be through a strengthening of regional towns and through regional development plans.

The argument is not that rural research should be identical with the regional economics. This scientific area deals first and foremost with application of macro-economics on a given sub-national, geographical unit. What I am in favour of is to develop a rural research agenda, which with rural set of problems – i.e. how to develop rural and peripheral areas – logs on to exogenous factors such as the knowledge economy, innovation systems, competence building, regional specializations and the like. There is simply a need for a new approach or 'a new rural policy' as it is labelled by some Americans (DRABENSTOTT, WEILER and NOVACK, 2004, pp. 97-104) or 'a new rural paradigm' as it is called by the OECD (OECD, 2006). A more precise term, but perhaps not that comprehensible in a broader audience, has been phrased by professor Christopher Ray, Newcastle, calling for a 'neo-endogenous' approach (RAY, 2006). The core of all three labels is to claim a need for a closer interlinkage between rural and urban economy and to see rural development in a close interplay with regional development in general. The content of this approach will be presented below taking departure in developments in OECD as such and in its member countries.

The empirical case will have Denmark as an example. This small country, only 43,000 km<sup>2</sup> and 5.3 mill. inhabitants – i.e. the size of Niedersachsen – has a tradition of a quite homogenous geographical distribution of economic activity. However, in the recent decade regions have diversified, and population and economic activity are concentrating in a few areas. It will be shown how the general development in urban economy and globalization contributes to create increased regional inequality. It is not the intention to explain why those factors influence rural districts. The aim is to underline with Denmark as example that it is not sufficient to see rural areas as isolated regions, but to understand their developmental potentials both as a matter of own resources and strengths and as part of

their proximity to adjacent bigger towns and placement in the general regional development.

## 2 ENDOGENOUS AND EXOGENOUS DEVELOPMENT STRATEGIES

We see the endogenous development strategy in policies in many countries aiming at promoting for instance:

- Local niche products;
- Rural entrepreneurs;
- Rural, social capital;
- Local innovators, 'Feuergeist';
- Multi-functional farming.

This approach corresponds very well with the philosophy in both national and EU's rural policy and Leader-programme.

A communication from the Commission says about general objectives:

*'Drawing on the specific resources of rural areas as part of a development strategy which is relevant and tailored to the local circumstances seems increasingly to be the only way of adapting them to an ever-changing socio-economic context.....'*

*The aim of Leader+ is thus to encourage rural actors to think about the longer-term potential of their area. The local actors implement the original strategy that they themselves have designed, experimenting with new ways of:*

- Enhancing natural and cultural heritage;
- Reinforcing the economic environment in order to create jobs;
- Improving the organisational capabilities of their community.'

(EU COMMISSION, 2000).

Furthermore, the lessons learnt from the first Leader initiatives in the 1990s are that the so-called Leader method bears some strengths:

*'The mobilising of local actors to take control of the future of their area; decentralised, integrated and bottom-up approach to territorial development; the exchange and transfer of experience through the creation of networks; the ability to include small-scale projects and support small-scale promoters.'* (EU COMMISSION, 2000).

It will be fair to underline that the Commission is fully aware of the external threats:

*'Changes in the agricultural sector as a result of the reform of the Common Agricultural Policy (CAP) and the increasing demands of consumers, environmental pressure, the rapid spread of new technology, the ageing population and rural*

*depopulation are all factors affecting the countryside today'* (EU COMMISSION, 2000).

Even more subsidization will not turn the tide with depopulation in rural areas and continued concentration of economic activities in bigger towns and metropolises. The growing inequality between rural and urban regions is a result of the globalization process and the knowledge economy. In this process, one of the characteristic features has been that national borders have not been able to stem the tide. Especially in Western Europe, national policies have aimed at securing a degree of homogenous development. However, all countries, also outside Europe, have experienced growing differences between regions, increased specialization, and concentration of settlement, employment, and activities around bigger towns.

Through the Growth Project, the OECD has spearheaded quite a number of cross-country studies in order to analyse why some nations and regions have performed and developed much stronger than others. The conclusion is that five distinctive growth factors may be identified in prosperous regions:

- Macroeconomic stability and openness;
- Human resources;
- Entrepreneurship;
- Innovation;
- Information and communication technology (ICT) (OECD, 2001).

In a speech on 'Globalising Cities and Regions – Rethinking the Urban and Regional Policy Agenda' held on 22 January 2007, OECD Secretary-General ANGEL GURRÍA has phrased it this way:

*'Regional development must be about wealth creation, and upgrading regional assets, not just a redistribution policy. It is about building place-based assets and potential that will attract business investment and strengthen local firms already in the region. Where once we focussed on national systems of innovation, now we must focus on regional systems of innovation as well. This doesn't mean a narrow approach based on so-called high-tech sectors. It means focusing on innovation in all sectors and spheres of activity. Tourism, crafts and food can all be successful activities which generate regional wealth. And they can all be innovative, state of the art. To achieve regional innovation it is important to improve physical infrastructure, education and healthcare, the environment for start-ups and growth of small and midsize businesses, the sharing and spreading of knowledge, and the availability of support services...Universities and technical institutes can help companies, especially small and midsize enterprises, solve technical, managerial or marketing problems, as well as helping to provide skilled people and access to lifelong learning. Moreover, local networks of*

*entrepreneurs and supporting service industries represent an important means of knowledge-sharing in a community.*<sup>1</sup>

To sum up, it is possible to distinguish between two different development policies which both take their point of departure in a *sectoral* thinking, namely traditional development economics with emphasis on growth stimulation through macro economic initiatives, and an endogenous approach focusing on the possibilities of single sectors to develop from within.

Another possibility is to base development on a *territorial* thinking. It does not mean that rural development should be equated with regional economics, which primarily deals with applying macro economics on a given sub-national, entity. In stead it is an ambition to look at regions, rural and peripheral areas from a combined territorial and endogenous angle. The territorial, endogenous policy has invoked much attention in OECD-countries, where it has been labelled 'New rural paradigm' (OECD 2006). It may be illustrated in this way (Figure 1):

**Figure 1: Models of rural and regional development**

|                   | <b>Sectoral</b>                  | <b>Territorial</b>   |
|-------------------|----------------------------------|----------------------|
| <b>Exogenous</b>  | Traditional developmental policy | Regional economics   |
| <b>Endogenous</b> | Traditional subsidization policy | 'New rural paradigm' |

Source: Author.

For regions it means that special attention is attached to regional innovation systems. For rural districts and peripheral areas it means focus on a very close relationship between the general development and policy in the region. The point of departure is to see the rural economy in its close interlinkage with and dependency of the urban economy and knowledge import from other regions. At the same time attention is focused on regional positions of strength, cross sectoral collaboration, targeted investments (Figure 2).

Specifically, it means a gradual shift from sunset-sector subsidies to a policy based on strategic investments aiming at improving the specific production assets and peculiarities in the area. Public policies and support schemes will have more focus on comparative advantages, e.g. a specific nature, cultural environment, or business specialisations and clusters. The shift from a sectoral to a territorial policy also means an attempt to integrate the different sector policies at local and regional level and integrate them with national policies. This results in a more widespread use of partnerships between public, private and voluntary sector.

<sup>1</sup> <[http://www.oecd.org/document/45/0,2340,en\\_2649\\_33735\\_37966061\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/45/0,2340,en_2649_33735_37966061_1_1_1_1,00.html)>.

**Figure 2: The new rural paradigm**

|                          | <b>'Old' policy</b>  | <b>New policy</b>  |
|--------------------------|--|--|
| <b>Objectives</b>        | Create equality<br><br>Generate income in farming<br><br>Create competitiveness in farming | Competitiveness of rural areas<br><br>Valorisation of local assets<br><br>Exploitation of unused resources                     |
| <b>Key target sector</b> | Agriculture  | Various sectors of rural economies (tourism, manufacturing, ICT and others)  |
| <b>Main tools</b>        | Subsidies  | Investments  |
| <b>Key actors</b>        | National governments<br><br>Farmers  | All levels of government (supra-national, national, regional, local)<br><br>Various local stakeholders (public, private, NGOs) |

Source: OECD, Policy Brief. Reinventing Rural Policy, October 2006.

Many western governments have partly implemented the more integrated rural policy (it should here be kept in mind that rural in the OECD definition means regions with less than 100 inhabitants per square kilometre).

- Finland has implemented a comprehensive rural development programme emphasizing regional innovation systems since the beginning of the 1990s. At the moment a strong debate takes place about a further concentration of investments in only 4-6 internationally competitive centres/regions in different parts of the country.<sup>2</sup>
- Mexico has launched a so-called 'strategy for micro-regions', where 263 marginalised areas have formed Strategic Community Centres that mount cross sectoral initiatives through a high degree of stakeholder involvement.
- In the UK, the Government joined environment, food and rural areas in one department (DEFRA, Department for Environment, Food, and Rural Affairs) in 2001 in order to tackle rural policy from a broad perspective. A central part is the formation of Local Strategic Partnerships (OECD, 2006a).

<sup>2</sup> Presentation by director Sami Kurki, Ruralia Institute, Helsinki, OECD conference on rural investments, Edinburgh, 11-12 October 2006.

- In Australia, a strong focus is on local partnerships comprised by public authorities, private sector and NGOs. All in all, 56 Area Consultative Committees have been established.<sup>3</sup>
- The Bush-administration has implemented the new rural policy. In stead of the traditional product divided subsidies for agriculture, the many schemes have been brought together in one single package. Additionally, the rural development part is emphasised with three central areas: Amenities (natural and cultural), entrepreneurship (including the role of the creative class), and third, a significant effort on bio energy.
- By the CAP reform in 2003 the EU has embarked on the same direction. There are still many agricultural subsidy programmes, but they are grouped in one single scheme. Much more profiled but with much less money a rural policy programme for the period 2007-13 has been agreed upon. It contains four pillars:
  - Restructuring and modernisation of agriculture and forestry;
  - Environment;
  - Diversification of rural economy;
  - LEADER method.

The positive stories being mentioned – according to the OECD – it should also be stressed that the new rural paradigm has not swept across all countrysides. Strong sectoral interests, difficulties in adjusting political and organisational institutions, and neglect of place-based approaches still remain a dominating policy in many countries as it is documented in the latest review of German rural policies (OECD, 2007).

### **3 REGIONAL DEVELOPMENT IN DENMARK**

A basic condition for future development is the demographic development. All forecasts predict a concentration of people in the eastern part of the country in the Copenhagen area plus in the eastern part of the peninsula Jutland around the second largest town of Aarhus and the so-called triangular area between Jutland and the island of Funen. Map 1 shows that southern, western and northern parts of the monarchy with almost centrifugal power will experience a market decrease in labour force, some areas by more than 10 per cent over the next decade. For obvious reasons this will put pressure on the tax-financed heavy welfare system in some regions.

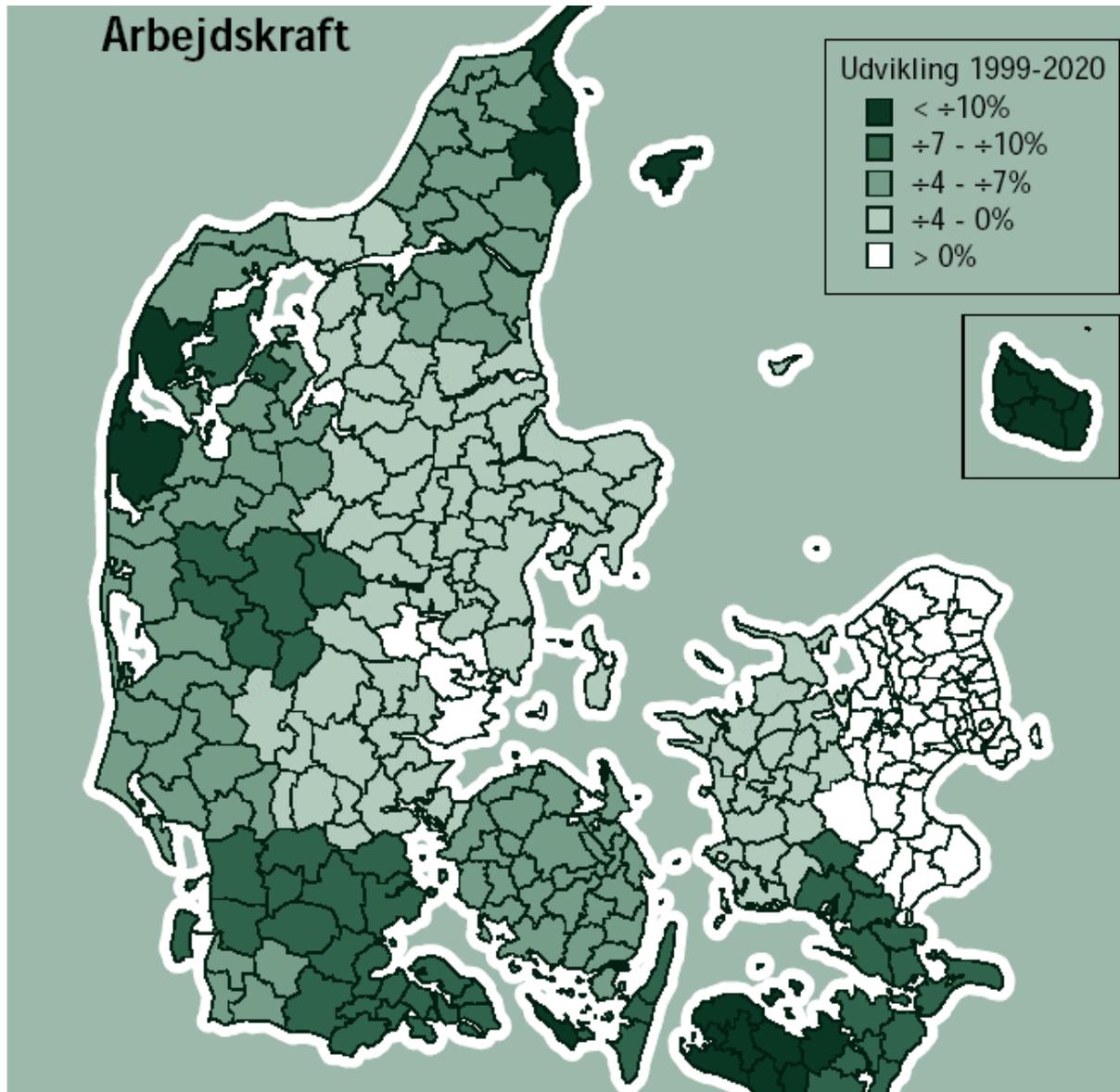
A more recent forecast paints the same picture of growing regional disparity. In the next ten years the Copenhagen metropolis will demand about 70,000 new

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<sup>3</sup> Presentation by executive director, CAROLYN McNALLY, Department of Rural Development and Transport, Australia, OECD conference on rural investments, Edinburgh, 11-12 October 2006.

fulltime employed people and the Aarhus area about 11,000. The rest of the country will lose about 37,000 fulltime workers (ARBEJDERBEVÆGELSENS ERHVERVSRÅD, 2005).

**Map 1: Forecast until 2020 of labour force (20-65 years) in Denmark**

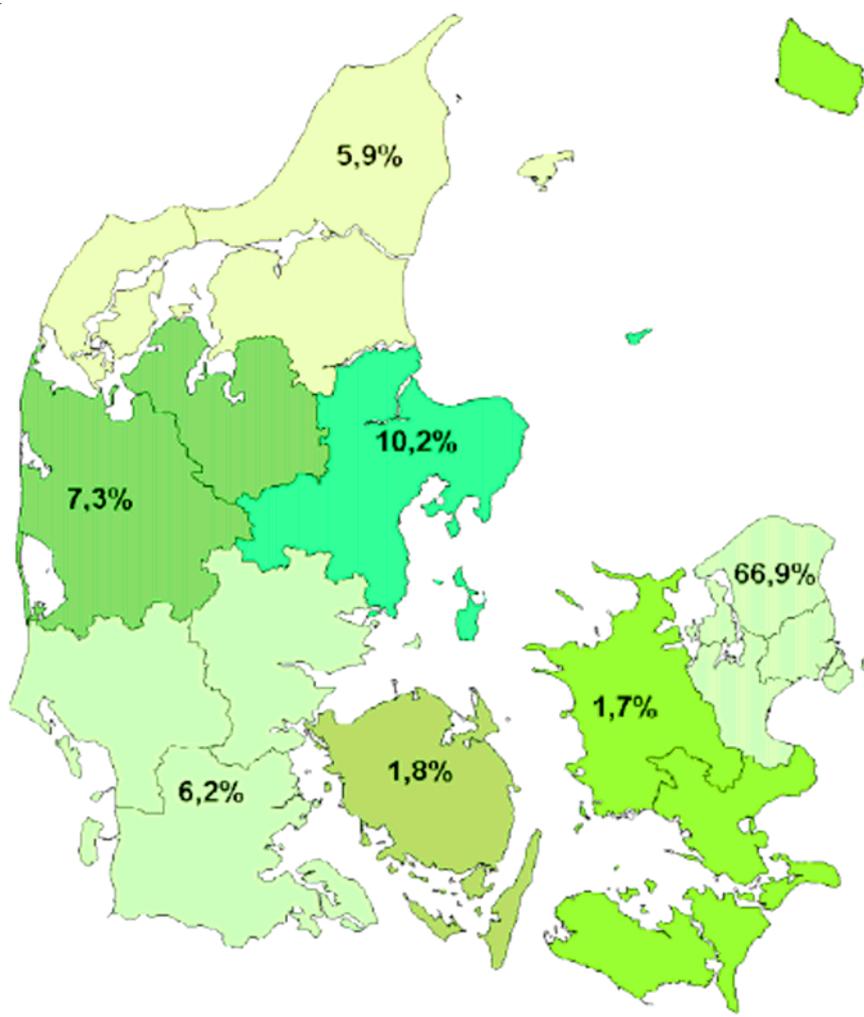


Source: ERHVERVSREDEGØRELSE JYLLAND-FYN (2000), p. 41.

The employment driver is the service sector (ICT, transport, experience economy, education, research, culture) which is especially strong in bigger towns. The knowledge economy is a driver in itself as two-third of all private and public research and development takes place in the Copenhagen area and 10 per cent in the Aarhus area (see Map 2). At the moment private R&D makes out 1.85 per cent of GDP and public research 0.75 per cent. As of 2010 it is expected that private and public spending on research and development will count for 2 and 1 per cent of GDP, respectively. This will push further in the direction of stimulating knowledge-based activities in the metropolis. The Government has launched

some programmes in order to spread public research, but related to the overall development it will only be drops in the ocean as public research is characterised by the Matthew Principle: ‘For whosoever hath, to him shall be given, and he shall have more abundance’ (MATTHEW, 13:12).<sup>4</sup>

**Map 2: Private R&D in Denmark 2003**



Source: DANSK CENTER FOR FORSKNINGSSANALYSE (2005), p. 26.

The growing regional disparity is emphasised in the latest GEM-analysis, i.e. the annual international comparison of entrepreneurship, Global Entrepreneurship Monitor. The Danish part shows how innovation and entrepreneurship has developed in the metropolis versus the provinces. The differences are substantial. The probability of establishing a new firm is 50 per cent higher for a person in Copenhagen than for a person in the provinces. The entrepreneur in the capital region will most likely be more innovative, more export oriented, more ambitious and more growth oriented:

<sup>4</sup> The Government has also introduced some special programmes aiming at stimulating rural activities, in total about 7 mill. Euros per year. It is hard to estimate the effects as a major part of funding goes to cultural activities, see THOMSEN (2007).

*'...entrepreneurship is indeed more prevalent in the metropolis than in the province. One reason is that the metropolis creates more networking, specifically with entrepreneurs, which in turn enhances the likelihood of being an entrepreneur. Furthermore, entrepreneurship in the metropolis is found to be more ambitious in terms of export and growth-expectation, and perhaps also innovation' (SCHØTT, 2006, p. 20).*

This coheres with an important background variable, namely educational level for a first-time entrepreneur. Persons with vocational qualifications and especially with long further educations have a much higher probability than others of creating a start-up company (SCHØTT, 2006, p. 39).

*'Education has four indirect effects. Higher education raises odds of being competent, risk-willing, opportunity-recognizing and networking, and each of these raises odds of being an entrepreneur' (SCHØTT, 2006, p. 55).*

As the educational level in the metropolis and in Aarhus is somewhat higher than in the rest of the country, that factor will in itself contribute to create more innovation and growth. Another dimension has been added through Richard Florida's work on the creative class (FLORIDA, 2002). He claims that competitiveness of companies will depend on their ability to attract and retain workforce with innovative skills. This is not just about higher educations, but more about innovative skills and readiness for change. In general one-third of the workforce belongs to the creative class in the western world. The geographical distribution, however, is very uneven. North American experience shows that talents stick together in towns with special qualities, often characterised by open-mindedness and tolerance.

As part of a big European project on 'Technology, Talent and Tolerance in European Cities: A Comparative Analysis', Vaarst Andersen & Mark Lorenzen have investigated if Florida's theses prove to be correct (VAARST ANDERSEN and LORENZEN, 2005). Apparently this is the case. 40 per cent of the Danish population belongs to the creative class, and it is primarily localised around Copenhagen and Aarhus. Their study shows at the same time that there is a positive and significant correlation between localisation of the creative class and the number of companies, but it does not tell about the causality: If the creative class creates the technological and economic development or if the people is attracted by certain regions because of the economic situation there and existence of 'tolerance'.

Probably, it is a dialectical relationship. Young people and the creative class are attracted by towns because of like-minded people in towns and more offers. Knowledge-based companies are localised in bigger towns because the needed labour force is there, and because labour force in that type of companies will live in big towns or in their vicinity. A consequence is that educational institutions in rural communities have difficulties in attracting students, and companies need to

merge in order to have a volume, which is sufficiently inspiring for young candidates. With almost full employment it is even more important to amalgamate.

Thus, a higher educational level, job and cultural expectations, and the growing adherence to the Matthew Principle among decision makers all point in the direction of hard times for peripheral areas. One major reason for that – and contributing to the choices made by private business and politicians – is the globalisation process that speeded up from the middle of the 1990s.

### 3.1 Globalisation and regional development

Globalisation is an external force that considerably influences conditions for rural areas and contains an immanent strengthening of urban economy and weakening of rural economy.

Part of the globalisation process is opening of food markets for exporters and abolition of export subsidies. This has called for a thorough change of the Common Agricultural Policy and hard times for many producers, for instance within sugar, beef, milk, tobacco and wine production. Even though agriculture seems to be hit in the first run, the bottom line is not necessarily negative. A substantial portion of existing subsidies has been transferred to nature and environmental purpose. Another part has been directed to rural development in general, and lastly: We will see some dynamic effects. Some farmers will change the whole production, e.g. to organic farming, or part of production either with niche products or with multi-functional agriculture, e.g. rural tourism. This value adding process will mean a bigger share of the budget landing at the primary producer.

The most important decreasing employment effect in Danish agriculture was not the reform of the CAP, but in stead significant increases in labour productivity – for a long period about 6 per cent annually (MINISTRY OF FOOD, 1998). This rationalisation has been decisive for Danish agriculture's strong position on international markets for foods, mink, malt, seed, starch, and seed.

Another perceptible consequence of globalisation is the outsourcing within traditional industry. It has been estimated that 5,000 workplaces annually move from Denmark to low salary countries.<sup>5</sup> As a whole, globalisation has evident positive benefits for Danish society, but it has also many regional consequences. Traditional jobs in the industry disappear, and these are almost always localised outside the biggest towns. In return many jobs requiring high technical, mercantile or communicative qualifications are established, but these are in general localised in the biggest towns (ARBEJDERBEVÆGELSENS ERHVERVSRÅD, 2004: 69-80).

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<sup>5</sup> Professor PETER BIRCH SØRENSEN, *Børsen*, 7 January 2005.

### 3.2 Differentiation

Empirical studies show that the challenges are rather different for rural areas. In some parishes local initiators and voluntary associations make enormous efforts to create a thriving and attracting village, but without much success measured in increasing population if the parish is located a long way from a town with growth. On the other hand, parishes without much activity experience growth if located close to a prosperous town (SØGAARD, 1997).

This is not to say that action does not matter. A recent study shows that villages in a remote area may experience quite different developmental paths. In this case both villages had an active population. One was placed at the sea with a long tradition for close contact with the outside world and hence an openness towards new impulses and a slightly different composition of population. The other one was placed in some distance from main roads and dominated by old farming traditions. The bottom line showed that the stock of social and human capital was decisive for the positive development in the first village, whereas the second one stagnated (SVENDSEN and SØRENSEN, 2007).

It shows that it is not enough to take a point of departure in a classical spatial division of rural communities, e.g.:

- A-rural areas      Close to bigger town centres;
- B-rural areas      Close to towns in peripheral areas;
- C-rural areas      Remote from towns in peripheral areas.

To get a full understanding of developmental potential, it is necessary to include a content side, which looks at degree of participation in town and service economy and the stock of human and social capital. The next step is to analyse the attractiveness and economic strength of the region in which the towns are situated.

## 4 DISCUSSION: CONSEQUENCES FOR RURAL RESEARCH

The changes brought about with the knowledge economy and globalisation call for a stronger involvement of 'place-based assets' where it is important to find and commit 'stewards of place' be it individuals, organisations or institutions like universities (REINDL, 2005).

Much rural research has not followed this move. One exception is Centre for Rural Economy, Newcastle University, headed by Professor Philip Lowe. Already in the middle of the 1990s he and his colleagues pointed at the need for examining the dividing line between an endogenous and an exogenous approach in research (LOWE, MURDOCH and WARD, 1995). The latest contribution has come from Christopher Ray from the same centre. He explicitly picks up the thread and writes about the need for developing a 'neo-endogenous rural development'-approach (RAY, 2006).

*'Generally, a synonym for endogenous would be participative. The 'neo' part, whilst not challenging the integrity of bottom-up dynamics, identifies the roles played by various manifestations of the extralocal. Actors in the politico-administrative system (through the national up to the European level) as well as in other localities are all seen as part of the extralocal environment of rural development and as potentially recruitable by localities in support of their re-generation strategies'* (RAY, 2006: 278).

This leads him to define three levels in a 'neo-endogenous' approach: An intra-territorial, i.e. internal resources in a given district; the political-administrative context; and inter-territorial relations, i.e. relations between actors and structures from both town and countryside in an area.

Ray's approach could be programmatic for much rural research. We should still analyse internal strengths, weaknesses, dynamics etc. Local initiatives are the salt that creates engagement, local pride, and joy of countryside living. But these conditions need to be seen in a closer context with exogenous political-administrative, economic, cultural and other factors influencing both town and rural areas. Together these should be synthesised in analyses of inter-territorial conditions for two reasons: Because it reflects driving forces of reality and because rural research in this way contributes to improved policy development.

A concrete example is the focus in many countries on growth drivers as innovation, entrepreneurship, human resources and ICT. However, can we conclude that growth promoters in metropolises also are drivers in the rural economy? Or do we need to develop a specific understanding of innovation processes and entrepreneurship in a rural context, for instance develop specific policies for creating networks and linkages between SMEs and knowledge institutions in towns? A first answer came from Bryden and Hall in a major international project on dynamics in rural areas (DORA). They concluded that place-based and 'soft' variables or less-tangible factors are important for creating development, among others vibrancy of civic community, cooperative behaviour, embeddedness, and external linkages (BRYDEN and HALL, 2001). A comparative OECD study from 2003 about determinants for rural development shows that eight broad groups of variables may be identified as important for business and settlement in rural areas. The most important ones are amenities (natural and man-made), infrastructure, and cultural identity (CLARK, 2003).

The question about endogenous and exogenous factors' importance for rural development cannot be settled with one or the other. There must be a mix of both if a positive spiral should get going. In general, rural areas are more than ever dependent on the overall economic situation in the broader region. That is why rural research needs a stronger focus on factors influencing rural communities and instruments to make rural areas link to the knowledge economy. Rural research must try to refine existing methodological and theoretical approaches, for instance

innovation research, and empirically the domain must to a higher degree try to analyse inter-territorial factors and be open for more comparative and non-European experience. Classical development research may also offer new insights. In this way rural research may also deliver valuable contributions to agenda setting and policy development.

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## **SUSTAINABILITY ASSESSMENT OF RURAL DEVELOPMENT: A REVIEW OF METHODOLOGIES**

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### **ABSTRACT**

From its beginnings in economics and ecological thinking, sustainability has become a planning concept that has been widely applied in rural development. Whether at the European or the state level, legislation, policy statements, and even research programmes on the future of agriculture, regional development or economic and social cohesion all increasingly refer to the need for sustainable rural development. This paper thus presents a structured review of methodologies available for assessing the sustainability of rural development. Specific recommendations regarding choice of sustainability measurement methods is not the intent of the paper. The paper does, however, recommend a pragmatic shift in the focus of sustainable rural development research away from theory development and towards more application and auditing.

**Keywords:** Assessment methods, rural development, sustainability.

### **1 INTRODUCTION**

From its beginnings in economics and ecological thinking, sustainability has become a planning concept and has been widely applied in rural development. It has been variously defined as the capacity to create, test, and maintain adaptive capabilities (HOLLING, 1973), the resilience of socio-ecological systems (CARPENTER et al., 2001) or the ability to live within the regenerative capacity of the biosphere, whilst maintaining natural capital (WACKERNAGEL et al., 2002). Sustainability can simply be described as continuing to improve human well-being, whilst not undermining the natural resource base on which future generations will have to depend.

For the past decade, sustainability has been seen as the overriding developmental consideration and regarded as an inherently dynamic, indefinite and contested concept (MOG 2004). Indeed, it can be argued that the goal of development is essentially to enable its beneficiaries to gain a more effective form of control

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over their environment. Thus, sustainable development must be seen as a never-ending process defined not by fixed goals or the specific means of achieving them, but by an approach for creating change through continuous learning and adaptation (MOG, 2004). It is currently fashionable to say that the term 'sustainable development' defies definition because it is too complex. In fact, there are rumoured to be well over 200 definitions of sustainable development in circulation (PARKIN, 2000). However, the best-known definition is perhaps the one popularised by Brundtland (WCED, 1987), which arose from increasing global concern about the plundering of resources to meet immediate needs at the expense of long-term societal development.

The expression 'rural development' is currently used in various senses in a number of public policy programmes and can be said to be a somewhat over-worked expression. Simply put, rural development is about implementing a political, economic and social project attuned to a collective vision of the future of rural regions (YVES, 2005). Whether at the European level or at that of existing or new member states, legislation, policy statements, and even research programmes on the future of agriculture, regional development or economic and social cohesion all increasingly refer to the need for rural development. This can be attributed to the vital role that rural areas play in fulfilling functions that are essential to the lifestyles of the urbanised population. Beyond the traditional productive function of rural areas, i.e., supplying agricultural, agro-food and forestry goods, goods from extractive industries and craft products, rural areas have become an environment for living and leisure. In view of this, sustainable development is paramount to maintaining its function of conserving nature and protecting natural resources.

Rural sustainability is best attained through well-planned and properly implemented initiatives that address the social, physical and economic facets of the environment in an integrated and participatory approach (SANDHAM and VAN DER WALT, 2004). This ensures that this generation's activities leave future generations with a better resource endowment than that which they inherited (YIRENKYI-BOATENG, 2001). The concept of sustainable rural development embraces both the natural and social environments. Since becoming a catchword in international policy discussions, several approaches to its assessment have been developed. According to LAWRENCE (1997), sustainability assessment is simply applying the broad principles of sustainability to ascertain whether, and to what extent, various actions might advance the cause of sustainability. The term "sustainability assessment" is used in both literature and practice in two very different manners. Firstly, it is used in the context of determining whether a community or organisation is progressing towards sustainability. Here, it serves as an auditing or performance testing system. In the second context, the term serves more as an impact assessment process in that it attempts to assess the sustainability of proposed projects, plans, policies or legislation before they are implemented (DEVUYST, 2000). In

both contexts, much effort has been made to develop approaches to sustainability assessment. These efforts have ranged from assessing change that pushes beyond an emphasis on economic signals, to a more complete treatment of both human and ecosystem well-being (HODGE, 1997).

Much of the literature and theory surrounding sustainability assessment has argued that current assessment methods often fail to involve sufficient vision and understanding of the interrelations and interdependencies of social, economic and environmental considerations. This paper thus seeks to contribute to the debate by reviewing the underlying methodologies for the existing assessment methods and presenting their potentials and limitations. As part of the review, some specific assessment methods found to be in extensive use are closely examined. In order to present a structured and focussed review, the paper relied on a review framework that allowed for most issues relevant to sustainable rural development to be covered. Specific recommendations regarding choice of a particular sustainability measurement method is not the intent of this paper. Rather, it presents basic methodologies for the assessment of sustainable rural development and describes methods most commonly identified in practice.

## **2 REVIEW FRAMEWORK**

As indicated earlier, "sustainability assessment" is used in literature and practice in two very different contexts. Firstly, it refers to checking whether a community or organisation is progressing towards sustainability, and secondly, it refers to attempts to assess the sustainability of proposed projects, plans, policies or legislation before they are implemented. There are many methods for assessing sustainability in terms of the first context, but fewer for the second (DEVUYST, 2000). This paper carries out a review of auditing or performance testing methods that helps to determine if rural communities are progressing towards sustainability. It also provides an overview of the current status of methods for assessing the sustainability of rural development. Due to the proliferation of well-established sustainability assessment methods, many such methods can be identified in practice. However, for the purposes of this paper, the identified assessment methods are grouped based on their methodological foundation.

In carrying out this review, a framework allowing for the involvement of most issues relevant to sustainable rural development was employed. For each group of assessment methods identified, issues such as the origin and status of the methodology, whether it ranged from well-established to experimental, its data requirements and its applicability to rural developmental activities such as planning, construction and operation were all covered under the review. This allowed the strengths, limitations, potential applications, data inputs, outputs and methodological problems for each group of assessment methods to be identified.

### **3 ASSESSMENT METHODOLOGIES**

Methods available for measuring the sustainability of rural development range from sets of simple socio-economic and environmental indicators to complex, holistically integrated models. A careful examination of the identified methods revealed three common methodological foundations, namely, 'environment in general', life cycle assessment, and sustainability indicator assessment.

#### **3.1 'Environment in general' methods**

Sustainability assessment methods based on environmental assessment dates back to the pre-Brundtland era, where sustainability mainly focused on environmental issues such as resource consumption, pollution and impacts on biodiversity. Across the range of rural activities, the environmental dimension of sustainable development has the greatest coverage. Based on this methodology, many sustainability assessment methods that focus on energy and material flow and address both resource use and waste arising across a wide range of rural activities have been developed. It is a methodology that prominently considers resource consumption, pollution and environmental valuation.

A careful look at 'environment in general' methods of sustainability assessment reveals rather significant limitations with respect to the range of sustainability issues they are capable of addressing. These are mostly limited to applications at the levels of policy planning and programme development (GUY and MARVIN, 1997). 'Environment in general' methods for sustainability assessment of rural development have lost their appeal due to their rather minimal coverage of sustainable rural development activities. (BERGH et al., 1997; NIJKAMP and PEPPING 1998; BIZARRO and NIJKAMP, 1997).

#### **3.2 Life cycle assessment methods**

The origin of life cycle assessment methods can be traced to Agenda 21's call for the integration of environment and other aspects of development such as social, economic and institutional issues (UNCED, 1992). This has resulted in a shift of focus in method development away from environment evaluation to life cycle assessment (LCA). LCA methods attempt to address broader sustainability issues such as environmental limits, social equity concerns and stakeholder participation, and are based on a structured methodology that can be utilized to evaluate the impact of various developments across their life cycles.

In comparison to 'environment in general' methods, LCA methods appear to address a much broader range of rural developmental activities. This is due to its focus on both social and economic issues of development. LCA methods capture social, economic and environmental issues in their assessment of the sustainability of rural development, but fail to integrate them. In spite of being based on a

well-established and standardized methodology (SAHELY et al., 2005), LCA methods still exhibit limitations with respect to the range of sustainability issues they are able to address. They are seen not to perform well with respect to social and institutional issues of development. Some major weaknesses of such methods include the complex and time-consuming nature of analysis, and its large data requirements. Nevertheless, LCA methods have contributed significantly to the sustainability assessment of rural development by widening the coverage of developmental activities and spatial scales.

### **3.3 Sustainability indicator methods**

How environmental, social and economic information is analysed, integrated and presented to decision-makers is the most critical concern of sustainability assessment. However, methods of assessment that were developed based on the 'environment in general' and LCA methodologies have all, in one way or another, failed to achieve this requirement. Thus, a third methodology seeking to achieve integration of all sustainable development issues has been developed. This methodology employs a wide range of indicators to characterise the different dimensions of sustainable development. With this methodology, the assessment of rural development sustainability is actually an assessment of indicators by which people in rural regions can track their progress towards sustainability.

Sustainability indicators are useful for monitoring and measuring the state of the environment by considering a manageable number of variables or characteristics (MCLAREN and SIMONOVIC, 1999). Several studies at the rural, urban, regional, and national levels have compiled extensive lists of sustainability indicators (FOXON et al., 2002; HELLSTRÖM et al., 2000; ALBERTI, 1996; MACLAREN, 1996). Of these indicators, assessment methods have been developed which attempt to simplify the holistic assessment of sustainable development. From a methodological standpoint, sustainability indicator methods are recognised as useful integration tools for evaluating a situation in several dimensions, as well as for testing sustainability. However, the main problem with the use of sustainability indicators is relating what the indicators measure to actual sustainability. Such indicators are not useful when considered in isolation, but rather their usefulness comes from monitoring relative changes in the state of the environment. The use of sustainability indicator methods for assessing the sustainability of rural development has had mixed results in practice and, in some cases, minimal effects on policy (LEVETT, 1998). These methods are unavoidably value-laden, and sometimes present difficulties in interpreting whether or not any progress towards sustainability is actually being made.

## **4 KEY ASSESSMENT METHODS**

As shown in literature and in practice, some sustainability assessment methods have received extensive use in rural sustainable development assessment due to their strengths, potential applications, data inputs, outputs and applicability at various spatial scales. This section of the paper takes a close look at examples of such assessment methods, namely; Community Sustainability Assessment (CSA), Material Flow Accounting (MFA), Ecological Footprinting (EF), and Integrated Assessment (IA).

### **4.1 Community sustainability assessment**

Community Sustainability Assessment (CSA) is a comprehensive checklist that anyone can complete to get a basic idea of how sustainable their community is. While CSA requires good knowledge of the lifestyles, practices and features of the community, it does not require research, calculation or detailed quantification. With CSA, more people at the rural level are able to participate in and/or learn about the sustainability assessment of their community development.

### **4.2 Material Flow Accounting (MFA)**

Material Flow Accounting (MFA) is a sustainability assessment method that aims to quantify the flow of resources, in terms of mass, within a defined geographical area and over a set period of time. It does this by means of material input, output and consumption indicators (HINTERBERGER, 2003; KRAUSMANN et al., 2004). The various indicators used in MFA differ with respect to what stage of the material life cycle they measure, and cover all levels of aggregation (micro, macro, input, output, consumption, trade). However, there are weak links between MFA indicators and environmental impacts, and this is seen as a major weakness of the MFA method of assessing rural development sustainability. Also, many of the studies into MFA have, in most cases, focused on methodological issues and the presentation of material balances to the detriment of policy-related uses of its results.

### **4.3 Ecological footprinting**

Ecological Footprinting (EF) is a land-based measure of a population's demands on natural capital, and is defined as the total area of productive land and water required to produce all the resources consumed and to assimilate all the wastes produced by a defined population, regardless of where that land is located (REES and WACKERNAGEL, 1996). As a sustainability assessment method, ecological footprint analysis (EFA) involves collecting data for a range of activities, including food, materials, waste, direct residential and commercial services energy consumption, construction and land use in order to estimate both direct and indirect

impacts on sustainable development. However, a major limitation of this method is its lack of predictive capability.

#### **4.4 Integrated assessment (IA)**

Integrated Assessment (IA) of sustainable development is an interdisciplinary process whereby knowledge from diverse scientific disciplines is combined, interpreted and communicated in such a way as to provide insights on issues of sustainability to decision makers (ROTMANS et al., 2000). This approach to sustainability assessment of rural development allows for the integration of environmental, social and economic information in a single analysis of sustainable rural development. However, this type of assessment is unavoidably value-laden, as it usually involves both qualitative and quantitative data from diverse disciplines.

## **5 CONCLUSIONS AND RECOMMENDATIONS**

The primary object of any sustainability assessment exercise is to provide the opportunity for more inclusive and informed decision-making on issues of development. Thus, the ability to address economic, social and environmental interdependencies within policies, plans, legislations and projects at the rural level has become a basic requirement of any sustainable rural development assessment methodology. When examining the development of such sustainability assessment methodologies, one sees steady progress toward achieving this requirement.

The evolution of methods that attempt to assess the impact of development across most rural spatial scales can be traced to three underlying methodologies. Most available methods fail to demonstrate sufficient understanding of the interrelations and interdependencies of social, economic and environmental considerations. Many reports on sustainable rural development assessment methods point to the absence of truly integrated assessment methods. It is thus the view of this paper that further improvement in assessment methods can only be achieved when existing methodologies are critically reviewed and further research into methodological improvement is carried out.

One major shortfall of current developments in the area of sustainability assessment of rural development is the relative lack of implementing many of the developed methods. As demonstrated in this review, much progress has been made in improving sustainable rural development assessment theories. However, a wide gap still exists between assessment theories and assessment practices (COOPER, 1997; 1999). New assessment methods remain largely experimental, with relatively few applications in practice. An ample demonstration of this is that most assessment methods currently in widespread use fail to make assessments that adequately address most issues underlying the sustainable rural development process.

To improve upon the present situation, identifying those aspects of rural development which are poorly covered by available assessment techniques is necessary. Based on the identified gaps, a cross-fertilisation of methodologies can then be employed to develop methods which will be capable of addressing most if not all rural development issues. The paper further recommends a pragmatic shift in the focus of sustainable rural development research away from theory development towards more application and auditing. Methods must quickly move beyond the experimental phase to practical application. In so doing, great steps will be made in the learning process of assessing the sustainability of rural development, and these steps will help improve both theory and practice.

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## **POST-SOVIET TRANSITION, RURAL DEVELOPMENT AND THE PEASANT PROBLEM: THE CULTURAL AND INSTITUTIONAL ECONOMIC DIMENSION**

*ERNST-AUGUST NUPPENAU\**

### **ABSTRACT**

This paper discusses transition-oriented problems stemming from the persistence and re-emergence of peasant behaviour in agrarian and post-Soviet societies. As such, it clarifies what is meant by peasant behaviour and why this behaviour is distinct from pure profit maximisation. It further suggests the theory of reciprocity as an explanatory approach. The paper illustrates how observations support the hypothesis of the emergence of peasants. Finally, a discussion on policy responses provides hints on how to cope with current problems to assure that transition does not stagnate.

**Keywords:** Household subsidiary farming, peasant behaviour, land reform.

### **1 INTRODUCTION**

Living in the 21<sup>st</sup> century does not mean that the problems regarding agriculture that were prevalent in the 19<sup>th</sup> and 20<sup>th</sup> century are now obsolete. One of these problems or issues is the question of which role peasants and peasantry play in agriculture. With respect to rural development, rural livelihood, marketed surplus, commercialisation of agriculture, industrialisation, etc., peasants have always played a special role and have confused the proponents of agrarian change (ELLIS, 2003). For some scholars, a peasant is a backward, shabby rural dweller, an impediment to development, an ignorant farmer, etc., of whom we should rid ourselves. For others, he is a land custodian, an efficient producer, a non-capitalist operator, etc., who is a committed tiller and has always been the backbone of the rural economy, thus guaranteeing ecological and economic stability, as well as food security. In the beginning of transition, there existed in many countries the idea of a rapidly developing middle-sized farmer class – let us also call it a peasantry; but the idea was now distinct from rural labourers on large enterprises. Unfortunately, this rapid expansion did not happen (as already suggested by SARRIS et al., 1999), perhaps due to the unwillingness of labouring

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‘peasants’ (rural proletariat) to become ‘real’ peasants (self-reliant, small-scale owner class). Thus, the debate on farmer behaviour, rural and cultural identity, rural organisation, etc., is back. This is not to say that the peasant is back.

Evidently, in the more eastern parts of transition countries, the phase of collectivisation, as well as the phase of large-scale collective and state-run farm operation (in Russia this ran from the late 1920s to the early 1990s; in other countries it began post-World War II) started after governments initiated the dissolution of a centuries-long prevailing agrarian institution: The peasant economy (as "labour constitution"). However, it is difficult to say whether a "western" path would have been inevitable had collective farming not occurred. The current phase of de-collectivisation and emergence of new rural structures (small-scale household subsidiary farming and partly-emerging large landholdings) should be seen in light of this historical background; there is a path dependency at work. A major hypothesis of this paper is that the current level of rural development (or lack of development) in many transition countries has to be reviewed against this background. Problems with low labour and land productivity, economically "irrational" behaviour, and strategies to minimise work loads and commitments to landlords seem to be deeply-rooted in rural cultures and impede new organisational schemes in transition countries. We thus must research "peasant behaviour" in transition to better understand rural development in the respective countries, keeping in mind that peasant behaviour has a lengthy historical background.

Based on more and more qualitative findings from rural anthropology and empirical findings from economics, it has become evident that the strategies and behaviour of rural populations suffering the severe problems of poverty and endangered livelihoods are correlated with what has been called peasant behaviour. As observed, food insecurity, poverty, and missing markets in the countryside drive the population to become less interested in exchange economies and to develop kinship or group-oriented solutions that are inward looking, resistant, subsistent, and even adversarial to outsiders. In more culturally-oriented institutional economics theories, as opposed to neoclassical economics, it makes a big difference, with respect to motivation, whether somebody labours for wages or is a free-holding farmer. Some of the older arguments on tenure, peasant farmers, freeholding, commercial small-scale farms versus big-estates as institutions and the corresponding behavioural and cultural background must be renewed and brought back into the discussion for understanding recent trends of peculiar rural developments in transition countries (positive analysis). Further, we need scenarios for better policies promoting progressive rural development and interventions (normative analysis). As has been shown (below), even in economics culture matters. This contribution has to be seen in the light of emerging questions of peasant behaviour or theories combining cultural and sociological aspects in rural development and transition studies.

In the following, the paper presents a condensed analysis of arguments from the theory of peasant behaviour, as well as theoretical suggestions from the new socio-economic theory of reciprocity as a driver of change (no change). To support the theory, a literature overview explores current discussions on the re-emerging problem of peasants (better peasant behaviour) and offers new findings, especially for rural development. We will discuss how one can gain insight into development analysis using knowledge from past and modern peasant literature. Issues such as real and perceived ownership, uncertainty of contracts, power struggles, migration strategies, urban-rural bias, and the necessity of social infrastructure are addressed. The objective here is to provide hints on what can be done to make development more viable regarding peasant behaviour.

## **2 CLARIFICATION ON THE TERM "PEASANT"**

### **2.1 Peasant behaviour definitions**

As researchers have found in many areas of Eastern Europe, when the dissolution of collective and state-run farm operations took place, portions of rural populations tended to distance themselves from labour and land markets and become self-sufficiency oriented small gardeners who prefer to work on household plots and engage in petty trade rather than become modernised individual farmers. Though many labourers still work on large holdings, they retreat more and more from official labour markets. Labour markets seem to be un-trustable and unable to achieve food security and income. So how much of this is linked to peasant behaviour? Apparently, the debate should be based on a wide range of issues regarding the peculiarities of peasants; but it is nearly impossible to reflect on even a few aspects in depth. We have to refer to given literature (ELLIS, 2003; ELLIS and SWIFT, 1988; HOWE, 1991) and extract an essential, previously made point when setting the agenda: How much does a peasant culture matter in transition (PAXSON, 2002)?

Let us start with what is meant by "peasant" and peasant institutions. Basically, the term refers to a land use system containing parts of collective decision-making (MCCLOSKEY, 1991; BEKAR and REED, 2003) and is also reckoned to be resistant to change. For those development planners who wanted to rapidly modernise agriculture, peasant behaviour was always something suspect, and as time went by, it became evident that it should undergo institutional reform towards smallholder tiller systems. This view is reiterated by history books about the past living conditions of peasants (WEBER, 1979). Hence, it is understandable that the word peasant creates negative emotions, but it creates positive ones as well. However, if one tries to lay a foundation of peasant behaviour, which is relevant for our further discussion, one finds seven building blocs of a peasant

economy and behaviour. Note that they are also divergent to conventional beliefs on farmer behaviour:

- An objective function that varies from profit and utility maximisation;
- Collective elements of decision-making;
- Collective land use and labouring, to various degrees (village, tribe, kin, family, etc.);
- Social connectivity, group-based risk mitigation, and cultural identification;
- Lower degree of individualism (though difficult to perceive for economists);
- Different mentality (paternalism, for instance);
- Recognition of nature (soil fertility, but also forest and ecosystem wealth).

This basic list can be supplemented with many other aspects. For instance, an anti-modernisation impetus, conservative attitudes, unwillingness to integrate into markets, etc.. To comprehend why peasant behaviour departs from "normal" modern farm behaviour, many researchers have probed into peasant behaviour and found explanations acceptable to economists (DE JANVRY et al., 1991). In this context, there exists Eastern European and Russian literature that explores such topics (TSCHAJANOV, 1923; GEORGESCU-ROEGEN, 1960). Some issues are:

- Inferior natural conditions;
- Preservation of natural resources and nutrient cycles;
- Local risk-mitigation strategies;
- Remoteness and high transaction cost;
- Protection against exploitation of landlords and governments;
- Limited expectations for prosperity.

So a major question is, are there "natural" conditions that impose a departure from "capitalist" behaviour, and what creates a "peasant"? The authors would answer, *Yes*, and respond that peasant behaviour is created by misery.

## **2.2 Questions regarding peasant behaviour**

We could make things easy and ask ourselves, are the abovementioned types of behaviour and issues prevalent in the rural areas of transition economies? But is that sufficient? As will be shown, rural dwellers actually cope with misery. This would imply a positive approach, as has already been initiated and conducted by others (see below). In the following sections, information is provided on positive research agendas, and we will see that there is already an illustrative form of literature arriving at the point that the 'peasant' has not disappeared.

But further clarification on the normative aspects of research is needed. Dealing with rural populations in transition, many researchers consider it self-evident that transition should contribute to a "better livelihood" for the people and is "good" for peasants. However, from the very beginning policy-makers anticipated that problems with the welfare of the rural population might occur (WEGREN, 1993). However, statements on welfare require precision. An immediate question is "who loses and who gains," (see below). This has a positive and a normative component. For instance, while describing the winners and losers, (WEGREN et al., 2002) we can find a wide spectrum of peasants. Social stratification in a peasantry can be narrow or wide, and it is necessary to clarify what stratum we are talking about (note: This also depends on ideology). The immediate question is whether peasants are the only poor people without land. In the historical context of Eastern Europe (PAXSON, 2002), land rights per se define a class. This is a particularly relevant problem in the current situation of weak rights. Nowadays a duality (actually a triad: I. very small land occupations, gardening households; II. large farm operations; and III. medium-sized peasants) prevails, where poor peasants are the majority. For the discussion of distribution, this has strong implications. Currently, we are primarily dealing with the lowest stratum of peasants. That is, the *kulaks* are missing, though any discussion of behaviour has to be made with reference to social status as it matters in agrarian societies. Status depends on the ability to command resources, that is, prominently land. However, in this respect the peasants who have emerged after de-collectivisation may be more typical of manorial systems, eventually only owning their cottage. These are not peasants exercising greater command and control, as noticeable in history, of a viable or emerging better-off peasantry (in Western Europe and the *kulaks* in Russian history). But *kulaks* are rare. Even managers and powerful people (WEGREN, 1993) seem to behave differently from peasants.

The next question is, "Do we know the aims of the peasant?" From the point of view of a research agenda, the (positive and normative) questions are inter-linked. Any analysis on the absolute and relative position of a peasant needs to delineate the aims of peasants. As will be shown (below) and as mentioned above, peasants under harsh conditions may have developed hierarchies of objectives that aim to achieve different things than a culturally-biased agricultural economist of the West may think. We have to go into an analysis of aims envisaged in whole life-cycles and of daily targets on an operational basis.

When it comes to explaining the limited involvement of peasants in labour markets, which is a prerequisite for the success of large-scale and medium-sized farm enterprises in transition countries, the question of aims, objectives and goals re-emerges. A major hypothesis is that aims such as a wish for reciprocity and a will for self-governance are not addressed by the current design of transition policies. With respect to creating institutions, the current top-down approach runs into the dangers that the addressed population is not willing to involve

themselves in ‘unfair’ institutions and that it pursues a strategy of hiding against authority (HUMPHREY, 2002). This is a well-known feature of peasants, who don’t like collaborating with governments and markets; they would prefer to stay on their own. The question is, then: What are policy recommendations?

In traditional peasant societies, a fine-tuned relationship exists between peasant communities, their representatives, the landlord and government authorities; this builds a governance structure which includes land rights and regulations (BARDHAN, 1989). In this context, some agricultural economists may have to re-appreciate that not only private rights (tenure) exist, but that, especially under harsh conditions, transition may result in some elements of common property and informal regulations.

The behaviour of peasants towards a common (meadow and field) is one of the most interesting topics in land use. Actually, some current land use practices in Russia (PAXSON, 2002) already show features of a common property management system. Because the authority of the *kolkhoz* has collapsed, people use meadows for hay and plant potatoes on grounds for which no exclusion mechanism exists. A majority of the rural population seem to live in an archaic world; but it can also be a self-regulated world.

Though the objective of a government should be to regulate land use in the interest of society, a disconnection to government authority seems to have evolved. The question at hand is how to make peasant contributions productive and efficient in the case of disconnection? Apparently, a ‘true commercialisation of agriculture’ (in the sense of Western European institutions that include rural labour markets and wage labour employment) has become wishful thinking. The basics of policies are missing. Still, the issue is, can some peasants be integrated in labour exchange and serve emerging big estates? The answer may be different rights regimes and reciprocity beyond markets.

### **3 RECIPROCITY, EXCHANGE, AND IDENTITY**

To further understand the interests of peasants and even to give provide hints on how to better design transition policies (re-opening options), in this section we refer to a more general, current debate on the fundamentals of exchange systems, common interests, and mutual behaviour between agents. The idea is to create more mutually acceptable and beneficial exchange systems. Here, we refer to KAHAN, who has recently established the logic of reciprocity (KAHAN, 2005). In light of KAHAN’s arguments and findings, a peasant might be rational in behaving as he does, i.e., not providing labour to large estates or not giving up farming on small plots to sell or lease land, but rather staying. A more fundamental misunderstanding may impede real transition.

KAHAN argues that an agent looks at reciprocity thusly: "Most persons think of themselves and want to be understood by others as cooperative and trustworthy and are thus perfectly willing to contribute their fair share to securing collective goods. By the same token, however, most individuals hate being taken advantage of. Accordingly, if they perceive that most other individuals are shirking, they hold back to avoid feeling exploited." (KAHAN, 2005, p. 341). Also, "Individuals prefer to contribute if they believe others are inclined to contribute, but to free-ride if they believe others are inclined to free-ride." (KAHAN, 2005, p. 342). Further, KAHAN (2005, p. 344) writes: "An example is the power of higher-than-average wage to elicit higher-than-average productivity in the workplace. Workers naturally suspect their firms of being unwilling to share a fair portion of the surplus generated by the workers' labour.... They respond... by voluntarily working more productively," (if they are offered a higher wage than marginal productivity) "..., which inclines the firm to maintain or even raise their wage. The result is a self-sustaining form of reciprocal cooperation that obviates the need for costly performance monitoring regimes."

In this theory, one's contribution is to be understood as a result of the contribution of the other (KAHAN, 2005, p. 345): "Moreover, some reciprocators are relatively intolerant: They bolt as soon as they observe anyone else free riding." Notably, there are many issues surrounding cooperation and reciprocity, even if equity, intention, and potential to retaliate are concerned (FALK and FISCHBACHER, 2005); especially intention plays a significant role. Humans infer intentions from rules and regulations, as well as pay-off matrices imposed on them, and they can shy away to cooperate with agencies which they consider to have the wrong intentions (FALK and FISCHBACHER, 2005, p. 206); peasants are no different.

What can be learnt from the literature on reciprocity for our problem on explaining peasant behaviour in light of transition must be seen in the assertion of others' intention and strategy in the 'game'. Especially rural people, after decades of collectivisation, which for most of them meant working in fields that produced food for urban people, should have a fine sentiment on the intentions of their counterparts. This not only refers to relationships between labourers, firm management and public authority. Even more pronounced is applying this to money lenders, banks, crediting units and machinery and tool provision companies if they want business.

In contrast to outsiders, as will be explained below, peasants prefer to work with those of a similar origin and who share common beliefs and intentions. Sometimes this phenomenon is simply portrayed as "trust". But it is also more, and one cannot simply say "trust" must be created. For instance, peasants may have developed a strong work ethic and they eventually, in terms of reciprocity, expect similar behaviour from their managing counterparts (PAXSON, 2002, p. 169). To generalise on ethics: One expects similar things from others as others expect

from you, i.e., expecting the same that (s)he expects of you. To a certain extent, this relates to equity as well. But it does not mean that pure wealth equity is a criterion. Rather, it reflects that efforts are to be put into reciprocity.

The concept of reciprocity can be supplemented with the concept of identity, closeness, and agency as has been applied in rural anthropology and manifested in culture (RANGERS, 1987, cited in LEONARD and KANEFF, 2002). This means that exchange systems in peasant economies are both a means and ends of informal social contracts of people who live under harsh natural and social conditions, and who have a history and group feeling. A consequence is that the trading of goods and the exchange of labour and land become limited to specific groups, and parallel cultures develop.

#### **4 OBSERVATIONS**

Any assessment of observations regarding success, problems and deficits of agrarian reforms in light of the above peasant question must certainly first tackle the issue of peasants' objectives. Unfortunately, objectives are mostly and merely broadly-given and not clearly-defined. For instance, title, tenure or even individualisation (MACEY, 2002) can be goals of their own, but they can also be a means of increasing productivity (WEGREN et al., 2002) or alleviating poverty (O'BRIEN et al., 1993). Hidden objectives also exist, such as keeping agricultural production under the control of the administration (AMELINA, 2002). Many officially-declared objectives, legal frameworks and property rights assignments are vague, top-down, or overruled by local reality: "A growing body of literature on property rights in the context of agrarian change in post-socialist countries suggests that under conditions similar to those in rural Russia, ownership categories neither help us to understand the local realities of property relations nor necessarily determine particular economic outcomes," (ALLINA-PISANO, 2002). Similar observations apply in countries that have distributed land and titles. In these countries, land markets as institutions seem not to function (GOGODZE et al., 2007), even though land is redistributed; objectives, as well as the legal framework of new agrarian institutions, are also unclear, with the consequence that farms are trapped in small, unproductive units.

Due to slight differences in conditions between a voucher and a land privatisation system, we firstly distinguish cases. The aim here is to refer to a more general identification of peasant strategies and to make strategies conditional. The underlying theme has been set by lacking formal reciprocity and the prevalence of informal reciprocity in communities. So there may be similarities, and the contrasting cases may help to identify them. The subject of similarities in peasant behaviour must be seen in light of reciprocity, identity and limited willingness to expose one's self to formal exchange systems in a peasant environment.

#### 4.1 Voucher privatisation and peasants

This is not the place to discuss the strengths and weaknesses of voucher privatisation, for instance in Russia, in detail. Basically, however, a voucher system means that employees and *kolkhoz* members receive a title, equivalent in value, but not identified in hectares. Indeed, no straight parcelling of land occurs. The impacts can be inferred from other publications (LERMAN, 2004; WEGREN et al., 2002). Rather, here we will provide an excerpt dealing with the question of how much this system has stabilised or contributed to peasant behaviour. Let us take the above description of peasantry and look into the contribution of Margaret PAXSON (2002) because it seems to be a representative case study. The case study was done by an anthropologist, but it also delivers much insight for an institutional economist dealing with peasant behaviour. A first introductory aspect is that money plays a different role in Russian peasant communities than suggested by neoclassical economists. As has been explained by other narratives (PAXSON, 2002, p. 160-166), money is considered necessary as a medium of exchange for commodities, especially for purchased goods like sugar, gas and electricity, etc.. However, money should not do more. There is a fear that money destroys traditions in group exchange, which is built on mutuality in labouring and gift circles. Money and cash payments cannot serve as a simple incentive scheme in peasant communities. Also, we have to note that rural economies, as have been described, never experienced a great surplus (MACEY, 2002). Thus, money may be of secondary importance, and eventually peasants feel that surplus money has to be shared through purchased goods used in celebration of community identity and for developing trust. A second interesting feature is the relationship to land (PAXSON, 2002, p. 149-155). It may be surprising that a scanty concept of private land ownership exists. There are apparently household plots that are farmed as gardens and considered private property, i.e., exclusive and protected. But these serve as a medium of basic life support, not as an asset. Indeed, these "gardens" have always been the backbone for food security. Beyond that, land seems to be considered common property. Especially the long description in the chapter by PAXSON on family and community work in open fields and meadows, partly abandoned by the *kolkhoz*, is an illustrative description of peasant living and conditions not far from a traditional "mir" and "obshchina" (village and collective farming) system. The decision-making of labour has not been completely individualised; rather, villagers follow traditional rules and the authority of the village headman plays a major role. Though land acquisition for "private farming" is prevalent, there are apparently many social, moral, and economic impediments to land acquisition. It is likely that these impediments are not fully understood. In this respect, we have to acknowledge that it is more evident that private farmers are winners (WEGREN et al., 2002), and that they expand their land holdings (PATSIORKOVSKY et al., 2005). A question is, are peasants only a phenomenon of transition and will they disappear in favour of private farmers?

From the analysis of PAXSON (2002), one gets the impression that this will not be the case: *Unless those humans currently living in the countryside are completely exchanged for a new species of dwellers* (changing mindset) a peasantry will remain. But to what extent will this happen?

As a fourth aspect, the mindset of peasants, who were previously labourers on *kolkhozes*, plays a major role. Some people would argue that from their mentality, they can only be labourers on large-scale private farms. Indeed, most of the emerging private farmers are highly-trained specialists. So one could dismiss the majority of peasants as being ignorant and say that transition can only result in large estates with low-quality labour. But is this true? It implies that there is a path dependency of inherited low-skilled labour, and managers are needed to assign labourers with tasks. A crucial question is, again, can this only be pursued on large estates? We have to acknowledge, from the peasant theory, that labour supervision imposes transaction costs or limited efforts result (BARDHAN, 1989).

A fifth aspect of peasant behaviour is given by the question of whether a hierarchical or command and control system exists in communities. It appears that in villages, collective decision-making exists, which guarantees some leadership (PAXSON, 2002, p. 166-170). This is important to know and is somehow also self-evident, especially when one looks at the historical background. In Russian peasant communities prior to 1917, the landlord and state authorities worked with indirect governance to extract rents and recruits. This brought about a countervailing internal communal structure resulting in the local leadership protecting the community against extraordinary exploitation. It did not, however, create an individual will and feeling of responsibility (PAXSON, 2002, p. 171). In contrast O'BRIEN et al., (2004, p. 485) still sees the existence of an 'entrepreneurship'.

How to explain this contradiction? Personal initiative is very much related to authority. A common statement is that the communist period (especially the time under Stalin) created an extreme reluctance to interfere with authorities. Indeed, breaking the peasants' will was even policy. Hence, a sixth aspect is the mistrust of power (PAXSON, 2002, p. 169). This is encapsulated by a quote given by Smith in 1990: "Another deterrent to radical change in Soviet agriculture is the brooding fear among peasants – a fear that the parasitic apparatus of officials and Party workers shrewdly manipulates – that free-market economies will cause thousands of state and collective farms to fail, throwing the mass of peasants into chaos and leaving them even in worse poverty than they are today (SMITH, 1990, p. 215, cited in O'BRIEN et al., 1993). So there is suspicion on the part of peasants.

Besides findings in the village, we have to appreciate the impact from the remaining large-scale farm operations and encounter its dynamics, apparently as downscaling occurs in the process of privatisation. AMELIA (2002) and

ALLINA-PISANO (2002) provide case studies in this area. Again, there are many narratives and we can only highlight some aspects that contribute to reciprocity and intention, the key issues in this paper. One main problem for new enterprises is that they depend on local government positions towards their budget (soft budgets) and the labourers know that. Soft budget constraints are typical, but: "If the government changes, newly-elected administrators may decide not to invest in preserving the redistribution scheme and instead let it collapse". Also, "... money-making opportunities make the government periodically harden the budget constraint," (AMELINA, 2002, p. 269). The question is, why do authorities act or not act, and what can be expected? As a labourer, one has to know the relationship of the manager to the authorities. Securing food provision is surely one aspect; the other is taxing and reciprocity in *oblast* power struggles.

Surely there are managerial adaptations, but these can be harmful to both labourers and managers. "In Engels raion enterprises, the managers admitted that they had too many workers, ... However, they could not foresee firings, because theft by fired workers would be even more difficult to control ..." and "The boundaries between the enterprise and the villages...continue to be ill-defined" (AMELINA, 2002, p. 282). Regarding the social relationships in a reorganising collective, ALLINA-PISANO (2002, p. 313) writes: "Both village intelligentsia and...labourers concluded that the reorganisation process itself did not provide for fundamental, equalising change it was intended to produce." Moreover, there is the inherited enterprise and household tie: "In the years following reorganisation, access to garden inputs and trading relationships grew...important..." (ALLINA-PISANO, 2002, p. 315), and "Both individual households and enterprises produce not what they might most efficiently achieve in an ideal situation, but what they need to survive in a climate of permanent scarcity and uncertainty ...members ... remain tightly bound to the slowly disintegrating carcass of Russia's agroindustrial complex" (ALLINA-PISANO, 2002, p. 318). To interpret this, there is a mentality or strategy to use resources, but reciprocity is differently reckoned.

## **4.2 Land and title distribution, parcelling and fragmentation**

We briefly switch to the other type of privatisation, namely, land distribution by parcelling and titles; this also can be taken to mean fragmentation. Below, we touch on the case of Georgia. Again, objectives of reform matter, and our focus is on the peculiarities of peasant behaviour. We must admit that parcelling is a complex story that cannot be fully appreciated by this short review. Firstly, it is noticeable that rural people have become poorer, and self-help systems have been established (DERSHEM and GZIRISHVILIE, 1998). For the objectives and process of reform, it was expected that this privatisation would quickly result in productivity and income growth; however, that did not happen. As a secondary problem, the question of functioning land markets for peasants emerged

(LERMAN, 2004). GOGODZE et al., (2007, p. 12) state in their research on Georgia's rural reform in a chapter on policy implication that, "The progress of land reform in Georgia was gradual and has not reached full coverage, mainly due to institutional complexity." Reasons given for this rank from problems in registration (GOGODZE et al., 2007, p. 13) to credit availability (GOGODZE et al., 2007, p. 14). Peasants, being less productive and efficient on their land, should eventually lease to better farmers. However, they are not willing to participate in labour markets. "First, increasing landholdings require ...labour, and above a certain threshold, family labour will not be sufficient and additional workers will have to be hired. Second, if some farmers are to give up...rural labour market will be the first choice. Without a well-functioning rural labour market, the response of farm households to the land reform will be limited," (GOGODZE et al., 2007, p. 14).

In a second paper on Georgia, the same study group emphasises the issue of required farm equipment and increased sales as part of a commercialisation strategy (KAN et al., 2006). They developed a farm-household model adapted to local conditions and investigated the relationship between output market participation, farm equipment and income. The results are not surprising; increased sales increase the propensity to buy inputs and foster commercialisation (KAN et al., 2006, p. 4). In contrast, empirical evidence is that 28% of the farms investigated in the survey did not participate in markets at all (KAN et al., 2006, p. 4), but are instead classified as subsistence farmers. A first explanation is that subsistence farmers do not participate in labour and land markets due to a lack of trust (KAN et al., 2006, p. 5).

At this point it must be mentioned that many subsistence farmers (household gardeners) in Russia do just the opposite and become commercial, i.e., lease land and engage in output sales. This happens even though no formal land distribution program, such as the one in Georgia, has been introduced (O'BRIEN et al., 2004). Some peasants who have expanded their household plots are capable of acquiring physical capital (machinery), and can be considered winners; that is, winners for Russian conditions. But the question remains, why are such a large group of Georgian farmers not willing to participate in the labour and food markets?

As a summary of the observations, one can conclude that peasants behave differently than a pure economic-rationality would imply, even in transition. In transition, the abovementioned reasons for diverging from a simple economic theory of profit and utility maximisation becomes more pronounced, and a retreat to peasant behaviour becomes the strategy of individual rationality. Especially risk and uncertainty, not only with respect to natural conditions, but also with respect to authority and mutuality in transactions (lack of reciprocity), are obstacles for more fruitful involvement by peasants in exchange systems.

## **5 CONCLUSIONS AND DISCUSSIONS ON ALTERNATIVES IN TRANSITION**

This brings the discussion back to the objectives of transition, its peculiarities, the aim of peasants, their behaviour, and institutional change. A first conclusion would be that peasant behaviour is an obstacle to farm development, at least, as envisaged mostly by governments, which includes modernisation and rapid closure of the gap with Western farming. But managing transition as pure modernisation, as it is also seen by some international consultancies, is far from the "best" strategy in the eyes of peasants. Further research is needed to address the identified peasant behaviour characteristics in transition. As opposed to the simple assigning of property rights, recommendations for more dynamic concepts of institutional and evolutionary processes have to be found. These concepts should not be purely planning concepts. Rather, they should include feedback and participation. As has been highlighted by SALETH, DINAR (2004), governing institutional amendments has to consider several layers and participation.

Regarding the request for participation of local communities, the emphasis should be on community development, because not only individually-addressed measures are needed in the reform. Governments have to risk a partial loss of power to hand over power to communities and the local informal governance structure of peasants. A second, better, conclusion is that power has to be redistributed. Although this statement relates to the objectives of reform and willingness to look for less "planned" reform paths, it does have a general feature. Its findings are that most approaches are still very much top-down, and peasants are really not willing to involve themselves. For some people it may, however, be a question of whether they should be involved at all or only left to protest. Peasants no doubt create political problems such as uprisings, self-empowerment and uncontrollable games; but the alternative is that they shy away, and development stops.

For independent researchers, especially for those who read peasant literature and keep themselves independent from the delivered success stories, there is a feeling that controlling peasants is indeed a hidden objective. For other researchers who are strongly involved in power struggles, the opposite maybe true. We must clarify the need for control. With unclear and under-determined objectives, even in the presence of control and rules of conduct, it is evident that situations may evolve which can be considered as being in a vacuum of authority. This is already envisaged as resulting in a large-scale farming system (combating theft: KOESTER, 2005) which promotes newly-emerging landowners, advisers and authorities on the one side, and leaves out the peasants, who will be trapped in subsistence, on the other side. This is already happening (ALLINA-PISANO, 2004) and it favours members of the rural elite.

In contrast, the class of potentially-emerging medium-scale farmers (from peasants and subsistence farming) will have no chance to develop. As has been said, it depends on the objectives whether more general aims in agricultural policy such as growth, productivity increases, employment aspects, etc., are a basis of reform; or else peasant farming can become conducive. If this is not the case, there will, perhaps, remain a sentiment of forgiven chances. Notably, however, forgiven chances cannot design policy. But through will and support, upgrading peasants to modernised peasants (or *kulaks*) or re-opening an evolutionary process of peasant integration is possible. Notice that historical examples do exist (WEBER, 1979) and to look at their make-up, a proactive venture is needed.

A pro-active policy is not a harmonic thing. Crucial elements of a proactive policy will be a (natural) selection of those peasants who have the potential to improve. But peasant behaviour is a mixture of relational adjustments to a harsh natural and social environment, and we have to appreciate that neither a voucher nor a simple land distribution policy will initiate the comfortable process of peasants engaging in modernisation strategies. Thus, a question: Will the process of modernisation stop with household labour as a constraint, or will communities offer a platform for hired labour to increase operation and productivity?

Access to technology is an important facet of development. As subsistence farming is known to be labour-intensive and medium-scale technologies are lacking, it is of major importance to offer technologies that suit farmers. It has been observed that parts of machineries and tools can be produced locally and improved. This especially applies to simple technologies that may be, from a Western point-of-view, outdated, but are still effective for peasants: A machine supplied with horsepower can offer opportunities to specialise. As there are records of community ownership of such machinery, a worthwhile question is, How to expand?

On a social science level, one can think communities should become self-organising with a flat hierarchy. Recent research on nature-conserving communities (MCCARTHY et al., 2001) gives hints on how to start processes of mutual responsibility that go beyond family and kinship. Cooperation is also not something based on an absolutely equal society. A major impetus may come from the stratification of "peasants". In this respect, wealth accumulation plays a role. The task will be to foster such local stratification and create a class of wealthier peasants who can escape risk-aversion. This is not the same thing as market integration; it should not be seen as imposed, top-down market development. Cooperation and reciprocity are key issues, but cannot be imposed.

First of all, a differentiated analysis on the degree of peasant resistance to cooperation is needed; that is, cooperation which is not harmful to them. In the given context of bad experiences both before and during transition, one could simply say a "pro-peasant" policy is necessary, which means abolishing any discriminating

policies and attempting to correct "wrong" cooperation, which is considered exploitative. But more elaborate policies are also needed to regain trust and reciprocity. Apparently, one could put a pro-peasant policy into a slogan. But before we do so, an emphasis should be put on the aspect of reciprocity which lies at the core. Reciprocity means that those who want peasants to become more exposed to exchange systems must give up a minimum perspective on investing, if negatively formulated. Or, if positively formulated, they should engage in activities that are in the indirect interest of peasants. These activities can be:

- Providing service for public goods in rural areas such as health, infrastructure, schools etc., though the services must be linked to community performance. Taking the duality of peasant production and large farms into account, both traders and local landowners should become engaged. Eventually, portions of gains in trade should be used exclusively to refinance services for peasants.
- Since land expansion is a major bottleneck both in pure-household-subsidary and full-land-tenure systems, schemes are needed that give investing farmers scope, but also that allow the retired to secure jobs. In the first case, entitlements to more land could be built on labour and contracts with larger farms that grant peasants ownership after a certain number of years of labour service: Thus, land for labour.
- Transparency is needed to reduce suspicion. A crucial element may be a locally-negotiable tax system. Also, authorities have to understand that taxing peasants should be moderate, transparent and include exemptions for emerging farmers: Thus, suitable taxes.
- Differentiation and stratification should be encouraged by wealth accumulation, which is conducive to peasant beliefs: Thus, animal accumulation.
- Exhibition and extension of technologies and skill acquisition of (non-moder-nised) farm equipment appropriate for peasants can be a core element of a new, yet-to-be-established extension system: Thus, local production of equipment.

A proactive peasant policy is not a self-run policy; it needs, at its core, motivated policy-makers seeing reciprocity, identity and community development.

## **6 SUMMARY**

This paper raised the topic of peasant behaviour in transition. It firstly provided a brief introduction into elements of peasant behaviour which are typical and could potentially shape the behaviour of the rural population in transition. Secondly, aspects of reciprocity and identification as a basis of cooperation and a need for accepted exchange systems were discussed from a theoretical point of view. These two aspects were supplemented with observations made in the literature on institutional deficits in transition. Two cases were presented: a) the

Russian voucher privatisation of land policy, and b) the land distribution, parceling and title policy of Georgia. Based on the literature review, major findings were that peasants do not respond as expected and maybe they are trapped in an inferior rationality, from a societal point of view, but a superior rationality from an individual and a community point of view. Emphasis was given to community-wise addressing of land and peasant behaviour issues.

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# **RURAL LAND AND LABOUR MARKETS**



## ECONOMIC IMPACTS OF LAND MARKET DEVELOPMENT: EVIDENCE FROM MOLDOVA

*DRAGOȘ CIMPOIEȘ\**

### ABSTRACT

Moldova has experienced striking changes in land tenure and land ownership since its independence. The land reform, which was practically completed in 2000, created over 1 million landowners among the rural population. The creation of independent family farms was one of the primary goals of the land reform. More than 280,000 peasant farms have been created, averaging 1.86 hectares in size. The small size of the peasant farms, whose holdings are furthermore split into 3-4 parcels, raises considerable concerns about their long-term viability and has led to an intense public debate regarding the impacts of fragmentation. In this context, land consolidation has been proclaimed as one of the major directions of the agricultural policy. Among the multiple methods of consolidation, an important place belongs to the development of land market. In this paper, the author considers the impacts of land reform on privatization and ownership structure of agricultural land and analyzes the development of land market transactions. The analysis is based on official statistical sources, data and results of several questionnaire-based surveys. The main idea of the paper – land market register a steady development, plays an important role in reducing land fragmentation and there is no necessity in other mechanisms for land consolidation.

**Keywords:** Buy-and-sell, land lease, fragmentation, consolidation, farm size, Moldova.

### 1 LAND REFORM OUTCOMES

Privatization of agricultural land and assets followed by restructuring of collective and state farms were among the primary goals of Moldova's transition to a market-oriented economy in the post-Soviet space (LERMAN et al., 1998).

The first attempts to reform the agrarian sector fall on 1992. This year can be considered as "the beginning of all transformations" as the first post-Soviet Land Code has been adopted, leading to effective privatization of land through the

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distribution of landownership certificates to more than one million individuals – one third of Moldova’s population.

Despite an early start, the process of land reform in Moldova was not visible until 1996. Authorities had no sufficient political will for restructuring of old legal entities and privatization of their land to rural residents, being a decisive factor determining managers of the former collective farms be unwilling the forthcoming changes. Therefore, during this period land reform in Moldova saw only minimum changes, agriculture not having got rid of the Soviet heritage.

In March 1998, the National Land Program (NLP) was initiated as a transition from the pilot project to the privatisation of all existent collective farms and led to a sweeping conversion of the paper certificates to physical plots, averaging less than 1.5 hectares. The share of agricultural land in state ownership dropped from 100% in 1990 to less than one-fourth in 2005. As of the end of 2005, over 670,000 holders of land shares, or about two-thirds of all beneficiaries, had withdrawn nearly 900,000 hectares of agricultural land from large-scale collectives.

**Table 1: Progress with distribution of physical land to rural population (cumulative data 1999-2005)**

|   | 1998  | 2000  | 2002  | 2004  | 2005  |
|---|-------|-------|-------|-------|-------|
| Number of people allocated physical plots against land shares, ‘000 | 241.1 | 502.7 | 617.0 | 655.8 | 677.3 |
| Total land allocated against land shares, ‘000 ha                   | 317.5 | 701.8 | 836.6 | 862.6 | 881.7 |
| Average allocated plot, ha  | 1.32  | 1.40  | 1.36  | 1.32  | 1.30  |

Source: NATIONAL BUREAU OF STATISTICS.

Each landowner who decided to exercise his rights under the NLP received on average 1.3-1.4 hectares of agricultural land. Combined with the original household plot of 0.3-0.4 hectares, the NLP distribution produced small holdings of less than 2 hectares.

The fragmentation was further exacerbated by the equity-driven design of the land privatization process in Moldova. To ensure that all peasants had equal access to land of different types, each land share was divided into three separate parts: A share of arable land, a share of orchards, and a share of vineyards. In practice, however, many landowners received more than three parcels against their land shares. In the 2003 World Bank survey of household plots, 53% of respondents had more than three parcels. In the 2003 PFAP survey of peasant farms, 55% reported 3-6 parcels and 19% reported more than 6 parcels (MURAVSCHI and BUCATCA, 2005). The inherently small holdings are further fragmented into still smaller parcels in scattered locations. Many parcels are located 3-5 or even kilometres away from the village, implying high production costs. Land fragmentation in Moldova thus has two characteristics: Exceedingly

small size of family farms and fragmentation of land ownership into multiple parcels.

Less than half the landowners who received physical plots through the NLP decided to farm their land independently (DSS, 2004a), creating the new category of independent peasant farmers that did not exist prior to reform.<sup>1</sup> The rest (57%) leased their land to operators, including so-called "leaders" or "managers", i.e., enterprising individuals who founded new corporate farms by consolidating the dispersed small plots of passive landowners. At present, these "leaders" manage about 1,500 farms – limited liability companies, joint stock companies, agricultural production cooperatives – with an average size of 500-800 hectares depending on organizational form. The new corporate farms are substantially smaller than the traditional collective and state farms, which averaged 2,000-3,000 hectares in 1990.

**Table 2: Number and average size of corporate farms 1990-2004**

|                                  | 1990            |                  | 2004            |                  |
|----------------------------------|-----------------|------------------|-----------------|------------------|
|                                  | Number of units | Average size, ha | Number of units | Average size, ha |
| <b>Traditional forms:</b>        |                 |                  |                 |                  |
| State farms                      | 432             | 1,600            | 72              | 2,200            |
| Collectives                      | 540             | 2,800            | 4               | 3,400            |
| Interfarm cooperatives           | 71              | 1,500            | 4               | 50               |
| <b>New organizational forms:</b> |                 |                  |                 |                  |
| Joint stock companies            |                 |                  | 112             | 440              |
| Agricultural cooperatives        |                 |                  | 140             | 820              |
| Limited liability companies      |                 |                  | 1,263           | 510              |
| <b>Total</b>                     | 1,043           | x                | 1,595           | x                |

Source: THE STATE CADASTRE AGENCY.

<sup>1</sup> Unfortunately, official sources give widely conflicting information on the number of peasant farms and the area of agricultural land they control. In DSS (2004b), one table (p. 120) gives 526,000 hectares in 283,200 registered peasant farms (implying an average of 1.86 hectares per farm), while Cadastral data summarized in Table 2 correspond to 700,000 hectares in 558,000 peasant farms, which implies an average farm size of 1.3 hectares.

As a result of all transformations occurred in agriculture, one positive shift should be noticed: The share of land cultivated by large-scale corporate farms declined from 90% in 1990 to 45% in 2004.

The distribution of land to the rural population led to dramatic changes in the structure of land use by farms of various organizational forms (Table 2). Particularly notable is the shrinking share of former state and collective farms and a corresponding increase in land used by the individual sector. Thus, in 1990, about 30% of the 2.5 million hectares of agricultural land in Moldova was managed by state farms and 60% by other corporate forms (collective farms and interfarm cooperatives). The individual sector (household plots at that time) cultivated less than 9%. As of 2004, the individual sector (which now consists of household plots and peasant farms) controls 40% of the agricultural land. Approximately the same land area is operated by large-scale corporate farms, mostly new organizational forms with private ownership of land and assets. These new corporate farms – agricultural production cooperatives, joint stock companies, limited liability companies – are basically corporate shareholder structures with joint cultivation of land. The traditional collective farms practically disappeared during the last decade, as many of them have been privatized or liquidated, while others registered in new legal forms. State farms still persist, but they operate in highly specialized areas that can be legitimately regarded as a public good (seed selection, livestock selection, experimental stations, agricultural education and research).

While corporate farms average 500-800 hectares, the individual farms (household plots and peasant farms) are much smaller. Thus, the average peasant farm has 1.8 hectares and only 277 peasant farms (out of some 300,000 in total) are larger than 50 hectares, compared to 342 similar farms in 2003 (DSS, 2004b). Half the agricultural land in Moldova (excluding Transnistria) is in units smaller than 10 hectares (WORLD BANK, 2005).

This category comprises over 1 million household plots and small peasant farms with average holdings of 0.8 hectares. For comparison, the average farm size in Greece is 4.4 hectares, in Italy 6.1 hectares, and in Portugal 9.3 hectares (in all other EU-15 countries the average farm size is between 17 and 70 hectares). These figures – the small average size and the huge number of small farming units in a population of less than 4 million – clearly demonstrate the extent of fragmentation produced by land reform processes in Moldova.

## **2 RATIONALE FOR LAND MARKET DEVELOPMENT**

There is a voluminous literature on the farm size effect on efficiency and productivity both in transition countries. Thus, at the outset of transition some argued the necessity of preserving large farm structures and following efforts to hamper farm fragmentation on the basis that smaller farms are less efficient

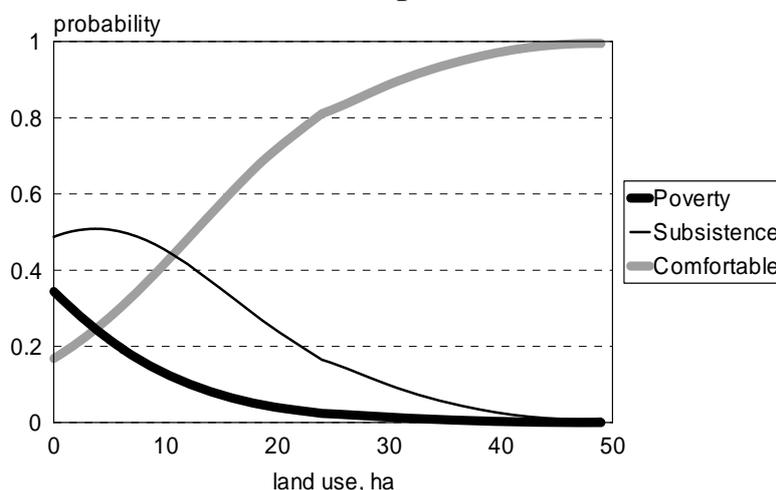
(KANCHEV and DOICHINOVA, 2000). In contrast, others argued that large farms in Eastern Europe suffered from diseconomies of size so that land reform strategies must include proposals to reduce the mean size of farms (KOESTER and STRIEWE, 1999). So far, the results are indecisive: There is no conclusive evidence that large farms are more productive and more efficient than small farms or vice versa – large farms are not inferior to small farms.

What are the criteria by which we can judge about the farm size? There has been no generally accepted measure on firm size in the economic literature to guide the choice in agricultural studies. Various measures of outputs, inputs and of incomes have been employed. However, the most commonly employed measure is the total area of land managed by farm (LUND, 1983).

What do we mean by "large or small farms"? What is the optimum average farm size for a given country? The optimality is largely an empirical issue (SWINNEN, 2006). Several studies find that there is an inverse U-function between size and efficiency (FEDER, 1985). Efficiency grows with size for the smallest farms, but beyond a certain size, typically coinciding with larger family farms, there is a declining relation between size and efficiency.

The most recent survey (2005, WB Survey) determined that size strongly affects the standard of living of rural families, where a comfortable standard of living is associated with a much larger farm size than lower standards of living.

**Figure 1: Probability of achieving a given standard of living as a function of farm size for peasant farmers**



Note: Definition of standard of living levels: "Poverty" – family income not sufficient to buy food; "subsistence" – family income just sufficient to buy food and daily necessities; "comfortable" – family income sufficient to buy food, daily necessities, and durables.

Source: 2005 WB survey.

Peasant farmers reporting a comfortable standard of living in the 2005 WB survey have 11 hectares on average, compared with less than 5 hectares for farms in the

two lower categories – poverty, when family income is not sufficient to buy food, and subsistence, when family income is sufficient to buy food and daily necessities. The standard of living of peasant farmers is thus an increasing function of farm size, as is commonly observed in farm surveys in CIS and other transition countries.

The probability of being in the highest standard of living (gray curve) increases with farm size, while the probability of being on the lowest "poverty" level, when family income is not sufficient to buy food (thick black curve), sharply decreases with farm size.<sup>2</sup> These results provide the ultimate support for land consolidation policies and hence the need to encourage land market development.

**Figure 2: Partial productivity measures versus number of parcels for household plots in Moldova**



Source: 2003 WB survey of household plots.

Common wisdom argues that consolidation of small disjointed parcels into contiguous holdings is preferred by farmers and landowners. This kind of consolidation should reduce production costs and improve net income for a farm of given size. Land consolidation that produces larger farms (keeping the number of parcels fixed) is also believed to be beneficial, as it should reduce the ratio of fixed costs per unit of land, allow more efficient use of technology, and ultimately increase productivity and efficiency. These theoretical arguments, however, are difficult to substantiate empirically and world experience does not unanimously support either position.

<sup>2</sup> The probabilities of achieving a given standard of living were obtained in a multinomial logistic regression with the three-level standard of living as the discrete dependent variable and farm size as the continuous covariate.

Some evidence that supports the advisability of reducing the number of parcels through land consolidation is provided by a 2003 World Bank survey of household plot operators in Moldova. This survey shows a clear negative relationship between productivity and the number of parcels held by the operator.

The results presented in Figure 2 clearly show that both the productivity of land (farm income per hectare) and the productivity of labor (farm income per work day) decrease as fragmentation (i.e., the number of parcels) increases. The negative relationship between productivity and fragmentation is an ultimate argument for the necessity of individual land consolidation, based on land market development.

### **3 EMERGENCE OF LAND MARKET IN MOLDOVA**

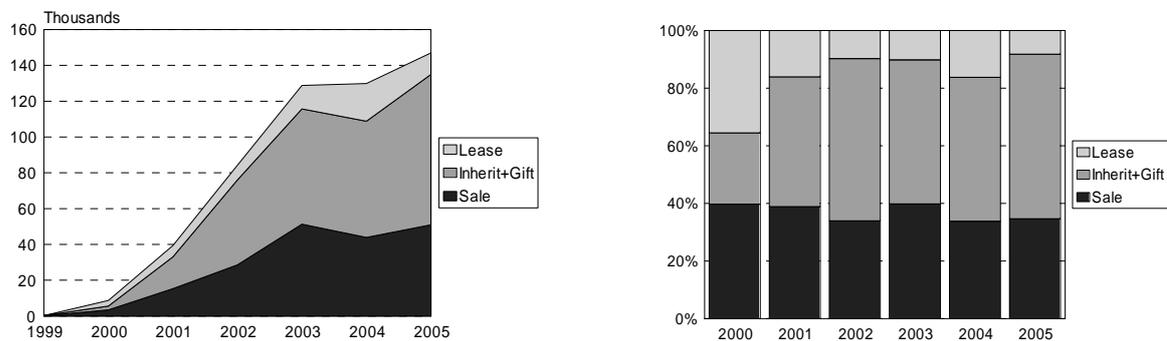
In market economies, farms are usually privately run, and private ownership of land and other farm assets is dominant in the agricultural sector. But owner and farmer are not necessarily the same person; in fact, farmers may lease or rent both land and other farm assets from natural and legal entities, or even from public institutions. With the lease and sale of the land, historically established farm boundaries may change, and farms can be expanded to reach their optimum sizes (SCHULZE, 2000).

As a result of land reform held in Moldova, almost one million hectares of agricultural land has been distributed to over 600,000 people. Among this multitude of smallholders, many of them remain inactive for different reasons (age, health, etc.). Mass distribution of small plots to individuals requires development of land market mechanisms to enable land to flow from less efficient to more efficient users, allowing farmers to adjust the size of their holdings. Land market is the only effective way to satisfy the new demand for land from the direction of those who desire to extend the size of their farms.

Land market is emerging in Moldova. The moratorium on buying and selling of land and the imposition of high normative prices for land transactions and transfer taxes was a major obstacle to the development of a viable land market in Moldova. The "Law on Normative Price of Land and Procedure for Sale and Purchase of Land", adopted in 1997 removed basic restrictions to the development of functioning land markets and this year can be considered by right as year of birth of land market in Moldova.

The number of registered transactions is a general indicator of the land market development.

**Figure 3: Number and structure of transactions in agricultural land in the Republic of Moldova**



Note: Data for 2005 are extrapolated to a full year.

Source: First Cadastre Project.

Thus, transactions in agricultural land increased from virtually zero in 1999 to about 150,000 in 2005. During the 6-year period 2000-2005, the cumulative number of transactions exceeds 550,000. Of the total number of recorded transactions, 51% are transactions involving inheritance and gifts, 36% involve buying and selling of land, and the remaining 13% are leasing transactions.

It is necessary to note that the reported share of leasing transactions is much smaller than in reality. According to recent studies, land lease is the most popular kind of land transactions, as it has important advantages with buying-selling (GUDYM et al., 2003). According to the Cadastre Agency Data, about 30% of total agricultural land is leased only by limited liability companies (the most numerous corporate legal form) and peasant farms. If to take into account the fact that many peasant farms lease land from their relatives, without concluding an official land-lease agreement, this figure might be substantially higher.

This apparent discrepancy arises because only lease contracts for a term of 3 years or longer are subject to registration in the regional cadastre office. Leases for less than 3 years are registered at the village primaria (mayorality), and no central record of these contracts exists. Local experts estimate that at least 70% of all lease contracts in Moldova are for a term shorter than 3 years and are therefore not reflected in State Cadastre records. A more detailed analysis of the place of land lease in Moldavian agriculture will be discussed in the next section.

The increasing number of transactions led to a significant increase of the transacted area (Table 3). Over 300 thousands hectares of agricultural land changed ownership during the investigated period. Taking into account that the overall area of agricultural land amount about 2 million hectares, we conclude that during such short period of time, about 19% of privately owned agricultural land changed ownership.

**Table 3: Transacted area of agricultural land (excluding leasing)**

|           | Transacted area, ha |                           |         | Percent of total |                           | Average transaction, ha |                           |       |
|-----------|---------------------|---------------------------|---------|------------------|---------------------------|-------------------------|---------------------------|-------|
|           | Sale                | Other ownership transfers | Total   | Sale             | Other ownership transfers | Sale                    | Other ownership transfers | Total |
| 1999      | 74                  | 28                        | 102     | 73               | 27                        | 0.68                    | 0.48                      | 0.57  |
| 2000      | 1879                | 1364                      | 3243    | 58               | 42                        | 0.61                    | 0.61                      | 0.61  |
| 2001      | 9,238               | 14,201                    | 23,439  | 39               | 61                        | 0.62                    | 0.74                      | 0.65  |
| 2002      | 17,599              | 28,825                    | 46,424  | 38               | 62                        | 0.63                    | 0.59                      | 0.61  |
| 2003      | 36,248              | 47,036                    | 83,284  | 44               | 56                        | 0.66                    | 0.68                      | 0.67  |
| 2004      | 53,818              | 40,421                    | 94,239  | 57               | 43                        | 1.15                    | 0.58                      | 0.73  |
| 2005      | 32,363              | 38,952                    | 71,215  | 45               | 55                        | 1.62                    | 0.89                      | 1.06  |
| 1999-2005 | 151,121             | 170,825                   | 321,946 | 47               | 53                        | 0.88                    | 0.68                      | 0.72  |

Note: Data for 2005 are extrapolated to a full year.

Source: First Cadastre Project.

According to 2004 IAMO survey and 2006 survey of farm managers, conducted by author, the development of buy-and-sell transactions dramatically changed during a very short period of time. Farm managers began to understand the importance of having land in private property. If few years ago, most of them owned several hectares of land, now the picture is changing dramatically.

**Table 4: Buying of land by farms of different legal forms**

|             | Average area bought per farm, ha | Average price / ha, lei* |
|-------------|----------------------------------|--------------------------|
| <b>2003</b> | 35.4                             | 4369                     |
| <b>2006</b> | 160.6                            | 2605                     |

Note: 1 Euro=14.5 MDL in 2003 and 16.5 MDL in 2006.

Source: Author.

During a relative short period of time they bought over one hundred hectares in average per farm. Thus, the share of own land in used land increased substantially. According to the last survey, it already reaches about 17%. It is necessary to note that CISR survey conducted in 2003 underlines that 98% of cultivated land by farms is leased land (GUDYM et al., 2003).

One of the reasons may be that land became cheaper than even before. If in 2003 one hectare of agricultural land was estimated at about 300 Euros, now it reaches only half (160 Euros).

Cadastre records show that some 150,000 hectares of agricultural land were sold and bought in 160,000 transactions between 1999 and 2005 (see table 3). The average land sale transaction was thus less than 1 hectare. The average transaction size remained fairly constant at 0.6-0.7 hectares between 1999-2003, and then increased significantly to more than 1 hectare in 2004-2005. This is the

average size of a parcel recorded as a cadastral object in the system, reflecting the original fragmentation of the land shares in the process of privatization. The increase in average transaction size between 1999-2003 and 2004-2005 may in fact reflect certain parcel consolidation trends in Moldova.

Despite these positive developments, buy-and-sell transactions constitute only one-third of all officially recorded land transactions in Moldova, and their role in land consolidation so far seems to be marginal compared to the role of the widespread leasing arrangements.

#### 4 LAND LEASE DEVELOPMENT IN MOLDOVAN AGRICULTURE

In Moldova, lease relations in agriculture most probably arose because of the small plots of agricultural land and of the incapacity of an important part of the rural population to cultivate land individually (MURAVSCHI, 2002).

At the moment, the main approach to individual land consolidation is leasing. According to the Center for Strategic Studies and Reforms (CISR), 50.6% of agricultural land owned by individuals is leased out. Therefore, the problem of the consolidation of land shares received by peasants as a result of the land reform is partly solved through leasing (GUDYM et al., 2003).

Lessees are represented by four legal entities: Joint stock companies, agricultural cooperatives, limited liability companies and peasant farms. The area leased by these enterprises constitutes over 94% of the total leased agricultural land. The major lessees are limited liability companies, as 72% of their land is leased.

A general tendency for the above-mentioned farms was a transition to larger area farming. Nevertheless, depending on the legal forms of enterprises, a specific character is outlined.

**Table 5: Structure of agricultural land depending on the legal forms of enterprises, %**

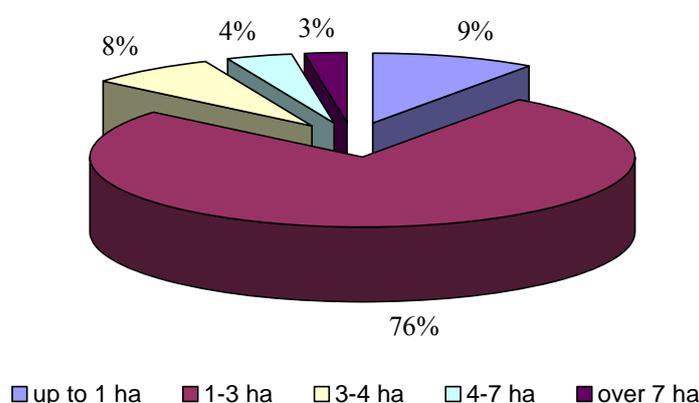
|               | Joint stock companies | Agricultural cooperatives | Limited liability companies | Peasant farms |
|---------------|-----------------------|---------------------------|-----------------------------|---------------|
| Up to 50 ha   | 0.0                   | 0.0                       | 2.5                         | 22.4          |
| 50 - 100 ha   | 0.0                   | 7.2                       | 2.0                         | 8.2           |
| 100 - 500 ha  | 33.3                  | 21.4                      | 36.0                        | 49.0          |
| 500 - 1000 ha | 33.3                  | 14.3                      | 26.0                        | 14.3          |
| Over 1000 ha  | 33.4                  | 57.1                      | 33.5                        | 6.1           |
| Total         | 100                   | 100                       | 100                         | 100           |

Source: Own calculations based on the CISR Survey, 2003.

Thus, joint stock companies and agricultural cooperatives operate only on large areas, over 100 ha. Limited liability companies and peasant farms, based on leases, cultivate both small and large areas. But even in this case, over 2/3 of the lessees prefer to cultivate plots larger than 100 ha<sup>3</sup>.

Of particular interest for investigation is the distribution of leased areas according to their size. Lease depends, to a great extent, on the plot size. Thus, plots smaller than 1 ha are farmed by their owners independently. Large plots require machinery for cultivation. Therefore, lack of machinery forces the owners of such plots to lease them out.

**Figure 4: Structure of leased-out areas based on their size**



Source: CISR Survey, 2003.

Why do managers lease in land? In the 2004 IAMO survey of 104 corporate and peasant farms in Moldova, more than 40% of respondents expressed the view that they found it more profitable and more efficient to cultivate a larger plot. Nearly 30% indicated that they preferred to lease plots adjacent to the existing farm. These two factors explain the strategy of leasing in additional land from individual landowners to augment the farm. Farm managers seem to realize that land consolidation allows them to use land more efficiently (CIMPOIEȘ and SCHULZE, 2006).

What reasons do the households give for leasing out land? The main reason is insufficiency of resources. In the 2003 CISR survey, 65% of lessors identify lack of machinery and purchased inputs as the main cause for leasing out land. Age is also one of the important reasons for leasing out one's land – this was indicated by every fourth landowner (GUDYM et al., 2003). In the 2005 WB survey, 40% of lessors put the blame on insufficient labor, while difficulties with

<sup>3</sup> As to peasant farms, the results of the survey rise a big question on their reliability. According to official statistics there are over 300.000 peasant farms and only 277 of them are larger than 50 hectares. However, there is no information on how much land they operate.

access to purchased inputs and credit (or money in general) rank next. In aggregate, reasons associated with the functioning of normal markets are cited by 78% of the households in the 2005 WB survey as responsible for their decision to lease out land.

**Table 6: Reasons to lease out land and relationship with augmentation factor for households**

|  | Percent of lessors | Grouped reasons | Percent of lessors | Desired augmentation, times land used |
|--|--------------------|-----------------|--------------------|---------------------------------------|
| Plot too far from house                  | 1                  | Physical        | 15                 | 1.0                                   |
| Plot too small                           | 3                  |                 |                    |                                       |
| Land of poor quality                     | 0                  |                 |                    |                                       |
| Farming not profitable                   | 11                 | Market          | 78                 | 4.7                                   |
| Inputs not available                     | 19                 |                 |                    |                                       |
| No money                                 | 15                 |                 |                    |                                       |
| Insufficient labor                       | 40                 |                 |                    |                                       |
| No marketing channels                    | 3                  | Institutional   | 7                  | 50.0                                  |
| Obligated to lease as member/shareholder | 7                  |                 |                    |                                       |

Source: 2005 WB survey.

It may be argued that these individuals would tend to farm the land on their own if the missing or distorted markets were corrected. This conjecture is supported by the observation that respondents who attribute leasing to market imperfections express a desire to increase their plot size by a substantially greater factor than respondents who lease out because of physical deficiencies of their land.

Health and age are important factors in the decision to lease out for pensioners and elderly people. In the 2003 CISR survey, 80% of the pensioners and 70% of landowners older than 60 cited health and age as main reasons for leasing out their land. In the 2003 PFAP survey, the highest percentage of landowners who intended to lease out their land (36%) were 60 or older (MURAVSCHI and BUCATCA, 2005).

The creation of new corporate farms by "leaders" is the most obvious manifestation of land consolidation through leasing. In this way, farms with 500-1,000 hectares of land are created by enterprising individuals who lease the dispersed and fragmented plots of hundreds and even thousands of small inactive landowners. Yet the results of various surveys in Moldova confirm that land leasing also promotes consolidation in the individual sector, where the landowner is an active farmer with an initial endowment of 2-3 hectares.

Survey results consistently show that land lease plays a huge role in land consolidation and its role with time is increasing. The share of leased land became very significant in 2006: Only 12% of land of the total agricultural land belongs

to farms. The rest of the cultivated land farms lease in from individual landowners. About half of the surveyed farms had used leased land only.

**Table 7: Average size and structure of corporate farms in Moldova according to different surveys**

|               | 1999 |      | 2003 |      | 2006 |      |
|---------------|------|------|------|------|------|------|
|               | ha   | %    | ha   | %    | ha   | %    |
| <b>Owned</b>  | 621  | 44.3 | 585  | 42.8 | 171  | 12.0 |
| <b>Leased</b> | 780  | 55.7 | 783  | 57.2 | 1250 | 88.0 |
| <b>Total</b>  | 1401 | 100  | 1368 | 100  | 1421 | 100  |

Source: 2004 IAMO Survey of farm managers, 2006 Survey of corporate farms (unpublished).

A similar picture might be observed with peasant farms. Results of World Bank surveys conducted in 1997, 2000 and 2005 show that peasant farms with leased land are, on average, much larger than farms based only on privately owned land. Markets for land leasing evolved strongly over time: Only 6% of peasant farmers reported leasing land in the 1997 survey, and this percentage increased to 28% in the 2005 survey (WORLD BANK, 2005).

Although no comprehensive official statistics on lease transactions are available to this day, the number of lease transactions recorded in the State Cadastre increased from around 3,000 to more than 21,000 between the years 2000 and 2004 (this includes only contracts for a lease term of 3 years and longer). The land lease market has definitely grown much stronger as leaders of the new corporate farms join private farmers in competing for additional land among inactive landowners.

## 5 CONSTRAINTS ON LAND TRANSACTIONS

All the surveys mentioned in this study, as well as official statistical data on sources of land used by agricultural producers reveal that farms of all types heavily rely on leased land. However, among the latest trends we denote that many of them began to purchase actively land from individuals and traditional (old) forms of corporate farms. Thus, we may conclude that although to a short history of the local land market, it has a perspective future. All the indicators show that land fragmentation is reducing, while land consolidation is increasing. In this context, an important role belongs to land transactions.

However, this does not mean that land market is developing cloudless. Although to positive trends, some negative factors are triggering land market development.

The IAMO survey explored the difficulties that managers and farmers face in their attempts to lease in land (Table 8). It is encouraging to note that nearly 30% of respondents did not report any difficulties in their lease transactions. Among those who did mention difficulties, high transaction costs ranked highest

(16% of respondents), followed by lack of cash to cover lease payments (14%), and uncertainty about land prices in the absence of functioning markets (11%).

**Table 8: Main difficulties in leasing in agricultural land**

|  | 2004 | 2006 |
|--|------|------|
| No supply  | 6.0  | 3.6  |
| Farm administration does not know who wants to lease out land      | 2.0  | 3.6  |
| Difficulties in determining the proper price                       | 11.2 | 4.3  |
| Land lease transactions are complex and are not cleared to farmers | 7.3  | 10.1 |
| High transaction costs   | 16.0 | 17.4 |
| No money   | 13.9 | 20.3 |
| Too many owners of very small parcels*                             |      | 20.3 |
| Land owners refuse to lease out their land because of low prices   | 11.9 |      |
| Other reasons  | 3.3  | 9.5  |
| No difficulties  | 28.4 | 10.9 |

Note: \* This option has not been provided by the 2004 IAMO Survey.

Source: 2004 IAMO Survey; 2006 Survey of corporate farms (unpublished).

Curiously, but 12% of farm managers complained of insufficient supply of land, and that despite the manifested tendency of small landowners to entrust their land to operators. The recent survey of farm managers, conducted by author in 2006 underlined that about 20 percent of farm managers reported excessive fragmentation (too many owners of very small parcels) as one of the biggest difficulty, followed by lack of cash to cover lease payments (20% of respondents) and high transaction costs (17%). It seems that the state of land lease relations did not take a turn for the better during this period. The number of respondents reporting no difficulties sharply dropped from 28.4% (IAMO Survey) to only 10.9%.

The situation is not better with buy-and-sell transactions. Again, about one quarter of respondents in 2004 IAMO Survey reports they do not face any problem, a striking contrast to the results of the recent survey, reporting only 2% of farms without problems in buy-and-sell transactions.

**Table 9: Main difficulties in buying agricultural land**

|  | 2004 | 2006 |
|--|------|------|
| No supply  | 16.4 | 12.1 |
| Difficulties in determining the proper price                 | 7.1  | 22.5 |
| No money   | 28.6 | 12.9 |
| Too many owners of very small parcels*                       | 0.0  | 15.3 |
| Buyers do not know the average prices on land market         | 1.5  | 4.0  |
| Land transactions are complex and are not cleared to farmers | 5.7  | 9.7  |
| Land transactions are too expensive                          | 12.9 | 18.5 |
| Other reasons  | 3.5  | 3.2  |
| No difficulties  | 24.3 | 1.8  |

Note: The 2004 IAMO Survey has not provided this option.

Source: 2004 IAMO Survey; 2006 Survey of corporate farms (unpublished).

Among those who face any difficulties, lack of money was on the top of difficulties two years ago. The last survey revealed that reluctance of landowners for selling their land seems to be the biggest problem, especially in individual land consolidation through buy-and-sell transactions. The first two difficulties correspond to this problem. Skeptical attitude of landowners towards buy-and-sell transactions is caused by very low prices on the local land market (Table 4). One of the major impediments for corporate farms is the excessive number of landowners possessing small and very small plots spread at a significant distance to each other, making very difficult to buy contiguous plots in a single field. This is one of the reasons of launching the National Land Consolidation Program.

No changes for better for excessive transaction costs. They are still high and the registration procedures are very complex. Excessively high transaction costs and complex administrative procedures constitute a serious obstacle to land consolidation through buying and selling. The costs associated with registration of transfer of ownership are estimated at 277 lei per transaction (Table 10). This figure underestimates the true transaction costs as it does not include the cost of making two trips to the district cadastre office – one trip to submit the paperwork, another trip to collect the new title, which is estimated at about 35-40 lei, raising the cost to over 300 lei per transaction. Nor does it include the cost of surveying and mapping the plot: These activities were carried out with USAID funding as part of the NLP and are free to the landowner.

Since the average sale transaction recorded in the State Cadastre is 0.9 hectares (see table 3), purchasing one hectare of agricultural land involves practically one cadastral transaction (one "parcel") and carries transaction costs of about 300 lei, equivalent to 10% of the price of land.

**Table 10: Land transaction costs according to the standard and the consolidation procedures**

|  | Standard procedure |     | Consolidated procedure |     |
|--|--------------------|-----|------------------------|-----|
|  | Lei                | %   | Lei                    | %   |
| Extract from cadastre registry             | 24                 | 9   | --                     | --  |
| Authentication of sales contract by notary | 180                | 65  | 25                     | 42  |
| State tax for authentication               | 15                 | 5   | --                     | --  |
| New record of ownership                    | 42                 | 15  | 34                     | 58  |
| Certificate of land quality                | 16                 | 6   | --                     | --  |
| Total                                      | 277                | 100 | 59                     | 100 |

Source: STATE CADASTRE AGENCY.

The main cost component is the notary fee for authentication of documents. It is charged at 180 lei per transaction and thus accounts for 65% of the total transaction costs. In theory, notary fees are charged pro rata on a sliding downward scale. However, the sliding scale starts at 1.3%, but not less than 180 lei. To reduce

transaction costs under conditions of Moldova's highly fragmented holdings, the unrealistically high minimum fee should be abolished and notary fees should be calculated pro rata.

High transaction costs in general, and high notary fees in particular, are damaging for large agricultural investors even more than for small farmers. An entrepreneur buying 120 hectares of land would have to register 200 average transactions to complete the transfer of ownership. The transaction cost would reach 60,000 lei, or 10% of the 600,000 lei paid to landowners.

An even more radical solution to the problem of high transaction costs is to charge all fees on the basis of a whole physical transaction, and not for each cadastral object ("parcel") separately. This, however, may involve considerable changes in the configuration of the cadastral objects recorded in the system and thus require additional costs for surveying and mapping. On the other hand, drastic reduction of transaction costs will adversely affect the income of the territorial cadastral offices, which by design cover their operating costs from fees and taxes. The realization of radical cost-reducing measures therefore should be considered only in the whole context of costs and benefits of land consolidation programs with proper external financing.

## **6 CONCLUSIONS AND RECOMMENDATIONS**

Land fragmentation is considered as one of the major impediments for the successful development of Moldovan agriculture. In this context, the most common approach to land consolidation in Moldova is individual or market-driven consolidation, which relies on encouraging the development of land market transactions – mainly leasing at the present stage. The prevalence of short-term lease agreements is an obstacle to land consolidation as it discourages investment by lessees in land improvement and infrastructure. Excessively high transaction costs and complex procedures are two important obstacles to the development of buy-and-sell transactions for land consolidation.

Agricultural policy therefore should encourage longer term leasing and simplify the ownership-transfer procedures. Specifically, transaction costs can be reduced by abolishing the minimum notary fee and allowing the buying and selling of multiple parcels by one person to be treated as a single consolidated transaction.

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## REGIONAL SPECIFICITY OF RURAL LABOUR ALLOCATION AND MIGRATION IN UKRAINE

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### ABSTRACT

This paper analyses the determinants of rural labour allocation and migration in Ukraine at the regional level. The Human Development Index in connection with several socio-economic variables are used to explain the reasons of total and foreign migration of rural population. Our findings suggest that such factors as life expectancy, GDP per capita, social environment, unemployment level, and housing conditions must be considered to provide sustainable development of rural population.

**Keywords:** Rural labour, migration, Human Development Index, Ukraine.

### 1 INTRODUCTION

It is well known that the human potential is a basic strategic resource and one of the main driving forces of the economic growth in any country. Among other things, the specifics of able-bodied population's allocation and migration can significantly affect the sustainable development of regions that certainly differ in patterns of socio-economic development. The Ukrainian regions make no exception in this respect reporting substantial changes in rural labour allocation and migration in the transition period.

Generally, the regional differentiation of the level of human capital development is determined by the differences in demographic tendencies, employment of population, state of labour market, educational qualification, level of financial well-being, development of social infrastructure, etc.

In this paper, we analyse the determinants of rural labour allocation and migration at the regional level using the human development index. The analysis takes into account the following questions: Which factors influence rural labour migration and allocation in the Ukrainian regions? Which measures can be consequently taken for the sustainable rural development of the Ukrainian regions?

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## 2 THE DEVELOPMENT OF HUMAN POTENTIAL AND LABOUR MIGRATION IN THE UKRAINIAN REGIONS

### 2.1 The development of human potential

Obviously, socio-economic processes in territorially and administratively coherent regions coincide with general economic tendencies at the national level taking some specific regional features. In the last 15 years, the socio-economic development in the Ukrainian regions can be divided into two basic stages: The period of protracted economic crisis (1991-2000) and the period of economic recovery (from 2001 till present time). Each of these stages is characterised by specific aspects, tendencies and prevailing problems in socio-economic development of regions (VARNALIY, 2005). Our focus is mostly on the second stage here.

Despite the economic recovery stage in Ukraine, the development of regional human potential is still hampered by the difficult situation at the labour market and high level of unemployment, depopulation, low availability and insufficient quality of social services, decline in quality of education, etc. The combination and degree of sharpness of these problems differ both between regions and in every region between cities and rural territories.

*Labour market.* Even though the average official level of unemployment in Ukraine (7.9 % of able-bodied population in 2005) is lower than in some developed EU countries, there is, however, an evidence of poor social support of an unemployed population. Additionally, significant differences in unemployment rates between regions occur ranging from 5 % in the West to 0.7 % in the East. Official statistics also show that unemployment levels are more stable in industrially developed eastern regions while these tend to decrease in agriculturally specialised western regions (STATE STATISTICS COMMITTEE OF UKRAINE – DERZHKOMSTAT, 2005).

The average level of profits and personal consumption among rural population remains low. In spite of substantial increase in real wages (about 25 % in 2006 compared to 2005) and high rate of wages growth in agriculture and related sectors (129 % in 2006 compared to 2005; DERZHKOMSTAT, 2006), the consequences of this improvement can hardly be observed in rural territories. As reported by the Ministry of Labour and Social Policy of Ukraine, the lowest real wages are in fisheries, agriculture and related sectors, and health and social services (MLSP, 2006) that can also result in increase of the regional development differences. Regarding social services in the rural territories an important aspect is low and lowering state support of the development of social infrastructure including poor financing of rural developers crediting, arrangement of ambulance services and provision of rural territories with gas. On account of this, more and more migration from villages to cities is being observed.

*Education.* Another driving force of urbanisation is education. In Ukraine, population with completed higher education increased in the transition period. The number of urban population with higher education per 1000 inhabitants has risen by 30.7 %, and rural population – by 68.8 % in 2001 compared to 1989. Such development is the result of increased opportunities for population to enter higher educational institutions. One of the possible explanations of this phenomenon is that universities have increased their enrolment numbers in order to survive in the newly established market conditions.

*Social environment.* Regarding social environment in Ukraine, its overall level has essentially reduced over the last decade. Population's psychotropic addictions are strongly exemplified in regions where other types of social problems (criminality, suicides, diminishing of life-span and depopulation) are spread. In this context, eastern regions prevail showing also a high level of poverty and low level of education compared to other regions.

*Health protection.* Nowadays qualified medical services are mostly available in the private sector of the national economy. However, due to high prices this type of medical care is usually inaccessible for the majority of population. Adequate medical care in the state sector is often hard to get because of outdated infrastructure. These tendencies are common for all regions of the country.

*Terms of population dwelling.* Though the living conditions remain low in rural areas, today the level of housing corresponds to the number of population that lives in rural areas. The main reasons for this are the demographic situation and low housing costs compared to cities.

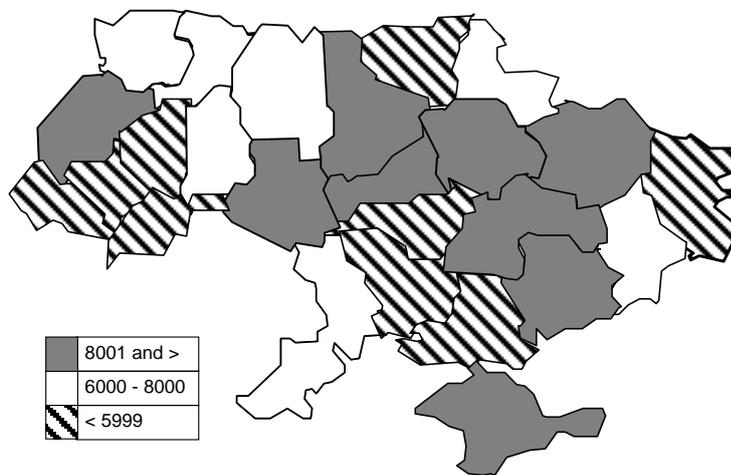
*Population.* Alongside with the above developments, a substantial reduction of the population has occurred over the last decade. Between the Soviet census of 1989 and the Ukrainian census of 2001, Ukraine's population declined from 51,271,996 to 48,077,020, with the loss of 3,194,976 people or 6.23% of the 1989 population. However, this loss has been quite unequal by regional aspect. West-Ukrainian regions show slight average depopulation levels whereas the population of eastern regions has dramatically decreased. Additionally, there is an evidence of increase in population by some basis points in several western regions. An overall pattern of population change from 1989 to 2001 is as follows: Substantial growth in the capital – the city of Kyiv; slight decline in western Ukraine; significant decline in eastern, central and southern regions; and catastrophic decline in Crimea.

## **2.2 Internal and foreign labour migration**

In the context of low salaries and high unemployment within Ukraine, labour migration became a mass phenomenon at the end of the 1990's. The newfound openness of borders has created opportunities for Ukrainians to improve their life quality through labour migration. The adoption of the "Law on Entry and Exit" (1994),

alongside with the "Law on Employment of Population" safeguarded the right of Ukrainian citizens to move to and work in areas that correspond to their preferences.

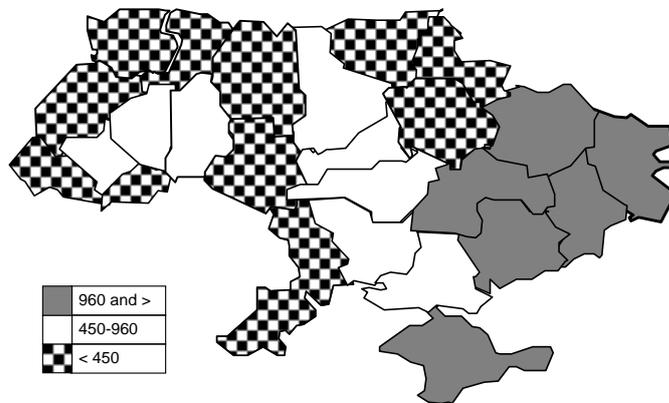
**Map 1: Total migration of rural population, 2006**



Source: Author's calculations based on data of DERZHKOMSTAT.

The evidence suggests that rural areas, or impoverished urban regions, are sending migrants to urban areas and big cities. Eastern oblasts of Kharkiv and Dnipropetrovsk, and the cities of Kyiv and Sevastopol (Crimea) envisage the largest inflows of internal migrants capturing more than 80 % of those. These regions are large urbanised areas (more than 75 % of population live in towns and cities). On the contrary, eastern Donetsk and Luhansk oblasts with about 90 % of urban population exhibit large outmigration. The main reason for this is the worsening of living conditions caused by the closure of mines in these industrialised regions. In fact, Luhansk is one of the most depopulated oblasts. About 40 % and more of population live in rural areas of Kirovohrad (Centre), Kherson (South), Chernihiv (North) oblasts, and western regions of Ukraine (Ternopil, Vinnytsya, Rivne, Khmelnytskyi and Zhytomyr). These areas represent two thirds of the internal migration.

Regarding foreign migration, Ukraine is the major source of migrants to many of the European Union Member States. During the 1990's and early 2000's, Ukraine's sputtering economy and political instability contributed to rising emigration, especially to neighbouring Poland and Hungary, but also to other States such as Portugal, Turkey, Israel, Russia and Canada. Although available estimates vary, approximately two to five million Ukrainian citizens are currently working abroad, most of them illegally, in construction, service, housekeeping, and agriculture industries (MALYNOVSKA, 2004).

**Map 2: Foreign migration of rural population, 2006**

Source: Author's calculations based on data of DERZHKOMSTAT.

Official accounts of migration – that usually underestimate the real magnitude of this phenomenon – indicate that, on average, more than 140 thousand Ukrainians left the country each year between 1995 and 2001. In 2002 and 2003, the out-migration slowed down significantly to 34 and 24 thousand people, respectively. In 2005, the number of outmigration accounted for about 20 thousand (DERZHKOMSTAT, 2005). Ukrainian embassies report that 300,000 Ukrainian citizens are working in Poland, 200,000 in Italy, approximately 200,000 in the Czech Republic, 150,000 in Portugal, 100,000 in Spain, 35,000 in Turkey, and 20,000 in the US. The largest numbers of Ukrainian workers abroad, about one million, are in the Russian Federation. Since 1992, 232,072 people born in Ukraine have immigrated to the US. In the age-related context, migrants at the age of 40 or above tend to migrate to the Russian Federation and other CIS states, while younger migrants move to Europe and other Western countries. The oblasts of Chernihiv (North), Rivne and Volyn (West) are the ones that send most migrants abroad relative to their populations, whereas oblasts like Zakarpattya (West) and Luhansk (East) have more than 28 % of the total amount of official migrants (DERZHKOMSTAT, 2005).

The impact of emigrants on local economies is most frequently assessed by the indicator of the volume of immigration as a proportion of the native population. On account of this, Portugal and Czech Republic have the highest rate of Ukrainian emigrants as a proportion of the native population.

Another economic result of foreign migration processes is the cash inflows into the Ukrainian economy through remittances from Ukrainians abroad. They annually account for about \$4-\$6 billion. This income is predominantly used for family consumption, housing, and children education. Considerably less amounts

of this money are invested in small family businesses, mainly because Ukraine has few economic incentives for such enterprises.

One more important aspect in labour allocation is the shift that has occurred between the public and the private sectors. In the period from 1999 to 2005 private employment has doubled, while public employment and, especially, collective employment has fallen. On the other hand, state owned organisations, entities and institutions remain the single largest source of employment, still absorbing 47 % of all employment. Collective enterprises (mostly agricultural enterprises in rural areas) account for 10 %, while only one of five workers is employed in a private company.

Generally, internal and external migration patterns suggest a strong correlation between poverty and allocation of labour resources. In this case, migration serves as household risk management behaviour since it provides alternative sources of income. Thus, the difference in migration indicators is associated with differences in labour markets opportunities that determine the level of earnings. Even so, possible "loading" of better income groups does not necessarily reflect the incidence of migration. In fact, some specific surveys on migration indicate that while those in rural areas are more likely to migrate, a large part of migrants is involved in seasonal migration on construction, and some in agriculture and other works and services (LIBANOVA and POZNYAK, 2002).

We further discuss the determinants of rural labour migration in Ukraine. Additionally, we make suggestions about what can be done to deal better with rural labour allocation and migration in Ukraine.

### **3 METHODOLOGY AND DATA**

Human potential forms the social terms of the realisation of economic interests at the regional level. One of the most important factors in the analysis of the determinants of regional economic interests' formation is the standard of living which predetermines a certain level of human potential. Obviously, achievement of high population's standard of living is the primary purpose of economic development in a region. On account of this, the standard of living has a substantial impact on both, formation and realisation of human potential and, consequently, of economic interests in a region. Undoubtedly, corresponding living standards strongly correlate with average life expectancy as well as with level of education.

#### **3.1 Methodology**

The integral measure of the state of human capital is the human development index (HDI) developed by the United Nations. The HDI takes into account such

factors of human capital development as demography, labour market conditions, social support, environmental conditions, educational quality, dwelling, etc.

As defined by the United Nations Development Program, the HDI is a summary measure of human development. It provides measures of the average achievements in three basic dimensions of human development (UNDP, 2006):

- A long and healthy life.
- Knowledge.
- A decent standard of living.

Corresponding weights are put on variables representing each of dimensions.

Before the HDI itself is calculated, an index needs to be created for each of these dimensions. To calculate these dimension indices minimum and maximum values (goalposts) are chosen for each underlying indicator.

Performance in each dimension is expressed as a value between 0 and 1 by applying the following general formula:

Dimension index = (actual value – minimum value) / (maximum value – minimum value). The HDI is then calculated as a simple average of the dimension indices (UNDP, 2006).

In general to transform a raw variable, say  $x$ , into a unit-free index between 0 and 1 (which allows different indices to be added together), the following formula is used:  $x$ -index =  $\frac{x - \min(x)}{\max(x) - \min(x)}$

where  $\max(x)$  and  $\min(x)$  are the lowest and highest values the variable  $x$  can attain, respectively.

The Human Development Index (HDI) then represents the average of the following three general indices:

- Life Expectancy Index =  $\frac{LE - 25}{85 - 25}$ ;
- Education Index =  $\frac{2}{3}xALI + \frac{1}{3}xGEI$ ;
- Adult Literacy Index (ALI) =  $\frac{ALR - 0}{100 - 0}$ ;
- Gross Enrollment Ratio (GER) =  $\frac{CGER - 0}{100 - 0}$ ;
- GDP Index =  $\frac{\log(GDPpc) - \log(100)}{\log(46000) - \log(100)}$ ,

where LE denotes life expectancy; ALR – adult literacy rate; CGER – combined gross enrollment ratio; GDPpc – GDP per capita at PPP in USD.

The gross enrolment ratio (GER) or gross enrolment index (GEI) is a statistical measure used in the education sector. The GER gives a rough indication of the level of education – primary, secondary, and/or tertiary – amongst residents in a given jurisdiction. It is calculated by dividing the total number of students enrolled at each educational level (regardless of age) by the population of the age group that should be enrolled at that level at the start of the academic year.

A combined gross enrolment ratio (CGER) incorporates all three levels of education. Amongst other measures used in the calculation, the CGER is given one-third weight in assessing the knowledge component while the adult literacy rate for a given territory is assigned two-thirds weight.

At the second stage of empirical analysis we regress the indicators of total and foreign migrations on HDI-based indexes and a number of variables described below.

### **3.2 Data**

The study employed the official information of the State Statistics Committee of Ukraine – Derzhkomstat. Data on 25 regions (24 oblasts and Autonomous Republic of Crimea) of Ukraine for the year 2005 is extracted from the statistical yearbooks *Agriculture of Ukraine*, *Population of Ukraine*, and *Regional Human Development in Ukraine*. Statistical information used relates to rural population only.

To elaborate on the index of labour market, we used the data on officially registered numbers of unemployed population. Terms of population dwelling are given by the indicator of provision with dwelling according to the material well-being. The number of rural population undergoing medical treatment at hospitals represents the health protection variable. Social environment is estimated by the levels of alcohol and drug addictions as well as of psychological stability of rural population. Ecological situation is given by the ratio of actually taken measures and actually needed measures for the maintenance of ecological safety.

## **4 EMPIRICAL ANALYSIS**

The results of the calculations are given in Table 1. We employ the HDI with regard to rural labour on the regional level considering 9 exponents. These characterise the demographic development, development of labour market, financial welfare, terms of population's dwelling, health conditions and protection, educational level, social environment, financing of human development, and ecological situation.

**Table 1: The HDI-based indexes for Ukrainian regions**

| Region           | LE In-<br>dex | Edu<br>Index | GDP<br>Index | LM<br>Index | TPD  | HCaP | SE   | ES   |
|------------------|---------------|--------------|--------------|-------------|------|------|------|------|
| AR Crimea        | 0.32          | 0.95         | 0.59         | 0.14        | 0.16 | 0.22 | 0.21 | 0.65 |
| Vinnitsia        | 0.41          | 0.95         | 0.59         | 0.18        | 0.40 | 0.17 | 0.16 | 0.55 |
| Volyn'           | 0.30          | 0.92         | 0.57         | 0.25        | 0.09 | 0.15 | 0.43 | 0.63 |
| Dnipropetrovs'k  | 0.38          | 0.95         | 0.67         | 0.26        | 0.25 | 0.23 | 0.48 | 0.33 |
| Donets'k         | 0.40          | 0.96         | 0.67         | 0.04        | 0.15 | 0.24 | 0.65 | 0.28 |
| Zhytomyr         | 0.39          | 0.94         | 0.56         | 0.22        | 0.29 | 0.19 | 0.44 | 0.57 |
| Zakarpattia      | 0.25          | 0.93         | 0.56         | 0.11        | 0.13 | 0.18 | 0.22 | 0.61 |
| Zaporizhia       | 0.37          | 0.96         | 0.65         | 0.38        | 0.14 | 0.23 | 0.69 | 0.41 |
| Ivano-Frankivs'k | 0.31          | 0.93         | 0.60         | 0.48        | 0.19 | 0.18 | 0.15 | 0.55 |
| Kyiv             | 0.42          | 0.96         | 0.62         | 0.05        | 0.39 | 0.22 | 0.29 | 0.49 |
| Kirovograd       | 0.39          | 0.95         | 0.58         | 3.15        | 0.20 | 0.17 | 0.86 | 0.55 |
| Lugans'k         | 0.40          | 0.96         | 0.60         | 2.90        | 0.01 | 0.21 | 1.40 | 0.21 |
| L'viv            | 0.33          | 0.94         | 0.60         | 0.18        | 0.22 | 0.24 | 0.11 | 0.47 |
| Mykolaiv         | 0.33          | 0.95         | 0.61         | 5.29        | 0.07 | 0.19 | 0.45 | 0.56 |
| Odessa           | 0.31          | 0.94         | 0.64         | 0.15        | 0.25 | 0.19 | 0.25 | 0.51 |
| Poltava          | 0.42          | 0.96         | 0.65         | 0.23        | 0.32 | 0.16 | 0.40 | 0.76 |
| Rivne            | 0.29          | 0.91         | 0.58         | 0.73        | 0.13 | 0.17 | 0.27 | 0.43 |
| Sumy             | 0.45          | 0.96         | 0.59         | 3.00        | 0.20 | 0.20 | 0.75 | 0.51 |
| Ternopl'         | 0.37          | 0.94         | 0.54         | 0.55        | 0.18 | 0.19 | 0.26 | 0.54 |
| Kharkiv          | 0.40          | 0.96         | 0.64         | 0.14        | 0.21 | 0.22 | 0.47 | 0.43 |
| Kherson          | 0.31          | 0.95         | 0.57         | 0.35        | 0.05 | 0.18 | 0.85 | 0.43 |
| Khmel'nutskyi    | 0.43          | 0.95         | 0.57         | 0.17        | 0.30 | 0.15 | 0.40 | 0.54 |
| Cherkasy         | 0.43          | 0.95         | 0.57         | 0.34        | 0.36 | 0.17 | 0.39 | 0.55 |
| Chernivtsi       | 0.31          | 0.93         | 0.54         | 0.52        | 0.13 | 0.20 | 0.37 | 0.62 |
| Chernigiv        | 0.51          | 0.95         | 0.59         | 0.02        | 0.39 | 0.16 | 0.84 | 0.46 |

Source: Author's calculations based on data of DERZHKOMSTAT (2005).

**Table 2: Regression statistics on total and foreign migration**

| Regression statistics | Total migration | Foreign migration |
|-----------------------|-----------------|-------------------|
| Multiple R            | 0.760           | 0.807             |
| R <sup>2</sup>        | 0.576           | 0.652             |
| Fixed R <sup>2</sup>  | 0.302           | 0.478             |
| Standard error        | 139.331         | 49.374            |
| No. of observations   | 25              | 25                |

Source: Author's calculations.

Due to the results of multiple regression (Table 2), total migration is strongly correlated with the given factors. Precisely, the total migration dependence on the factors of the model is 57.6 %. F-value of 4.19 % (see Appendix 1) suggests that the model is statistically significant at 0.05 probability level. The dependence of foreign migration on considered variables is even more and accounts for 65.17 % with F-value equal to 1.18 % at 0.05 probability level.

**Table 3: Main factors of total migration**

|                    | Coefficient | Standard error | t-statistics | P-value |
|--------------------|-------------|----------------|--------------|---------|
| Y-Intercept        | -7906.090   | 4293.465       | -1.841       | 0.080   |
| LE Index           | 13802.390   | 4781.243       | 2.887        | 0.009   |
| GDP Index          | 18413.870   | 7219.579       | 2.551        | 0.019   |
| Social environment | -3099.730   | 984.685        | -3.148       | 0.005   |

Source: Author's calculations.

**Table 4: Main factors of foreign migration**

|                     | Coefficient | Standard error | t-statistics | P-value |
|---------------------|-------------|----------------|--------------|---------|
| Y-cross             | -5315.166   | 1594.118       | -3.334       | 0.003   |
| LE Index            | 4506.678    | 2304.616       | 1.956        | 0.065   |
| GDP Index           | 9505.731    | 2671.912       | 3.558        | 0.002   |
| Labour Market Index | -212.102    | 90.335         | -2.348       | 0.029   |
| Terms of PD         | -5049.808   | 1397.776       | -3.613       | 0,002   |

Source: Author's calculations.

Resulting from multifactor simulation in regression analysis (Appendix 2), the main determinants of total migration are Life Expectancy Index (LEI), GDP Index and Social Environment Index (SEI). Each of these factors has significant t-statistics (Table 3). In other words, the main reasons for migration in rural areas are the level of family income; features of social environment, e.g. the level of alcohol addiction or drug addiction of the population; and the level of sustainable living.

In the case of foreign migration, multifactor simulation (Appendix 3) reveals that the main factors are LEI, GDP Index, the ratio of employed and unemployed population, and terms of population dwelling (Table 4). As in the case with total migration, foreign migration is strongly dependent on family income and sustainability of livelihoods. Additionally, job availability and dwelling conditions influence foreign migration.

## 5 CONCLUSIONS

Recent developments in most Ukrainian regions reveal an aggravation of inadequate standards of living of rural population. As our research findings suggest, an increased attention must be paid to sustainable development of rural labour. For this, such factors are of major importance as the level of family income, social environment features, life expectancy, job availability and housing conditions. In order to improve these indicators, efforts of the policymakers must concentrate on the development of modern agricultural policy as it has always played an important social role in the Ukrainian rural areas.

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### Appendix 1: Dispersion analysis of total and foreign migration

| <b>Total migration</b>   |           |             |             |             |                 |
|--------------------------|-----------|-------------|-------------|-------------|-----------------|
|                          | <i>df</i> | <i>SS</i>   | <i>MS</i>   | <i>F</i>    | <i>Amount F</i> |
| Regression               | 9         | 42233538.34 | 4692615.371 | 2.719387547 | 0.041962852     |
| Remainder                | 16        | 31061066.22 | 1941316.639 |             |                 |
| Total                    | 25        | 73294604.56 |             |             |                 |
| <b>Foreign migration</b> |           |             |             |             |                 |
|                          | <i>df</i> | <i>SS</i>   | <i>MS</i>   | <i>F</i>    | <i>Amount F</i> |
| Regression               | 8         | 7299140.528 | 912392.566  | 3.742624607 | 0.0118448       |
| Remainder                | 16        | 3900546.432 | 243784.152  |             |                 |
| Total                    | 24        | 11199686.96 |             |             |                 |

### Appendix 2: Multifactor model simulation on total migration

|                                  | <b>Coefficient</b> | <b>Standard error</b> | <b>t-statistics</b> | <b>P-value</b> |
|----------------------------------|--------------------|-----------------------|---------------------|----------------|
| Y-Intercept                      | -54026.1489        | 37568.18855           | -1.438082351        | 0.169682751    |
| LE Index                         | 4189.044796        | 12061.85756           | 0.347296822         | 0.732894593    |
| Edu Index                        | 62550.32475        | 47323.1899            | 1.321768987         | 0.204833073    |
| GDP Index                        | 9402.767128        | 10333.44245           | 0.909935597         | 0.376360768    |
| Labour Market Index              | -175.901434        | 275.7607931           | -0.637876879        | 0.532577399    |
| Terms of PD                      | 1381.07064         | 7093.74176            | 0.194688598         | 0.848087341    |
| Health conditions and protection | -11094.96777       | 18189.85912           | -0.609953475        | 0.550457999    |
| Social environment               | -3764.34977        | 2481.065274           | -1.517231252        | 0.14871718     |
| Ecological situation             | -3692.767375       | 4208.242642           | -0.877508188        | 0.393196698    |

**Appendix 3: Multifactor model simulation on foreign migration**

|                                 | <b>Coefficient</b> | <b>Standard error</b> | <b>t-statistics</b> | <b>P-value</b> |
|---------------------------------|--------------------|-----------------------|---------------------|----------------|
| Y-Intercept                     | -11621.10014       | 13312.96534           | -0.872915977        | 0.395620798    |
| LE Index                        | 4217.78752         | 4274.33682            | 0.986770041         | 0.338443631    |
| Edu Index                       | 9438.889203        | 16769.82604           | 0.56284956          | 0.581339222    |
| GDP Index                       | 5620.462233        | 3661.841745           | 1.534873057         | 0.144351192    |
| Labour Market Index             | -189.4550087       | 97.72081173           | -1.938737566        | 0.070380222    |
| Terms of PD                     | -4962.922822       | 2513.795363           | -1.974274794        | 0.065871441    |
| Health condition and protection | 3289.029377        | 6445.904721           | 0.510251007         | 0.616842411    |
| Social environment              | -515.2201025       | 879.2102377           | -0.586003302        | 0.56604883     |
| Ecological situation            | -1243.788705       | 1491.266696           | -0.834048469        | 0.416532572    |

## INFRASTRUCTURE AS A DETERMINANT OF RURAL NON-FARM EMPLOYMENT: THE CASE OF UKRAINE

*MARIYA PORTYANKO\**

### ABSTRACT

The objective of my research is to empirically determine the role of infrastructure in Ukrainian rural non-farm employment (RNFE). Existing experience with RNFE estimation is considered and the probability of RNFE estimation for Ukraine is provided. Empirical evidence is taken from a household survey conducted in 2004. To find out what factors determine off-farm employment, a bi-variable probit model is used. The paper also considers the issue of Ukraine accession into the World Trade Organization. The problem of subsidising agricultural activities is particularly discussed.

**Keywords:** Rural non-farm employment, infrastructure, Ukraine.

### 1 INTRODUCTION

The objective of my research is to empirically determine the role of infrastructure in Ukrainian rural non-farm employment (RNFE).

The spread of RNFE is important for the sustainable development of rural areas. The key reason for this is diversifying rural employment opportunities and sources of income. This permits avoiding or lowering agricultural risks, overcoming negative shocks and increasing incomes, thereby raising the standard of living in rural areas.

As a substantial portion of the Ukrainian population lives in rural areas (more than 30 %) sustainable rural development policy is very important for Ukraine. Still, there is a sizable disparity between urban and rural areas in terms of income, quality of life, job opportunities and physical and economic infrastructure. For a long time, rural areas were associated with farm activities, while urban areas were associated with non-farm activities (REARDON, 1998). And indeed, traditionally, people who live in rural areas are engaged in farming. However, the reformation and modernisation of agriculture releases labour employed in farming. This is one of the reasons for rural unemployment.

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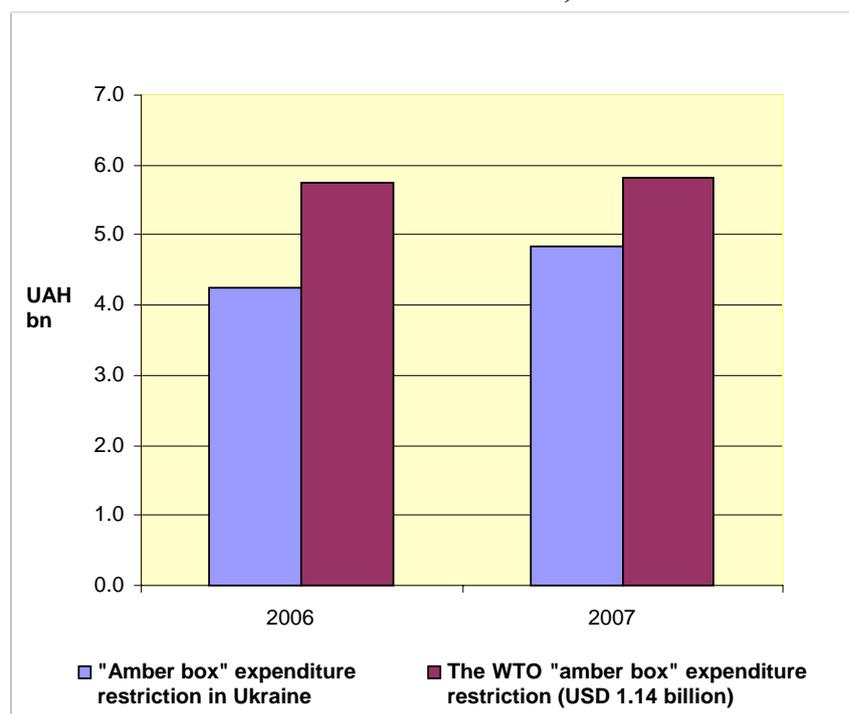
Therefore, promoting other types of employment, such as off-farm employment, is becoming more and more important. Moreover, RNFE is an important source of income in rural areas. It was found that those involved in off-farm activities usually have a higher living standard (DE JANVRY et al., 2005). Furthermore, for an efficient agricultural process, developing the agro-industrial sector is necessary. Overall, off-farm employment absorbs the excess labour supply, provides rural people with an income source, improves the quality of life and assists in efficient agricultural development. Therefore, RNFE promotion is essential for the sustainable development of rural areas in Ukraine.

Considering the importance of RNFE in Ukraine, it is useful for the government to know what factors determine off-farm participation and how they influence the probability of participation. This research can provide the government with proper information for conducting rural policies; for instance, one could expect a positive influence of infrastructure on participating in off-farm activities. Moreover, it is obvious that investing in infrastructure would be beneficial not only for the off-farm sector, but also for rural areas as a whole. The government should consider this fact in their rural policies. Indeed, instead of subsidising farms, the money could be better spent on improving infrastructure, education, training and other developmental expenditures. This would have a positive effect on both farm and off-farm activities.

RNFE is also of current importance for Ukraine in the context of WTO accession. One of the problems of the accession process is connected with agriculture: Highly subsidising agricultural activities (which is a common practice) is restricted by the WTO, as such activities are considered to be trade-distorting methods of support. Those activities belong to the so-called "amber box". Thus, subsidising farms is considered to be a part of the "amber box".

As can be seen in Figure 1, "amber box" expenditures are increasing and are also approaching the WTO restriction.

**Figure 1: Budget financing and the WTO "amber box" expenditure restriction in Ukraine, 2006 and 2007**



Source: Author's calculation based on the law, "On State Budget 2006", and the draft law "On State Budget 2007", second reading.

At the same time, development expenditures are not forbidden by the WTO. In Ukraine the share of "amber box" expenditures is still dominant; it accounts for 64.6% (Table 1). Meanwhile, development expenditures remain extremely low – about 35.4%. However, "green box" expenditures have positive long-run impacts on rural development.

**Table 1: Budget expenditures in Ukraine according to WTO classification, 2006 and 2007**

|                          | 2006        |                       | 2007        |                       |
|--------------------------|-------------|-----------------------|-------------|-----------------------|
|                          | Billion UAN | % of all expenditures | Billion UAN | % of all expenditures |
| "Amber box" expenditures | 4.2         | 57.8                  | 5.8         | 64.6                  |
| "Green box" expenditures | 3.1         | 42.2                  | 3.2         | 35.4                  |
| Total                    | 7.3         | 100.0                 | 9.0         | 100.0                 |

Source: Author's calculations based on the law, "On State Budget 2006", and draft law, "On State Budget 2007", second reading.

Therefore, it is necessary to re-direct budget expenditures towards the improvement of rural areas, since it will not only assist the sustainable development of rural areas, but also allow Ukraine to enter the WTO. Thus, the results of this research could be used by policy-makers in formulating rural development policies, particularly for promoting RNFE.

## **2 LITERATURE REVIEW**

Rural non-farm employment is defined as all economic activities conducted in rural areas, aside from agriculture, livestock, fishing and hunting (LANJOUWA and LANJOUW, 1995). Rural non-farm activities include agro-processing, small businesses in rural areas, migration, switching from farming to commodity trading, or selling household assets in response to negative circumstances (DAVID and PEARCE, 2001).

The most discussed issues in the literature are those that describe:

- Determinants of RNFE;
- Factors of RNFE diversification;
- Non-farm employment opportunities in countries with different levels of economic development;
- and methods of estimating RNFE participation.

I will shortly describe and summarise all of these issues in the literature review section.

Most researchers agree that the main determinants of RNFE participation are education, gender, credit, land and ethnicity (WANDSCHNEIDER, 2003). In his article, DAVIS (2003) also considers physical infrastructure and information to be determinants that influence the probability of participating in RNFE. Both economists mention wider factors that determine participation in off-farm activities: Agricultural development, natural resource endowment, economic infrastructure, public services, investment, rural town development and business environment (WANDSCHNEIDER, 2003; DAVIS, 2003).

Further, so-called peer<sup>1</sup> effects were recognised to have a positive role on a household's decision to participate in off-farm activities. The distance to the country capital also decreases the probability of participating in RNFE (DE JANVRY et al., 2005). Similar results were found by LASS et al. (1992) in their research; they included distance to the nearest town as an explanatory variable and found that it has a negative effect on participating in off-farm activity. Another variable that they added was years of farming, which also decreases the probability of participating in RNFE. Additional important factors

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<sup>1</sup> Neighbours around the household on a certain area (DE JANVRY et al., 2005).

that determine RNFE participation are size of household, age and the presence of livestock (BEZEMER and DAVIS, 2002).

The key point of the literature is to determine whether a person is engaged in off-farm activities due to revenues and new opportunities, or is forced to conduct off-farm activities due to factors that discourage the continuation of farming, such as risky agriculture, bad soil, drought, land scarcity, etc. Thus, all factors that determine participation in off-farm activities are defined as demand-pull or distress-push (EFSTRATOGOLOU-TODOULO, 1990; ISLAM, 1997; BRIGHT 2000). A more detailed description of the pull and push factors is presented in Table 2.

**Table 2: The pull and push factors of RNFE diversification**

| <b>Pull Factors</b>  | <b>Push Factors</b>                       |
|--|---|
| Higher returns from off-farm activities                    | Population growth                         |
| Higher returns on investment in RNFE                       | Limited availability of quality land      |
| Lower risk of non-farm activities compared with farming    | Decreasing farm productivity              |
| A source of cash for households' needs                     | Decreasing returns from farming           |
| Economic opportunities: Social advantages of urban centres | Insufficient access to farm input markets |
| Urban life preferences of young people                     | Exhausting of natural resources           |
|  | Temporary circumstances and shocks        |
|  | Limited access to rural financial markets |

Source: DAVIS and PEARCE, 2001.

DAVIS and PEARCE (2001) suggest that in poor rural areas, people tend to switch to non-farm activities due to its higher returns and lower risks. However, in spite of having strong motivation to engage in non-farm employment, poor individuals often have limited access to RNFE due to a lack of resources (REARDON, 1998). Therefore, participation in non-farm activities depends on a household's wealth. Less wealthy households prefer less risky activities, as it is difficult for them to overcome shocks. The rate of RNFE also depends on rural agro-climatic characteristics. Thus, households situated in areas with high-risk

agriculture are "pushed" into RNFE to avoid negative shocks. On the other hand, households situated in areas with low-risk agriculture are engaged in non-farm activities due primarily to additional income opportunities.

Obviously, with an increase in returns to farming, RNFE will decline (DAVIS and PEARCE, 2001). Moreover, demand-pull influence increases with the increase of incomes for poor or middle-income households, and for an increase in demand of urban territories for rural products (ISLAM, 1997). Distinguishing between the reasons for participating in non-farm activities is important for authorities that conduct rural policies because it provides an understanding on whether a given mode of livelihood provides prosperity or distress (DAVIS and PEARCE, 2001).

RNFE also differs across countries and the manner of promoting RNFE varies with different levels of economic development. For developing countries, it is necessary to increase poor households' access to financial assets, improve the quality of education and rural infrastructure, and take away land constraints (REARDON, 1998). These measures, as well as experience in developed countries, can also be applied to countries in transition.

Agriculture in developed countries is characterised by increasing diversification. Thus, some rural areas manage to specialise in tourism or rural products, for example. And stress is placed on the peculiarities of a given region so that different policies are required and a multi-sectoral approach is needed (VON MEYER et al., 2000).

To capture relationships between RNFE participation and explanatory variables, most researches use a bi-variate probit model (LASS et al., 1992; LANJOUW, 1998; ISGUT, 2002; DE JANVRY et al., 2005; HOYMAN and KIMHI, 2005). In addition to a probit model, SERRA et al., (2003) estimate RNFE participation by a Tobit model, as she supposes censoring of the samples due to the fact that most individuals are working on farm, but not off-farm.

A logit model produces results similar to probit estimation. The logit method was applied in estimations carried out by BUCHENRIEDER (2003), while MDUMA (2003) tried to estimate factors that determine the number of households in a cluster (village) participating in wage employment. In order to do this, he employed a Poisson regression.

In spite of the importance of the rural non-farm sector in agriculture and the economy as a whole, little research has been done in this area for Ukraine; it is thus of current interest for the Ukrainian economy. This paper determines the factors that influence participation in off-farm activities, and particularly the role of infrastructure in off-farm employment. Many studies on RNFE have been conducted for other countries. But I want to conduct such research for Ukraine in order to determine what factors influence RNFE participation and whether estimates differ from those obtained for other countries.

An attempt to find the determinants of RNFE participation in Ukraine was carried out by NIVYEVSKIY (2005). However, that research does not convey much information for policy-makers, as most of the variables used cannot be directly influenced by the authorities. For example, such an important policy variable as infrastructure is omitted from the model.

### **3 METHODOLOGY AND DATA DESCRIPTION**

I employ research considering existing experience with RNFE estimation, but apply it to the case of Ukraine. Considering previous studies on the RNFE issue and my own suggestions, the following independent variables will be used in the model: Age, gender, education, number of children, household size, land, geographical regions, infrastructure, and livestock.

Education consists of primary secondary education (8 years of studying at secondary school), high school secondary education (last 3 years of studying at secondary school), basic higher education (4 years of education at a higher educational establishment), complete higher education (last 1-2 years of education at a higher educational establishment) and basic technical education.

To account for a life-cycle effect, two variables, age and age squared, are introduced.

Under the variable "land", I consider land area per member of a household (in 0.01 hectares). To account for a change in probability of RNFE with an increase of land per member, this variable will also be introduced in the power of 2.

Livestock means the presence of domestic animals, poultry or/and bees in a household.

To capture the influence of geographical location on RNFE probability, I divided the territory of Ukraine into five main geographical regions: Northern, Western, Eastern, Southern, and Central<sup>2</sup>.

In the model, I added infrastructure as an important explanatory variable. This includes telecommunication, gasification, sewerage, and running water. This factor is expected to be essential in determining RNFE participation (DAVIS, 2003). Moreover, evidence of infrastructure impacting RNFE participation will allow policy-makers to consider this fact in rural policy-targeting. As already mentioned, investment in Ukrainian rural development is currently of great impor-

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<sup>2</sup> Northern region: Zhytomyr, Kyiv, Rivne, Chernigiv, Sumy oblasts. Western region: Zakarpattia, Lviv, Volyn, Ivano-Frankivsk, Ternopil, Chernivtsi oblasts. Eastern region: Kharkiv, Donetsk, Lugansk oblasts. Southern region: Odesa, Mykolaiv, Kherson, Zaporizhzhya oblasts and Crimea Autonomy. Central region: Vinnytsya, Khmelnytsky, Cherkasy, Poltava, Kirovograd, Dnipropetrovsk oblasts.

tance. This is even more evident when the process of Ukrainian WTO accession is considered.

Aside from adding infrastructure as an explanatory variable, I also consider the existence of livestock as a factor that contributes to the model specification. Adding new explanatory variables will also allow to better specify the model avoid omitted variable bias.

The dependant variable is the probability of RNFE. This either takes the value of 1 if a person is engaged in off-farming, or 0 otherwise<sup>3</sup>.

To find out what factors determine off-farm employment, bi-variable **probit** and **logit** models will be used.

However, the problem of **causality** may arise in the estimation. Indeed, empirical research shows a positive correlation between higher non-farm activity diversification and level of education, quality of infrastructure and other variables (DAVIS and PEARCE, 2001). Nonetheless, the direction of causality is unclear.

It was found that panel data is more efficient in explaining causality, while cross-sectional data sets fail to detect the direction of causality (ELLIS, 1998).

Data is available from State Committee of Statistics household survey, conducted in 2004 in Ukraine, which gathered 10,059 total observations. Among these are 1,178 observations for rural areas covering all 25 regions, Kyiv and Sevastopol cities.

After applying these methods of estimation, I expect the following results. Age should have a positive influence on off-farm participation up to some point, and then decrease the probability of RNFE participation (FERRIERA and LANJOUW, 2001). Gender should be significant and women are expected to have fewer chances to be engaged in off-farm activities (WANDSCHNEIDER, 2003). Educated people are expected to have more chances to start off-farm businesses (WANDSCHNEIDER, 2003). However, the probability of non-farm employment may change due to the level of education (NIVYEVSKIY, 2005). Results received by NIVYEVSKIY (2005) show that a greater number of children decreases the probability of RNFE participation. The larger the size of a household, the greater is the probability of participation in non-farm activities (BEZEMER and DAVIS, 2002). Concerning the influence of land possession, NIVYEVSKIY (2005) found that up to some point, land availability decreases the probability of RNFE participation, but then with an increase in land ownership, participation in non-farm activities rises. Considering geographical regions, it was found (NIVYEVSKIY, 2005) that people who live in the Western region of Ukraine are the most likely to participate in off-farm activities.

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<sup>3</sup> Only primary employment of the rural population is considered in my estimation.

As for the new factors added, I expect them to contribute to the model specification. Infrastructure quality is expected to increase the off-farm participation rate (DAVIS, 2003). Using estimation results for Georgia, I expect that with the increase in livestock, the probability of RNFE will fall (BEZEMER and DAVIS, 2002).

#### 4 ESTIMATION RESULTS

The impact of each explanatory variable on the probability of RNFE is estimated by marginal effects (elasticities). The marginal effects show how the probability of non-farm employment changes when a particular explanatory variable changes by one unit (or changes from 0 to 1 for the dummy variable) while keeping all other explanatory variables constant. The elasticities are provided for a household with optimal RNFE characteristics (according to probit and logit estimations). Thus, this household is from the central region, with livestock and running water, and sewerage provided. The head of the household is a man with a high school secondary education. All other explanatory variables are taken at their average values. The probability of RNFE for this particular household is 58% for the probit estimation, while for a household with all the characteristics taken at the average values, the probability of RNFE is 38.7%.

The marginal effects of explanatory variables are presented in Table 3.

**Table 3: Estimated marginal effects (elasticities)**

|                                   | <b>Probit</b>       | <b>Logit</b>        |
|-----------------------------------|---------------------|---------------------|
| Household size                    | 0.007<br>(0.016)    | 0.007<br>(0.016)    |
| Number of children in a household | -0.013<br>(0.023)   | -0.012<br>(0.022)   |
| Age                               | -0.001<br>(0.011)   | -0.001<br>(0.010)   |
| Age squared                       | 0.00001<br>(0.0001) | 0.00001<br>(0.0001) |
| Gender*                           | 0.184***<br>(0.049) | 0.186***<br>(0.058) |
| Complete higher education*        | 0.099**<br>(0.043)  | 0.097**<br>(0.045)  |
| Basic higher education*           | 0.090**<br>(0.038)  | 0.082**<br>(0.039)  |
| Primary secondary education*      | -0.089              | -0.090              |

|                                |                          |                         |
|--------------------------------|--------------------------|-------------------------|
|                                | (0.057)                  | (0.059)                 |
| Basic technical education*     | 0.015                    | 0.013                   |
|                                | (0.030)                  | (0.030)                 |
| Running water*                 | 0.013                    | 0.008                   |
|                                | (0.097)                  | (0.100)                 |
| Sewerage*                      | -0.069                   | -0.063                  |
|                                | (0.099)                  | (0.102)                 |
| Centralised gas*               | 0.041                    | 0.042                   |
|                                | (0.033)                  | (0.034)                 |
| Telephone*                     | 0.086**                  | 0.091**                 |
|                                | (0.036)                  | (0.038)                 |
| Land per member of a household | -0.001***                | -0.001***               |
|                                | (0.0002)                 | (0.0002)                |
| Land per member of a household | 1.5*10 <sup>-7</sup> *** | 1.5*10 <sup>-7</sup> ** |
|                                | (0.000)                  | (0.000)                 |
| Livestock*                     | -0.067                   | -0.070                  |
|                                | (0.043)                  | (0.044)                 |
| Car*                           | 0.086**                  | 0.087**                 |
|                                | (0.037)                  | (0.039)                 |
| Southern region*               | 0.118***                 | 0.112**                 |
|                                | (0.042)                  | (0.045)                 |
| Northern region*               | 0.099**                  | 0.095**                 |
|                                | (0.041)                  | (0.042)                 |
| Western region*                | 0.267***                 | 0.257***                |
|                                | (0.071)                  | (0.080)                 |
| Eastern region*                | 0.145***                 | 0.138***                |
|                                | (0.049)                  | (0.052)                 |

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Observations 1,178

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Standard errors in parentheses

\*\* significant at 5%; \*\*\* significant at 1%

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Note: (\*) A dummy that takes values of either 0 or 1.

Source: Author's calculations.

As mentioned previously, both models provided similar results.

As can be seen from the above table, coefficients such as household size, number of children in a household, age, age squared, primary secondary education, basic technical education, running water, livestock, centralised gas and sewerage appear to be insignificant, even at a 10% level of significance.

For this particular household, *ceteris paribus*, a man is 18.4% more likely to be engaged in RNFE than a woman. This result confirms the expectation that some programs for females in rural areas are needed to encourage their participation in non-farm activities. Somewhat unexpectedly, age appears to have a negative influence on off-farm participation up to some point, and then increases the probability of RNFE participation. This contradicts the results received by FERRIERA and LANJOUW (2001) in their study. At the same time, this result is similar to what NIVYEVSKIY (2005) found. However, the age coefficient in my estimation is insignificant, even at a 10% level of significance. By taking into account the negative impact of age on RNFE probability, it is obvious that programs aimed at young rural people are important. Developing the rural financial market and improving bank micro-crediting are crucial for this purpose.

The higher the level of education, the higher is the probability of RNFE. As can be observed in Table 3, if the head of the household had a basic technical education, he or she would have 1.5% (1.4% in the logit model) more probability of being non-farm employed, *ceteris paribus*. Basic higher education increases the chances of RNFE by 9% (8.2% in the logit model) *ceteris paribus*. Receiving complete higher education, *ceteris paribus*, increases RNFE probability even further (9.9% for the probit estimation and 9.7% for the logit estimation). Thus, we can conclude that, as was expected, receiving higher education raises the chances of off-farm employment.

Issues that describe quality of infrastructure, such as running water and the provision of centralised gas – as was predicted – appeared to have a positive effect on RNFE. Only the existence of sewerage decreases the chances of RNFE. However, all these explanatory variables are insignificant, even at a 10% level of significance. An exception is the availability of a telephone, which is significant at a 5% level and is positively correlated with RNFE participation. Thus, having a telephone set increases the probability of RNFE by 8.6% (9.1% for the logit estimation), controlling for all other explanatory variables. This result confirms our expectations about the positive impact of telecommunication on RNFE.

The probability of RNFE is also positively influenced by the number of cars in a household. Each additional car in a household increases the probability of non-farm employment by 8.6%, *ceteris paribus*.

It appears that the existence of livestock has no statistical influence on the probability of RNFE participation (at a 10% level of significance). However, as was expected, an increase in livestock is negatively correlated with the probability of RNFE.

The availability of land per household member, as was expected, decreases the probability of RNFE participation up to some point, but then with the increase in land ownership, people tend to participate in off-farm activities. This result confirms the suggestion that it might be useful to remove land constraints.

Even though the coefficients of household size and number of children are statistically insignificant, they still show the direction of influence on RNFE participation. Thus, holding all other variables constant, the larger the size of a household, the greater is the probability of participation in non-farm activities, while each additional child, *ceteris paribus*, decreases the probability of non-farm employment.

The probability of RNFE is influenced by the geographical location of a household. Thus, living in the Western region, *ceteris paribus*, increases the chances of being non-farm employed by 26.5% (25.7% for the logit estimation) compared to the Central region. A household from the Eastern region also has a greater probability of RNFE than those from the Central region – by 14.5% (13.8% for the logit estimation). Compared to the Central region, living in the Southern region increases the probability of RNFE by 11.8% (11.2% for the logit estimation) and only by 9.9% (9.5% for the logit estimation) for the Northern region. The reason for the high off-farm probability of participation in the Western region may be the fact that by tradition, the Western region is less agrarian compared to other regions.

## 5 CONCLUSIONS AND SUGGESTIONS

Promoting RNFE is an important issue in the development of rural areas, and includes increasing the quality of infrastructure, rural inhabitants' education level, removing land constraints, etc.

This is why RNFE should be carefully considered when the Ukrainian government addresses rural development policy; their main task is to switch from trade-distorting measures and to developing budget expenditures that have positive long-run effects. This would not only guarantee the sustainable development of rural areas, but also accelerate the process of Ukrainian WTO accession.

Even if variables that constitute infrastructure, for example the availability of running water and gasification, appeared to be insignificant, the direction of their influence can still be taken into account. Thus, the availability of running water, gasification and telecommunication has a positive effect on the probability of RNFE. Therefore, infrastructure development is an important issue. Moreover, improving rural infrastructure will make the countryside an attractive region for business. Therefore, the government should take steps to provide rural areas with gas, electricity, roads, and telecommunication facilities. Furthermore, rural educational programs should be undertaken, as they provide more chances for

the rural population to increase their incomes and standards of living. Also, it is necessary to increase poor households' access to financial assets. Considering the fact that women are less active in RNFE participation, certain rural development policies should make their access to off-farm activities easier. All these policies will increase RNFE opportunities and thus, permit the diversification of income sources, raise rural inhabitants' quality of life and make rural areas an attractive place to live.

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# **RURAL FINANCIAL MARKETS**



## INFORMAL LOANS – ALTERNATIVES OR SUPPLEMENTS TO BANK CREDIT FOR POLISH FARMS

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### ABSTRACT

The aim of the paper is to examine the different dimensions of informal loans in Polish agriculture. The results of the investigation imply that informal lenders were important sources of financing farmers' activity in Polish agriculture during the examined period. A significant percentage of borrowing farms took formal and informal loans simultaneously, mainly for "productive purposes". The terms of informal loans were considerably more advantageous than formal loans with respect to form, interest and collateral.

**Keywords:** Credit, formal loans, informal loans, farmers, Poland.

### 1 INTRODUCTION

Among the various sources of financing the agricultural activity of farms and consumption expenditure of farmers' households, the role of bank credits is especially important. As a result, the creation and maintenance of a stable system of rural financial institutions is one of the main aims of agricultural policy. Researchers in this field focus on the barriers that constrain the development of rural financial intermediaries (DESAI and MELLOR, 1993), intervention on credit markets (BESLEY, 1998), the results of credit programs, or positive phenomena such as the Grameen Bank of Bangladesh (ROBINSON, 1998). The problem of informal sources of loans are often discussed in the context of the underdevelopment of formal financial institutions, which limits access to formal credits. Most literature on this subject deals with informal loans in developing economies. However, informal loans exist in developed and post-communist countries as well. Polish agriculture provides a good example of the viability of the informal loans phenomenon.

Considering the network of bank branch offices or terms of credits granted mainly on preferential terms, Polish farmers have rather good access to bank

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credits<sup>1</sup> (DANILOWSKA, 2005)<sup>2</sup>. From 1995-2001, about 50 % of farms examined by the Institute of Agricultural and Food Economics took bank credits every year. However, the data shows that during that period, about 40% of the aforementioned farmers borrowed from individuals and various non-financial organisations. The aim of the paper is to examine the different dimensions of informal loans in Polish agriculture. The analysis focuses on these questions: (i) how important is the informal sector as a source of loans for Polish farmers, (ii) what are the formal and informal loans used for, (iii) what are the determinants of taking formal and informal loans.

The paper is organised as follows. First, the classification of loans by sources is presented. This is followed by analyses of the scope of informal loans in Polish agriculture in comparison with bank credits. Next, characteristics of formal and informal loans with respect to purposes and terms are given. Following that, an econometric model is applied to identify the micro-determinants that lead farmers to take formal and informal loans. Conclusions are drawn in the last section.

### **1.1 Materials and methods**

The examined period covers 7 years, from 1995 to 2001, and the information and data are taken from two main sources: (i) a survey by the author on the purposes of loans, terms of loans from different sources, and the implementation of loan contracts, (ii) the Institute of Agricultural and Food Economics (IAFE). The survey on terms of loans was carried out from January to March, 2004, and involved a systematic study of farms by the Institute of Agricultural and Food Economics. Specifically, it examined farms which were in debt due to informal loans as of 31 December 2001. Because a portion of those farms were in debt not only due to informal loans, but to bank credits as well, it was assumed that they provided the information about terms of bank credits as well. Finally, 230 farms from all over Poland gave information about the purposes, terms and implementation of 612 loan contracts: 362 bank credits, 108 loans granted by individuals, and 142 loans extended by various non-financial organisations. Additional information about the finances of the farms under investigation and their borrowing activity from 1995-2001 was gathered from the Institute. Mixed methods of analysis were then used. The descriptive method, with elements of the comparative method, is used to characterise the loan market. Moreover, the panel data analyses help to examine the microeconomic determinants of why farmers take formal and informal loans.

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<sup>1</sup> In the examined period.

<sup>2</sup> This does not mean they are not credit-rationed at all (see PETRICK, 2004).

## **2 FORMAL AND INFORMAL LOANS: CLASSIFICATION**

The existence of informal lending is derived from a lack of access to formal financial institutions. The formal credit market does not develop smoothly in poor rural areas because of the many barriers that formal intermediaries meet. The lack of collateral, high transaction costs for small loans, enforcement problems, underdevelopment of complementary institutions, and imperfect information (BESLEY, 1998; ARYEETAY and UDRY, 1995) all create space for informal lenders. These failures occur not only in the economies of developing countries, but in post-communist and in developed countries as well. However, in developed economies, their scope and scale are considerably smaller compared with developing ones.

MCKERNAN et al., (2005) presented a review of loan classifications by type of sources. Three of the six presented classifications categorised the loans into three groups: Formal, informal, and "others", while the three other classifications considered loans as only formal or informal. Researchers who classify loans into three groups consider loans granted by commercial and agricultural development banks as formal loans, whereas loans granted by micro-credit government cooperative structures, NGOs, Grameen-type banks, and local groups are considered "others". Other authors include these loans in the group of formal loans.

Informal loans is a very broad category. According to the motives for lending, informal loans are often divided into two basic types: Commercial loans and noncommercial loans (ROBINSON, 1994, p. 46; NISBET, 1967, p. 73). The first are granted by moneylenders, landlords, traders, employers, commodity wholesalers, and retailers, while the latter are given by relatives, neighbours, friends or some form of rotating savings and credit associations. Commercial lenders are interested in profits and/or benefits from their lending activities. The benefits can be in different forms, such as interest payments (BASU, 2004), borrowers' defaults (ROBINSON, 1994, p. 57) or labour at less than opportunity costs (SRINIVASAN, 2004). Non-commercial loans, on the other hand, are extended without financial interest, but they often entail other types of social, political and economic obligation (ROBINSON, 1998, p. 394).

In this analysis, the sources of loans (as well as the loans themselves) are classified into two main groups: Formal and informal. Formal loans are granted by two types of banks that operate in Polish rural areas: Commercial banks and cooperative banks. Informal loans involved all loans extended by no bank sources. The group of informal sources is divided into two subgroups: Individuals and non-financial organisations. This classification is derived from the motives to lend. The reasons for lending in the case of individuals are not of an economic character, while for non-financial organisations they are.

Various dimensions of informal loans have been analysed, for example BRAND, HOSIOS (2004) and BECKMANN, BOGER (2003) examined enforcement issues, BELL (2005) and MCKERNAN et al., (2005), examined interactions between institutional and informal credit sectors, and BRAVERMAN, STIGLITZ (2004), ZELLER (1994) investigated credit rationing by informal lenders. This paper provides comparative analyses of formal and informal loans, as these are the alternatives that Polish farmers faced.

### 3 THE SOURCES OF LOANS IN POLISH AGRICULTURE

From 1995-2001, the farms examined by the IAFE borrowed loans from different sources – formal (banks) and informal (individuals and non-financial organisations). The scope and comparative role of each source can be evaluated by the analysis of how many farmers borrowed from them.

**Table 1: Share of farms being examined by IAFE that borrowed from different sources in 1995-2001 (%)**

| Specification               | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|-----------------------------|------|------|------|------|------|------|------|
| Banks                       | 34.7 | 52.9 | 53.4 | 52.5 | 54.0 | 57.8 | 51.9 |
| Individuals                 | 22.8 | 25.7 | 24.0 | 23.6 | 26.1 | 28.2 | 25.6 |
| Non-financial organisations | 34.7 | 13.4 | 14.5 | 15.2 | 17.3 | 16.7 | 14.4 |

Sources: Author's calculation based on IAFE data.

Data in Table 1 indicates that banks were the most popular source of credit for farmers. Since 1996, each year between 50-55% of farmers took bank credits. In second place were individuals, with a 25% share. Non-financial organisations extended loans year-by-year to about 15% of farms. In comparison, the results of a World Bank survey indicate that in 1999, about 33% of investigated farms took bank credits (REPORT, 2001, p. 76). That ratio is considerably lower than that of the group of farmers reviewed by IAFE. This could have been influenced by the fact that the group of farms that were examined by the Institute involved larger and market-oriented farms. The report states that of the largest farms in Poland, 12% borrowed from non-financial organisations (REPORT, 2001, p. 68). The data suggests that informal loans were quite popular among Polish farmers. As NIKOLOV (2004) reported, a similar situation occurred in another post-communist country – Bulgaria. The percentage of Bulgarian rural households that are served by informal lenders is estimated at 29%.

To obtain additional information about the role of each economic source in farmers' finances, research into the structure of total values of loans by type of lenders was carried out (Table 2).

**Table 2: The structure of the total value of loans taken by farms examined by IAFE, by source (%)**

| <b>Specification</b>        | <b>1995</b> | <b>1996</b> | <b>1997</b> | <b>1998</b> | <b>1999</b> | <b>2000</b> | <b>2001</b> |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Banks                       | 68.1        | 86.0        | 88.9        | 82.1        | 84.5        | 83.6        | 80.9        |
| Individuals                 | 15.9        | 9.9         | 8.2         | 12.5        | 10.9        | 11.8        | 15.6        |
| Non-financial organisations | 16.0        | 4.1         | 2.9         | 5.4         | 4.6         | 4.6         | 3.5         |
| Total                       | 100.0       | 100.0       | 100.0       | 100.0       | 100.0       | 100.0       | 100.0       |

Sources: Author’s calculation based on IAFE data.

Results of the data analysis from Table 2 support the tendency suggested by the percentage of farms borrowing from formal and informal sources. That is, banks extended the largest portion of the total value of loans. Every year their share was high, but it decreased during the examined periods, so in the last examined year it was 80%. In second place were informal loans, and in third were loans from different non-financial organisations. The data from Tables 1 and 2 indicates that the value of bank credits was much higher than value of informal loans. Data from the author’s survey showed that the average value of the examined bank credits was about 2.8 times higher than of loans from individuals, and 3.2 times more than loans from various non-financial organisations. In 1995, the share of bank credits was considerably lower than in the following years. This was probably due to the very high level of bank interest rates, which discouraged farmers from taking credits, and the fact that the system of preferential credits (very influential in the following years) was at the beginning stage of its operations.

The interesting question is whether farms are simultaneously active in both informal and formal markets. The answer can help to discover whether the farmers who borrowed from informal sources used these sources because of a lack of access to bank credits, or whether they were searching for another source of financial means, aside from bank credits.

**Table 3: Share of farms borrowing from given sources from 1995-2001 (%)**

| <b>Specification</b>  | <b>1995</b> | <b>1996</b> | <b>1997</b> | <b>1998</b> | <b>1999</b> | <b>2000</b> | <b>2001</b> |
|-----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Farms that took loans | 100.0       | 100.0       | 100.0       | 100.0       | 100.0       | 100.0       | 100.0       |
| of which:             |             |             |             |             |             |             |             |
| Only formal           | 40.5        | 45.6        | 49.2        | 48.0        | 42.3        | 44.9        | 46.4        |
| Only informal         | 36.2        | 17.8        | 17.7        | 18.4        | 17.3        | 16.2        | 18.9        |
| formal and informal   | 23.3        | 36.6        | 33.1        | 33.6        | 40.4        | 38.9        | 34.7        |

Sources: Author’s calculation based on IAFE data.

Data (Table 3) showed that each year, more than 80% of borrowing farmers took bank credits. This implies that they have quite good access to formal sources of loans. Further, 30-40% of farms (researched by IAFE) that took loans in the

examined period used formal and informal sources simultaneously. This indicates that many farmers were active in looking for financing possibilities for their expenses. A quite high percentage of farmers borrowed only from informal sources of loans; it is ambiguous whether they had limited access to formal loans or whether they preferred informal sources. The internal structural analyses of each source, in terms of informal and formal loans, that are contained in the next part of the paper can clarify this problem.

#### **4 GROUP STRUCTURE OF INFORMAL AND FORMAL LENDERS**

In the Polish formal credit market, two types of banks operate: Commercial banks and cooperative banks. Cooperative banks held a monopolistic position on the rural credit market during the centrally-planned economy. However as data indicates (Table 4) these banks are still the main formal source of credit for farmers in the market economy. A comparison of the credit structure by number with the credit structure by value shows that credits from cooperative banks were of smaller value than from commercial ones.

The informal loan market in rural Poland is larger in number of participants than the formal market, and much more heterogeneous. Two groups of lenders grant loans to Polish farmers: Commercial lenders and noncommercial lenders like relatives, neighbours and friends. However, the feature of the Polish lenders which is lacking compared to similar groups in developing countries is the lack of moneylenders<sup>3</sup> or landlords, who are important sources of loans in these countries. In the group of loans from individuals, loans from relatives are the most important source when considering their share in number and value of loans. A high number of loans from relatives indicates that farmers were afraid of default. Were this to happen, the farmers have very limited possibilities to make debtors repay debt. BECKMANN, BOGER (2003, p. 417) reported that only 38.5% of Polish farmers declared court as way of enforcing contracts. And nearly 70% of farmers told the author that they do nothing to recoup loans.

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<sup>3</sup> Moneylenders were active in rural areas before the second war.

**Table 4: The number and value structure of loans, grouped by source of loans**

| Sources of loans  | Structure (%)      |                    |
|---|--------------------|--------------------|
|   | by number          | by value           |
| Bank credits  | 100.0 <sup>1</sup> | 100.0 <sup>1</sup> |
| of which:   |                    |                    |
| – Cooperative banks   | 78.4               | 62.8               |
| – Commercial banks  | 21.6               | 37.2               |
| Loans from individuals                                      | 100 <sup>1</sup>   | 100 <sup>1</sup>   |
| of which:   |                    |                    |
| – Relatives   | 77.2               | 68.6               |
| – Neighbors   | 9.5                | 20.0               |
| – Friends   | 13.3               | 11.4               |
| – Commercial lenders  | 0.0                | 0.0                |
| Loans from non-financial organisations                      | 100.0              | 100.0 <sup>2</sup> |
| of which:   |                    |                    |
| – Employers   | 16.9               | 9.8                |
| – Wholesaler and retailer of investment and working capital | 25.3               | 34.5               |
| – Manufacturers   | 33.8               | 34.5               |
| – Others  | 24.0               | 21.2               |

Notes: <sup>1</sup> Only loans with answers. <sup>2</sup> The share of one loan in total value of loans from non-financial organisations was 50%, so this loan was not taken into consideration.

Source: Author's calculations based on the author's survey of 612 loans.

The group of non-financial organisations includes very different agents like employers, wholesalers and retailers of investment goods and working capital, shops with household equipment, farmers unions, processors, etc. The manufacturers that purchase agricultural products are the most important source of loans in that group.

## 5 PURPOSE OF THE LOANS

Data reported in Table 5 indicates that most credits and loans from all investigated sources were taken for "productive purposes". However, the percentage of consumption loans from informal sources was considerably higher than from banks. It is remarkable that in each source, there was nearly the same percentage of investment loans. Although the share of consumption loans in total number of informal loans was quite high, it is worth indicating that it was lower than shares of loans for working capital.

**Table 5: Purpose of loans by the type of sources**

| Specification                                       | Bank             |       | Individuals |       | Non-financial organisations |                    |
|---|------------------|-------|-------------|-------|-----------------------------|--------------------|
|   | Structure of (%) |       |             |       |                             |                    |
|   | Num-ber          | Value | Num-ber     | Value | Num-ber                     | Value              |
| Loans and credit total                              | 100.0            | 100.0 | 100.0       | 100.0 | 100.0                       | 100.0 <sup>1</sup> |
| of which:   |                  |       |             |       |                             |                    |
| - Agricultural investments and residential building | 43.9             | 80.5  | 48.2        | 56.3  | 45.8                        | 45.6               |
| - Working capital                                   | 50.8             | 18.5  | 31.4        | 35.2  | 31.0                        | 41.3               |
| - Consumption                                       | 5.3              | 1.0   | 20.4        | 8.5   | 23.2                        | 13.1               |

Source: Author's calculations based on the author's survey of 612 loans.

The results of loan value structure analyses by purpose are generally in line with the tendency observed in number structure. The role of credits and loans taken for financing production and investment is even higher than that which the structure of loan numbers by purpose indicated. The shares of investment credits from banks and loans from individuals in all loans' total values exceeded 50%, and in the case of bank credits, even 80%. The shares of consumption credits and loans were much smaller in every examined group compared with the previous classification, and especially low in bank credits. The very high share of investment credits in bank credits was due to the well-developed system of preferential credits that operated in Poland during the examined period. The bank consumption credits were not popular because of their high interest rate, so the borrowers preferred informal sources for financing consumption.

Results on the purpose of informal loans in Poland are not consistent with relevant findings concerning developing countries, where informal loans are taken mainly for consumption. They are, however, in line with results regarding bank credit purposes (BESLEY et al., 2001).

## 6 THE TERMS OF BANK CREDITS AND INFORMAL LOANS

Comparisons of the terms upon which formal and informal loans were granted can help to understand the nature of each alternative and clarify the motives for applying for all types of loan. Of course it is necessary to remember that poorer borrowers, especially in developing countries, often do not face alternative sources of loans; they have only limited choices, generally in the frame of informal loans. The terms of loans are evaluated by estimating the percentage of loans that are characterised by the chosen features. It is worth noting that this data can be treated as an indicator of the borrowing costs of each type of loan.

**Table 6: Terms of formal and informal loans by sources**

| <b>Specification</b>                | <b>Banks</b> | <b>Individuals</b> | <b>Non-financial organisations</b> |
|-------------------------------------|--------------|--------------------|------------------------------------|
| Loan contracts in written form (%)  | 100.0        | 5.6                | 91.5                               |
| Loans with collateral (%)           | 91.2         | 0.9                | 49.3                               |
| Loans repaid by installments (%)    | 60.5         | 55.3               | 83.8                               |
| Loans with interest of any kind (%) | 100.0        | 17.1               | 35.7                               |

Source: Author’s calculations based on the author’s survey of 612 loans.

Data in Table 6 shows that the terms of loans vary across the type of loan sources. Bank credits are the most formalised, while nearly no loans from individuals are formal. Collateral is generally required by banks and a portion of non-financial organisations. Only one loan from individuals was granted with collateral. Method of repayment is the only aspect in which the differences between loans from the three sources are not significant; most loans were repaid by installments. This method of repayment is more advantageous for borrowers, especially when the loan is repaid by product deliveries. The high percentage of loans being repaid in this way within the group of non-financial organisations is an effect of many lenders, such as employers and manufacturers. In the literature concerning informal loans in developing countries, the problem of very high interest rates is discussed. Nevertheless, that problem concerns loans granted by commercial informal lenders like money-lenders or landlords. Non-commercial loans are extended without any interest, often with negative real interest rates (NISBET, 1967). In the investigated group of farms, the repayment of loans from individuals were generally paid in kind (food, sweets). Some lenders from the group of non-financial organisations were not interested in receiving financial interest payments. Instead, they achieved benefits in other ways; for example, for manufacturers, high quality raw materials are very important, so they granted loans to help farmers meet quality requirements (DRIES and SWINNEN, 2005; DANILOWSKA, 2006).

## **7 THE DETERMINANTS OF TAKING INFORMAL LOANS AND BANK CREDITS**

Analysis of the scale of different loan source usage showed that quite a high proportion of farmers took formal or informal loans. The question is whether there is a connection between taking loans from various sources and farm economics or farmers’ characteristics. It is necessary to note that the act of a farmer taking a loan is an effect of applying for a loan, and the willingness of a lender to lend. Some variables exhibit their importance for lenders when they come to a decision to lend. To clarify that problem, the probit estimation model was applied. From the farms analysed by IAFE from 1995-2001, only those that were examined every year during that period were qualified for analysis (balanced sub-panel). There were 657 farms that met this condition.

In the analysis, the two-way mixed probit model was chosen (DEMIDENKO, 2004).

### 7.1 The choice of variables to model

The fact of taking a loan is a dependent variable. It is of a dichotomous character and takes the value of 1 if a farmer obtains the loan during a given year, or 0 if not.

As determinants of taking loans, a set of independent variables (with expected signs in parentheses) was chosen. These are related to: (i) farmer's characteristics (ii) the economics of the farm. Among the determinants, 3 are dichotomous in character: Level of education (1 – secondary and higher; 0 – less than secondary); gender (1 – man; 0 – woman); fact that farmer is a shareholder in a cooperative bank (1 – yes; 0 – no). Descriptive statistics of all variables used in the model are displayed in Table 7.

To characterise the farmer, the following features were chosen: Age of farmer (3-)<sup>4</sup>, gender (3?), level of education (+; ?, +), fact of being the shareholder of cooperative bank (+; -; -).

The economics of the farm are represented by: Land area (owned and leased) (+; -; +), the value of fixed assets (+; -; +), labour resources (3+), purchased inputs (3+), consumption of chemical fertilisers kg/1 ha of agricultural land (3+), value of market output/1 ha of agricultural land (3+), share of animal output in final agricultural output (3+), investment value (3+), agricultural income (3+), income from nonagricultural activity (?; -; -), income from work outside farm (?; ?; +), social benefits (3?), savings (3-).

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<sup>4</sup> This means that a negative influence is expected for each type of loan; for some other signs, the following order was applied: Banks, individuals, non-financial organizations.

**Table 7: Description of variables used in probit model**

| <b>Variable</b>   | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min.</b> | <b>Max.</b> | <b>Valid obser.</b> |
|---|-------------|------------------|-------------|-------------|---------------------|
| Age (year)  | 45.6        | 10.6             | 18          | 79          | 4599                |
| Gender  | 0.88        | 0.33             | 0           | 1           | 4599                |
| Level of education                                      | 0.37        | 0.63             | 0           | 1           | 4599                |
| Land area (own and leased)                              | 17.11       | 34.41            | 1.07        | 1203        | 4599                |
| Value of fixed assets (ths PLN)                         | 182.42      | 135.33           | 7.35        | 1837.2      | 4599                |
| Resources of labour (number)                            | 2.9         | 1.3              | 0.1         | 8           | 4599                |
| Purchased inputs (ths PLN)                              | 18.80       | 38.44            | 0.82        | 1168.29     | 4599                |
| Consumption of chemical fertilisers (kg/1 ha)           | 123.4       | 79.3             | 0.0         | 408         | 4599                |
| Value of market output (ths PLN/1 ha)                   | 2.45        | 1.75             | 0.0         | 21.92       | 4599                |
| Share of animal output in final agricultural output (%) | 69.7        | 26.7             | 0.0         | 1.0         | 4599                |
| Investment value (ths PLN)                              | 10.08       | 25.81            | 0.0         | 643.90      | 4599                |
| Agricultural income (ths PLN)                           | 15.12       | 23.79            | -38.06      | 644.00      | 4599                |
| Income from nonagricultural activity (ths PLN)          | 0.63        | 4.16             | -28.90      | 206.76      | 4599                |
| Income from work outside farm (ths PLN)                 | 3.48        | 6.72             | 0.0         | 69.14       | 4599                |
| Social benefits (ths PLN)                               | 3.91        | 4.82             | 0.0         | 48.08       | 4599                |
| Savings (ths PLN)                                       | 11.70       | 39.55            | 0           | 1130.39     | 4599                |
| Farmer is a shareholder of cooperatives bank            | 0.64        | 0.48             | 0           | 10          | 4599                |

Source: Author's calculations based on IAFE data.

## 7.2 Results of model

Results of the applied model imply that the influence of chosen determinants for obtaining bank credits was rather small. The level of  $R^2_{LR}$  is only 9% (Table 8). From 17 modeled variables, only 11 are statistical significant. These include: Age (-), level of education (+), labour resources (+), purchased inputs (+), consumption of fertiliser per 1 ha of agricultural land (+), market output per 1 ha (-), investments (+), income from work outside the farm (-), social benefits (-), value of savings (+), membership in a cooperative bank (+).

**Table 8: The probit estimates of taking bank credit (only significant variables)**

|  | Coefficient        | Std. Error | z-value | Pr(> z ) | Marginal effect <sup>1</sup> |
|--|--------------------|------------|---------|----------|------------------------------|
| Age  | -1.34E-02          | 3.86E-03   | -3.4612 | 0.0005   | -0.522%                      |
| Level of education                           | 1.86E-01           | 8.74E-02   | 2.1242  | 0.0337   | 7.256%                       |
| Resources of labour (number)                 | 1.07E-01           | 3.06E-02   | 3.4935  | 0.0005   | 4.183%                       |
| Purchased inputs( ths PLN)                   | 8.77E-03           | 2.10E-03   | 4.1716  | 3.0E-05  | 00%                          |
| Consumption of chemical fertilisers kg/1 ha  | 1.96E-03           | 5.01E-04   | 3.9178  | 8.9E-05  | 0.08%                        |
| Value of market output (ths PLN1 ha)         | -8.3E-02           | 2.69E-02   | -3.0831 | 0.0020   | -3.0%                        |
| Investment value ( ths PLN)                  | 1.91E-02           | 2.04E-03   | 9.3359  | 2.20E-16 | 1.0%                         |
| Income from work outside farm (ths PLN)      | -16.0              | 5.83       | -2.7525 | 0.005915 | -1.0%                        |
| Social benefits (ths PLN)                    | -2.37E-02          | 8.39       | -2.8286 | 0.004676 | -1.0%                        |
| Savings (ths PLN)                            | -1.02E-02          | 1.69E-03   | -6.0506 | 1.44E-09 | 0,0%                         |
| Farmer is a shareholder of cooperatives bank | 6.85E-01           | 8.90E-02   | 7.6975  | 1.39E-14 | 26.76%                       |
| Model significance                           | p-value= 3.705E-81 |            |         |          |                              |
| R <sup>2</sup> _LR                           | =0.091             |            |         |          |                              |

Notes <sup>1</sup> Due to nonlinear dependencies, the marginal effect is calculated in percentage points as sample mean. For the variables of dichotomy character, marginal effect was calculated by changes from 0 to 1.

Source: Author's calculation based on author's survey.

In most cases, the direction of influence is as it was assumed, except for market output/ha. This indicates that the more efficient production is, the less willing a farm is to take credit. The investigation settled doubts about gender (non-statistically significant), and about the social benefits of income from work outside the farm. It is somewhat surprising that the influence of variables such as land area, value of fixed assets or agricultural income are not statistically significant. Instead, they indicate the potential of farm and collateral for banks.

**Table 9: Probit estimates of taking loans from individuals (only significant variables)**

|                            | Coefficient        | Std. Error | z-value | Pr(> z ) | Marginal effect <sup>1</sup> |
|----------------------------|--------------------|------------|---------|----------|------------------------------|
| Labour resources (number)  | 8.36E-02           | 28.2       | 2.960   | 0.003    | 2.259                        |
| Purchased inputs (ths PLN) | 2.99E-03           | 1.34E-03   | 2.236   | 0.025    | 0.08                         |
| Investment value (ths PLN) | 5.22E-03           | 1.09E-03   | 4.796   | 1.62E-06 | 0.14                         |
| Social benefits (ths PLN)  | -1.54E-02          | 7.27E-03   | -2.117  | 0.034    | -0.42                        |
| Savings (ths PLN)          | -5.79E-03          | 1.39E-03   | -4.177  | 2.96E-05 | -0.16                        |
| Model significance         | p-value= 3.569E-14 |            |         |          |                              |
| R <sup>2</sup> LR          | =0.016             |            |         |          |                              |

Notes: <sup>1</sup> As in Table 8.

Source: Author’s calculation based on author survey.

In the case of loans from individuals, the level of R<sup>2</sup> is very small – about 0.016 (Table 9). Only 5 of the 17 variables were statistically significant. Among these, there were no variables that represented the demographic characteristic of farmers. The significant variables have the expected sign, but their influence on the dependent variable were very small.

**Table 10: Probit estimates of taking loans from non-financial institutions (only significant variables)**

|  | Coefficient       | Std. Error | z-value | Pr(> z ) | Marginal effect <sup>1</sup> |
|--|-------------------|------------|---------|----------|------------------------------|
| Gender   | -1.90E-01         | 1.16E-01   | -1.638  | 0.101    | -3.19%                       |
| Level of education   | 1.22E-01          | 8.06E-02   | 1.514   | 0.130    | 2.05%                        |
| Labour resources (number)                                      | 6.41E-02          | 3.10E-02   | 2.064   | 3.90E-02 | 1.08%                        |
| Purchased inputs (ths PLN)                                     | 2.98E-03          | 1.57E-03   | 1.904   | 0.057    | 0.00%                        |
| Value of market output/1 ha                                    | 5.70E-02          | 2.58E-02   | -2.210  | 2.71E-02 | -1.00%                       |
| Investment value (ths PLN)                                     | 2.21E-03          | 1.15E-03   | 1.925   | 5.43E-02 | 0.00%                        |
| Agricultural income (ths PLN)                                  | -3.32E-03         | 2.39E-03   | -1.389  | 1.65E-01 | 0.00%                        |
| Income from work outside farm (ths PLN)                        | 1.23E-02          | 5.32E-03   | 2.316   | 0.021    | 0.00%                        |
| Savings (ths PLN)  | -5.35E-03         | 2.19E-03   | -2.442  | 0.015    | 0.00%                        |
| Farmer is a shareholder of cooperatives bank (1 – yes, 0 – no) | 1.49E-01          | 8.78E-02   | 1.696   | 0.090    | 2.50%                        |
| Model significance   | p-value=2.001E-10 |            |         |          |                              |
| R <sup>2</sup> LR  | =0.014            |            |         |          |                              |

Notes: <sup>1</sup> As in Table 8.

Source: Author’s calculations based on author’s survey.

The results of the probit model for loans from non-financial organisations showed (Table 10) that 10 variables are statistically significant. Their signs are as expected, except farm membership in a cooperative bank. What is more, in the case of these loans, gender is statistically significant. Its influence is very low, but it signals that this direction of investigation is worth examining.

## 8 CONCLUSIONS

The results of investigating the Polish loan market imply that informal lenders were important sources of financing farmers' activity in Polish agriculture during the examined period. This is consistent with findings about other post-communist countries and developing countries. However, the role of informal loans is very different. In Poland, informal sources of lending play supplementary roles to banks, while in developing countries they are the main source. It is expected that informal loans will retain their importance in the future, as farms increasingly integrate with their suppliers and buyers of their products.

The group of formal and informal lenders consists of the same type of lenders as in developing countries, with one exception. There are no moneylenders or landlords in Poland nowadays, while in developing countries they are very important sources of loans in rural areas.

The terms of formal and informal loans varied considerably. Moreover, the terms varied across the main groups of informal loans. The terms of informal loans were more advantageous for farmers compared with the terms of bank credits. This implies that farmers would prefer informal loans (especially from individuals) to formal loans. However, the informal sources offered loans of rather small value, which could be a problem for large expenses, for example investment projects. Thus, informal loans would not be sufficient.

Results on the level of influence that farm economics and farmers' characteristics have on taking loans are somewhat surprising: They showed that neither demographic features nor farm economics are important. Considering that loans were taken mainly for investment and production, features of entrepreneurship and creativity seem to be important.

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## DEVELOPMENT OF INNOVATIVE TECHNOLOGIES IN RURAL FINANCE

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### ABSTRACT

Expanding financial service coverage for rural residents is determined by the innovative potential of the financial sector. In this context, attention should be paid to the obvious need for improvement of rural financial institutions. Indeed, most rural residents do not have access to formal mechanisms of risk management; as a result, considerable credit risk is shifted to creditors. Therefore, special emphasis should be placed on strengthening the relevant institutional environment, including the development of rural finance, the creation of adequate infrastructure, and a more enabling policy environment. In this context, applying new financial technologies in Ukraine is critically important for reducing the default risk for borrowers, which would simultaneously improve access to finance for many rural residents.

**Keywords:** Rural financial system, microloan, innovative technologies.

### 1 INTRODUCTION

There is a growing understanding that developing countries' financial systems should be more open to their rural populations, including those with low incomes. In general, providing financial services to rural residents is located in a niche that is not sufficiently integrated into the main financial system. This isolation negatively affects both the coverage and efficiency of such services. High transaction costs associated with the provision of financial services to rural households (partly because they possess small amounts of money, live in sparsely populated areas and rarely have a credit history), are the reason why many representatives of the formal financial sector still view microfinance activities as non-profitable. Most rural residents do not have access to formal mechanisms of risk management; as a result, considerable credit risk is shifted to creditors.

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In this context, attention should be paid to the innovative potential of the financial sector, which determines the ability to expand financial service coverage for rural residents. Twenty years ago, the main tasks for the financial sector when dealing with the rural population were related to finding methods of providing and repaying loans (not backed by collateral) for rural entrepreneurs and low income households. Today, after major success in this area, a new systemic task has emerged – the search for ways to integrate a full range of financial services for the rural population into the traditional financial system.

Hence, the main task in rural development is the elimination of barriers between the rural population and the formal financial sector. Since rural customers represent a huge potential market for retail financial services, more and more financial intermediaries all over the world are successfully entering this market. However, it is obvious that financial intermediaries would not set the goal of providing services to the rural population until they find ways of profitably providing services to these clients. This requires the availability of marketing channels for services that would not only be affordable for the majority of the rural population, but would provide the opportunity to decrease transaction costs. Existing programs for providing loans to the rural population appear to be profitable, but operating in this market requires changes in the personnel recruiting systems, which is not easy to do for traditional financial intermediaries. In developed countries, the technological channels of low cost "direct financial services" (who provide transactions at a price equal to just 1/5<sup>th</sup> of the cost of traditional services) are widely used (IVATURY, 2006). Thus, using modern financial technologies as a channel for providing services to the rural population may decrease transaction costs to such a level that formal financial intermediaries would be able to provide profitable services to very poor customers in remote areas.

However, we should not conclude that the rural population would turn to formal financial services just because they have access to various technological channels. In countries where financial intermediaries actively use these technological channels for providing services to rural customers, a high percentage of rural customers possess inactive accounts. In this context, it is important to determine to what extent the manner of providing services limits the financial needs of the rural population, and how it influences the profitability of the financial intermediaries providing these services. However, there are no studies in Ukraine that analyse how convenient and reliable the existing channels of providing service are for rural customers (according to their assessment). In this context, it is necessary to conduct a survey to discover why some rural clients feel uncomfortable when using technological channels: Do they not trust the operator? Do they feel that the proposed products are not good for them? Or are they afraid of various technological innovations? Answers to these questions would allow financial intermediaries to expand their opportunities to use technological channels and products for providing services to rural customers.

The need to study innovative approaches to rural finance is stressed by Fernando (FERNANDO, 2003; 2004). Banks using technological channels to provide services to the rural population are discussed in the works of Ivatury (IVATURY, 2006) and Mainhart (MAINHART, 1999). These researchers analyse the strategy of creating policy and infrastructure, which is necessary for improving the rural population's access to financial services, by means of technological channels, as well as the peculiarities related to the poor using these technologies.

Concerning Ukraine, there is a lack of research dedicated to the interaction of the banking sector and rural residents. Most studies analyse the needs of rural residents, or develop recommendations for the governmental and financial sectors. However, such recommendations often do not take into account the economic interests of financial intermediaries, and that is why, as a rule, they do not look attractive for participants in rural financial markets and are rather declarative by their nature. Sedik (SEDIK, 2003) stresses the need to create a commercially viable client base for the further development of rural finance. However, there have been insufficient attempts to analyse the conditions under which providing services to the rural population would be profitable for financial intermediaries.

## **2 METHODOLOGY**

The main purpose of our paper is to explore financial technologies that would facilitate the creation of viable financial products combining resource credit and insurance, and simultaneously stimulate the development of a marketing infrastructure. We have explored alternatives for providing additional financial services through information and communication technologies. This survey was conducted by interviewing various participants of the rural finance system: Banks, which provide services to the rural population and to farms, the rural population and managers of agricultural enterprises; also, experts in the field of providing microfinance in rural regions. As a result of our research, we plan to develop a strategy for creating efficient financial systems by means of technological channels.

The goal of our survey was to obtain answers to the following questions:

- Will implementing various financial technologies in developing countries result in the increased profitability of financial services provided to the rural population by traditional financial institutions?
- Will traditional financial institutions decrease costs to such a level that providing profitable services, even to the very poor or people who live in remote areas (which are usually excluded by banks) is possible?
- How will rural clients perceive the introduction of technological channels? Will these channels be convenient for them?

- Of what value is the use of technological channels for financial institutions?

In our research, we used materials from the Consultative Group to Assist the Poor, as well as the Program of Providing Microloans in Ukraine, which is the product of joint efforts by the European Bank for Reconstruction and Development and the German-Ukrainian Fund.

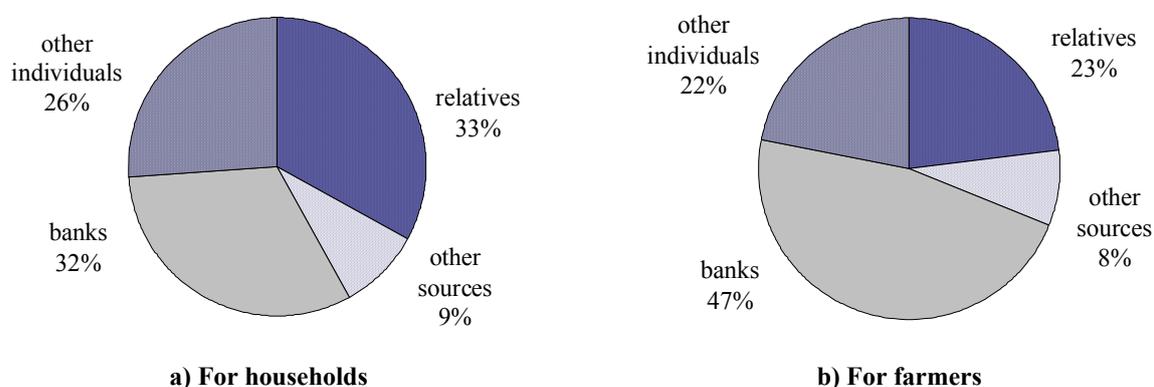
### 3 RESULTS

#### 3.1 Analysis of the Ukrainian rural microfinance market

Today, the financial needs of Ukrainian rural territories, which are characterised by a high percentage of agriculture, remain largely unsatisfied. Ukrainian banks almost ignore small rural businesses. The percentage of loans extended to small businesses in the total portfolio of loans of an average bank hardly exceeds 10% (DEMENKOV, 2006). Obvious causes of this situation include underdeveloped financial institutions, high risk, and the asymmetric distribution of information between creditors and borrowers. Providing microfinance services to Ukrainian rural households is associated with considerable costs – partly because they possess small amounts of money, live in sparsely-populated areas and rarely have a credit history. Hence, high transaction costs associated with financial activities in rural regions are the reason why many representatives of the formal financial sector still see microfinance activities as non-profitable; they believe the rural population is not able to pay the high interest rates that would offset these transaction costs.

Nevertheless, according to the results of our research, for most rural residents banks are a very important source of borrowed funds (Fig. 1). Formal loans are gradually replacing informal borrowing from relatives and other individuals. The state as a source of loans has practically disappeared.

**Figure 1: Sources of credit for farmers and rural households in Ukraine, 2004**

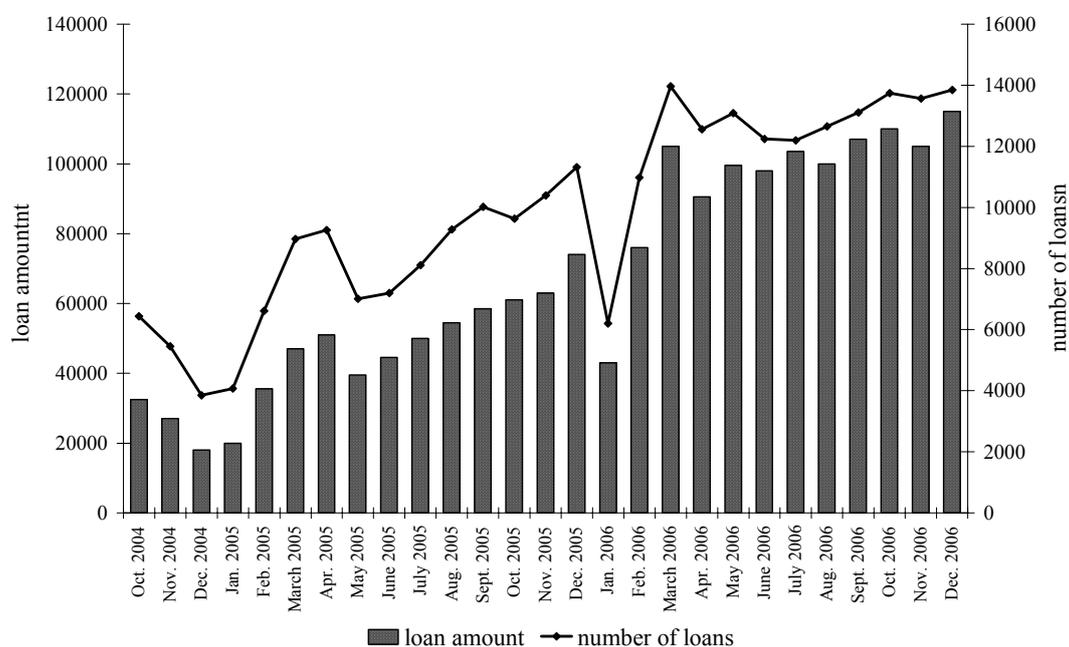


Source: LERMAN et. al., 2006.

Figure 1 illustrates that, in contrast to general opinion, farmers and rural households (even with low incomes) need financial services, use them, and are ready to pay even high interest rates. For example, in order to obtain a loan without collateral, a typical rural entrepreneur pays the bank a rate of 24-36% in annual interest. Annual interest rates for collateralised loans are somewhat lower – 16-17%. So interest rates for small rural entrepreneurs remain high in the financial market. Comparisons with the United States, Western Europe and even Russia are not beneficial for Ukraine (the cost of borrowed capital in developed countries usually does not exceed 9%). Indeed, we have reason to say that domestic financial institutions overstate interest rates – for all banks participating in our survey, the percentage of overdue loans extended to small businesses did not exceed 1-2% (DEMENKOV, 2006). However, banks oriented toward small businesses, especially in rural areas, add considerable risk premiums – hence, their loans are quite expensive.

Despite quite expensive loans, the number of potential micro-borrowers is constantly increasing. For example, in 2005-2006, the number of loans extended through the Program of Providing Microloans in Ukraine increased by 54% (Fig. 2).

**Figure 2: Loans, extended through the Program of Providing Microloans in Ukraine**



Source: PROGRAM OF PROVIDING MICROLOANS IN UKRAINE: <<http://microcredit.com.ua/>>.

Thus, access to loans is more important for the poor than are interest expenses (since small rural entrepreneurs have a larger income per *hrivna* of investments compared with large businesses) and interest expenses appear more preferable

than other business expenses or costs associated with loans from informal sources.

This explains recent positive trends in the area of providing microloans to Ukrainian farms. For example, the average loan amount decreased considerably. In 2000, the average loan amount equalled USD 12,000, while today it amounts to just USD 6,700. This illustrates the improved access to loans for small market segments. By the end of 2006, 84% of all outstanding loans were made up of loans in the amount up to USD 10,000. Such a situation is the result of an increase in the banks' interest in this group, as well as an increasing awareness level inside the target group concerning the possible financing of small business (PROGRAM OF PROVIDING MICROLOANS IN UKRAINE).

It should be mentioned that rural entrepreneurs' access to banks' resources was opened by foreign financial intermediaries. The European Bank for Reconstruction and Development pioneered the field of providing loans to small businesses in 1994. Today the number of banks that finance small rural enterprises (sometimes with the aid of foreign financial institutions) is constantly increasing.

The Program of Providing Microloans in Ukraine is a bright example of the interaction between Ukrainian banks and international financial intermediaries. Participants of this program include the following banks: Raiffaisen Bank Aval, Privatbank, Forum, ProCredit Bank, Nadra, Kreditprombank, and Kredo Bank. These partner banks systematically obtain technical assistance that allows them to develop loan products (which are acceptable for target groups), as well as to determine the solvency level for potential borrowers and to assess possible risks, thus controlling and expanding their loan portfolios.

In 2005, the focus of this program shifted to the expansion of activities directed at the target group in rural towns, where most target customers are represented by farmers who earlier did not have access to bank loans. The technologies for providing loans used in this program were adapted to the peculiarities of agricultural business, and transferred to four partner banks – Privatbank, Nadra, Forum and Kreditprombank. During the first year of using this technology, the partner banks extended more than 4,000 loans amounting to USD 20 million to rural and agricultural entrepreneurs. The average loan amount equalled USD 5,000, and in most cases loan terms do not exceed one year (Table 1).

**Table 1: Description of loan products of the Program on Providing Microloans in Ukraine**

| Type of Loan                       | Maximum Amount                | Purpose of Loan                           | Peculiarities   | Target Group                        |
|------------------------------------|-------------------------------|---|---|-------------------------------------|
| Credit card                        | Up to USD 1-2 thousand.       | Small purchases, business travel expenses | No collateral, flexibility in terms of usage and amortisation | Entrepreneurs, legal entities, etc. |
| Overdraft                          | Up to \$25 thousand           | Replenishment of current assets           | Flexibility in terms of usage and amortisation                | Legal entities                      |
| Credit line                        | Depends on transaction volume | Replenishment of current assets           | Flexibility in terms of usage and amortisation                | Legal entities                      |
| Express loans                      | USD 5-10 thousand             | Replenishment of current assets           | No collateral, quick application procedure                    | Entrepreneurs and legal entities    |
| Microloan                          | Up to USD 30 thousand         | Replenishment of fixed and current assets | Collateral is necessary, interest rates are lower.            | Entrepreneurs and legal entities    |
| Loan in terms of the Agro+ Program | Up UAH 300 thousand           | Replenishment of fixed and current assets | Provided mostly in UAH  | Rural entrepreneurs                 |
| Small loan                         | Up to USD 100 thousand        | Replenishment of fixed and current assets | Customised amortisation schedule                              | Small businesses                    |
| Financing of microprojects         | USD 100-250 thousand          | Modernisation of existing operations      | Project evaluation  | Small businesses                    |

Source: Authors.

Ukrainian banks behave somewhat aggressively when providing microloans. An increasing number of banks, being subject to severe competition in the traditional segment, are entering the market of providing loans for small businesses. Thus, commercial banks play an important role in the market for microfinance services. In view of the inactive microfinance organisations in Ukraine, commercial banks have a potential competitive advantage in many areas, such as famous brands, infrastructure and access to capital.

As a result of our research, we found that many banks consider the possibility of the rural population entering new financial markets; this is represented by absolutely new clients and assets. Commercial banks, encountering increasing competition in traditional retail markets, are showing interest in rural microfinance because these new potential customers may increase the client base, but still allow the banks to retain adequate profitability.

However, there are a lot of unsolved problems. For example, Ukrainian banks provide almost no start-up capital and investments for modernising existing

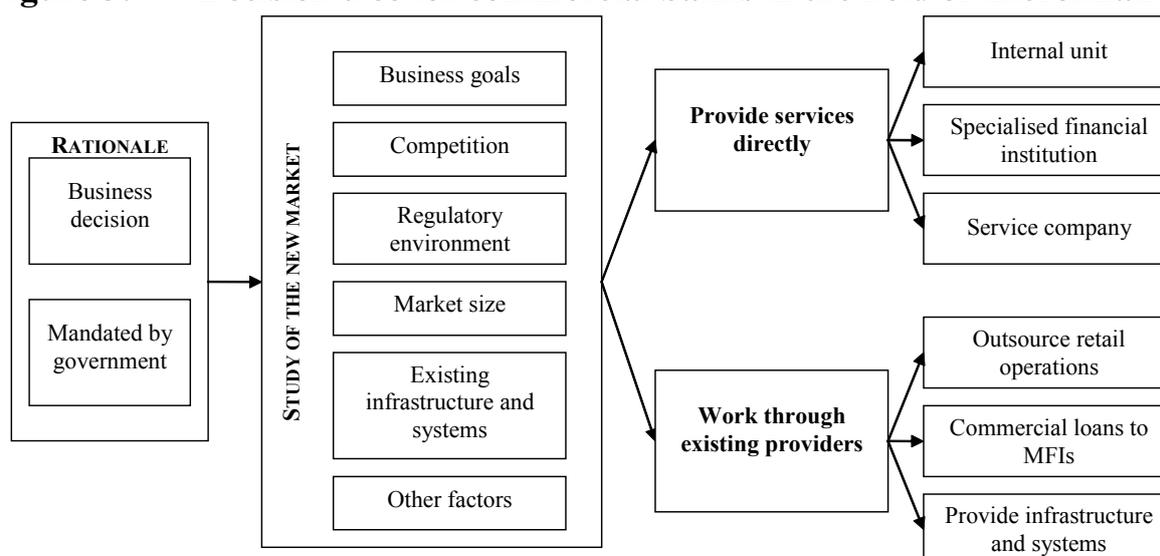
capacities in agricultural enterprises. In view of the extreme shortage of investments in the modernisation of agricultural machinery and technologies, banks usually provide loans for financing enterprises' current operations. Indeed, the share of investment loans for small businesses does not exceed 9% of the total volume of extended loans. The high costs of investment loans restrict their demand.

### 3.2 Organisational features of bank operation models in the field of microfinance

It is necessary to understand that banks' success in rural microfinance is not guaranteed. Attempts by many Ukrainian banks to enter this market did not bring them any success, since they did not understand this market's dynamics and tried to use standard approaches of providing services to new customers. We can say for certain that there is no single prescription for entering the microfinance market. Each bank has its own business goal, its own competitive and regulatory environments. Banks apply various approaches to the selection of the microfinance market entry strategy. Isern and Porteous distinguish two microfinance market entry strategies, (depending on the way banks contact their clients) either direct and indirect (ISERN and PORTEOUS, 2005). For example, banks may enter the market directly, expand operations with individuals, or create a new department or company. At the same time, other banks may apply indirect approaches by cooperating with existing microfinance organisations.

The Consultative Group to Assist the Poor (CGAP) determined six different approaches employed by banks for entering the microfinance market (Fig. 3).

**Figure 3: Decision tree for commercial banks in the field of microfinance**



Source: ISERN and PORTEOUS (2005, p. 3).

Creating an internal department leads to the provision of microfinance services in terms of existing organisational structure, as well as the improvement of personnel's skills. Such a unit requires adapting the bank's systems and procedures to the microfinance requirements. Banks may extend more independence to their units by creating separate systems, loan procedures, personnel policies and governance. Internal units may be linked to various bank departments, such as retail or consumer finance departments.

On the other hand, rather than setting up an internal unit, banks may decide to create a legal entity, for example a specialised financial institution (SFI), which is licensed and regulated by local banking authorities. Such an institution (a finance company or other non-bank institutions) may provide retail microfinance services including loan origination, disbursement, collection, etc. SFI is characterised by separate corporate identity, governance, management and personnel, as well as the usage of parent bank infrastructure (offices, information technologies, accounting, etc.) (ISERN and PORTEOUS, 2005).

In terms of the service company pattern, banks create non-financial legal entities (service companies) that are expected to provide microloans and portfolio management services. Unlike specialised financial institutions, service companies usually undertake a rather restricted range of operations, and they are not regulated by banking authorities. Loans and other financial products (savings, transfers, payment services, etc.) are registered with the parent bank, while the service company usually maintains separate corporate identity, governance, management, personnel and information systems (though they tend to be linked directly with the parent bank's informational systems). Service companies may be owned by the bank, but the structure of the service company allows the bank to use various experienced providers of technical service and other interested investors as equity partners, which would be impossible in terms of an internal unit. Further, service companies may operate in designated areas within bank branches or in separate offices located nearby the bank.

In terms of this model, the bank originates microfinance loans, which are registered in the bank's books, in order to make loan decisions and to maintain the loan portfolio. They do this in return for a share of the interest income or fees. This arrangement is similar to how banks outsource transaction processing to ATM network operators. Microfinance products, including loans, insurance, and money transfers, may be branded by the bank or the MFI, or may be a joint brand. However, this model requires the bank and MFI to share risks and incentives, thereby maintaining the quality of the portfolio. Hence, the bank may ask the MFI to finance a portion of the microfinance loan portfolio or to provide a first loss guarantee on a portion of it (ISERN and PORTEOUS, 2005).

Banks can provide loans to an MFI for various terms or lines of credit. This is one of the most common models, since it is very close to standard commercial

bank lending. The loan may be unsecured, secured by collateral or be a third-party guarantee. Further, the bank may stipulate the submission of regular financial statements, rights to inspection, and other financial covenants. In some cases, banks provide access to their branches or ATM networks, front office functions (including cashier services), or back-office functions such as IT services and transactions processing, to a microfinance institution and its clients. In return, the bank receives fees, commissions, and rents from the MFI and its clients depending on the terms of the agreement. Transaction processing is the most basic and common form of this link between banks and MFIs, and it is generally the lowest-risk approach. MFIs can use their own personnel in the bank branch in order to serve MFI customers, or they can rely on the bank's infrastructure (ATMs and cashiers) for loan disbursements and repayments, domestic and international transfers, and foreign exchange transactions. Clients can have accounts with the bank directly or receive loan disbursements and repay loans to the MFI's account at the bank.

Commercial banks oriented towards taking advantage of microfinance opportunities should carefully evaluate the considerations listed in the decision tree (Fig. 3); specifically, they should consider their own goals, potential market size and competition, regulatory environment, current infrastructure and systems. Given the differences between classic banking and microfinance, commercial banks should view microfinance as a new business and conduct the same kind of research as any company entering a new market (ISERN and PORTEOUS, 2005).

The abovementioned models present a certain risk for banks and their system of management. Any bank will need to consider its own interests and institutional capacity, competition and other market factors. Second, banks involved in microfinance will need to develop new products to satisfy their target customers. In order to deliver their products effectively, banks often need to adapt their systems and procedures, providing specialised staff with training and incentives regarding new customers and products.

### **3.3 Use of technologies in financial system development**

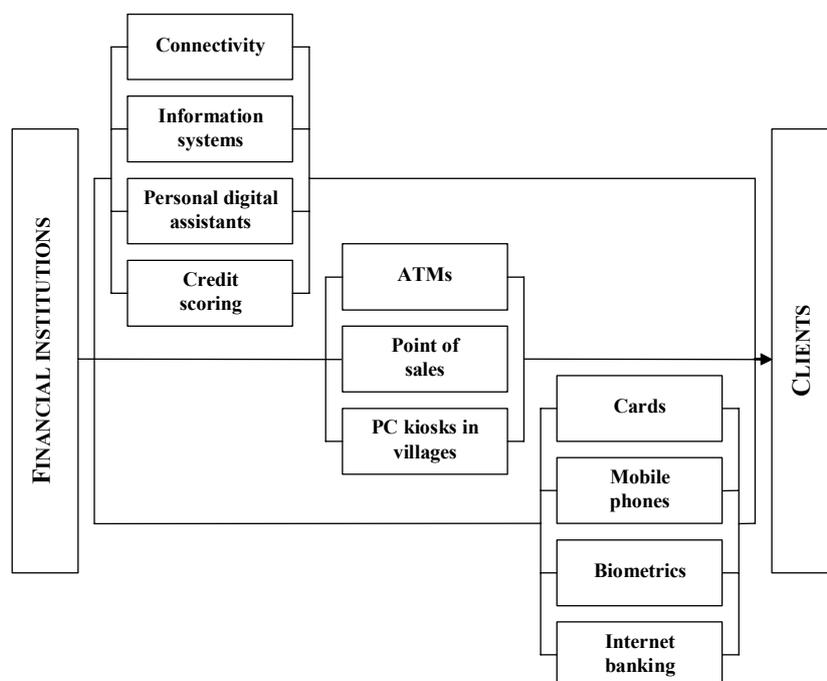
Considering the system for financing the rural population, we should remember that banks would not set the goal of providing services to the rural population until they find a way to do it profitably. This requires certain marketing channels to be accessible to a larger number of rural clients, as well as possibilities to process transactions with moderate costs. Programs for providing loans to the rural population have proven their profitability, but operating in this market requires changes in the system of selecting personnel, which is not easy to do for traditional banks. Despite this, developing ways to cut costs is critically important for the successful provision of financial services to rural customers (accounts and operations of rural clients with low incomes are quite small, which makes decreasing transaction costs the primary task).

Therefore, banks considering the possibility of financing rural clients and hoping to obtain profits from this segment should study alternative ways of providing additional financial services by means of information and communication technologies. Using modern banking technologies as a channel for providing services to the rural population may decrease transaction costs to such a level that banks would be able to provide profitable services to very poor rural clients and customers in remote areas. Hence, banks should search for ways of profitably providing loans. Since the majority of the rural population is paid in cash, in order to process operations with cash outside banks, they should at least have access to informational and communicational technologies.

Technology promises to reduce the costs of and improve transparency in delivering financial services, both of which can translate into increased access for large numbers of rural clients. Streamlined and automated processes allow financial institutions to extend services to harder-to-reach and more costly clientele by replacing people and branches with point-of-sale (POS) devices and the like. At the same time, reducing the "hassle factor" makes banking relationships attractive to more people. Finally, technology underpins the information and reporting systems that are essential for efficient financial service delivery (HELMS, 2006).

Figure 4 shows technologies that can be used to support financial services for rural residents. These technologies range from software that supports the internal systems of financial institutions to debit or credit cards and linkages with clients' mobile phones.

**Figure 4: Technology map**



Note: PC – Personal computer.

Source: Modified from HELMS (2006, p. 114).

These technologies are becoming increasingly available because of falling hardware costs and growing support infrastructure. At one time, the poor supply of telecommunications and electricity could not support ATMs or POS devices, particularly in rural areas. Now, however, telecommunications and electricity are more widespread and reliable.

Below we examine some of the technologies that may be used in rural microfinance.

*Information Systems* include custom-built or commercially-available software that allows financial institutions to record transactions and create reliable financial reports. Obtaining this right is a critical building block for all other technology applications.

*Connectivity* refers to network connections (for example, dial-up, broadband, or satellite) that link staff and branches for real-time information exchange, transaction processing, and distance learning.

*Personal Digital Assistants* (PDAs) refers to small handheld computers that help staff in the field collect data more efficiently, manage client records and process loans (HELMS, 2006).

*Credit Scoring* includes digitising or enhancing the loan approval process by the computerised analysis of customer characteristics and behaviour in order to predict willingness and ability to repay.

*Automatic Teller Machines* (ATMs) refer to machines that dispense cash or provide a wider range of services to cardholders. ATMs are relatively expensive to own and operate. Most of them require network connectivity and reliable power. However, ATMs are intended for customers in urban and semi-urban areas. These locations are more likely to have reliable electricity and "always-on" telecommunications connections that most ATMs require to connect to a bank's central server. In addition, because ATMs must regularly be manually refilled or emptied of cash, it is most cost effective to place them in densely-populated areas.

*POS devices* are typically used to handle payment transactions. The device can be a card reader, mobile phone, personal computer (PC), barcode scanner, or any hardware that can identify customers and receive instructions for the transfer of value. Where transaction volume is expected to be high, or where wireless Internet access is available, PCs may be used, although most POS devices are card-reading terminals. Each POS device uses a telephone line, mobile phone connection, or the Internet to send instructions for transferring value from one account to another. For example, after swiping a card through the POS device, the merchant presses a button on the terminal authorising payment from the customer's line of credit (credit card) or funds available in the customer's current account (debit card). If the POS device is a mobile phone, the customer uses his or her mobile phone to send a text message authorising payment from her bank account, or from her account with the mobile phone company, to the merchant's phone.

A POS device is not a banking channel on its own. A human attendant must be available to count and store cash and to use the POS device to identify the customer (such as by having the customer swipe a debit card and input a personal identification number – PIN). The bank also relies on this person to answer customer queries, explain product features, and do other tasks. Supermarkets, drug-stores, post offices, and other retail outlets are ideal locations for a POS device because they have cash on hand and have staff to operate the device. In return for "hosting" the POS device and offering banking services, the retail outlet expects to increase sales by attracting customers as well as to earn a share of bank fees (IVATURY, 2006).

*Internet Banking* is the ability to conduct banking transactions over the Internet from any location, such as from the home or Internet kiosks. This service is probably more relevant for higher-income clients.

*Magstripe and Smart Cards* include debit (or sometimes credit) cards that store customer information and account balances. These cards allow customers to access their accounts online via ATMs and POS devices. Smart cards have an embedded chip that stores information, thereby allowing customers to complete transactions using remote devices that do not have an online real-time connection with the central server (HELMS, 2006).

*Biometrics* is a technology that measures an individual's unique physical characteristics, such as fingerprints, to recognise and confirm identity for security purposes.

*Mobile Phones* employs technology that offers an opportunity to operate virtual bank accounts with minimal infrastructure. Millions of poor and low-income people in rural regions have access to mobile phones, and increasingly use text messaging. Mobile phones can also be used as a POS device by merchants, market vendors, and others.

Financial institutions can employ some combination of these technologies to reach clients directly, or use them in partnership with others. The large volume of transactions required to ensure a return on technology investments (especially ATMs) drive financial institutions to leverage each other's networks. Also, by working with agents like local merchants and smaller MFIs, financial institutions can reach poorer or more remote rural clients without building expensive branch networks. Nevertheless, several challenges remain, including the high cost and limited availability of existing technological solutions, consumer acceptance of technology, the lack of basic communications infrastructure, and inadequate government policies.

It is difficult to say whether using technological channels is profitable enough to make providing bank services to rural clients possible. There is no analysis of the profitability of substituting banks with cellular phones or cash terminals. Though the use of ATMs or terminals for obtaining cash decreases costs, this

approach would not help banks to attract clients in remote areas. In general, using technologies becomes profitable only if there is a critical mass of clients and if a wide range of services is provided.

We believe that the most appropriate technological channel for Ukrainian financial institutions is related to the use of points of sales. As a result of the survey, we came to the conclusion that many rural residents are unfamiliar with bank branch procedures or feel uncomfortable dealing with tellers and other branch staff. In contrast, retail and postal outlets often enjoy substantial brand value and are trusted by rural residents. Instead of branch banking, customers may use POS devices located at a nearby post office or retail outlet, which has longer hours than the bank branch. Banks that did not participate in the survey are also interested in using this technological channel, since it is much cheaper compared to traditional methods of providing services. Indeed, bank branches are expensive because they require considerable investments in staffing, infrastructure, equipment, and security for cash and valuables storage and transportation.

The ATM is a convenient technological channel for the cities' suburbs. The ATM channel is generally less expensive than the use of branch tellers, because ATMs fully automate cash disbursements and collections. However, cash still needs to be transported to and from the machine. The use of POS devices is probably the least expensive of these channels, because these devices are placed at retail or other outlets, which already have cash on hand.

#### **4 CONCLUSION**

Developing financial infrastructure in rural areas is vitally important for economic growth and poverty alleviation. The rural population needs deposit and loan facilities, as well as other financial services that provide opportunities for opening businesses, improving living conditions and the level of social and economic security. Efficient financial markets facilitate the accumulation of assets, diversify and increase incomes, as well as decrease vulnerability to economic perturbations. Hence, the rural population demands bank deposits and loans, and is ready to pay a high price for services delivered by formal intermediaries. Nevertheless, rural clients are still viewed as unprofitable by most banks. High transaction costs associated with microfinance activities are the reason why many commercial banks still view microfinance activities as unprofitable.

In many developing countries, state agricultural banks, development banks and savings banks provide services to poor clients, but their goals are more social than commercial in nature. Thus, rural finance has been seen as a specialised niche for development programs, incompatible with financial markets and systems. It is widely believed that the provision of loans to farmers and households is an area for socially-oriented non-government organisations, and not for banks and other participants of the financial market.

In this context, attention should be paid to the obvious need for improvement in rural financial institutions, since most rural residents do not have access to formal mechanisms of risk management; as a result, considerable credit risk is shifted to creditors. The application of new financial technologies in Ukraine is critically important for reducing the default risk for borrowers, which would simultaneously improve access to finance for many rural residents. These technologies would facilitate the creation of viable financial products combining resource credit and insurance, and simultaneously stimulate the development of marketing infrastructure. In other words, expanding financial service coverage for rural residents is determined by the innovative potential of the financial sector.

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## EFFICIENCY OF INDEX-BASED CROP INSURANCE IN RUSSIAN AGRICULTURE

RAUSHAN BOKUSHEVA,\* MARINA SANNIKOVA,\*\* OLAF HEIDELBACH\*\*\*

### ABSTRACT

The paper evaluates two main types of index-based insurance – area yield insurance and weather-based index insurance – regarding their efficiency in reducing the production risks of Russian farms in the steppe climatic zone. The analysis considers area yield insurance at two levels of aggregation – *oblast* and *rayon* (county) level. Weather-based index insurance products are drawn up by combining two weather parameters – daily precipitation and average daily air temperature. We employ yield and weather data from an experimental station in Central Volga Russia from 1979 to 2000. In addition, expert assessments are used to specify alternative levels of production technology and respective yield distributions for the considered region. To assess the utility-efficiency of the defined insurance products, a programming model was formulated for 22 states of nature and 3 levels of the decision-maker's risk aversion. The model estimation results show that area yield insurance, based on *oblast* and *rayon* yields, is most efficient in stabilising farm income. The weather-based index insurance follows immediately thereafter. Both index-based insurance types provide the considered farm with a higher utility than farm yield insurance with deductibles. This result implies the high potential of index-based insurance for Russian farms situated in the steppe zone.

**Keywords:** Risk-management, index-based crop insurance, Russia.

### 1 INTRODUCTION

Production risk is an important determinant of production development in Russian agriculture. Production risk caused by unfavourable weather conditions not only seriously affects Russian farm income, but also significantly defines national

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agricultural output during individual years (LIEFERT, 2002). In this context, assessing production risk and determining effective risk-coping instruments play an important role in terms of both the stabilisation of farm incomes and the consequent reduction of Russian agricultural output volatility. While assessing the effect of production risk on the development of agricultural production has been the subject of several investigations (BOKUSHEVA, 2002; BOKUSHEVA and HOCKMANN, 2006), so far there has been no study analysing suitable risk management instruments for Russian agricultural enterprises.

Production risk is especially prevalent in crop production. Appendixes A and B illustrate grain and sunflower yields and coefficients of variation in the main Russian agricultural regions from 1985-2005. As can be seen, the grain yield coefficient of variation in the individual *oblasts* of two main grain-producing regions – the Southern and Volga Federal Districts – exceeds 20 per cent; in several *oblasts* it accounts for more than 30 per cent. A similar picture is observable regarding sunflower yield variation: Its coefficient of variation is over 20 per cent in almost all main production regions.

The high level of production risk in Russian agriculture is primarily explained by unfavourable climatic conditions in vast areas of the country. A significant part of the country's agricultural area is defined as either an *area of risky agriculture*, or as an *area of increased production risk* (SHELTIKOV et al., 2001). Indeed, the most important agricultural regions in Russia are situated in the steppe climatic zone (LOSEV and ZHURINA, 2001). The steppe zone covers the Low and Central Volga region, Northern Caucasus, Southern Ural as well as southern areas of Western and Eastern Siberia. A main feature of the steppe zone is that annual evaporation typically exceeds annual rainfall, which varies between 250mm and 450mm. The average daily temperature in July ranges from 20-25°C, and while snow coverage in winter is rather moderate, the air temperature can get down to -45°C (LOSEV and ZHURINA, 2001). With drought and dry winds as the main natural hazards, such climatic conditions seriously affect agricultural production and render the application of risk management instruments indispensable.

Agricultural commodity producers have many alternatives for coping with risks. Risk management instruments can be classified into two basic groups: (1) on-farm instruments, and (2) risk-sharing tools (FLEISCHER, 1990). The first group includes such risk management instruments as diversifying one's production portfolio, holding sufficient liquidity, creating reserves, choosing less risky products and production practices, reducing production cycles, progressive investments, etc. Moreover, contracting production, hedging on the futures and options markets, vertical integration, insurance, and availability of additional sources of incomes belong to risk-sharing strategies (MEUWISSEN et al., 2004). While on-farm risk management instruments can be employed by farmers independently,

risk-sharing strategies assume the availability of a corresponding institutional environment and market infrastructure.

At the current stage of economic development, technological instruments and crop insurance present the most accessible risk-reducing tools in Russian agriculture. Technological solutions include maintaining soil humidity, correctly timing the implementation of technological operations, adopting new plant sorts, etc. Crop insurance has a long tradition in Russia, but currently, it is provided in the form of farm yield insurance (FYI) only. Historical experience shows that this type of insurance is strongly prone to asymmetric information problems. In fact, Russian agricultural insurers emphasise the increasing occurrence of moral hazard (INTERFAX, 2007). A traditional way of preventing moral hazard is to provide crop insurance at lower loss coverage levels. This, however, may seriously affect insurance effectiveness from the farmers' point of view, and thus may reduce demand for this risk management instrument. The introduction of index-based insurance presents a new approach for solving moral hazard problems on the insurance market. However, to the best of the authors' knowledge, the applicability of such insurance products to Russian agriculture has not yet been evaluated in the literature. Thus, the objective of the study is to determine appropriate index-based insurance products for Russian agriculture and to analyse their efficiency in comparison to traditional FYI. Therefore, based on the weather and yield time series from a study farm in Saratov *oblast*, we first draw up alternative index-based insurance products. In a further step, by applying a utility-efficient programming model, we comparatively evaluate their efficiency by taking into account the decision-maker's risk attitude and different levels of farms' risk exposure subject to production technology choice.

The paper proceeds as follows. In the next section, we describe the methodology and data applied. Section 3 presents and discusses the empirical results of the study. Section 4 concludes.

## 2 METHODOLOGY AND DATA

In the first step of the analysis, alternative schemes of index-based crop insurance products were drawn up by taking into account climatic conditions and structural characteristics of the Central Volga region. Area-yield insurance (AYI) was formulated at *oblast* and *rayon* (county) levels. Weather-based index insurance (WBII) was designed by employing different hydro-meteorological indices. In the second step, the efficiency of the considered insurance products was analysed comparatively by applying a utility-efficient programming model and taking into account differences in farm's risk exposure subject to choice of production technology.

## 2.1 Insurance products design

Index-based insurance contracts applied in crop production are built on either a weather index or an area-yield index for pricing insurance contracts. For AYI contracts, average area yield triggers an indemnity payment equal to the difference, if positive, between actual area yield in an individual year and some pre-determined critical yield (MIRANDA, 1991). In WBII contracts, insurance payoffs are subject to the occurrence of a special weather event, which can be described by a meteorological index (SKEES, 1999). Index-based insurance enables the solving of problems caused by information asymmetries on the insurance market. This index-based insurance advantage exists due to the objective nature of the parameters it is based on. At the same time, the risk-reducing potential of index-based insurance contracts depends strongly on the extent to which individual farmers are affected by systemic risk related to AYI or an individual natural hazard (drought, for example) concerning WBII. Consequently, the level of basis risk which cannot be insured through index-based insurance will determine the effectiveness and hence the demand for such insurance contracts. In this regard, a particular task of insurance design is to find parameters of insurance contracts that allow the maximum reduction of a farm's basis risk.

### *Area yield insurance*

According to MAHUL (1999) an individual farmer's stochastic yield can be related to a corresponding area yield as follows:

$$\tilde{y}_i - \mu_i = \beta_i(\tilde{y} - \mu) + \tilde{\varepsilon}_i, \quad (1)$$

with

$$\beta_i = \text{cov}(\tilde{y}_i, \tilde{y}) / \text{var}(\tilde{y}), \quad (2)$$

$$E\tilde{\varepsilon}_i = 0; \quad \text{cov}(\tilde{\varepsilon}_i, \tilde{y}) = 0, \quad (3)$$

$$E\tilde{y}_i = \mu_i; \quad E\tilde{y} = \mu, \quad (4)$$

where  $\tilde{y}_i$  is the farmer's stochastic individual yield, and  $\tilde{y}$  is the stochastic area yield. The coefficient  $\beta_i$  measures the sensitivity of farm yield to changes in area yield. Formula (1) divides a farm's total yield risk into a component that perfectly correlates with the area yield, i.e., systemic risk, and a component  $\tilde{\varepsilon}_i$  that does not correlate with the area yield, i.e., a farm's idiosyncratic risk. Consequently, an AYI contract covers only involved systemic risk, while the farm's idiosyncratic risk remains uninsured in this case. The optimal coverage of the AYI contract is equal to the farmer's individual  $\beta_i$ -coefficient. Accordingly, indemnity payments are defined by the following rule:

$$\text{indemnity}_t = \begin{cases} 0, & \text{if } y_t \geq \mu \\ \beta_i(\mu - y_t), & \text{if } y_t < \mu \end{cases}, \quad (5)$$

where  $y_t$  is the actual realisation of the area yield in year  $t$ .

### *Weather-based index insurance*

For WBII, the farmer's individual yield  $\tilde{y}_t$  can be decomposed into a component  $y_t^w$  that depends on realisation of a weather parameter (or index) in year  $t$  and a component  $\tilde{\varepsilon}_t$  that is determined by other factors:

$$\tilde{y}_t = y_t^w + \tilde{\varepsilon}_t, \quad (6)$$

with

$$y_t^w = \text{const} + \alpha I_t, \quad (7)$$

$$E\tilde{\varepsilon}_t = 0; \quad \text{cov}(\tilde{\varepsilon}_t, \tilde{y}_t^w) = 0, \quad (8)$$

$$E\tilde{y}_t^w = \mu^w, \quad (9)$$

where the component  $y_t^w$  is defined by regressing the farm's yield on a selected weather-based index  $I_t$ .

Indemnity payments are defined, respectively, as follows:

$$\text{indemnity}_t = \begin{cases} 0, & \text{if } y_t^w \geq \mu^w \\ \mu^w - y_t^w, & \text{if } y_t^w < \mu^w \end{cases}. \quad (10)$$

### *Farm yield insurance*

In this study we evaluate the efficiency of index-based insurance products by comparing them with traditional FYI, which is defined based on the farm's historical yields. In this case, indemnity payments are described according to the following:

$$\text{indemnity}_t = \begin{cases} 0, & \text{if } y_t \geq \mu_i \\ c(\mu_i - y_t), & \text{if } y_t < \mu_i \end{cases}, \quad (11)$$

where  $y_t$  is the realised farm yield in year  $t$  and  $c$  is the coverage level.

An important disadvantage of FYI is its limited potential to prevent moral hazard. Moral hazard is defined as the result of those hidden actions of the insured which increase the risk of the insurer. The effect of moral hazard can be described in the following way: Assume that a farmer demonstrates opportunistic behaviour by switching to a less intensive technology than he practiced in the past. Then, the farmer's indemnity gain due to moral hazard  $I^{mh}$  can be defined as follows:

$$I^{mh} = \begin{bmatrix} 0 & \text{if } y_t \geq y^{strike} \\ E(y^{APH}) - E(y^{ext}) & \text{if } y_t < y^{strike} \end{bmatrix} * p, \quad (12)$$

with

$$y^{strike} = E(y^{APH}) > E(y^{ext}), \quad (13)$$

where  $y^{strike}$  is the strike yield estimated on the basis of the farmer's actual production history and typically equals its expected value  $E(y^{APH})$ ;  $y_t$  is the farmer's yield under the less intensive technology in production year  $t$ ;  $E(y^{ext})$  is the expected yield under this technology, respectively; and  $p$  is the price of the insured crop as stated in the insurance contract.

## 2.2 Utility-efficient modelling framework

Comparing the efficiency of different insurance products was done by estimating their utility-efficiency for the decision-maker. The Expected Utility approach provides a convenient way to represent a decision-maker's risk preferences: Its basic idea is that a decision-maker maximises his expected utility. When income increases, utility increases less than proportionately for risk-averse decision-makers (the more risk-averse a person is, the more he will be prepared to pay to eliminate risk). Hence, utility is an increasing but downward-bending function of income. Expected utility estimates can be transformed into certainty equivalents (CE), which is the inverse of the utility function and which represents a certain monetary value. This provides a decision-maker with the same utility as a risky alternative, thus making him indifferent to facing the risk or accepting the sure sum (HARDAKER et al., 2004). An important advantage of CE is that it allows a quantitative comparison of different risky alternatives. Knowing certainty equivalent outcomes not only permits the ranking of risky alternatives, but also facilitates estimating risk premiums. CE simultaneously accounts for the probabilities of risky prospects and the preferences of the decision-maker (ANDERSON et al., 1977). Each production activity and risk management instrument may influence a decision-maker's expected utility. Examining CE is an approach for investigating the magnitude of this influence.

The utility efficient programming model (HARDAKER et al., 2004) is formulated as follows:

$$\max CE = [(1-r)E(U)]^{1/(1-r)}, \quad (14)$$

where  $CE$  is the certainty equivalent,  $r$  is the absolute risk aversion coefficient, and  $U$  a utility function defined in this study as a negative exponential function:

$$U = 1 - \exp(1-r)z \quad (15)$$

subject to

$$Ax \leq b, \quad (16)$$

$$Cx - Iz = uf, \quad (17)$$

and

$$x \geq 0, \quad (18)$$

where  $A$  is a matrix of technical coefficients for all activities,  $b$  is a vector of capacities,  $x$  is a vector of activity levels,  $C$  is a matrix of activity net revenues by state of nature,  $I$  is an identity matrix,  $z$  is the annual net income in each state,  $u$  is a vector of ones, and  $f$  is fixed or overhead costs.

The absolute risk aversion range for the model was derived from the plausible range of relative risk aversion coefficients –  $r_r$ , defined as the marginal utility of wealth. ARROW (1965) has shown that

$$r_a = \frac{r_r}{w}, \quad (19)$$

where  $w$  is wealth. HARDAKER et al., (2004) suggest that  $r_r$  should be a number close to 2. In our study, we employ three levels of relative risk aversion – 0.5 (hardly risk averse at all), 2 (rather risk averse) and 4 (extremely risk averse).

The model includes 4 different types of insurance products – FYI with coverage level 0.75, AYI based on *oblast* yield (OYI), AYI based on *rayon* yield (RYI) and WBII – and considers three levels of production technology related to the degree of intensity – intensive, medium, and extensive. Formulating technologies was done through expert assessments, with one of the regarded technologies being based on the historical yields of the study farm<sup>1</sup>. We consider 22 states of nature that correspond to the individual years in our data set. The basic descriptive statistics of the considered technologies are presented in Appendix C.

To rate the utility efficiency of index-based insurance products and assess their effect on the farm's production decisions, income certainty equivalent was estimated for different scenarios as described in Table 1.

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<sup>1</sup> Farm yields were de-trended by employing linear and second-degree polynomial functional forms.

**Table 1: Model scenarios**

| Scenario     | Description  |
|--------------|--|
| R            | Reference scenario: No access to insurance, $r_r = 2$  |
| 1            | Access to all insurance products                       |
| 2 (FYI-AYI)  | Access to farm yield and area yield insurance          |
| 3 (FYI-WBII) | Access to farm yield and weather based index insurance |
| 4 (AYI-WBII) | Access to area yield and weather based index insurance |

Source: Authors' estimates.

### 2.3 Data

In our empirical analysis we employ yield and weather data from an experimental station, situated in Saratov *oblast* (the Central Volga region), from 1979 to 2000. The weather data includes daily precipitation (mm) and average daily temperature (°C). Additionally, the study used official statistics on *oblast* and *rayon* yields for the same period.

The study farm produces winter wheat and spring wheat, winter rye, barley, sunflower seeds, and has a typical Saratov *oblast* production structure. The farm's crop area is 4,193 ha. The study farm primarily applies intensive technology and for the region has a relatively low yield variation<sup>2</sup>; nevertheless, coefficients of variation of the farm's main crops are higher than 30 per cent. The average level of winter crop yields on the study farm is slightly higher than average yields formulated by experts for intensive technology. On the other hand, spring crops' yield is somewhat lower compared to expert assessments for this level of technology. The average sunflower yield corresponds to yields under medium technology.

Twenty two considered states of nature are combined in 5 aggregated states; this allows a more convenient discussion of the model results:

S1 – Strong drought (1984, 1987, 1995, 1998);

S2 – Average drought (1979, 1981);

S3 – Weak drought (1985, 1988, 1991, 1992, 1994, 1996, 1999);

S4 – Favourable weather conditions (1980, 1982, 1986, 1990, 1993);

S5 – Very favourable weather conditions (1983, 1989, 1997, 2000).

<sup>2</sup> As can be seen from Appendix C, yield variability is strongly connected to the technology applied on farms in the considered region: Yield variation decreases with an increasing level of production intensity.

### 3 ESTIMATION AND EMPIRICAL RESULTS

#### 3.1 Area-yield index insurance

The high correlation between farm yields and *oblast* and *rayon* yields (Appendix D) point to a relatively high level of systemic risk in Saratov *oblast*, which is an important precondition for the introduction of AYI. Correlation coefficients between farm and area yields at the *rayon* and *oblast* levels vary from 0.85-0.95, with a higher correlation being observed with *oblast* yields. This means that the study farm's systemic risk component is better represented by yields of a higher than *rayon* level of aggregation and supposedly illustrates a relatively low level of idiosyncratic risks on the investigated farm compared to other farms in the respective *rayon*. Table 2 presents critical  $\beta$ -coefficients, which reflect the optimum insurance coverage for individual crops.

**Table 2:**  $\beta$ -coefficients estimated for AYI at *oblast* and *rayon* level

| Crops        | <i>Oblast</i> -yield index crop insurance (OYI) | <i>Rayon</i> -yield index crop insurance (RYI) |
|--------------|---|--|
| Winter rye   | 1.08  | 0.71   |
| Winter wheat | 1.14  | 0.83   |
| Spring wheat | 1.18  | 0.69   |
| Barley       | 1.30  | 0.85   |
| Sunflower    | 0.97  | 0.82   |

Source: Authors' estimates.

#### 3.2 Weather-based index insurance

In the literature, a weather index is usually built either from one or several weather parameters (BOKUSHEVA et al., 2006; KARUAIHE et al., 2006). In our study we tested different weather indices by employing various combinations of two weather parameters – cumulative precipitation and average daily temperature. To determine the weights of individual weather parameters considered for a weather index, the (de-trended) farm's yields were regressed on selected weather parameters. On the whole, we regarded two critical periods of plant vegetation: 1) from April to September for all crops, and 2) from December to February for winter crops.<sup>3</sup> Composition of the individual weather indices, which significantly determine the farm's crop yields, is presented in Table 3.

<sup>3</sup> We could not find any dependence between the weather parameters considered for the winter period and winter crop yields.

**Table 3: Weather index composition by crops (assessed for the study farm, 1979-2000)**

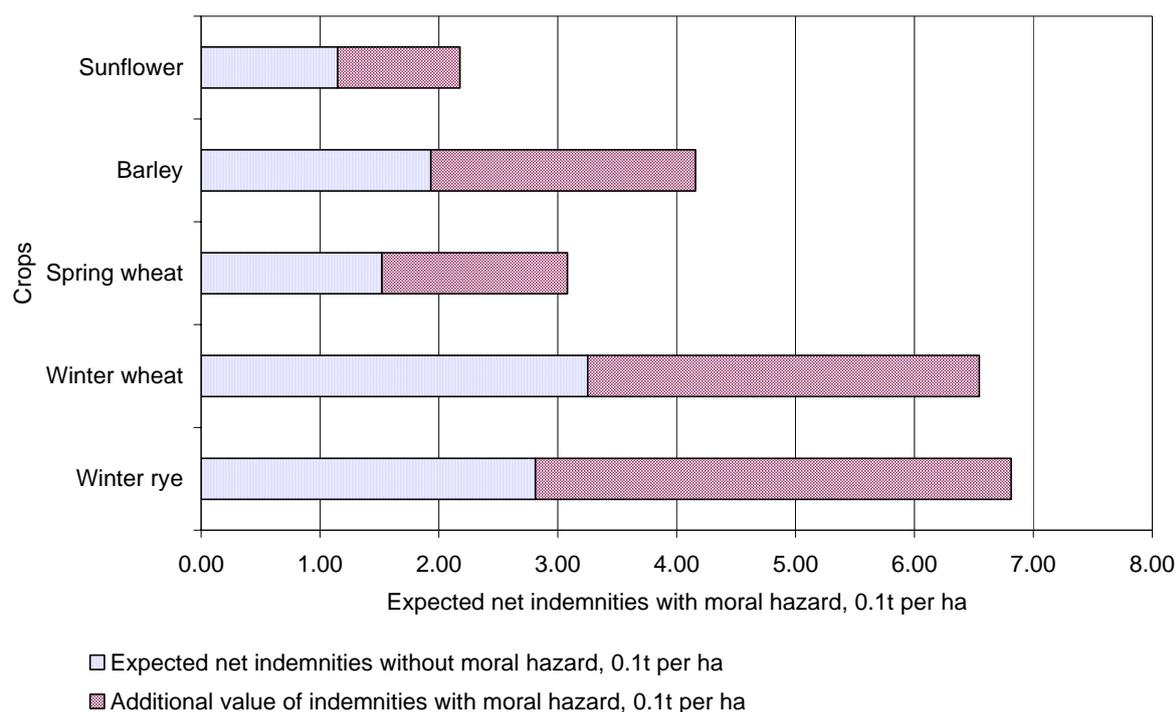
| Crops        | Weather parameter   | Coefficient estimates <sup>a)</sup> | R-squared |
|--------------|---|-------------------------------------|-----------|
| Winter rye   | Sum of rainfall from April 6 - June 4, mm ( <i>R</i> )                        | 0.05**                              | 0.80      |
|              | Sum of average daily temperatures from May 11 - June 29, degrees ( <i>T</i> ) | -0.04***                            |           |
| Winter wheat | Sum of rainfall from April 16 - June 4, mm ( <i>R</i> )                       | 0.10***                             | 0.78      |
|              | Sum of average daily temperatures from May 6 - June 29, degrees ( <i>T</i> )  | -0.03***                            |           |
| Spring wheat | Sum of rainfall from May 1-June 4, mm ( <i>R</i> )                            | 0.05**                              | 0.66      |
|              | Sum of average daily temperatures from May 1 - July 29, degrees ( <i>T</i> )  | -0.01***                            |           |
| Barley       | Sum of rainfall from April 26 - May 30, mm ( <i>R</i> )                       | 0.05**                              | 0.69      |
|              | Sum of average daily temperatures from May 21 - July 29, degrees ( <i>T</i> ) | -0.03***                            |           |
| Sunflower    | Sum of rainfall from May 4 - May 20, mm ( <i>R</i> )                          | 0.07***                             | 0.70      |
|              | Sum of average daily temperatures from May 4 - June 9, degrees ( <i>T</i> )   | -0.01*                              |           |

Notes: a) \*\*\*, \*\*, \* - significant at 0.01-level, 0.05-level, and 0.10-level, respectively.

Source: Authors' estimates.

### 3.3 Farm yield insurance

Farm yield insurance was constructed by employing the coverage level of 0.75, which is typically used in crop insurance practice. Introducing deductibles aims to prevent moral hazard; however, it can seriously affect the effectiveness of FYI. Thus, there is a certain trade-off between the FYI risk-reducing efficiency, which determines insurance demand, and losses that an insurer can experience in the face of moral hazard. Figure 1 shows that the effect of moral hazard can be very large under Russian conditions.

**Figure 1: Expected indemnity values with and without moral hazard**

Source: Authors' estimates.

For almost all crops, expected indemnity payments with moral hazard are at least twice as high as those without moral hazard. The potential insurance losses caused by moral hazard were calculated for a coverage level of 1.0, assuming that an insured farmer would switch from the medium technology to the extensive technology<sup>4</sup>.

### 3.4 Utility-efficiency of index-based insurance products

Model estimation results for the reference scenario R (without access to insurance) are presented in Table 4. According to the model estimates, the farm uses its whole crop area, i.e., 4,193 ha with 497 ha being occupied by winter wheat, 2,909 ha by barley and 786 ha by sunflowers. Winter wheat production is more profitable, but at the same time more risky than barley production – this prevents the farm from producing more winter wheat in the reference scenario. All crops are produced under intensive production technology. This result shows that this technology guarantees the farm the highest income utility.

<sup>4</sup> We estimate the moral hazard effect for switching from the medium to the extensive technology because only a limited number of farms in the Saratov oblast apply intensive technology.

**Table 4: Technology choices, scenario R**

| Crops        | Intensive technology | Medium intensive technology | Extensive technology | Total       |
|--------------|----------------------|-----------------------------|----------------------|-------------|
| Winter rye   | 0                    | 0                           | 0                    | <b>0</b>    |
| Winter wheat | 497                  | 0                           | 0                    | <b>497</b>  |
| Spring wheat | 0                    | 0                           | 0                    | <b>0</b>    |
| Barley       | 2909                 | 0                           | 0                    | <b>2909</b> |
| Sunflower    | 786                  | 0                           | 0                    | <b>786</b>  |
| <b>Total</b> | <b>4193</b>          | <b>0</b>                    | <b>0</b>             | <b>4193</b> |

Source: Authors' estimates.

The integration of insurance products into the model seriously alters the optimal production plan of the investigated farm (Table 5). The provision of insurance allows the farm to switch from barley to winter wheat production, the outcome of which is more uncertain. Demand for insurance strongly depends on the decision-maker's level of risk aversion. A less risk averse decision-maker would insure only a part of his winter wheat crop area, while a more risk averse or extremely risk averse farmer would prefer to insure all crops except sunflower. At the same time, it can be seen that preferences concerning crops and technologies are quite stable over all considered levels of risk-aversion.

Moreover, the purchase of insurance contracts allows for considerable increases in the farm's expected income and certainty equivalent. In the reference scenario, the expected income and certainty equivalent given a less risk averse decision-maker are 5,741 and 5,584 thousand Rubles, respectively. In scenario 1 (access to all insurance products) these values amount to 6,295 and 6,146 thousand Rubles. These differences increase with increasing risk aversion.

Among analysed insurance products, the farm prefers AYI to WBII and FYI. This result shows the prevalence of systemic risk on the considered farm. Additionally, we can observe that the farm uses a combination of OYI and RYI. This supposes that the farm's yield risk is well-captured by yields at both *oblast* and *rayon* aggregation levels. An examination of the annual indemnity payments shows that in some years, OYI ensures better indemnification of the farm's actual losses; however, in several years RYI performs better.

Optimal plans for all considered levels of risk aversion include sunflower production at the maximum rate of 786 ha (20 per cent of the total crop area). This can be explained primarily by its high profitability, but also by the relatively low yield variability of sunflowers. The latter fact indicates that sunflower production allows the farm to use the diversification effect. However, since traditional cultivating practices in Russia do not permit the farm to increase the sunflower crop area, this crop's diversification effect can be used only to a limited extent.

**Table 5: Technology and insurance product choices, scenario 1 – All insurance products**

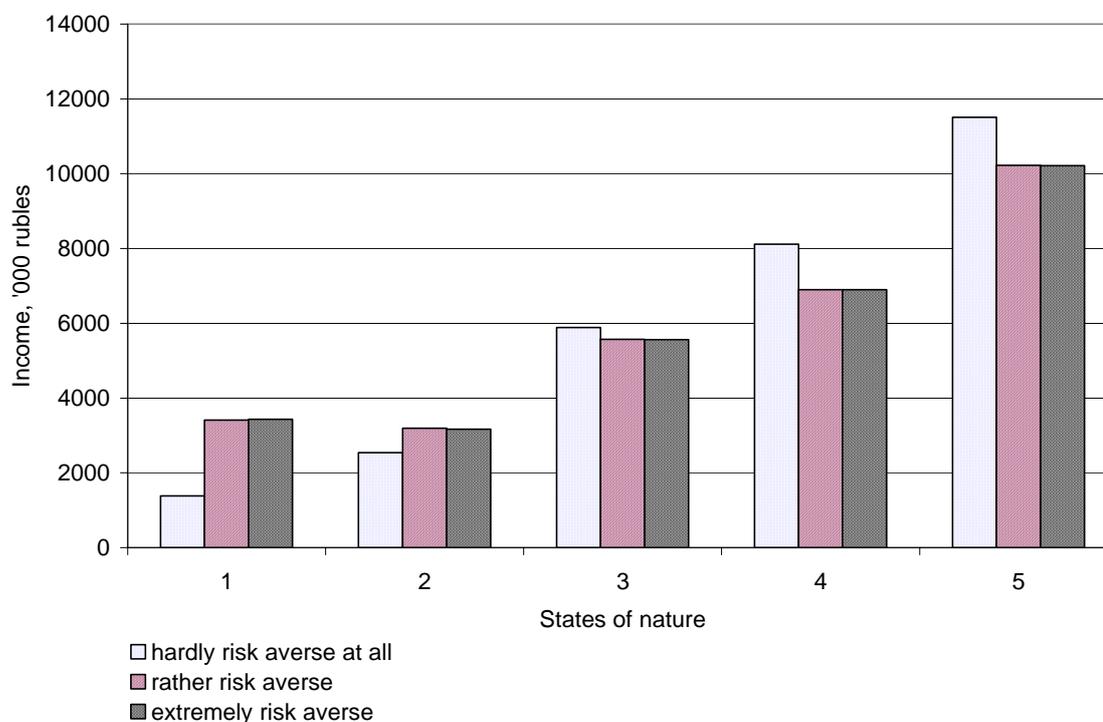
| Level of risk aversion                       | Crop         | Insurance product | Area, ha | Technology | Expected income, '000 Rub | Certainty equivalent, '000 Rub |
|--|--------------|-------------------|----------|------------|---------------------------|--------------------------------|
| Hardly risk averse at all<br>( $r_r = 0.5$ ) | Winter rye   | –                 | –        | –          | 6295                      | 6146                           |
|  |              | Without insurance | 718      | Intensive  |                           |                                |
|  | Winter wheat | RYI               | 798      | Intensive  |                           |                                |
|  |              | OYI               | 57       | Intensive  |                           |                                |
|  | Spring wheat | –                 | –        | –          |                           |                                |
|  | Barley       | Without insurance | 1834     | Intensive  |                           |                                |
|  | Sunflower    | Without insurance | 786      | Intensive  |                           |                                |
| Rather risk averse<br>( $r_r = 2$ )          | Winter rye   | –                 | –        | –          | 6111                      | 5831                           |
|  |              | Without insurance | 19       | Intensive  |                           |                                |
|  | Winter wheat | RYI               | 870      | Intensive  |                           |                                |
|  |              | OYI               | 683      | Intensive  |                           |                                |
|  | Spring wheat | –                 | –        | –          |                           |                                |
|  | Barley       | OYI               | 1834     | Intensive  |                           |                                |
|  | Sunflower    | Without insurance | 786      | Intensive  |                           |                                |
| Extremely risk averse<br>( $r_r = 4$ )       | Winter rye   | –                 | –        | –          | 6108                      | 5581                           |
|  | Winter wheat | RYI               | 1100     | Intensive  |                           |                                |
|  |              | OYI               | 473      | Intensive  |                           |                                |
|  | Spring wheat | –                 | –        | –          |                           |                                |
|  | Barley       | OYI               | 1834     | Intensive  |                           |                                |
|  | Sunflower    | Without insurance | 786      | Intensive  |                           |                                |

Source: Authors' estimates.

The income stabilising effect of crop insurance can be illustrated by means of Figure 2, which shows the distribution of the farm's income according to the 5 aggregated states of nature and its risk-aversion levels (for scenario 1). As can be expected, the demand for crop insurance depends on a decision-maker's risk aversion – a more risk averse decision-maker has higher demands for crop

insurance. At the same time, the decision maker's preferences do not change for the risk aversion coefficients in the range of 2.0 to 4.0.

**Figure 2: Income distribution among aggregated states of nature for three levels of risk aversion ( $r_r = 0.5$ ,  $r_r = 2$ ,  $r_r = 4$ ), scenario 1 – All insurance products**



Source: Authors' estimates.

Subsequent elimination of one of the regarded insurance products from the model (scenarios 2-4) was conducted to rate its individual utility-efficiency. The results show that though WBII is less efficient than OYI and RYI, it provides the farmer with a higher income utility than FYI, with a coverage level of 0.75.

## 4 CONCLUSIONS

The paper evaluates two main types of index-based insurance: Area yield insurance and weather-based index insurance regarding their efficiency in reducing the production risks of Russian farms in the steppe climatic zone. The analysis considers area yield insurance at two levels of aggregation – *oblast* and *rayon* (county) level. Weather-based index insurance products are drawn up by combining two weather parameters – daily precipitation and average daily air temperature. To assess the utility-efficiency of the defined insurance products, a programming model was formulated for 22 states of nature and 3 levels of decision-maker risk aversion. We employ yield and weather data from an experimental station in Central Volga Russia from 1979 to 2000. In addition, expert

assessments are used to specify alternative levels of production technology and respective yield distributions for the considered region.

The estimation results show that area yield insurance based on *oblast* and *rayon* yields are most efficient in stabilising farm income. Weather-based index insurance follows immediately thereafter. Both index-based insurance types provide the considered farm with a higher utility than farm yield insurance, with a coverage level of 0.75. Additionally, the analysis shows that Russian agricultural insurance companies can experience serious losses related to moral hazard. Thus, in the face of moral hazard, there is a certain trade-off between the demand for FYI and the insurers' willingness to provide this type of crop insurance. In this context, index-based insurance substantially limits the scope of moral hazard and presents a realistic alternative for Russian farms situated in the steppe zone.

Moreover, our investigations show that Russian farms, similar to farms in other post-Soviet countries, have only limited options for coping with risks on-farm (HEIDELBACH, 2006; BOKUSHEVA AND HOCKMANN, 2006). Most available technologies and production practices used on Russian farms are not adjusted to the prevailing climatic conditions; this seriously limits the farms' perspectives for reducing high yield variability, as well as adopting higher levels of crop diversification.

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**Appendix A: Descriptive statistics of grain crop yields in main agricultural regions of Russian Federation (1985-2005)**

|                                  | Average yield, 0.1t/ha | Coefficient of variation, % | Structure of grain production in 2005, % |
|----------------------------------|------------------------|-----------------------------|--|
| <b>RUSSIAN FEDERATION</b>        | <b>16.5</b>            | <b>12.4</b>                 | <b>100.0</b>                             |
| <b>Central Federal District</b>  | <b>18.7</b>            | <b>19.7</b>                 | <b>18.8</b>                              |
| Belgorod <i>Oblast</i>           | 24.4                   | 19.3                        | 2.6                                      |
| Voronezh <i>Oblast</i>           | 20.4                   | 18.7                        | 3.1                                      |
| Kursk <i>Oblast</i>              | 21.5                   | 16.2                        | 2.4                                      |
| Lipetsk <i>Oblast</i>            | 21.8                   | 23.3                        | 2.4                                      |
| <b>Southern Federal District</b> | <b>24.0</b>            | <b>20.8</b>                 | <b>34.2</b>                              |
| Krasnodar Territory              | 36.5                   | 16.0                        | 10.6                                     |
| Stavropol Territory              | 28.1                   | 21.8                        | 8.6                                      |
| Volgograd <i>Oblast</i>          | 14.5                   | 26.9                        | 4.6                                      |
| Rostov <i>Oblast</i>             | 21.9                   | 21.6                        | 8.0                                      |
| <b>Volga Federal District</b>    | <b>15.0</b>            | <b>18.7</b>                 | <b>24.5</b>                              |
| Republic of Bashkortostan        | 16.7                   | 31.5                        | 3.7                                      |
| Republic of Tatarstan            | 23.3                   | 34.2                        | 5.3                                      |
| Orenburg <i>Oblast</i>           | 10.3                   | 26.8                        | 2.3                                      |
| Saratov <i>Oblast</i>            | 12.2                   | 25.9                        | 4.5                                      |
| <b>Ural Federal District</b>     | <b>14.0</b>            | <b>15.0</b>                 | <b>6.3</b>                               |
| Kupgan <i>Oblast</i>             | 12.3                   | 27.3                        | 1.7                                      |
| Chelyabinsk <i>Oblast</i>        | 11.5                   | 32.6                        | 1.9                                      |
| <b>Siberian Federal District</b> | <b>13.1</b>            | <b>12.1</b>                 | <b>14.9</b>                              |
| Altay Territory                  | 11.2                   | 22.0                        | 3.8                                      |
| Novosibirsk <i>Oblast</i>        | 13.4                   | 17.9                        | 2.3                                      |
| Omsk <i>Oblast</i>               | 13.4                   | 20.8                        | 3.7                                      |

Source: Authors' estimates based on official statistics.

**Appendix B: Descriptive statistics of sunflower yields in main agricultural regions of Russian Federation (1985-2005)**

|                                  | Average yield, 0.1t/ha | Coefficient of variation, % | Structure of sunflower production in 2005, % |
|----------------------------------|------------------------|-----------------------------|--|
| <b>RUSSIAN FEDERATION</b>        | <b>10.4</b>            | <b>18.7</b>                 | <b>100.0</b>                                 |
| <b>Central Federal District</b>  | <b>10.5</b>            | <b>12.5</b>                 | <b>15.5</b>                                  |
| Belgorod <i>Oblast</i>           | 13.8                   | 18.5                        | 2.5  |
| Voronezh <i>Oblast</i>           | 11.4                   | 20.5                        | 8.3  |
| Tambov <i>Oblast</i>             | 9.0                    | 30.9                        | 3.8  |
| <b>Southern Federal District</b> | <b>11.6</b>            | <b>22.5</b>                 | <b>61.6</b>                                  |
| Krasnodar Territory              | 17.2                   | 20.1                        | 17.9   |
| Stavropol Territory              | 12.2                   | 20.7                        | 6.6  |
| Volgograd <i>Oblast</i>          | 8.3                    | 23.1                        | 10.5   |
| Rostov <i>Oblast</i>             | 12.4                   | 24.2                        | 24.6   |
| <b>Volga Federal District</b>    | <b>7.0</b>             | <b>17.0</b>                 | <b>19.4</b>                                  |
| Orenburg <i>Oblast</i>           | 6.4                    | 24.8                        | 4.2  |
| Samara <i>Oblast</i>             | 8.8                    | 23.1                        | 3.9  |
| Saratov <i>Oblast</i>            | 6.3                    | 29.1                        | 8.2  |
| <b>Siberian Federal District</b> | <b>4.9</b>             | <b>22.3</b>                 | <b>3.2</b>                                   |
| Altay Territory                  | 5.1                    | 18.9                        | 2.5  |

Source: Authors' estimates based on official statistics.

**Appendix C: Yield and yield variability of study farm's main crops by different levels of technology**

| <b>Crops</b> | <b>Technology</b> | <b>Mean yield, 0.1t per ha</b> | <b>Standard deviation, 0.1t per ha</b> | <b>Variation coefficient, %</b> |
|--------------|-------------------|--------------------------------|--|---------------------------------|
| Winter rye   | Intensive         | 18.71                          | 5.61                                   | 30.01                           |
|              | Medium intensive  | 16.28                          | 6.91                                   | 42.48                           |
|              | Extensive         | 11.10                          | 6.97                                   | 62.75                           |
| Winter wheat | Intensive         | 19.31                          | 6.52                                   | 33.77                           |
|              | Medium intensive  | 16.52                          | 7.77                                   | 47.05                           |
|              | Extensive         | 11.69                          | 7.86                                   | 67.29                           |
| Spring wheat | Intensive         | 13.49                          | 3.57                                   | 26.43                           |
|              | Medium intensive  | 7.37                           | 3.63                                   | 49.29                           |
|              | Extensive         | 5.35                           | 3.66                                   | 68.35                           |
| Barley       | Intensive         | 16.78                          | 4.80                                   | 28.60                           |
|              | Medium intensive  | 10.44                          | 4.89                                   | 46.83                           |
|              | Extensive         | 7.38                           | 4.94                                   | 66.92                           |
| Sunflower    | Intensive         | 9.37                           | 2.56                                   | 27.28                           |
|              | Medium intensive  | 6.12                           | 2.90                                   | 47.38                           |
|              | Extensive         | 4.71                           | 2.90                                   | 61.48                           |

Source: Authors' estimates.

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**Appendix D: Correlation coefficients of study farm's yields with respective oblast and rayon yields (1979-2000)<sup>a)</sup>**


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| <b>Crops</b> | <b>Correlation coefficient<br/>between farm level and<br/><i>oblast</i> level yield</b> | <b>Correlation coefficient<br/>between farm level and<br/>rayon level yield</b> |
|--------------|---|---|
| Winter rye   | 0.93  | 0.87  |
| Winter wheat | 0.93  | 0.92  |
| Spring wheat | 0.91  | 0.85  |
| Barley       | 0.95  | 0.92  |
| Sunflower    | 0.76  | 0.85  |

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Note: <sup>a)</sup> Correlation coefficients were calculated for de-trended yields.

Source: Authors' estimates.

## RURAL CREDIT PARTNERSHIPS AND THEIR ROLE IN THE DEVELOPMENT OF AGRICULTURE IN KAZAKHSTAN

*SHOLPAN GAISINA\**

### ABSTRACT

Transition from a planned to a market economy is neither an easy nor a fast process, particularly regarding the agricultural sector. Even in more developed countries, agriculture continues to be partially dependent on state support, and the rural financial market is included in this trend. However, a country's level of agriculture development is, in most cases, determined by the extent of this dependency. When agricultural producers are less dependent on state support, their position in the free market is more firm and stable. Hence, well-developed and organised private institutions, including financial institutions, that function in the agricultural market can significantly contribute to the strengthening of an agricultural producer's market position. There is relatively little work that investigates the performance of institutions operating in Kazakhstan's rural financial market. This article therefore attempts to describe steps which could be undertaken for the successful development of rural credit partnerships in Kazakhstan, i.e., the first cooperative type of financial institution in Kazakhstani agriculture.

**Keywords:** Rural financial market, credit partnerships, Kazakhstan.

### 1 INTRODUCTION

The rural financial market in Kazakhstan is represented by two very important groups of participants: Rural borrowers and rural lenders. The former include different types of agricultural enterprises, individual (peasant) farms, and subsidiary small holdings. The latter include formal and informal financial institutions serving the rural producers. The development of the rural financial market, which is the key element of successful transformation in the agricultural sector (BEZEMER, 2002), assumes the creation and development of rural financial institutions.

During transition, a centrally-planned system has been replaced by new market relations; however, this process has not always been accompanied by the creation of new market institutions. That is, some economic sectors, including

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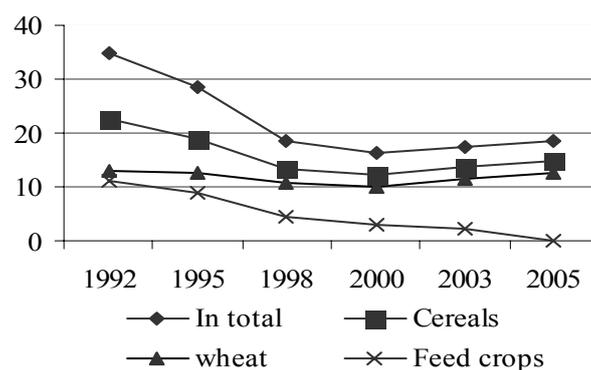
agriculture, are forced to operate using market rules without having an appropriate market infrastructure. Nowadays, the financial agricultural market in Kazakhstan is characterised by the dominating presence of governmental agencies and by the low participation of private financial institutions. This has been, and in many cases remains, a perennial problem in transition countries' rural credit markets, where governmental financial agencies offer subsidised credit (THE WORLD BANK, 2005).

Undoubtedly, credit plays an important role in the restructuring, competitiveness, recovery and growth of agriculture in transition countries. Therefore, issues related to developing rural credit institutions are crucial and require the attention of both policy-makers and scientists.

## 2 THE AGRICULTURAL SECTOR OF KAZAKHSTAN

Agriculture has traditionally played a significant role in the Kazakhstani economy. During the Soviet period, Kazakhstan was a major agricultural producer, supplying other republics with its surpluses of crop and livestock products (OECD, 1998). Agricultural production made up a considerable share of GDP in that period, accounting for about 30%. However, as a result of the severe economic crisis of the mid-1990s, along with the sharp reduction of agricultural production, the share of agriculture in GDP declined to 11% by the end of 1997, and in recent years this level has been stable at 7%. Between 1992 and 2003, the cultivated area of rural enterprises decreased by 50%, including the area producing cereals, which decreased by 39%, and the area growing feed crop, which decreased by 78.6% (Figure 1).

**Figure 1: Cultivated area (million hectares)**



Source: AGENCY ON STATISTICS OF THE REPUBLIC OF KAZAKHSTAN, <[www.stat.kz](http://www.stat.kz)>.

Consequently, grain production also declined, from about 30 million tons per year before the crisis, to 6.4 million tons in 1998. However, despite the marked decline of both the area sown and production levels, Kazakhstan has remained a

net-exporter of grain. During the recovery period, from 1998-2003, grain production increased to 14.8 thousand tons in 2003.

The value of livestock production from 1992 to 1998 also substantially decreased, from 9 million heads to 3.9 million heads. However, the recovery process in this area was much slower than in grain production. Since 1999, the annual rate of growth was approximately 4%.

The major goal of Kazakhstan's first agricultural reforms was to undergo a significant structural transformation that required broad institutional changes. The latter, in turn, included establishing a new legal form of farming and a new type of land relations. The gradual structural transformation of Kazakhstan's agricultural enterprises began in 1991 (after the collapse of the Soviet Union). At that point, the former state (sovkoz) and collective (kolkhoz) farms were dissolved as legal entities, and collective farms, which were further converted into production co-operatives, were created. This stage of restructuring, in most cases, led to formal rather than substantive changes, with little practical effect on ownership and management. The majority of farm entities continued to function as they did under the Soviet system, however, the environment and conditions had been changed. As a result, the production cooperatives faced financial difficulties and the ever-deepening crisis of indebtedness. During 1998, the government undertook new steps towards farm restructuring: All collective farming enterprises had to undergo re-registration as individual (peasant) farms, joint-stock companies, or limited partnerships, so as to conform to the Kazakh Civil Code (OECD, 1998). Consequently, the number of agricultural producers increased markedly.

Currently in Kazakhstan, there are two main types of farming: Legally-recognised forms and non-registered family farms, so-called subsidiary small holdings. The latter, by their nature, have to provide exclusively for personal consumption, but in fact most of those entities function as conventional commercial farms. Thus, the following types of farming exist: State agricultural enterprises, production co-operatives, joint stock companies, partnerships, individual (peasant) farms and subsidiary small holdings. In 2004 the agricultural sector was comprised of 0.06% state enterprises, 1.4% production co-operatives, 2.7% partnerships, 0.1% joint stock companies, and 95% individual (peasant) farms. The precise number of subsidiary small holdings is not known, but according to approximate calculations, their number accounts for about 2 million farms (Table 1).

**Table 1: Number of agricultural enterprises and farms**

|  | 1992  | 1998  | 2000   | 2002   | 2004   |
|--|-------|-------|--------|--------|--------|
| State enterprises<br>(including kolkhoz) | 2095  | 88    | 82     | 126    | 125    |
| Production cooperatives                  | –     | 2909  | 1710   | 2866   | 2609   |
| Partnerships                             | –     | 2140  | 3342   | 4822   | 5174   |
| Joint-stock companies                    | –     | 509   | 293    | 269    | 222    |
| Individual (peasant) farms               | 9262  | 78949 | 105174 | 141328 | 177883 |
| Other                                    | –     | 1078  | 1298   | 1285   | 1141   |
| Total                                    | 11769 | 85673 | 111899 | 150696 | 187139 |

Source: AGENCY ON STATISTICS OF THE REPUBLIC OF KAZAKHSTAN, <www.stat.kz>.

Land reform measures and the restructuring of agricultural enterprises have changed the distribution of agricultural land across farming structures. In 2002, individual (peasant) farms operated on 32% of the total arable land (in 1997 this number was 19%). Of these, small individual (peasant) farms (between 8-28 hectares) hold 81.4% of arable land and only 2.8 % of them are considered large-scale farms with land plots of a minimum 1,150 hectares per farm. The average hectares of arable land per agricultural enterprise have changed as well: Small agricultural enterprises (75-200 hectares) operate 47.8% of the arable land, medium-sized (1,300-3,200 hectares) operate 43.7% of arable land, and large agricultural enterprises (13,000-18,000 hectares) operate only 8.5% of the total arable land. That is, about 680 large-scale agricultural enterprises operate about 47% of the arable land.

Livestock production has become, by far, the most common specialisation among subsidiary small holdings, accounting for 87% of total production. Agricultural enterprises and individual (peasant) farms held 8% and 5% of livestock, respectively (Table 2). The same is true of dairy, vegetables and fruit production.

**Table 2: Agricultural output by producer (%)**

| Type of agricultural producers | 1995 | 1999 | 2002 |
|--------------------------------|------|------|------|
| <b>Plant growing</b>           |      |      |      |
| Agricultural enterprises       | 69.0 | 46.0 | 33.0 |
| Individual farms               | 3.0  | 26.0 | 42.0 |
| Subsidiary small-holdings      | 28.0 | 29.0 | 26.0 |
| <b>Livestock</b>               |      |      |      |
| Agricultural enterprises       | 32.0 | 10.0 | 8.0  |
| Individual farms               | 2.0  | 5.0  | 5.0  |
| Subsidiary small-holdings      | 66.0 | 85.0 | 87.0 |

Source: AGENCY ON STATISTICS OF THE REPUBLIC OF KAZAKHSTAN, <www.stat.kz>.

In spite of the growth of productivity for individual (peasant) farms (between 1997-2000 this index doubled), large-scale agricultural producers earn the bulk of net profits (72%). The level of profitability in small rural structures accounts for only 2.9%, which is approximately one-fourth of the profit of large- and middle-scale agricultural producers. Small farms and subsidiary small holdings do not have the same access to know-how, new technologies, markets and credit resources as the large- and middle-scale producers. The lack of working capital is also a constraint for them.

It is well-known that capital comes in two basic forms: Equity capital and debt capital. The use of credit is the second largest source of capital for farmers (KENT, 2004). However, Kazakhstani farmers have faced difficulties with using both sources. The low profitability of agricultural production, as well as hyperinflation in the early 1990s, complicated the use of their own financial resources. In turn, reforms of the banking sector have dramatically changed the situation in the rural financial market.

Prior to these reforms, credit for agricultural producers was distributed through the state-controlled banking system in accordance to a state central plan (SWINNEN et al., 2003). The interest rates for short-terms loans were 2%, and for long-term loans 75 %. Producers operating at "a planned loss," i.e., having an anticipated loss given the prices and commodity mix fixed in their production plans, received special 2-year grants for the "replenishment" of working capital. The ratio of loan repayment was very poor, which regularly led to restructuring and writing-off of the debts (YANBYKH, 2000). This explains agricultural producers' strong insistence on preferential credits. From 1992 to 1994, Kazakhstan's government provided farmers with soft credits, which were very easy to obtain. However, farmers often considered these credits as a subsidy and did not wish to pay

off the debt. That is, it was not only an economical problem, but also a psychological/educational one (SWINNEN et al., 1999). As a result, by 1994, access to soft state credit had become rare.

The new formal financial institutions that have arisen in the financial market of Kazakhstan are reluctant to lend to agricultural producers for a number of reasons: (1) lack of collateral, low profitability, (2) outstanding debts, (3) lack of credit history, and (4) high transaction costs.

Currently, large- and middle-scale farms, in particular grain producers, obtain credit from two main sources: Subsidised credit provided by the government, and through credit programs offered by international financial institutions. However, for the overwhelming majority of Kazakhstani farmers, informal credit has become the single source of replenishing financial resources.

Today, the Kazakh rural financial sector is represented by three main players: The government, international financial institutions and informal lenders. Financial institutions such as leasing companies, credit partnerships, credit unions, and micro-credit organisations still play a very insignificant role for agricultural producers.

### **3 THE ROLE OF CREDIT CO-OPERATION IN THE DEVELOPMENT OF THE RURAL FINANCIAL MARKET**

It is widely recognised that non-bank financing plays a significant role for rural producers in developing countries and transition countries (BANERJEE et al., 1994). Cooperative financial institutions are typically seen as filling a market niche that consists of low-income entrepreneurs, small business people, or farmers who need credit but who have essentially no collateral. In other words, cooperative financial institutions may be particularly well-suited to bringing banking services to the otherwise "unbankable" (EMMONS et al., 1997).

By its nature, the credit cooperative is not opposed to traditional banks, but rather supplements them. The credit cooperative system can better respond to the specific interests of low-income rural producers than can formal financial institutions, allowing them to periodically carry out innovative activity and investment projects (PHILIPPOVA, 2000). Cooperative financial services differ from commercial bank services by their availability, cheapness, and simplicity. The specific feature of the agricultural sector is the small scale of potential borrowers: Even the largest farms cannot be compared with industrial enterprises. In addition, most agricultural entities are usually geographically removed from financial centres.

Due to economies of scale in the provision of credit, credit cooperatives can enhance competitiveness and facilitate the dissemination and adoption of innovations, particularly when markets are incomplete and farmers' technical knowledge

is deficient. This would enhance farmers' economic well-being and facilitate the successful competition of co-operatives in the private sector (KOWALSKI, 1995).

There are some important advantages of rural credit cooperatives that enable them to be much better operators in the rural area than conventional commercial banks are.

First is the role of the rural community. The community controls the cooperative and can ensure whether its own objectives are met. Social sanctions, which can be provided by community residents who are also the members of the cooperative, are typically not available to the commercial banks. In addition, the sustainability of credit cooperatives lies in the long-term and repeated interactions of the participants (BANERJEE et al., 1994). Cooperative financial institutions effectively substitute "reputation capital" for traditional physical or financial capital (EMMONS et al., 1997).

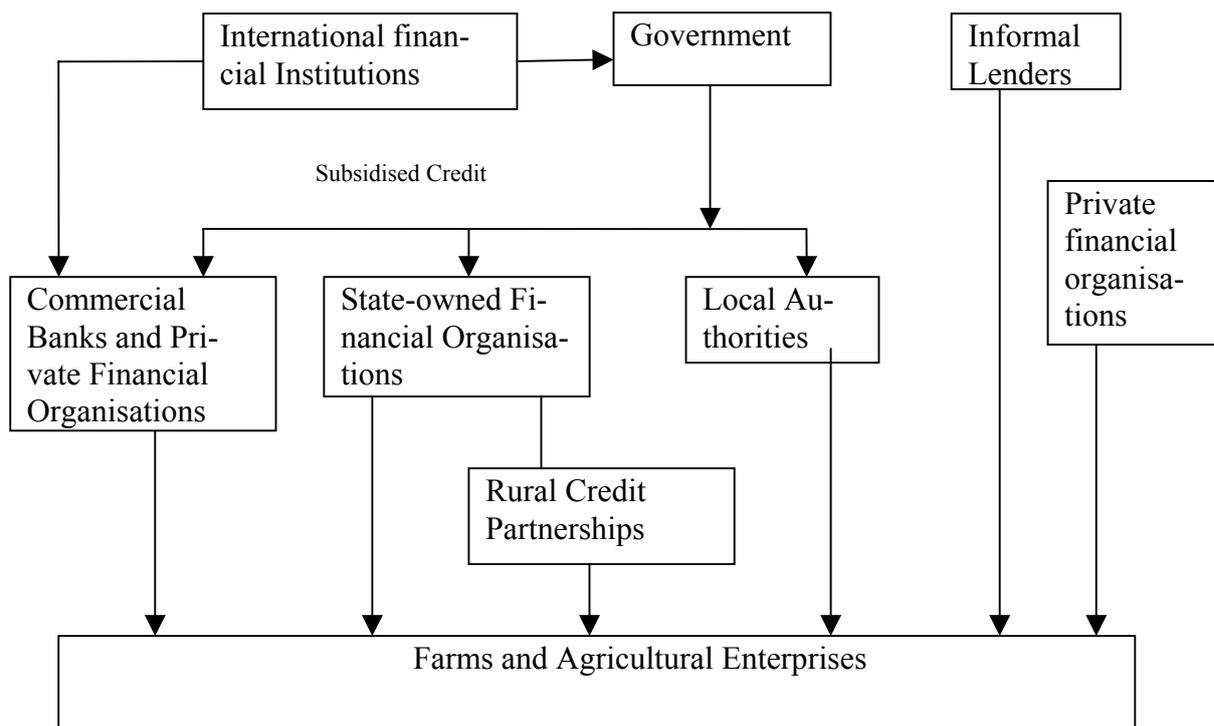
The second advantage of credit cooperatives lies in their goals. Cooperatives are interested in generating high profits for stockholders. Their objectives therefore focus on providing services for members rather than on maximising overall profit.

The third advantage is the level of transaction costs. Lenders' typical transaction costs include collecting and protecting information, reporting on transactions, and decision-making costs as well. According to Adams and Nehman, borrowers' transaction costs may include: (1) loan charges collected by the lender beyond interest payments, such as application fees, and forced purchases of other lender services, (2) costs due to negotiations with someone outside of the formal lending agency, such as extension staff, local officials, or co-signers, and finally (3) travel and time expenses, which may be substantial in rural areas and at certain times, e.g. during planting or harvesting periods (ADAMS et al., 1979). Since transaction costs are independent of loan size (fixed costs), their percentage of the total loan volume is especially high for small loans, which are demanded by small farms. In addition, transaction costs are not allocated in a fixed proportion among applicants, and as a result, the high transaction costs lead to the credit rationing of small farms (CUEVAS et al., 1986). Rural credit cooperative staff members are closer to their clients; in most cases they are a part of the rural community, and they have greater special knowledge of relevant agricultural activities. This can allow credit cooperatives to reduce asymmetric information problems, and along with it, adverse selection and moral hazard problems, thereby reducing rationing and stimulating agricultural lending (SWINNEN et al., 1997). In addition, rural credit cooperatives have more opportunities to analyse the credit-worthiness of clients, and can estimate the profitability and viability of a proposed project using untraditional methods to enforce the contracts. These all allow cooperatives to reduce their transaction costs.

#### 4 RURAL CREDIT PARTNERSHIPS IN KAZAKHSTAN

Currently, the rural financial market in Kazakhstan is characterised by the government reluctantly withdrawing from this market; the private sector, in turn, is reluctant to enter because of high risks and insufficient information, and also because of the threat of constant governmental presence. Rural financial institutions in Kazakhstan are the least developed institutions compared with other market institutions. The financing of agriculture is carried out through a number of channels, but not all of these channels are equally effective from the point of view of both accessibility for rural producers and their influence on agricultural development. There are three main players (and a number of other players who make up a very small part) in the rural financial market. The major players include the government, international financial organisations and informal lenders. The minor players are commercial banks, rural credit partnerships, leasing companies, insurance companies, and local public financial funds (Figure 2).

**Figure 2: The structure of rural financial system in Kazakhstan**



Source: Author.

Most rural producers have limited access to credit programs initiated by both government and international financial organisations. Furthermore, property such as agricultural land, machinery and houses are not considered to be proper collateral by commercial banks. Moreover, group guarantees are applicable only for rural producers with small credit demands.

The Kazakhstani government recognised this problem and initiated the creation of financial institutions which could coexist both with state financial programs and with the private sector. It did this by resolving what were seen to be market failures and by operating on a more commercial basis than government.

One of these initiatives was the establishment of a rural credit partnership network (RCP), which were new (for Kazakhstan) financial institutions operating in rural areas. That is, RCP is a new program for Kazakhstani agriculture that began in 2001 as a pilot project initiated by World Bank.

According to the project goals, RCPs were established to extend access to short- and middle-term credits for rural producers. It is still too early to make a strong comparison between RCPs and rural credit cooperatives in their classic form. This is because of the great amount of state participation in the RCPs' activity, which is evidenced by its 30% share in the RCP's authorised capital (the state's share is represented by the state-owned Agro Credit Corporation).

Established RCPs have a number of essential positive distinctions from other lenders, including:

- Short-term (up to 3 years) and middle-term (over 3 years) loans;
- Simplified requirements for the collateral;
- Low interest rate.

Since 2001, 130 RCPs have been established in Kazakhstan, and 4,300 farms became members of RCPs (2.2% of the total number), of which, 78% are individual (peasant) farms. RCPs' members operate about 2.9 million hectares of arable land (about 19.3% of the total arable land in Kazakhstan) and hold about 928,000 head of livestock (about 26.5% of the total number of livestock in Kazakhstan). From these figures, one can conclude that large-scale farms and agricultural enterprises are the main members of RCPs. In addition, most RCPs are located in Kazakhstan's northern grain regions.

Though the scope of RCP's network is still insignificant for satisfying all rural producers' requirements, RCPs have proved their viability. The main problem in this stage of RCP development is trying to find the most effective way to further it.

## **5 THE MAIN CHALLENGES OF THE RCPs' DEVELOPMENT IN KAZAKHSTAN**

Obviously, RCPs should be able to provide as many rural producers as possible with stable access to low interest rate credits. This means that RCPs must have the capacity to grow over time on a sustainable basis in order to form an appropriate governance structure, and to be competitive on the rural financial market.

The following methods could support and accelerate the further development of RCPs in Kazakhstan:

1. To continue expanding state participation in RCP activity.
2. To expand RCP activity by including additional financial services.
3. To establish an agricultural bank based on the Agro Credit Corporation.

*Continuing state participation.* Given that Kazakhstani farms are still financially unsustainable and the RCP network covers only about 2% of total farms, it is impossible to count on the independent development of RCPs. In addition, there are essential distinctions between different regions of Kazakhstan. Large-scale grain farms in northern and eastern Kazakhstan need significant credit sums to replenish working capital (for fuel, fertilisers, seeds and so on) and also to replace obsolete machinery and equipment. RCPs can grant such sums only by using state sources. In turn, small-scale farms in southern Kazakhstan have small financial demands, but require flexible timing and are associated with high risks. They also need state support, but in their case it is possible to gradually reduce it.

State participation in the RCP's activity is viewed, in some aspects, negatively. Namely, this system does not create regular financial intermediation between savings and investments; rather, it is wholly dependent on state financial sources. This is a reason why RCPs are excluded from decision-making regarding the granting of credit; it is the business of Agro Credit Corporation to approve credit applications. However, it is necessary to note that Agro Credit Corporation staff members are removed from local RCPs and hence, cannot take into account any local particularities. In addition, RCP managers, being excluded from the process of decision-making, cannot develop their managerial skills in what is for them a new area of activity. As a result, RCP, as the credit organisation which should join the rural producers, does not in fact have a significant influence on rural society due to insignificant financial power and because very few rural dwellers benefit from membership in RCPs (GAISINA, 2006).

Obviously, the government policy concerning RCPs has to be viewed as stimulating and strengthening RCPs' market position, rather than as direct financial participation. The government should not engage in strong control of the interest rate, allocation of credits and operational subsidies or the direct provision of financial services.

Thus, a more important role for the government should be to undertake complementary investment in rural and agricultural development such as infrastructure development, education, and improving returns on rural finance investments. Undoubtedly, state resources may be necessary to support new financial institutions; However, subsidies should assist primarily with capacity-building that aims to increase the skills of staff and management workers in the new institutions.

State subsidies should not try to fill gaps in income and interest rates of any institutions.

*Expansion of activity.* Another way of making RCPs more sustainable is by expanding their functions and attracting new members. The former could be realised by two means: Expanding the types of available financial operations and expanding the types of activity.

The experience of some developing countries with well-organised credit cooperative systems shows that low-income rural producers may have greater savings capacities than is sometimes estimated by policy-makers.

There are obvious advantages for agricultural producers and rural dwellers to place their savings in credit cooperatives rather than in commercial banks (or other formal credit institutions):

- Cooperatives use these savings only for lending to cooperative members under certain conditions, and so the lending is the responsibility of all members. Commercial banks, on the other hand, may place the savings in any direction on behalf of and under the responsibility of the bank. As a result, the default risk in cooperatives is much less.
- Savings regulations in cooperatives are based on conditions that are determined and accepted by a general meeting of the members. In contrast, contracts on bank deposits are recognised as a public contract and regulated by the Law on Banking, that is, without the direct participation of depositors and borrowers.
- Those who place their savings in cooperatives have many more incentives and opportunities to keep their cooperatives financially sound than do commercial bank savers regard their own banks (GAISINA, 2006).

In turn, RCPs also have obvious advantages by offering saving services. Currently, RCPs are strongly-regulated by and dependent on a state agency, and government loans directed to farmers make up the main part of the loanable funds handled by RCPs. Thus, RCPs are not flexible enough to meet members' diverse credit needs, and offer very limited variations of loan products. In this case, small savings accounts could become a stable and relatively low-cost funding source, and in due course make up a majority of loanable funds. Obviously, some necessary conditions have to be created in agriculture to attract savings. As T.Y. Lee, Dong Hi Kim and Dale W. Adams emphasise, first of all, agricultural production has to be profitable enough to allow rural producers to devote extra money towards their savings. In successful years, even the smallest farms and subsidiary small holdings are able to save significant amounts of money. Second, credit institutions based on the cooperative model should provide rural savers with secure and inexpensive ways to save financially. In other words, most rural producers cannot afford long-distance travel and must lose days of work in order

to make a financial deposit in the commercial banks located in the cities. Therefore, savings opportunities offered by RCPs could facilitate access to this financial operation for rural producers.

Third, and probably most importantly, is the expectation that the savings will bring some financial benefits to savers; in other words, savers have to have an incentive to save (LEE et al., 1977). Thus, well-organised rural credit cooperatives can play a major role in mobilising financial savings in rural areas (for example, the well-known credit cooperative systems of Germany, Japan, and the USA).

The expansion of activities could be done by setting up multi-purpose cooperatives based on existing RCPs, which deal with credit, input supply, marketing, and even provide some municipal requirements of the inhabitants. RCPs can forge much needed backward and forward linkages among agricultural production, agricultural input distribution, and agro-marketing and processing subsystems. Multi-purpose rural financial institutions will also accelerate the consumption linkages of technological change because they have a larger impact on rural incomes as a result of stronger and non-inflationary production and saving linkages (MELLOR, 1995).

Attracting new members to RCPs is at present limited for two main reasons:

1. Although the law on Rural Credit Partnerships stipulates the opportunity of resource expansion due to the additional payments of participants, RCP fixed capital is not in this case increased, and investors do not receive additional votes. This additional payment mechanism does not initially encourage sufficient motivation.
2. According to the law, only legally-registered farms and enterprises can be members of an RCP. However, as mentioned above, subsidiary small holdings in Kazakhstan make up a significant part of the agricultural market, in particular in the livestock, dairy, vegetable and fruit production areas. Some such entities have already reached the size of small farms. The problem is their unwillingness to be legally-registered, because their expectations of being registration are not very promising.

This means that the existing regulations concerning membership issues should be revised to expand the RCPs' opportunity to attract participants from various levels of farm structure. The main conditions should only be the financial sustainability of a member. Despite a subsidiary small holding not being registered as a legal entity, this does not mean that the head of the holding is not a legal person. He (she) could participate as a physical person, and it should be the responsibility and interest of RCP staff to elaborate on or to accept some known specific financial tools to collect information on the potential member and to control how this non-legally-registered member acts as a borrower.

*Creating an agricultural bank.* Presently in Kazakhstan, some economists have offered to create an agricultural bank based on the state-owned Agro Credit Corporation. The idea of the creation – or reanimation – of a specialised agricultural bank has many shortcomings that should be taken into consideration. Experience in some developing and transition countries shows that such banks inevitably become dependent on budgetary injections, excessively burden the national budget and, finally, may go bankrupt. If such a bank is completely state-owned, then according to its agricultural essence, it would be forced to provide credits on low interest rates (otherwise there is no reason for its creation). In this case, such a bank has no source of liquidity maintenance except state budget funds (SEROVA, 2000).

In this case, the established agricultural bank would be independent from state bodies regarding the allocation of subsidised resources, and would instead be guided by commercial interests; its shares could gradually be sold to borrowers, who in due course could become its proprietors. Then the bank could transform from being state property and into a cooperative form like the Farm Credit System in the USA. Moreover, in due course, it could return the national budget resources invested in its fixed capital during the initial stages of development. But if such a bank is just a distributor of budget resources, then it could lead to a decrease in the credit amount received by farmers, because the bank takes a certain percentage of its activity. On the other hand, such a bank would control the intended usage of budget funds. In other words, they would have to carry out the functions of ministries and local authorities, which also increases transaction costs.

The agricultural banking systems in most OECD countries originated as rural cooperative systems, for example, Norinchukin Bank (Japan), Rabobank (The Netherlands), Credit Agricole (France), and Farm Credit System (USA). Many of these bank organisations started with strong participation of state capital and under special state policy. As they grew, these banks were more and more involved in the crediting of agri-business and other sectors of the economy. Simultaneously continuing to maintain special relations with agricultural producers, they have expanded their client base. For example, Rabobank originated as a bank focused on farms, now it is both the major internal lender in the Netherlands and a large lender for agribusiness all over the world. Similarly, Credit Agricole, the French cooperative bank, provides credits to agricultural producers not only in France, but also in other countries. Moreover, cooperative banks were often created as a result of local initiatives with partial state support, as in the cases of Germany and Poland.

Cooperative banks usually have a wide network of branches and offer certain advantages in their services, such as:

- More simplified scheme of mutual relations with clientele;

- Estimation of a credit application not only includes economic indexes, but also such factors as the experience of the farmer and qualitative condition of the farm;
- Savings services for even very small amounts, and farmers are often involved in management.

To support a cooperative agricultural banking network, it is necessary to provide significant outlays. However, this type of bank considerably minimises the risk of default and has an opportunity to cover a very broad array of clients. These networks are also developed in tandem with members of various farms, which helps to quickly address changes in the agricultural sector (DUNKAN, 1999).

## 6 CONCLUSIONS

The agricultural financial system in Kazakhstan today is arranged in such a way that the largest part of credit resources are received by large-scale farms and agricultural enterprises, while small-scale farms and subsidiary small holdings suffer from inaccessibility to credit sources. Rural credit cooperation structures (in Kazakhstan's case, the RCPs) could be an effective means of solving that problem.

Rural credit cooperation has usually appeared in regions where expanding local businesses experienced a shortage of adequate financial sources. Credit cooperatives may supplement the bank system, but they are no substitute for it.

Despite improvements for farmers in market and legal conditions that began in 2001 Kazakhstan, the current farm income forecasts reflect uncertainty concerning accessibility to credit resources. Improvements in rural financial markets can be a key stimulus for accelerating agricultural productivity and rural growth. Financial services are instrumental in assisting rural producers in maintaining food security and smooth consumption levels, thus safeguarding and improving labour productivity.

Thus, the successful development of RCPs in Kazakhstan requires undertaking the following activities:

- To revise the existing legal status of RCPs, to widen the number of financial operations, and to gradually transform RCPs into multi-purpose cooperative structures. According to the existing law, only registered entities can participate in RCP activities. However, there are a lot of effectively-functioning rural producers suffering from a lack of access to credit sources that have the financial potential and wish to participate in RCPs.
- To allow RCPs to collect savings. The law does not allow deposit operations to be conducted by RCPs. Thus, RCPs have the only stable and sufficient crediting source represented by state-subsidised credit programs. At the same time, the rural population does not have an opportunity to allocate

its free money in these financial organisations; commercial banks do not have sufficient networks in rural areas and RCPs have no right to collect savings.

- To promote cooperative concepts among rural producers. For the conditions in Kazakhstan, it would be impossible to force farmers into membership in agricultural cooperatives. This is because of seventy severe years of kolkhoz and sovkhoz membership. But at the same time, it is necessary to conduct an educational campaign to explain the principles of pure cooperation, as seen in developed western countries.
- To continue governmental financial support of RCPs. Under the current conditions of agriculture in Kazakhstan, it is impossible to count upon the independent development of RCPs. Obviously, it is more reasonable to maintain state financial support of RCPs, simultaneously strengthening the managerial and professional skills of RCP's staff.
- To study and use the best international practices in rural credit cooperation development.

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## TAKING THE HANDS OFF THE RURAL CREDIT MARKET: AN EVIDENCE FROM CHINA

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### ABSTRACT

Previous research on rural credit market explored credit rationing with exclusion of the non-borrowers. Formal and informal credits were estimated independently. By jointly estimating the credit rationing in both the formal and informal sector, this paper elaborates on the existence of pervasive credit rationing in rural China and the poor strata can hardly benefit from the subsidized but highly regulated credit policies. Due to a lack of a formal insurance system, the rural poor divert to informal credit to pool risks. Reciprocal loans, however, do not fully substitute for the institutional lenders. We therefore observe a highly fragmented rural credit market in China.

**Keywords:** Rural China, credit rationing, partial observability, bivariate probit, Asia.

### 1 INTRODUCTION

The rural financial market in China carries the traditional paradigm that is similar to what has been found in many other developing countries: Institutional credit is subsidized; formal credit programs are highly centralized and heavily depend on governmental budget; "cheap" credits with earmarked utilization are extended to stimulate investments in agricultural production; private lending is highly regulated and often considered illegal (CHENG and XU, 2004; PIOTROWSKI and JIA, 2006). Due to the increasing awareness of the importance of agriculture and the striking inequality between urban and rural region, policy makers in China wage a national "New Rural China Campaign" from 2006 onwards to spur the rural economy and ease tensions in rural areas. Credit policies, believed often as efficient and guided tools to deliver money to groups of interest, gain a great deal of

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appeal. Given the widely existing failure of government-driven rural credit programs in other developing countries: What are the outcomes of the current intervention? Can the rural poor benefit? Is credit policy a candidate to serve agricultural development? This paper assesses the current state of the intervention on rural credit markets in China.

Three major sets of views have dominated the literature on rural credit markets. Development economists during the 1950s-1970s viewed the lack of physical capital as a primary constraint on both agricultural and industrial growth. The contribution of technology to agricultural production, especially the "Green Revolution", reinforced the belief that subsidized credits to small farmers played a crucial role in the increase of agricultural production, poverty alleviation and rural development (EICHER and STAATZ, 1998). Ample evidence in the 1980s presented that the government-oriented "cheap" credit policies, implemented in numerous developing countries, failed to live up to the expectations. The concessionary rate of interest discouraged savings, distorted factor price and failed in the substitution of labor for land and capital, paralyzed the institutional lenders and dampened the poor and smaller farmers (VON PISCHKE et al., 1983; ADAMS et al., 1984). The counterintuitive opinions on subsidized credit policy shed light on the failure of the intervention of government and quickly appealed to many free-market fundamentalists. The theory of intervention-free rural financial market was thereby oversold in the 1980s. In the following years, focusing on imperfect market and information asymmetries, development economists started to explain the reasons for the failure of rural credit markets in developing countries and redefined the role of government in the presence of imperfect information (STIGLITZ and WEISS, 1981; HOFF and STIGLITZ, 1990; STIGLITZ, 1990; BESLEY, 1994). Notwithstanding the progress in economic theory, there was little micro-level evidence on that. Therefore, in the subsequent years, empirical research, based on rural surveys in various geographical and economic scenarios, have been mounting up.

This paper addresses four main questions. First, in the presence of subsidized credit policies, to which degree are rural households credit rationed? Second, which factors determine credit rationing? Third, can the rural poor benefit from the subsidized credit programs? Forth, how fragmented are rural credit markets in China?<sup>1</sup>

This analysis is organized as follows. Section 2 reviews the applied measurement of credit rationing in a variety of empirical analyses, primarily using survey data. Section 3 presents the data collection and describes the participation in

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<sup>1</sup> Rural financial markets have often been described as fragmented in the sense that different segments of borrowers are observed to be systematically sorted across different loan types and lending intermediaries according to the characteristics of the borrowers and lenders (CONNING and UDRY, 2005).

credit markets. Starting with the econometric framework, section 4 presents results in single sectors, and subsequently compares between estimates of partial observability and full observability. An interlinked credit system is jointly estimated afterwards. Related conclusions are drawn in section 5.

## **2 MEASUREMENT OF CREDIT RATIONING IN EMPIRICAL ANALYSIS**

Since the formal credit market is highly regulated with capped rates of interest and earmarked loans in favor of agricultural investment, institutional lenders always prefer the more creditworthy and wealthy farmers. It is consequently believed that formal credit rationing in rural areas is widespread. Informal credit market fills a gap in the presence of spillover of credit demand from the formal sector (BELL, 1990). By using the evidence from Malawi, however, DIAGNE and ZELLER observed that informal sector's function is more than just serving as a substitute to the formal sector; the formal and the informal sector are by no means perfect substitutes (DIAGNE and ZELLER, 2001).

Concerning informal credit market itself, ALEEM (1990) observed that in a less monopolistic informal credit market in Pakistan, interest rates charged by private money lenders are close to average costs and slightly above marginal costs. In comparison, BELL claimed that, though the conventional views on private lenders overstate the exploitative high interest rates, a free-entry informal credit market is impossible because the contract of informal credit is exclusive and there are entry costs for new private lenders (BELL, 1990). In addition, BELL et al. (1997) observed that active informal credit systems are often tied with other transaction (85 percent of informal loans are shown to have tied transaction). Another important branch of literature found a striking prevalence of reciprocal credits without explicit interest rates and collaterals, for example, UDRY in rural Northern Nigeria (1994), and La Ferrara in Ghana (2003).

Though various approaches are available measuring credit rationing in empirical analysis, collecting credit information in surveys has been widely used.<sup>2</sup> The earliest empirical evidence of measuring credit constraints directly through interview can be backdated to JAPPELLI (1990) and FEDER et al (1990). Credit rationing is defined as the presence of demand for loans in excess of binding borrowing, by asking farmers whether they are willing to borrow more at the prevailing interest rate. The household with a positive answer is labelled as "credit-constrained". This practice, however, has been questioned for its reliability because the presumable extent of credit rationing is likely to be overstated, especially when subsidized credit policies are used to gain political patronage or give priority to a specific population.

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<sup>2</sup> A thorough review of different approaches exploring credit rationing in empirical analysis is available in PETRICK (2005).

Rather than asking respondents about their extra credit demand, ZELLER (1994) refined the approach by obtaining information about the credit application of households in Madagascar. Those who applied were asked whether the credit was fully granted, partially granted or rejected. Those who did not apply for credits were questioned their particular reasons; according to their answer they were then grouped into no-demand and discouraged households. Furthermore, the author conceptualized a sequential decision process where borrowers first decided whether to apply or not, and lenders then decided whether to grant. Two-stage Probit was used to handle potential selection bias in the sequential decision making framework.

While there has been by now a number of studies measuring rural credit rationing through the direct survey method, few studies explore the relationship between formal and informal credit markets. The path-breaking theoretical work has been carried out by BELL (1990) and BELL et al. (1997), with the gap of empirical evidence filled by KOCHAR (1997) who estimated the probability of demand and access to both formal and informal sources and thereby observed the overstated credit rationing as assumed in conventional research. But as KOCHAR (1997, p. 344) stated "the extent of effective formal sector rationing ... requires knowledge of the households who demand formal credit but do not have access to it...and such an analysis is clearly necessary for the design of effective credit policy".

In this paper, we jointly estimate the credit rationing in formal and informal markets, by including the information of the non-borrowers. This is a unique study, because there is an increasing consensus that, in developing countries, formal and informal credit markets are of different nature, providing different types of loans at varying transaction costs and interest rates as well as collateral requirements. In this analysis, we focus on the credit rationing in formal credit markets and its spillover of demand in informal sectors in the presence of a regulated formal system.

### **3 DATA AND DESCRIPTION OF PARTICIPATION IN CREDIT MARKETS**

The data are based on a multi-topic survey which was conducted by the authors in Spring 2005 in the North China Plain. The survey covers such topics as land tenures, farm resource management and production, and rural credit access, and thereby is of a production-oriented nature. 337 rural households out of 5 counties were randomly selected in 20 villages.<sup>3</sup> In the survey, households were

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<sup>3</sup> The villages were purposively selected to ensure its dominant farming activities and to meet various needs in the survey team. Though meriting some advantages in the multi-topic survey, the sampling technique still limit the generalization of the derived results.

asked if they had applied formal and informal credit respectively from 2003 to 2004. Those who had applied for credit were further asked whether they were fully granted, partially granted or rejected were furthered. The non-applicants were questioned for the reasons and accordingly were grouped into no-demand and discouraged households. The certain household is defined as credit rationed when the application was partially rejected, fully rejected or discouraged.

Table 1 presents the participation in both formal and informal markets by the sample households from 2001 to 2004. The sources of formal and informal credits are strikingly similar for all. As the Agricultural Bank of China (ABC) is more urban oriented, Rural Credit Cooperatives (RCCs) casts the main role and 88 percent of institutional credits are from RCCs. Due to the fragile insurance and public educational system in rural China,<sup>4</sup> credits for medical and tuition outlay carry substantial shares in the stated credit utilization, even though the institutional loans are earmarked for agricultural production. In addition, institutional loans are mostly in short term (less than 1 year) and of medium size.

Informal credits, as shown in Table 1, feature the predominance of reciprocal lendings within kinship or social networks. While a majority of the formal credits are in short term and demand a third-party cosigner as guarantor, informal credits are more flexible and 50 percent of them even explicitly set no repayment dates. Few informal loans require mortgage and 92 percent of informal loans carry no interest. The difference in the collateral requirements suggests the advantages of information and enforcement mechanisms in informal sectors.

The distinct utilization of credits suggests a highly fragmented credit market. While 70 percent of formal credit is stated for productive utilization, 61 percent informal credits are for consumption; more than half of which are for medical service and education. The reciprocal mechanism is more of the nature of risk pooling rather than standard credit transaction.

The capped rate of interest is similar to the findings in other studies by various researchers in other developing countries. The interest rate for institutional loans in rural China is capped and allows less flexibility. The mean rate is around 10 percent, which is comparable to the interest rates of 12-14 percent in Thailand in 1984, 10-12 percent in India in 1981 and 12 percent in Pakistan in 1980 (HOFF and STIGLITZ, 1990). If we take the inflation into consideration, however, the real interest rates for institutional loans in rural China are even lower. The concessionary rate of interest distorts the relative price of labor and capital, resulting in overcapitalization and a distorted resource allocation in the rural

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<sup>4</sup> Though education expenditure is reported to be 3.4 percent of its GDP, one report from UN exposed that the real number was 2 percent, far lower than the UN recommended 6 percent (ECONOMIST, 2003).

economy because institutional lenders are in favor of established large-scale firms instead of small farmers.

#### 4 ECONOMETRIC SPECIFICATION AND RESULTS

Univariate probit and censored regression models are widely used in this field, although non-borrowers are treated with in different ways. While ZELLER (1994) employed a two-stage probit to conceptualize the sequential decision process of borrowing and lending, MUSHINSKI (1999), by applying a univariate probit, estimates *notional demand offer probabilities* which are higher than the results using merely observed outcome of formal credit access. In this analysis, we select the univariate probit for two reasons. First, by grouping the partially granted, fully rejected and discouraged household into credit rationed households, the information on the demand side, de facto, has been incorporated into the estimation. In Table 3, the bivariate probit, which is used to capture the sequential decision process as Zeller did, does not produce significant differences compared with the parameters of the univariate probit estimation.

Secondly, a two-stage probit undermines the full observability because the usage of the Mills ratio leads to sample selection bias and thereby the estimation in the second-stage is based on the partial observability, i.e. the outcome of credit access is conditioned on the probability of credit application. If non-applicants are taken into consideration, the estimation is in full observability. In this case, two-stage approach is redundant and leads to large standard errors because it introduces severe collinearity among regressors (WOOLDRIDGE, 2002, p. 564).

**Table 1: Formal and informal credit market participation (2001-2004)<sup>1</sup>**

| Formal Credit                       |       |                   | Informal Credit                         |       |       |
|-------------------------------------|-------|-------------------|---|-------|-------|
|                                     | Freq. | Pct.              |   | Freq. | Pct.  |
| <b>Sources</b>                      |       |                   | <b>Sources</b>                          |       |       |
| Agr. Bank of China                  | 8     | 11.76             | Friends&relatives in the same village   | 112   | 57.73 |
| RCCs                                | 60    | 88.24             | Friends&relatives in different villages | 77    | 39.69 |
|                                     |       |                   | Other resources                         | 5     | 2.58  |
| <b>Proposed Amount</b>              |       |                   | <b>Proposed Amount</b>                  |       |       |
|                                     |       | <b>Percentile</b> |   |       |       |
| 4000                                |       | 25%               | ≤1500 (25% percentile)                  | 53    | 25.59 |
| 6000                                |       | 50%               | (1500, 5000], 75% percentile            | 108   | 52.16 |
| 10500                               |       | 75%               | (5000, 10000], 90% percentile           | 28    | 13.53 |
| 50000                               |       | 90%               | (10000+)                                | 18    | 8.7   |
| <b>Proposed Utilization</b>         |       |                   | <b>Proposed Utilization</b>             |       |       |
| Agri. Production                    | 32    | 44.44             | Agri. Production                        | 59    | 27.83 |
| Consumption                         | 23    | 31.94             | Consumption                             | 130   | 61.32 |
| Medical and educational expenditure | 14    | 19.45             | Medical and educational expenditure     | 70    | 33.02 |
| Social activity                     | 3     | 4.17              | Social activity                         | 20    | 9.34  |
| Non-agriculture                     | 17    | 23.61             | Non-agriculture                         | 23    | 10.85 |
| <b>Maturities<sup>2</sup></b>       |       |                   | <b>Maturities</b>                       |       |       |
| Short term                          | 58    | 86.58             | Short term                              | 77    | 37.20 |
| Medium & long term                  | 9     | 13.43             | Medium & long term                      | 15    | 7.25  |
|                                     |       |                   | Without limiting maturities             | 105   | 50.72 |
| <b>Annual Interest Rate</b>         |       |                   | <b>Annual Interest Rate</b>             |       |       |
| ≤9.6                                | 19    | 28.37             | No interest rate                        | 184   | 91.54 |
| (9.6-10.56]                         | 15    | 22.39             | Charging interest rate                  | 17    | 8.46  |
| (10.56-12]                          | 28    | 41.78             | ≤9.6                                    | 5     |       |
| 12+                                 | 5     | 7.46              | (9.6, 12]                               | 9     |       |
|                                     |       |                   | 12+                                     | 3     |       |
| <b>Mortgage</b>                     |       |                   | <b>Mortgage</b>                         |       |       |
| Personal guarantee                  | 13    | 19.12             | Personal guarantee                      | 163   |       |
| Consigner & bail                    | 45    | 66.18             | Written pledge                          | 22    |       |
| Others                              | 10    | 14.7              | Others                                  | .     |       |
| <b>Repayment</b>                    |       |                   | <b>Repayment</b>                        |       |       |
| Yes                                 | 34    | 38.18             | Yes                                     | 44    | 36.97 |
| No                                  | 21    | 61.82             | No                                      | 75    | 63.03 |

Notes: 1. This table presents both formal and informal credit participation from 2001-2004. Since respondents failed in recalling some information, especially informal credits, the observations are unmatched from items.

2. Short term is defined for credit with maturity less than or equal to 12 months; medium & long term is defined for credit with maturity more than 12 months.

Source: Authors' calculations.

**Table 2: Description of variables**

| Name                         | Explanatory Description  | Obs          | Mean     | Median | IQR <sup>1</sup> | SD           |
|------------------------------|--|--------------|----------|--------|------------------|--------------|
| <b>Dependent Variables</b>   |  |              |          |        |                  |              |
| ration_04                    | Formal credit rationed in 2004<br>(1=rationed; 0=not rationed)   | 337<br>(129) |          |        |                  |              |
| apply_fm                     | Applied formal credit in 2004<br>(1=applied; 0=otherwise)  | 337<br>(41)  |          |        |                  |              |
| infra-<br>tion_04            | Informal credit rationing in 2004<br>(1=rationed; 0=not rationed)  | 337<br>(57)  |          |        |                  |              |
| gramnt_0<br>4                | The amount of formal credit granted by<br>institutional lenders  | 39           | 15500.00 | 6000   | 5000             | 28155.8<br>2 |
| grant_04                     | Granted formal credit (1=granted;<br>0=otherwise)  | 337<br>(39)  |          |        |                  |              |
| willing                      | Willing to borrow from institutional<br>lenders at the prevailing rate of interest<br>(1=willing; 2=otherwise) | 337<br>(127) |          |        |                  |              |
| <b>Explanatory Variables</b> |  |              |          |        |                  |              |
| land_own                     | Owning area of land ( $mu^2$ )   | 337          | 7.71     | 7      | 5                | 3.90         |
| agehead                      | Age of household head  | 337          | 47.06    | 48     | 15               | 11.29        |
| deprt                        | Dependency ratio   | 337          | 0.30     | 0.33   | 0.43             | 0.25         |
| ini                          | Observable initial assets ( $yuan^3$ )   | 337          | 17329.66 | 10110  | 21000            | 18694.9<br>4 |
| aginc_rt                     | Ratio of farming revenue to sum of off-<br>farm income and farming revenue                                     | 337          | 0.75     | 0.86   | 0.47             | 0.28         |
| med_tui                      | Medical and tuitional expenditure<br>( $yuan$ )  | 337          | 3160.61  | 1100   | 2600             | 6511.74      |
| edu1                         | Dummy of educational level of head:<br>Elementary school   | 336<br>(29)  |          |        |                  |              |
| edu2                         | Dummy of educational level: Middle<br>school   | 336<br>(255) |          |        |                  |              |
| edu3                         | Dummy of educational level: Secon-<br>dary school or higher  | 336<br>(52)  |          |        |                  |              |
| social                       | Household member has social respon-<br>sibility in the village<br>(1=has; 0=has no)                            | 337<br>(41)  |          |        |                  |              |
| selfrun                      | Has self-run business<br>(1=has; 0=has no)   | 337<br>(28)  |          |        |                  |              |
| know-<br>bank                | Knows the number of financial institu-<br>tions in the dwelling area<br>(1=knows; 0=does not know)             | 337<br>(227) |          |        |                  |              |
| grant01_0<br>3               | Had formal credit in the past 3 years<br>(1=had, 0=otherwise)  | 337<br>(24)  |          |        |                  |              |
| infgant0<br>1_03             | Had informal credit in the past 3 years<br>(1=had, 0=otherwise)  | 337<br>(54)  |          |        |                  |              |

Notes Figures in parentheses are frequencies if the boolean variable is True. 1. IQR means interquartile range (75% percentile minus 25% percentile) 2. 1 hectare = 15 mu. 3. 1 US\$ = 8.2645 yuan, from Sep. 2003 to Oct. 2004.

Source: Authors' calculations.

#### 4.1 A single sector model

The variables used in different regression models are listed in Table 2. Different models with distinct definition of the credit constraint which have been employed

in various empirical analyses are presented and compared below. We start with a specification including the non-borrowers, and we then estimate a model with partial observability by excluding non-borrowers. By comparing the results, we are able to find how biased the results are if non-borrowers are excluded from the survey.

#### *4.1.1 Model specification with full observability*

3 presents the results of the determination of credit rationing with the different regression specifications. While model I applies a univariate probit, model II uses a seemingly unrelated bivariate probit to conceptualize the sequential decision process of credit access proposed by ZELLER (1994). We see no significant difference in the parameters between these two specifications. The results show that households whose family members take on social responsibility in dwelling village are less likely to be formal credit rationed. The result leads to the interesting question: Whether the local elites have sufficient liquidity or have no demand for credit? In the application estimation of Model II and Model IV, the coefficients of social links are positive, indicating the local elites are more likely to apply for and to be granted meanwhile. The "cheap" credits are rarely in favor of the poor strata.

Moreover, the households who rely more on agricultural revenue are less likely to be formal credit rationed (*aginc\_rt*). Rather than benefiting from the subsidized credit programs, the households with higher dependencies on agriculture are less active in borrowing, as shown by the less significant parameters in the application estimation in Model II and Model V.

Furthermore, the significance of *lgmed\_tui* in model I and II, together with the insignificance in the application equation in model II, shows that the rural poor are highly rationed in credit for medical and educational expenditures. This figure also suggests that in the absence of an efficient insurance system the informal credit can not fully pool the risks and that there exists potential demand for consumption credits.

In addition, as the area of family-owned land is used as a proxy of household size,<sup>5</sup> the bigger households are more likely to be formal credit rationed, notwithstanding that they did not apply to formal lenders (significantly negative parameters of *land\_own* in Model II and Model V).

Lastly, in Table 3, we find that the older household heads are less likely to be formal credit rationed because they are risk-averse and have inactive demand

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<sup>5</sup> In China, the rural land is owned by village collective and land is contracted to farmers. Consequently, we employ the owning area of land as the proxy of the size of household.

(in the application estimation of model II, the coefficient of *age\_head* is negative, though not significant).<sup>6</sup>

Besides the categorization of households into rationed and non-rationed, some other definition of credit constraint are used in model IV and V. While model IV explores who was granted institutional loans, model V, which was used by FEDER et al. (1990) to identify the extent of credit constraint, measures who is willing to borrow in formal credit markets. Households who are active in self-run businesses are more likely to borrow formal credits. The earmarked credit programs in favor of agricultural production can hardly be effective because of either the depressed demand for agricultural loans or the fungibility of credits.<sup>7</sup> The spillover of demand for medical and educational credit, as shown in model I and II, proves the tremendously unmet demand for smoothing liquidity in the absence of institutional insurance.

#### 4.1.2 Specification with partial observability

In some targeted surveys, only borrowers are questioned and the information of non-borrowers is rarely covered. In this case, the sample is truncated and we observe neither the dependent nor the explanatory variables for the truncated population. But the more common type is *incidental truncation* in which only the dependent variables are truncated, though the sample is representative of the entire population (WOOLDRIDGE, 2002, p. 522). In an example of credit survey, if we ask whether they applied and then only those applicants are furthered, we do not observe the additional information for the non-applicants. But we still have other variables for non-applicants (demographic characteristics, farming activities etc.). Incidental truncation involves a self-selection component and HECKMAN (1979) suggested a two-step procedure, in which a probability model is estimated at the first step based on the full observability to correct the error of sample selection.

Compared with other specification in Table 3, Model III employs a Heckman two-stage estimation with sample selection. At the first stage, whether household applied credit is estimated in full observability and afterward the amount of formal credit access is regressed in partial observability. While the amount of credit granted depends on the demographic variables and other observable characteristics which influence the decision making of the institutional lenders, whether to apply is expected to depend more on financial resources. Though few variables of interest are significant, the results are in no way trivial. Households with social

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<sup>6</sup> Actually, the impact of age on regression is different among individuals and it is interacted with other factors, i.e. education and dependency ratio. By using a square term of age and an interaction term of age and education, however, we find no nonlinear characteristic.

<sup>7</sup> Fungibility means the interchangeability, substitution, and diversion of money in exchange (VON PISCHKE and ADAMS, 1980).

responsibility in a village can get more credit; the activeness in self-run business is a crucial determinant of formal credit application.

In the presence of partial observability, the credit rationing of rural household is conditional on the outcome of the credit application. By measuring the asymptotic efficiency of the parameter, MENG and SCHMIDT (1985) found that the cost of partial observability is very high and thereby it is worth obtaining and using extra observability information.

#### 4.1.3 Informal credit access

Model VI in Table 3 presents the determinants of the credit rationing in the informal credit market. Several conclusions can be drawn, as follows. Initial assets play important role because they can be easily observed and monitored in informal credit markets. The problem of information asymmetries is mitigated in the informal market. In comparison, the observed assets can not be used as physical collateral in formal credits.

In an agrarian society rural inhabitants are subject to substantial risks and numerous uncertainties. In the presence of poorly developed insurance markets, credit can serve as a close substitute for desired insurance (BINSWANGER and ROSENZWEIG, 1986). Though without interest and collateral requirement or even a written contract, 'quasi-credit', a term which originated from PLATTEAU and ABRAHAM (1987) and was further explored by FAFCHAMPS (1999), contains an implicit obligation to reciprocate.<sup>8</sup>

## 4.2 An interlinked sector model

In the preceding section, we analyzed the credit rationing in formal and informal credit markets respectively. Nevertheless, these two are rarely independent and separated. In Table 4, credit rationing in both markets is jointly estimated by starting a bivariate probit specification. We can not accept the null hypothesis that credit rationing in both markets is independent and uncorrelated ( $\rho$  is significantly different from zero). Formal and informal credit markets are related.

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<sup>8</sup> The reciprocal credits are always embedded in long term relationships and repeat interaction (FAFCHAMPS, 1999). Unfortunately, such evidence was not collected in the questionnaire related to our survey.

**Table 3: Credit rationing in single sector: A model comparison**

|                        | I                             | II   |                     | III   |                    | IV                         | V                          | VI                         |
|------------------------|-------------------------------|--|---------------------|---|--------------------|----------------------------|----------------------------|----------------------------|
|                        | Univariate<br>probit          | Seemingly unrelated<br>bivariate probit <sup>1</sup> |                     | Heckman<br>(Stage II) (Stage I)                   |                    | Who was<br>granted         | Willing to<br>borrow       | Univariate<br>probit       |
| DV                     | ration_04                     | ration_04  | apply_fm            | gramnt_04   | ap-<br>ply_fm      | grant_04                   | Willing                    | infra-<br>tion_04          |
| land_own               | 0.048**<br>(2.44)             | 0.047**<br>(2.42)                                    | -0.062**<br>(-2.04) | 1230.023<br>(0.87)                                | -0.030<br>(-1.15)  | -0.071**<br>(-2.30)        | -0.006<br>(-0.32)          | 0.019<br>(0.87)            |
| agehead                | -0.014**<br>(-2.06)           | -0.013*<br>(-1.88)                                   | -0.009<br>(-0.91)   | -351.963<br>(-0.76)                               | -0.010<br>(-1.15)  | -0.010<br>(-1.00)          | -0.006<br>(-0.85)          | -0.003<br>(-0.33)          |
| edu1                   | -0.233<br>(-0.88)             | -0.261<br>(-0.99)                                    | 0.501<br>(1.5)      | 36646.22***<br>(3.00)                             |                    | 0.476<br>(1.46)            | -0.265<br>(-0.97)          | 0.316<br>(1.15)            |
| edu3                   | -0.630***<br>(-2.75)          | -0.608***<br>(-2.71)                                 | 0.267<br>(1.05)     | -5713.729<br>(-0.60)                              |                    | 0.113<br>(0.41)            | -0.188<br>(-0.91)          | -0.233<br>(-0.94)          |
| deprt                  | -0.069<br>(-0.21)             | -0.109<br>(-0.34)                                    | -0.998**<br>(-2.14) | -2906.090<br>(-0.13)                              |                    | -1.076**<br>(-2.25)        | -0.558*<br>(-1.72)         | -0.870**<br>(-2.26)        |
| lgini                  | -0.043<br>(-1.43)             | -0.043<br>(-1.42)                                    | 0.045<br>(0.78)     | 2828.796<br>(0.77)                                |                    | 0.055<br>(0.90)            | -0.023<br>(-0.75)          | -0.077**<br>(-2.4)         |
| social                 | -0.637**<br>(-2.51)           | -0.582**<br>(-2.37)                                  | 0.205<br>(0.74)     | 3127.048<br>(0.27)                                |                    | 0.029<br>(0.09)            | 0.125<br>(0.57)            |                            |
| aginc_rt               | -4.387***<br>(-2.8)           | -4.476***<br>(-2.91)                                 | 0.033<br>(0.02)     |   | 0.457<br>(1.39)    | 3.228<br>(1.47)            | 0.223<br>(0.15)            | 1.436<br>(0.78)            |
| aginc_rtsq             | 2.974**<br>(2.52)             | 3.062***<br>(2.63)                                   | 0.209<br>(0.15)     |   |                    | -1.985<br>(-1.21)          | -0.337<br>(-0.30)          | -0.789<br>(-0.57)          |
| selfrun                | -0.005<br>(-0.02)             | 0.021<br>(0.07)                                      | 1.130***<br>(3.64)  |   | 1.225***<br>(4.68) | 1.258***<br>(3.98)         | 0.020<br>(0.07)            | 0.385<br>(1.28)            |
| lgmed_tui              | 0.124***<br>(3.1)             | 0.132***<br>(3.2)                                    | 0.045<br>(0.9)      |   | 0.036<br>(0.86)    | 0.031<br>(0.64)            | 0.102***<br>(2.75)         | 0.048<br>(1.08)            |
| grant01_03             | -0.326<br>(-1.09)             | -0.272<br>(-0.94)                                    | 0.059<br>(0.16)     | -22207.69<br>(-1.48)                              |                    | -0.296<br>(-0.70)          | -0.035<br>(-0.12)          |                            |
| inf-<br>grant01_0<br>3 |                               |  |                     |   |                    |                            |                            | -0.242<br>(-0.97)          |
| knowbank               | -0.030<br>(-0.18)             | -0.002<br>(-0.01)                                    | 1.081***<br>(3.4)   |   |                    | 1.001***<br>(3.19)         | 0.389**<br>(2.37)          |                            |
| _cons                  | 1.112<br>(1.54)               | 0.998<br>(1.37)                                      | -2.074<br>(-2.1)    | 30121.58<br>(0.61)                                | -1.290             | -2.824<br>(-2.58)          | -0.592<br>(-0.84)          | -0.992<br>(-1.23)          |
| Obs                    | 336                           | 336  | 336                 | 336 (censored obs=298)                            |                    | 336                        | 336                        | 336                        |
| F-test                 | LR<br>$\chi^2$ (13)<br>=41.07 | Wald $\chi^2$<br>(26)=73.33<br>Prob> $\chi^2$ =0.000 |                     | Wald $\chi^2$ (8)=14.89<br>Prob> $\chi^2$ =0.0613 |                    | LR $\chi^2$ (13)<br>=41.07 | LR $\chi^2$ (13)<br>=19.68 | LR $\chi^2$ (11)<br>=19.26 |

Notes: 1. The likelihood-ratio test of  $\rho = 0$ :  $\chi^2=22.823$ ,  $\text{Pr}> \chi^2=0.0000$ . We can not accept the null hypothesis that the two estimation are uncorrelated and independent. The figures in parentheses are corresponding z-value.

\*, \*\*, \*\*\* Significant at the 10-percent, 5 percent, and 1 percent level, respectively .

Source: Authors.

Besides the bivariate specification, a univariate probit with endogeneity is specified as well. In the presence of endogeneity, whether a household cooperates with others in farming activities (t i e) is used as instrumental variables to identify the credit rationing in formal sector. The selection of the instrumental variable is

very challenging because few variables can be unrelated to the disturbance in formal credit rationing but highly related to the informal credit rationing. The tie in a local village is very important in the reciprocal credit between kin and friends, and it is presumably unrelated to formal credit access. The Wald test of exogeneity, however, shows that we can not reject the null hypothesis that the probability of informal credit rationing is exogenous from the formal credit rationing. A simple univariate probit can be used to jointly estimate the credit rationing.<sup>9</sup>

**Table 4: Interlinked formal and informal credit rationing**

| DV            | Bivariate probit <sup>1</sup> |                     | Univariate Probit    | Probit with endogeneity <sup>2</sup> |
|---------------|-------------------------------|---------------------|----------------------|--------------------------------------|
|               | ration_04                     | infration_04        | ration_04            | ration_04                            |
| infration_04  |                               |                     | 0.950***<br>(4.74)   | -0.384<br>(-0.08)                    |
| land_own      | 0.050**<br>(2.51)             | 0.018<br>(0.83)     | 0.047**<br>(2.33)    | 0.047*<br>(1.84)                     |
| agehead       | -0.015**<br>(-2.21)           | -0.003<br>(-0.37)   | -0.015**<br>(-2.09)  | -0.013<br>(-1.18)                    |
| edu1          | -0.212<br>(-0.80)             | 0.291<br>(1.07)     | -0.342<br>(-1.25)    | -0.195<br>(-0.30)                    |
| edu3          | -0.626***<br>(-2.74)          | -0.241<br>(-0.98)   | -0.606***<br>(-2.59) | -0.607*<br>(-1.92)                   |
| deprt         | -0.058<br>(-0.18)             | -0.912**<br>(-2.37) | 0.146<br>(0.44)      | -0.112<br>(-0.12)                    |
| lgini         | -0.043<br>(-1.42)             | -0.071**<br>(-2.20) | -0.028<br>(-0.90)    | -0.053<br>(-0.72)                    |
| social        | -0.669***<br>(-2.71)          |                     | -0.764***<br>(-2.81) | -0.654<br>(-0.95)                    |
| aginc_rt      | -4.535***<br>(-2.91)          | 1.443<br>(0.79)     | -4.959***<br>(-3.09) | -4.042<br>(-0.80)                    |
| aginc_rtsq    | 3.113<br>(2.64)               | -0.761<br>(-0.56)   | 3.304***<br>(2.73)   | 2.748<br>(0.85)                      |
| selfrun       | 0.009<br>(0.03)               | 0.366<br>(1.26)     | -0.158<br>(-0.57)    | 0.007<br>(0.01)                      |
| lgmed_tui     | 0.123***<br>(3.07)            | 0.059<br>(1.33)     | 0.118***<br>(2.93)   | 0.118**<br>(2.02)                    |
| grant01_03    | -0.468<br>(-1.60)             |                     |                      |                                      |
| knowbank      | -0.084<br>(-0.54)             |                     |                      |                                      |
| lgexp_soc     |                               | 0.010<br>(0.36)     |                      |                                      |
| infgrant01_03 |                               | -0.487**<br>(-2.02) |                      |                                      |

<sup>9</sup> One of the possible reasons for the exogeneity might be the selection of instrumental variables. The choice of instruments should be based on the understanding of formation of the informal and reciprocal credits. Unfortunately, this topic is not covered in our analysis. This shortcoming begs further analysis on the informal credit and nature of agrarian institutions in the presence of imperfect markets.

|                                    |  |  |   |                   |
|------------------------------------|--|--|---|-------------------|
| _cons                              | 0.083<br>(0.14)                                  | -1.096<br>(-1.36)                                | 1.027<br>(1.39)   | 1.159<br>(1.65)   |
|                                    | probmgl=0.639                                    | probmgl2=0.249                                   | pr=0.521  | pr=0.637          |
| Predicted probability <sup>3</sup> | p <sub>11</sub> =0.221<br>p <sub>01</sub> =0.028 | p <sub>10</sub> =0.417<br>p <sub>00</sub> =0.334 | pr: the univariate predicted probability of success Pr(y=1) |                   |
| IV: tie                            |  |  |   | -0.055<br>(-0.73) |

Notes: 1. Likelihood test of  $\rho = 0$ :  $\chi^2 = 28.52$ ,  $\text{Pr} > \chi^2 < 0.001$ .

2. Wald test of exogeneity:  $\chi^2 = 0.07$ ,  $\text{Pr} > \chi^2 = 0.785$ . 3. p<sub>11</sub> calculates the bivariate predicted probability Pr(y<sub>1</sub>=1, y<sub>2</sub>=1); p<sub>10</sub> calculates the bivariate predicted probability Pr(y<sub>1</sub>=1, y<sub>2</sub>=0), so do p<sub>01</sub> and p<sub>00</sub>; probmgl calculates the univariate predicted probability of success Pr(y<sub>1</sub>=1)

Source: Authors.

In Table 4, the discussion centers on the predicted probability when credit rationing is jointly estimated in both markets. In the scenario of a single sector, the households are formally credit rationed at the probability of about 0.639. In the scenario of interlinked formal and informal sectors, we predict the probability of formal credit rationing as well. If the reciprocal loans between households function as an efficient substitution for the institutional loans, the jointly estimated probability of formal credit rationing is expected to be significantly lower than in the case of the single sector. Unfortunately, the figure is 0.521 when both of the credit markets are jointly estimated. The reciprocal mechanism can not fully substitute for institutional lenders.

## 5 CONCLUSION

The objective of this paper was to measure the credit rationing in a purposively selected rural setting in China. Here, we explore the interdependence between formal and informal credit markets. Several conclusions can be drawn from the study. First, there exists pervasive rationing in the highly regulated formal credit market in rural China. Second, the subsidized credit policies favor local elites, instead the targeted poor strata; and the earmarked credit programs are less effective. Third, informal credits, in a form of reciprocal arrangement, weakly substitute for the institutional loans. Different segments of borrowers are systematically sorted out across different loan types. The rural credit market is highly fragmented.

The well functioning financial system is positively linked to long-run economic growth (LEVINE, 2004).<sup>10</sup> Government intervention not only shapes the structure and function of financial intermediaries, but also has a disproportionately beneficial impact on the poor. Nonetheless, the ubiquitous failure of intervention

<sup>10</sup> In LEVINE's reviewing paper, he also lists some opponent research about the finance-growth nexus.

in the rural credit market suggests government should "take hands off" direct intervention. Market failure does not mean governments are able to be free from the problem in affected markets. This, however, also does not mean that government should be inactive in promoting credit markets. Institution building that is innovative and efficient in tackling the information problems in screening credit applications, strengthening incentives and enforcement, improving court system, and decentralizing market power is an option to mitigate the imperfect information problem rooted in rural credit markets. Secured land rights are crucial for widening formal credit access, and improved access to credit and insurance is likely to contribute to reducing poverty. Subsidized credit programs, however, can hardly be a way to seek income redistribution or sustainable poverty reduction. Good intentions (such as interest subsidies) always paves the way for disastrous outcomes (such as rent-seeking by non-target groups).

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# **FOOD INDUSTRY**



## **RURAL DEVELOPMENT POLICY AND FOOD INDUSTRY DEVELOPMENT: INVESTIGATIONS OF SMALL FIRMS IN DENMARK**

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### **ABSTRACT**

Food industry firms in remote areas face a set of constraints, which have motivated the form and function of assistance instruments under various regional and rural development programmes. Recent food industry developments present new challenges to these firms, for which available assistance may be less appropriate. This paper employs telephone interviews and workshop discussions with firms in isolated locations to investigate their satisfaction with assistance programmes, their ability to innovate (through product introductions) and respond to challenges in the food industry (the emergence of power buyers). Further investigation was carried out on the topic of firms' formation of networks, and the use of available assistance in doing so. Firms' evaluations of support received in satisfying specified objectives are not correlated with their views on which objectives should be addressed. Some concrete suggestions for network activities had been made, but overall the development is at an early stage.

**Keywords:** Regional development, rural development, food industry, policy.

### **1 INTRODUCTION**

Food industry firms in remote areas face a set of constraints on their development associated with their small local markets, isolation from larger markets and remoteness from the business mainstream. Such firms often face highly seasonal supply, and demand, patterns and produce low product volumes. Local and parochial product attributes provide the only basis for product differentiation, the effectiveness of which can be reduced by non-availability of key inputs and ingredients. Skill shortages and poor social and physical infrastructure may also limit firms' capacities. Assistance to firms in this situation lies at the heart of regional and rural development policy instruments across a range of programmes.

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Against this background, the food industry is undergoing rapid consolidation, and most particularly "power" buyers, including retailers, have emerged. These conditions place new demands on small food industry firms that they are ill-equipped to handle. In particular, innovations in products and processes may become more difficult to develop and implement. Assistance programmes may not address these problems either in their design or in the arrangements they offer.

This paper reports on a structured set of discussions with eleven small food industry firms operating in isolated parts of Denmark. Its objectives are to evaluate regional and rural development assistance, as experienced by these firms, for its ability to solve the problems they face. Particular emphasis is given to the firms' capacity to innovate (through new products) and deal with power buyers. A popular strategy amongst firms was the formation of networks, and this was also examined for its suitability for support under various assistance schemes. A further objective of the work programme was to provide firms with the opportunity for structured discussion of policy with government staff, and researchers.<sup>2</sup>

This paper has four sections. In the second, available assistance programmes are outlined, the method used to recover information from firms and the setting for discussions are detailed, the participating firms are characterised, and formal evaluations of assistance received and the targeting of assistance more generally are presented. The third section provides a summary of discussion with firms, and the final section presents conclusions and policy recommendations.

Both rural development policy and regional business policy target the development and economic growth in remote or disadvantaged locations of Denmark. However, lagging peripheral regions are in particular addressed by the regional business support programmes (REGERINGEN, 2006). The objective of Danish rural development policy is that all areas in Denmark will be attractive areas for development and settlement and thereby sustaining the geographical dispersion of the population and economic activity (INDENRIGS- OG SUNDHEDSMINISTERIET OG FØDEVAREMINISTERIET, 2004). Its more specific objectives are:

1. Reduction of the income disparity between rural and urban areas through economic growth in rural areas;
2. Increased employment in rural areas;
3. Increased settlement of rural areas; and
4. Enhanced supply of environmental and cultural services in rural areas.

In Denmark there are five support programmes that to some degree are geographically targeted at rural or lagging regions and are relevant to agro-food enterprises (see Table 1). All are implemented on a re-imburement basis of

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<sup>2</sup> This research is funded by the Danish Innovation Law, and administered by the Danish Ministry of Agriculture, Food Industry and Fisheries.

some proportion of non-recurrent expenditures. Although local government agencies and private firms are eligible for many of these programmes, there is no facility for applications by groups or networks of firms.

## **2 MATERIAL STUDIED**

Some 15 small Danish food industry firms were approached in late 2006 and invited to participate in research into the reach and effectiveness of regional and rural development policies in addressing their problems. Eleven firms agreed to be interviewed by telephone and to attend a workshop to discuss the issues with government staff and the researchers. Telephone interviews were conducted in November 2006 and subsequent discussions with the firms were held in February and March 2007. These delivered a set of responses that characterised firms' commercial size and operations, use of regional and rural development assistance and managers' opinions about effectiveness and targeting of such assistance.

In order to focus the discussion at the workshop (5 March 2007), two prominent current food industry issues were emphasised: New product development and introduction; and the exercise of market power by large firms in the food chain, particularly retailers. In response to firms' emphasis on local networking and complementary actions by firms, some workshop discussion was dedicated to this topic. Workshop attendance entailed 5 food industry firms, a researcher from Bornholm's Centre for Regional and Tourism Research, a representative of the EU's LEADER+ programme, a staff member from the Directorate of Food, Fisheries and Agribusiness in the Ministry of Food, Agriculture and Fisheries working on implementation of regional development policy, and two researchers from FOI.

**Table 1: Danish regional and rural development programmes**

| Programme  | Legal basis   | Implementing agency   | Detail  | Targets   | Eligible investments   |
|--|---|---|---|---|--|
| The Rural Development Programmes   | Council Regulation (EC) Nos. 1257/1999 and 1698/2005 for the periods 2000-2006 and 2007-2013, respectively                | The Directorate for Food, Fisheries and Agri Business, Ministry of Food, Agriculture, and Fisheries | Two principal schemes (relevant to the agro-food industries): <ul style="list-style-type: none"> <li>"subsidy scheme for improving the processing and marketing of agricultural products"; and</li> <li>"subsidy scheme for promoting the adaptation and development of rural areas" (the so-called "article 33").</li> </ul> | Competitiveness and the value added of existing agricultural products, and the development of new food and agricultural products.<br><br>Living and business conditions in rural areas  | <ul style="list-style-type: none"> <li>Non-recurrent costs associated with environment, hygiene, food safety, documentation of production processes, traceability, organic production and animal health.</li> <li>17% of eligible costs or 25% in target areas.</li> <li>Non-recurrent costs associated with establishment of networks, renovation and use of abandoned buildings, investment in infrastructure, and marketing of regional products.</li> <li>25% of eligible costs; 50% for government agencies.</li> </ul> |
| The LEADER+ programme  | Council Regulation (EC) No 1260/1999  | The Directorate for Food, Fisheries and Agri Business, Ministry of Food, Agriculture, and Fisheries | To encourage local communities to initiate economic, social, and cultural activities in rural areas   | Four priority themes: <ol style="list-style-type: none"> <li>use of know-how and new technologies to enhance the competitiveness of products and services of rural areas;</li> <li>improvement of the quality of life in rural areas;</li> <li>assistance to small enterprises with market access for local products; and</li> <li>exploitation of local natural and cultural resources.</li> </ol>   | <ul style="list-style-type: none"> <li>Non-recurrent expenditures</li> <li>Both public and private agencies can apply.</li> </ul>  |
| The innovation law ("Innovationsloven")  | Danish regulation 318 (7 May 2001)  | The Directorate for Food, Fisheries and Agri Business, Ministry of Food, Agriculture, and Fisheries | To promote innovation and enhance research and development effort in the agricultural, food and fisheries sectors   | Priority topics include the working environment, food documentation, food safety, exports, organic production, processing for non-food use, applied research, animal welfare, eating quality, traceability, quality control and environmental protection.   | <ul style="list-style-type: none"> <li>Non-recurrent expenditures</li> <li>Maximum 50% of eligible costs, 55% for firms in disadvantaged locations</li> </ul>  |
| The rural fund for financing experimental projects in rural areas, and information and research initiatives ("Landdistriktpuljen") | Funded from annual budget allocations   | Ministry of Interior and Health   | To improve the potential for development of rural areas   | Support of new activities and/or pilot projects, research and information projects  | <ul style="list-style-type: none"> <li>A broad range of eligible items, although not recurrent expenses.</li> </ul>  |
| The objective 2 programme of the EU Structural Funds   | Council Regulation (EC) No 1783/1999 (The EU Regional Fund) and Council Regulation (EC) No 1784/1999 (The EU Social Fund) | National Agency for Enterprise and Construction, The Ministry of Economic and Business Affairs      | To increase wealth and employment in regions with structural problems through improvement of the conditions for development and adaptation  | Three priority themes: <ol style="list-style-type: none"> <li>development of regions (support to local agencies in the form of infrastructure investments, consulting services, analysis and research);</li> <li>development of small and medium-sized firms (support of product development, plant construction, technology transfer, consulting services and environmental improvements); and</li> <li>development of competence (training and development of educational institutions and processes).</li> </ol> | Grants subject to approval by local groups.  |

Source: Authors' compilation.

Firms were identified in association with relevant authorities in some isolated regions and contacted twice. In the first case an interview was conducted and firms were invited to a workshop to discuss the connection between their firms' development and regional and rural development policy. In the second case, points raised in the telephone interviews were re-visited and the content of discussions at the proposed workshop were finalised.

Some 11 firms (7 from Bornholm, 4 from Northwestern Jutland) were interviewed, of which 6 provided complete responses and support for the workshop. Firms participating in the study generally employed 4-10 people and had 2006 sales of 4-15 million DKK. Around 10-30% of products sales were "local", with the remainder going outside the area: An exception was a food processor for which some 80% of sales were to local firms for further processing. Most firms had some degree of vertical integration (e.g. ownership of a retail outlet and/or specialised distribution equipment), and a few were engaged in farming.

All firms interviewed had received support from regional and rural development programmes. Three firms had received support for investment in production facilities under the Objective 2 programme or the Rural Development Programme and most of the firms had received support for marketing under the LEADER+ programme or the Rural Development Programme.

Almost all firms owned and used a brand, but none used a brand that was owned or administered by a local network. Almost all firms supplied large retail chains, but just one supplied retailers' own-label brands. Most firms reported that in the last 5 years their main product or service had changed, their production and marketing procedures had changed and their relationships with local firms had all changed considerably. The only exceptions were new firms. Changes in the main product mainly involved an extended product line (rather than "truly new" products); changes in process involved more value addition; and new relations with local firms typically involved formal or informal networks. Other than locality, firms were unable to describe what common factor mobilised their network.

When firms were asked to describe their greatest single advantage, all mentioned the uniqueness of location. The older firms cited their established, known and reliable brands in various markets, and their business status in the locality. Younger firms cited high quality and uniqueness of products: Particularly the uniqueness of their location.

### 3 RESULTS

#### 3.1 Problem definitions

When prompted about each of 19 proposed "problems" likely to be faced by small food industry firms in a remote area, firms rated the problems according to severity, or alternatively not as problems or as an advantage (see Table 2). The most frequently cited "severe" problems were lack of information, the dominance of large firms as buyers and access to/complexity of government support. Other common definitions of problems included cost or time involved in transport, lack of a business network extending to other locations (no firm claimed that local networks were lacking), and paperwork. A few firms claimed that there were advantages to having large firms as buyers (specifically, assistance with product development), and to documentation demands (aptitude for traceability).

**Table 2: Firms' assessment of problems faced**

| Problem identified in interview   | Severity of problem |          |               |              |
|---|---------------------|----------|---------------|--------------|
|   | Severe              | Moderate | Not a problem | An advantage |
| Isolation from consumers  | 1                   |          | 4             |              |
| Isolation from wholesale and retail network                                     | 1                   |          | 4             |              |
| Isolation from farm and food raw materials suppliers                            |                     | 1        | 4             |              |
| Isolation from suppliers of other inputs and services                           |                     | 1        | 4             |              |
| Inability to differentiate products   |                     |          | 5             |              |
| Lack of information about market trends   | 4                   |          | 2             |              |
| Lack of information about new technologies                                      | 3                   |          | 3             |              |
| Lack of skilled staff   |                     | 2        | 3             |              |
| Lack of a local business network  |                     |          | 6             |              |
| Lack of a business network involving other locations                            |                     | 3        | 3             |              |
| Standards and procedures (required by buyers) in production and processing      | 1                   | 2        | 3             |              |
| Standards and procedures (required by regulation) in production and processing  | 1                   | 1        | 4             |              |
| Having to provide documentation and information as part of running the business | 3                   | 1        |               | 2            |
| The dominance of large firms as buyers  | 4                   |          | 1             | 1            |
| Cost or time involved in transport  | 2                   | 2        | 2             |              |
| Lack of government support  | 2                   | 2        | 2             |              |
| Lack of clear information about government support                              | 4                   |          | 2             |              |
| Inappropriate objectives, purposes and targeting of government support          | 4                   |          | 2             |              |
| Complexity and delays in applying for government support                        | 6                   |          |               |              |

Source: Authors.

### 3.2 Evaluation of assistance

Although almost all of the firms contacted had utilised regional and rural development assistance funds in the past, most declined to discuss details of the programme employed, the amounts and the purpose of the assistance. Firms did provide indicative information about the effectiveness of the assistance used, in response to prompting in regard to a set of broader policy objectives as proposed by the authors. Table 3 lists the 25 possible policy targets offered, and the frequency of responses to two questions:

1. According to the firm's experience, to which extent did the assistance received achieve the nominated target (on a scale -3 = "assistance was a major barrier to achieving this to +3 = "assistance was a major help in achieving this") – averages are presented in the middle column of table 3;
2. What role should each of the nominated policy objectives play in regional and rural development policy (on a scale 0 = "no role" to +3 = "a major role") – averages are presented in the right hand column of table 3.

Firms rated assistance received very favourably (average of 2.6 out of possible 3.0) for its ability to "meet the needs of firms in this locality". Firms ranked this objective first amongst the positive impacts of the received assistance, and first equal for its appropriateness for being addressed by regional and rural development assistance.

Firms also ranked specific new product introduction objectives (identifying and introducing new products, as well as new technical procedures) 3<sup>rd</sup> and 2<sup>nd</sup> respectively as being achieved by assistance received. However, the scores were low at just 1.0 and 1.2 of a possible 3.0. Firms' rated the effectiveness of the assistance they had received at 0.8 (rank 4<sup>th</sup>) in assisting development of location-specific unique food products, and 0.6 for networking (three objectives – between firms locally, in other locations, and in adding value) and ranked them 5<sup>th</sup> equal. Firms' assessments of the assistance on broader development objectives (local employment, retention of added value) were very low (0.0 out of possible 3.0). Business-oriented objectives (links with buyers and suppliers) also scored rather poorly and ranked 9<sup>th</sup>.

Firms' opinions about the appropriateness of regional and rural development policy for addressing the specified objectives present a different pattern. Solution of transport and logistic problems was ranked first equal, with solution of other location-specific "uniqueness"- related problems and "food industry opportunities" ranking 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup>. Meeting the needs of food industry firms was ranked the 6<sup>th</sup> most appropriate target of regional and rural development assistance: Albeit from a sample comprised of food industry firms. Firms' ranking of the objective "establishing links with buyers" (12<sup>th</sup>) was far higher than "establishing links with suppliers" (22<sup>nd</sup>).

**Table 3: Firms' evaluation and targeting of policy instruments**

|   | Experience of effectiveness of assistance in satisfying specific policy objectives | Opinion as to the appropriateness of regional and rural development in achieving specific policy objective |
|---|--|--|
|   | -3 = strongest negative effect; +3 = strongest positive effect<br>(rank)           | 0 = no role; +3 = a major role.<br>(rank)  |
| Nominated objective of regional and rural development policy instruments                        |  |  |
| Meeting needs of firms in this locality   | 2.6 (1)  | 3.0 (1)  |
| Meeting needs of food industry firms  | 0.2 (12)   | 2.0 (6)  |
| Identifying and serving new markets for food products   | 0.0 (15)   | 1.0 (18)   |
| Identifying and introducing new food products   | 1.0 (3)  | 0.5 (24)   |
| Identifying and implementing new technical procedures for food processing                       | 1.2 (2)  | 1.2 (12)   |
| Identifying and implementing new ways of organising the firm                                    | 0.2 (12)   | 0.5 (24)   |
| Identifying and implementing new ways of co-ordinating with other firms                         | 0.6 (5)  | 1.8 (7)  |
| Overcoming problems associated with isolation   | 0.0 (15)   | 2.5 (4)  |
| Overcoming other problems (i.e. not isolation) unique to this locality                          | 0.2 (12)   | 2.7 (3)  |
| Developing food industry opportunities unique to this locality                                  | 0.8 (4)  | 2.3 (5)  |
| Helping establish links with suppliers  | 0.4 (9)  | 0.7 (22)   |
| Helping establish links with buyers   | 0.4 (9)  | 1.2 (12)   |
| Helping firms in this locality to work together with each other                                 | 0.6 (5)  | 1.7 (8)  |
| Helping firms in this locality to work together with firms elsewhere                            | 0.6 (5)  | 1.2 (12)   |
| Identifying and implementing the benefits of formal co-operatives                               | 0.0 (15)   | 1.2 (12)   |
| Helping in identifying how to add value to food products  | 0.4 (9)  | 1.0 (18)   |
| Helping in providing the necessary investments to add value to food products                    | 0.0 (15)   | 1.5 (9)  |
| Helping in providing the necessary organisational change to add value to food products          | 0.0 (15)   | 1.0 (18)   |
| Help in working with other firms to add value to food products                                  | 0.6 (5)  | 0.8 (21)   |
| Ensuring that value added is retained in the local economy                                      | 0.0 (15)   | 0.7 (22)   |
| Solving transport and logistic problems   | 0.0 (15)   | 3.0 (1)  |
| Creating local employment   | 0.0 (15)   | 1.5 (9)  |
| Raising local skill levels  | 0.0 (15)   | 1.2 (12)   |
| Maintaining local population levels   | 0.0 (15)   | 1.2 (12)   |
| Maintaining a stable age distribution in the local population                                   | 0.0 (15)   | 1.3 (11)   |
| Correlation between assessment of effectiveness and of significance of role (Pearson's)         |  | 26%  |
| Correlation between rankings of effectiveness and rankings of significance of role (Spearman's) |  | 3%   |

Source: Authors.

The final rows of Table 3 show the Pearson correlation between firms' assessments of policy performance over each policy objective and appropriateness for

addressing that objective, and the Spearman correlation for the same variables (but addressing rankings). The Pearson correlation coefficient (26%) is insignificant at the 10% level of the test, and the Spearman correlation coefficient is close to zero. This means that although firms express some satisfaction with assistance received, they indicate that policy is inappropriately targeted across a broad range of possible objectives.

Firms' ranking of broad development objectives (e.g. local employment) is 9<sup>th</sup> out of 24. Their ranking of social objectives (maintaining local population and influencing its age distribution) is 11<sup>th</sup> and 12<sup>th</sup>: Rather higher than enhancing value addition by organisational change (18<sup>th</sup> and 21<sup>st</sup>) and retaining value added within the local community (22<sup>nd</sup>).

### **3.3 New product introduction**

Firms generally reported an abundance of ideas for new products and few technical problems in developing the products. Two exceptions concerned the sourcing of raw materials and ingredients. Where differentiation of products required specialist activities by farmers, special stock control within the firm or investments in equipment, constraints on new product development were experienced. Where specialist ingredients (e.g. herbs and flavourings) from outside the area were needed, delays in locating a reliable supplier held up product development. The major problems, however, related to information and analysis:

- Information about trends in market behaviour and prices, and in consumer preferences; and
- Analysis of likely and actual impacts of new products on the existing product line.

Several firms reported a shortage of facilities and services for "testing" (including certification) of products and processes. Several firms operated retail establishments (e.g. restaurants) where consumer testing was carried out. Market access for new products was not widely reported by firms as a problem. Moreover, large retail chains were reported to have assisted firms with product labelling, delivery of product information and other key steps. Most firms used a wholesaler, in some cases as an exclusive sales outlet. The firms reported no significant barriers to new product development as a consequence of sales to wholesalers.

Firms were unable or unwilling to list cost items associated with new product development. In general, staff time was not counted and the costs of technical tests were unknown. Instance of product failure was not reported, and its costs not factored into overall costs of new product development and introduction. Two firms reported that new product development was a form of promotion, designed to sell more of the main product lines: The firms could not comment fully

on the extent to which this was effective, and did not substitute sales away from the main products.

Two firms supplied ethnic shops with special fresh products. They reported logistic problems (high transport and storage costs relative to those of mainland firms) to be a major barrier to both introduction of new products and accessing new buyers. One firm reported similar problems in assembling fresh ingredients brought in from outside the area.

Entry into export markets (as one form of new product introduction) drew a separate set of comments from firms. Barriers included unfamiliarity with foreign countries' administrative tasks, the need to identify freight carriers and warehousing services, securing information about buyers and advice on payments systems. One firm had paid a fee to a government agency to assist, but had received "advice on strategy, rather than practical help".

Almost all firms listed their locality as being a valuable promotion item in new product introduction and sales of the existing product line. Firms expressed the view that local origin of new products and their raw materials formed a central element in product promotion. However, most firms also reported using a variety of non-local inputs and raw materials, particularly herbs, spices and ingredients not available in the locality.

### **3.4 Power buyers**

In general, firms expressed the view that "power buyers" were a problem for the future, and reported few such problems at present. There had been isolated cases of buyers requesting payment of slotting fees (payments to ensure access to supermarket shelves), and pressure to produce retailers' own-label brands, but these were not the norm. One firm reported that a buyer had requested a contribution toward in-store promotions, but that the request was withdrawn when the manager objected.

One firm reported that "power buyers'" contracts were extremely exacting and provided facility for high costs to the supplier of any breach of supply conditions. However, that firm reported that such contract clauses were never actually utilised: This was interpreted as a safeguard for the buyer rather than a threat. A different firm reported being disadvantaged by contracting arrangements with power buyers due to recent increases in raw materials costs, but that firm noted that this was not a consequence of market power, but rather of the use of contracts.

There was general favourable comment about the relations experienced with power buyers. They provided specialist advice on product and packaging design, labelling, logistics, information provision, regulatory compliance and the operation of HACCP systems. The persons employed as buyers were recognised as pleasant and honest to deal with.

Most firms reported that their scale of operation and (in some cases) newness in the business detracted from their credibility as reliable suppliers. Some firms (but not all) reported that a minimum supply was required for serving large buyers. However, this issue was reported to be a disadvantage in dealing with all buyers, not only large chains and those with market power. Prices paid by power buyers were reported to be about 20% below that offered by wholesalers, but the size of orders was adequate compensation, in the view of the firms.

One firm reported a strategy of selling no more than 20% of total volume to any one buyer. The manager reported that this had cost him one customer due to the volume restriction this imposed. As stated above, several firms operate retail establishments providing high mark-up sales outlets, although these are highly seasonal in operation. One firm stated that it refused to sell to power buyers, preferring to target high value, high priced small customers. That firm acknowledged that this would be difficult as (i) its own volumes grew and (ii) industry consolidation reduced the number of small buyers in the market. One firm expressed the desire to serve institutional buyers (hospitals, the armed forces, prisons) as a means of avoiding power buyers.

Several firms reported a developing trend toward use of a "quasi-private label". In this model, retail firms' names appear on the label, but so does the name of the manufacturing firm, with the locality's name displayed very prominently.<sup>1</sup> Firms interpreted this as high demand for the locality's products. On the topic of retailers' own-label brands, two firms welcomed offers from retailers, as commitment to a long term commercial relationship offering savings in marketing costs.

For almost all the firms, the favoured stance on power buyers was the establishment of a network of firms in the locality.

### **3.5 Networks of local food industry firms**

A previous network of food industry firms in the locality had operated under open membership, including firms selling non-local products. That network had been criticised for lacking focus on members' needs, and for having an ineffective decision-making structure. Moreover, firms expressed the view that the former network had not established and maintained a commitment to quality that is essential in the modern food industry.

One successful initiative of the previous network was the employment (as a consultant) of a "food ambassador" who conducted promotions throughout Denmark. This activity was supported by the LEADER+ programme, and notably it ceased when the funding ran out. The food ambassador was later employed directly by

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<sup>1</sup> This model is most apparent on some wine labels in supermarkets.

a few of the largest firms, although his efforts generated benefits for all firms in the locality.

Firms' ideas on the purpose of the network were not entirely formed. The general idea is to establish a joint effort in complementary promotion and marketing, information provision and certain mutual support activities. This latter function of the network would essentially be exchange of information and advice on commercial and legal matters threatening one firm or another. Proposed complementary marketing actions included development of a catalogue and website, joint promotions to tourists, use of a logo based on a consistent "story" about the locality, and enforcement procedures for quality of products and reliability and consistency of supply.

Firms were not able to specify the legal status that the proposed network might adopt. The proposed network was described as a totally private organisation with no links to government. These choices affect the ability of the network to sign and comply with contracts, employ staff, administer quality certification and trademarks, etc. It also affects the capacity of the network to absorb funds available under various regional and rural development funding programmes.

One firm expressed its intention not to join the proposed network because its products were "quite different to those of the other firms". This is a noteworthy comment because of the network's purpose of product complementarity. The issue of whether member firms should be similar or dissimilar has, thus, not been adequately addressed so far.

At this stage of planning, firms were generally unable to classify impacts of the proposed network according to:

- Public goods – Benefits that accrued to all local firms regardless of whether they were network members;
- "Club" goods – Benefits that are able to be confined to members of the network only; and
- Private goods – Benefits that are able to be confined to individual firms.

This classification has implications for both the form of funding of network activities that might be adopted, and for any application for regional and rural development assistance.

The manner in which the network might approach tasks affecting one subset of members, as opposed to all members, has also yet to be decided. While a fee-paying membership was favoured by prospective members, there was also a stated desire to ensure that firms paid for the services provided. A key item not discussed was whether the network would be a loss-making entity, and how losses might be funded. Overall, transparency of arrangements was prized amongst the firms, but arrangements for providing it had not yet been developed.

The twin challenges of initiating a network were discussed with firms:

- Establishment – Getting firms to join; and
- Sustainability – Getting forms to stay in.

The choice of activities to achieve these two ends has particular resonance for the utilisation of regional and rural development funding programmes. In particular, recurrent expenditures are largely ineligible for subsidisation. Sustainability is further implicated by the degree to which the network's benefits require monopoly (in sales or representation): If the departure from the network of a few firms reduces its benefits to the remaining firms then instability is (i) likely and (ii) likely to be exploited by power buyers. Firms showed a good understanding of these issues but had not yet reached a stage in design of the network that enabled responses to these questions.

### **3.6 Discussion of assistance mechanisms**

Most firms reported having used regional and rural development assistance the past. The assistance commonly entailed expansion of processing facilities (construction, equipment purchase) under objective 2, establishment of retail sales outlets under various programmes, marketing studies under LEADER+, and packaging under article 33. LEADER+ had also been used by a group of Bornholm firms to fund a "food ambassador". The firms expressed general satisfaction with the assistance, its administration and its impact. However, two concerns were expressed concerning:

- The lack of information about forms of assistance and eligibility of certain expense items; and
- The necessity to lay out all plans for expenditures in advance, which reduced flexibility in the use of funds later, as new information came to light or new needs appeared.

Firms first requested information about what assistance would be available for the introduction of new products. They emphasised that ideas and (for the most part) technical issues were not problematic, but pre- and post introduction analysis and monitoring of new products presented a challenge. All firms felt the need for information about products, markets and consumer trends.

Several firms proposed that assistance might be mobilised to establish a site for trials of products (agricultural, processed and technical) and dissemination of information to firms regarding their potential in local products. This might also extend to testing and certification, in association with a local programme of quality management.

Firms generally expressed a need for assistance with exports, particularly technical and colloquial knowledge and contacts in export markets. This would both

generate sales and information exchange with buyers about the potential for new products.

#### **4 DISCUSSION, CONCLUSIONS AND POLICY RECOMMENDATIONS**

Firms in isolated locations claim to lack information about market trends and new technologies. In general they do not claim to suffer due to their isolation from consumers or trading networks, and do not claim that a shortage of skilled staff is a severe problem. The cost of transport and logistics was seen as a moderate to severe problem by most firms.

Firms claim that the burden of business- and regulation-related paperwork is severe. Satisfying standards and procedures was not a major problem but firms diverged in their assessment of "large powerful buyers": Some treated this as a problem but others as an opportunity. Workshop discussion revealed that the constraint on small firms' ability to commit to large volumes was a major difficulty in dealing with large buyers. It also revealed some positive experiences where co-operation with powerful buyers had helped with labelling and logistics.

New product introduction, and innovation more generally, was not constrained by firms' ideas and flexibility. Rather, firms claim to lack the analytical capacity to determine how best to fit new products (i) into the existing product line and (ii) into contracting and other arrangements with suppliers and buyers. Ideas for firms' product differentiation centred on "local" products. However, this concept suffers from a lack of clear definitions of "local" (agro-food firms source many other raw materials), particularly referring to ingredients or certain advanced large-scale processing operations. Firms clearly want to employ the "local" identity as a central theme in a network of local food industry firms. This network has some clear objectives and proposed functions, but much thinking remains to be done before the concept is put into practice in a sustainable way.

Firms requested more information on available support under regional and rural development initiatives. Although firms stated their general satisfaction with assistance received, they criticised the burden imposed by its bureaucratic components: Paperwork; and inflexibility following implementation.

In a telephone assessment, firms claimed that government support was inappropriately targeted, was complex in administration and subject to delays. They also claimed that too little information was available about the programmes. This assessment was in some contrast to discussion at the workshop, where most firms expressed satisfaction with the assistance they had received. Also in the telephone interview, firms' evaluation of assistance received was positive with regard to some specific items, most notably "meeting the needs of firms in this locality". However, firms claimed that the assistance they had received had not

helped achieve some business-related targets (e.g. adding value to products, establishing linkages with suppliers and buyers). Firms also claimed that assistance received had not helped at all in reaching some social development goals specified by the authors (e.g. retaining value added in the local community, creating local employment, overcoming isolation and problems unique to this locality).

Leaving aside the assistance received, firms' assessment of what programmes *should* target was mixed. Top priority was assigned to "meeting the needs of firms", solving transport and logistic problems", "overcoming problems associated with isolation", and more generally supporting the local agro-food industry. Firms' view was that social targets (raising local employment, maintaining the local population) were more important than some business and economic targets (creation of value added and its retention within the local community).

There was a weak correlation between firms' assessments of assistance received and the extent to which each objective *should* feature in regional and rural development assistance. For example, firms claim that assistance received did little to offset high transport costs and other issues associated with isolation, but should target this as a very high priority. Although assistance was useful to firms in business re-organisation, this was assigned a very low priority as a policy objective.

The firms accessed in this research are actively working on the definition and development of a network of small food industry firms based in a specific locality. The form and function of the network is based around the differentiation of products due to the locality's uniqueness, and the potential for complementary amongst the firms. The nature of benefits to be generated (essentially, public or private) have not been clearly identified by the firms. The means of cost recovery (essentially for generation of private or "club" goods) has not been addressed by the firms. Firms are encouraged by previous experience with, and assistance to, a local network, and have some ideas for some initial activities (e.g. release of a catalogue of local food products).

A review of information provision mechanisms for small agro-food industries in remote areas is required. Regardless of whether firms' claims (a shortage of information) are correct, the impression of exclusion and isolation is real and needs addressing. The form of available information appears to lack sufficient guidance on the types of expense, activity, or investment that may be applied for by particular types of firm.

Firms' complaints about bureaucracy and delay should be addressed in the review of information delivery. At least part of the problem is that firms' expectations exclude the delays and procedures that are probably inevitable in this context.

Firms specifically requested information about the available opportunities for support of innovation of various kinds, and particularly with new product

introductions. Several firms identified the need for specific skills and analytical techniques in the planning and implementation of new product introductions, which appear to be amenable to funding of consultancy services and marketing studies. It is recommended that this element of support programmes (cutting across several programmes and sources) be addressed in a targeted information campaign.

Owing to the nature of new product introduction within the firm and between trading partners, flexibility in implementation of supported projects has been requested. It is recommended that nominated expenditure items in project plans be subject to reviews during the life of the project, with scope for significant changes in orientation and re-allocation of such spending as innovative activities proceed, succeed and fail.

Practical assistance with exporting for small food industry firms has been requested. In particular, some firms objected to the "strategic" approach taken by government assistance agencies: They would have preferred direct answers to some practical (perhaps "tactical") questions. It is recommended that regional and rural development assistance programmes interface with other government agencies to help participating firms access the advice they need in this regard.

Firms requested surprisingly little support in the matter of power buyers, although they anticipate difficulties in the future. It is recommended that development programmes include awareness of such issues in their future design. In particular, this might include support of information bureaux or mechanisms that highlight consolidation trends and advise on the best approach for small firms in specified commodity sectors. In addition, consultancies provided under the various assistance programmes should be required to provide information related to buyer power, in addition to market assessment of a more aggregate nature. This would improve firms' understanding of market access requirements in spheres beyond the technical.

It is recommended that a review take place of the definition and concept of "network" in regional and rural development assistance. This should define key desirable tasks of networks of small agro-food firms, and provide an assessment of the degree to which they might be promoted and secured by existing and/or new policy instruments. This will necessarily address the eligibility of certain types of expenditure for support, particularly recurrent costs. It will also address whether assistance can be provided to a network as an independent agent, rather than to the firms that make up the network.

Networks are capable of delivering several forms of benefit in a number of settings. The nature of these might dictate the likelihood of their being able to recover costs of various types from members and/or users. It is recommended that a review be made of the capacity of regional and rural development programme elements to assist in funding public goods components and functions of networks.

This will necessarily involve an examination of whether local government should play a role in networks receiving assistance for delivery of public goods. It is suggested that this would be unpopular with many firms.

Firms are struggling to define the conditions under which they would form networks. It is recommended that training be offered in this regard: It could draw on, for example, Denmark's tradition of co-operation at farm level and its successful operation of food processing and marketing. It could also draw on knowledge and experience bases about the use of the internet and communications technology in networks.

A longer term problem facing firms is the sustainability of networks. First, they may disband. Second, they may combine, fragment, or change form in some other way. It is recommended that guidelines be established regarding assistance to networks that undergo change: Two networks that merge should not, ideally, be entitled to two sets of assistance *per se*. However, it would be nonsensical to simply cut off support to one or the other network where separate activities were being pursued. More generally, support of networks may require subsidisation of their running costs. It is recommended that this possibility be reviewed and the outcome of the review publicised.

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## DAIRY FOOD CHAIN RESTRUCTURING IN POLAND – CAUSES AND IMPACTS\*

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### ABSTRACT

This paper discusses the nature of the restructuring of the Polish dairy sector. Using both national statistics and qualitative data collected at the regional level, we present the most important changes that have taken place in particular stages of the supply chain. The most significant and advanced changes have been observed at the farm and industry levels. These have substantially affected not only the production sphere, but also marketing practices and the whole institutional environment within which farmers and processors function. To a large extent, an adjustment process at the farm level was stimulated by the processors, who have been encouraged to pursue restructuring by the ongoing process of Poland's integration in the EU. Strict quality standards, a prerequisite for operating on the export and domestic markets, have been of special importance. The milk quota system is likely to become the most decisive factor determining the pace and scope of future restructuring, as the limits set by the European Commission become more perceptible.

**Keywords:** Dairy sector, restructuring, market channel choices, Poland.

### 1 INTRODUCTION

Profound restructuring has taken place in the Polish dairy sector during transformation, with the most significant changes occurring in milk production and processing. As an illustration of the restructuring at the farm level, one may look at the sharp decrease in total output and total dairy cows. Further examples are

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an increase in average milk yield, as well as fluctuations in the share of milk being marketed (Table 1). However, the most striking example is the scale of outflow of farmers from the dairy sector. Since the beginning of 1990s, this has amounted to more than 1 million farms (Table 2).

**Table 1: Characteristics of milk production in Poland from 1989-2005**

|  | 1989  | 1990  | 1994  | 1998  | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Number of dairy cows<br>[1,000 heads]          | 4994  | 4919  | 3863  | 3471  | 3098  | 3005  | 2873  | 2897  | 2796  | 2795  |
| Index %  | 100   | 98.5  | 77.4  | 69.5  | 62.0  | 60.2  | 57.5  | 58.0  | 56.0  | 56.0  |
| Milk yields<br>[litres/cow/year]               | 3260  | 3151  | 3121  | 3491  | 3668  | 3828  | 3902  | 3969  | 4083  | 4200  |
| Index %  | 100   | 96.7  | 95.7  | 107.1 | 112.5 | 117.4 | 119.7 | 121.7 | 125.2 | 128.8 |
| Milk production<br>[million litres]            | 15926 | 15371 | 11866 | 12178 | 11494 | 11538 | 11527 | 11546 | 11478 | 11600 |
| Index %  | 100   | 96.5  | 74.5  | 76.5  | 72.2  | 72.4  | 72.4  | 72.5  | 72.1  | 72.8  |
| Milk Deliveries<br>[million litres]            | 11385 | 9829  | 6269  | 7070  | 6583  | 7025  | 7219  | 7316  | 7997  | 8831  |
| Share of deliveries in total milk production % | 71.5  | 63.9  | 52.8  | 58.1  | 57.3  | 60.9  | 63.2  | 63.4  | 69.7  | 76.1  |

Source: IERiGŻ (Var. vol), GUS (Var. vol).

**Table 2: Number of dairy producers in Poland 1990-2005**

|   | 1990  | 1996  | 2002  | 2003  | 2004  | 2005  |
|---|-------|-------|-------|-------|-------|-------|
| A) Number of producers<br>[x1000]   | 1831  | 1309  | 876   | 810   | 735   | 712   |
| Index %   | 100   | 71.5  | 47.8  | 44.2  | 40.1  | 38.8  |
| B) Number of producers delivering to processing (x1000)                               | 835   | 560   | 376   | 356   | 312   | 294   |
| as % of total producers   | 45,60 | 42.78 | 42.92 | 43.95 | 42.45 | 41.29 |
| C) Number of producers delivering directly to the market * (x 1000)                   | n.a.  | n.a.  | n.a.  | n.a.  | 76    | 50    |
| Share of producers delivering to the market (B+C) in total number of producers (A), % | —     | —     | —     | —     | 52.8  | 48.3  |

Source: IERiGŻ (Var. vol), GUS (Var. vol).

On the other hand, changes at the processing level can be illustrated by the ongoing concentration of the dairy industry or the level of undertaken modernisation<sup>1</sup>. It is important to notice that during transformation, two periods could be distinguished, namely pre- and post-1995. During the former, dramatic deterioration was experienced in the sector's overall situation. The latter, on the other hand, has been characterised by a gradual stabilisation of output, increasing prices and substantial improvements in the sector's efficiency, as well as product quality (SEREMAK-BULGE, 2005).

Significant changes have also taken place with respect to the retail stage of the dairy supply chain. Traditional dairy shops were replaced, to a large extent, by super- and hypermarket (SM/HM) chains, as well as discount shops. Nowadays, modern retail chains account for over 40% of total dairy product sales. In fact, independent shops retained their dominant position only with traditional products (like traditional cottage cheese). Among reasons that explain this phenomenon, one should mention the introduction of private labels and lower prices in modern retail shops<sup>2</sup> (DETAL DZISIAJ, 2005). Also important is the fact that changes at the retail stage have substantially affected the situation in the wholesale segment. This is mainly because SM/HM chains started to purchase products directly from processors, both domestic and foreign, thus neglecting wholesale companies. Nevertheless, it must be stressed that wholesalers still play a very important role in the Polish food sector. This is because they are often the only partners for independent shops in small towns and villages.

Although the aforementioned changes have affected the whole country, significant differences between regions with respect to the rate and scope of restructuring have been observed. For example, 5 (out of 16) regions with large and increasing production accounted, in 2005, for 67% of the milk delivered to dairies. These regions are: Warmińsko-Mazurskie, Podlaskie, Wielkopolskie, Mazowieckie and Łódzkie. This development has been especially observed in the first three regions, and can be at least partly attributed to favourable natural conditions and the long tradition of local milk producers.

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<sup>1</sup> The number of processors decreased in the last decade by about 20%, and in 2004 fell to 265 dairies (SEREMAK-BULGE, 2006). Despite this change, the ownership structure of the dairy industry has continued to be dominated by domestic cooperatives that account for roughly 70% of market sales. Regarding the level of undertaken investments, from 1995-2005, they are estimated to be 6.2 billion PLN.

<sup>2</sup> The number of private labels is rapidly growing, especially in outlets run by foreign operators. In 2004, ca. 59% of dairy products were sold as private label products in discount shops, ca. 7% in HM, and ca. 3% in SM. Private label dairy products are usually 20-40% cheaper than the equivalent name-brand products (for UHT milk even 70%) (DETAL DZISIAJ, 2005).

The following sections aim to examine the issues presented above in more detail. Section 2 presents changes that have taken place in the downstream segments of the supply chain. Section 3 presents the restructuring process at the upstream portion of the supply chain, whereas Section 4 concludes and provides some policy recommendations. The presented material combines national statistics and qualitative data collected at the regional level<sup>3</sup>. The selected study sites were the Podlaskie and Warminsko-Mazurskie regions, both of which are located in the north-eastern part of Poland. This choice was based on the importance and extent of restructuring in the dairy sector in both regions. Though one has to be cautious when generalising about obtained results, it is reasonable to suspect that regions that have fallen behind in terms of restructuring would follow the path chosen by those two regions. Therefore, understanding changes that took place there may provide valuable insights and provide useful policy recommendations.

## 2 RESTRUCTURING OF DOWNSTREAM SEGMENTS IN THE SUPPLY CHAIN

The analysis presented in this section is based mainly on interviews with experts and representatives of firms operating in the processing, wholesale and retail segments.

### 2.1 Processing segment

Improvement in the quality and assortment of the final product, and the improvement of the quality of raw milk itself, were seen as the two main changes in the processing sector over the past 10 years. The *concentration* process was also acknowledged and was seen as particularly important during the past 5-6 years. Large dairy companies were often the initiators of this consolidation process. Furthermore, important changes occurred in the *profitability* of the sector at the time of and in the period following the accession process. After being somewhat modest in 1990s, profitability increased in the year of EU accession, which was a result of increased export demand and a very good Euro/Zloty exchange rate. However, in the following years the level of profitability progressively decreased; this was coupled with growing raw milk prices and an increase in production costs.

Increased competition on the dairy market forces dairy processors towards product specialisation. In large companies, this takes the form of dividing production among particular dairy plants, which allows them to provide consumers with a wide assortment of products according to current demand. Smaller processors,

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<sup>3</sup> In total, 36 in-depth interviews were conducted with experts, purchasing and sales managers from dairies, as well as wholesalers and retailers. In addition, 5 focus groups with farmers were organised. Research was conducted in May and August 2006.

on the other hand, having a less developed marketing system and worse access to funds, have limited possibilities to introduce innovations, and thus cannot adjust to consumer (or retail) requirements so quickly. Therefore, not being able to compete with larger companies in terms of size of deliveries nor variety of assortment, smaller companies try to find their niche and produce unique products or products for further processing, such as SMP. Moreover, some small processors specialise in exports.

In the opinion of both experts and segment representatives, the most significant factors influencing changes in the processing industry were: The transition period, which influenced the situation mainly in the 1990s; the pre-accession process, which started in 1998<sup>4</sup>, and finally, integration with the EU. All these aspects required significant adjustments concerning institutions and policies. On the one hand, necessary adjustments in the law were introduced. On the other hand, support programmes for processors and producers were launched to assist them in meeting consumer quality requirements. It was also mentioned that transformation in the retail sector (together with its internationalisation and consolidation) was an important factor. Retail expansion opened new outlets for dairy products, but at the same time imposed new requirements on dairies.

*Difficulties and development constraints* at the processing level are very important, not only for dairies but also for producers delivering to them; for producers, the dairy plant is the most important segment of the market chain. It was observed that dairy processors not only play the role of milk purchaser, but also assist in farm development, for instance, by organising traineeships or providing short-term loans (see section 3). According to respondents, the main problems processors are facing when competing on the market can be divided into two groups: 1) barriers arising from the legal regulations, and 2) barriers concerning the low economic efficiency of companies.

The milk quota system is the most frequently-mentioned legal barrier, both for the milk-processing segment and for producers. The main problems concerning milk quotas are: The limit that binds production<sup>5</sup>, and regional quota trade restrictions. The quota is allowed to be traded only between farmers who have their holding in the same administrative region. This results in high quota prices and inhibits the restructuring of milk production.

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<sup>4</sup> Despite the fact that the Polish pre-accession agreement was signed in 1994, the most significant arrangements concerning milk market regulation were prepared at the end of 1990s. Therefore, restructuring the dairy sector became more important.

<sup>5</sup> Deliveries to processing during the first milk quota year (2004/5) were 13% lower than quota assigned. However, due to very dynamic development of marketed milk production in Poland milk quota in 2005/2006 was exceeded.

The other group of barriers relates to factors influencing the low economic efficiency of dairy processing. The main constraints here are:

- Weak position in the chain (except for the largest companies), being a consequence of – on the one hand – producers' pressure (especially those with large deliveries) to obtain good milk prices, and on the other hand – retail pressure to receive cheap products;
- Low level of management skills and mentality of dairy employees (especially in dairy co-operatives);
- Low labour efficiency, which negatively affects dairies' comparative advantage;
- Level of consumption and low incomes of people, who can't afford to buy more expensive products. Smaller dairy processors especially have to compete on the local markets by lowering prices, which is extremely difficult with a low processing margin.

Some experts also said that a significant barrier for processing development is the co-operative ownership form. Unclear, disaggregated ownership rights result in more difficult management and more complicated decision-making process. Some experts mentioned that the problem lays in the co-operative law, which hampers flexible management and restructuring of dairy co-operatives.

Large-scale processors usually look for possibilities to deliver their products to SM/HM, where they can easily convey a large amount of produce. For those processors, large-scale retailers are also more stable partners than wholesalers, but they dictate stricter trade conditions and negotiate lower prices. The importance of a large retail channel has progressively risen since the end of 1990s, when the dominant form was wholesale, local cooperative chains and independent shops. But according to our experts, only about 5% of milk produce is still channelled through the SM and HM, although for fresh milk products (yoghurts), special cheeses and UHT milk, it reaches 20%. According to our research, in both regions large dairies are selling from 30% to 60% of their products to large retail chains, about 35-50% is channelled through the wholesale segment, and about 5% is delivered to local chains or independent shops. For small dairies as well as independent shops, the wholesale segment is dominant regarding share of sales. Smaller dairies usually have an insufficient scale of production to deliver to SM/HM.

## **2.2 Wholesale segment**

According to the respondents, the most important changes that took place in the wholesale segment were: Concentration and specialisation processes, changes in profitability, improvement in an assortment of dairy products, and technological innovations. These changes started with the transition process at the beginning

of the 1990s (when new private companies entered the market) and were further stimulated by the entrance of foreign retail chains in the mid-1990s. The regional experts also stressed the influence of dairy-processing concentration, which allowed wholesalers to extend economies of scale.

Strong competition between wholesale companies caused a deterioration of profitability. In addition, profitability of the wholesale sector decreased due to competition with foreign SM/HM chains<sup>6</sup>.

During the last 10 years, many small wholesale companies, unable to face stiff competition, went bankrupt. In addition, the number of wholesale companies that sold dairy products decreased due to the fact that the most common strategy adopted in such a highly competitive environment was to consolidate. One respondent said that the number of wholesale companies decreased from approximately 40 to 5 in the Warsaw agglomeration. Thanks to concentration, wholesale companies extended their operation.

Another strategy adopted in response to strong competition was specialisation in dairy products. Wholesale companies benefited from a growing demand for dairy products, as well as from increased competition between dairy processors. Both these processes resulted in an improvement of quality and assortment of dairy products.

It was also observed that large wholesalers introduced private labels as another response to increased competition. Both interviewed wholesalers in the Podlaskie region have private labels and control the quality of these products at the processing level. Further information tends to indicate that strong competition with SM/HM chains has also accelerated the vertical integration of Polish-owned companies.

Concentration and specialisation allowed wholesale companies to reduce costs. However, another important factor allowing for cost reduction, according to our respondents, was technological development. Wholesale companies introduced, for example, the possibility of ordering either through Internet or by palmtops.

The abovementioned changes have occurred at both the national and regional levels. However, several differences between the two regions can be observed. In the Podlaskie region, the wholesale sector still plays an important role in dairy product distribution. This is partially caused by the local government's strategy, which is very reluctant to allow SM/HM chains to enter the market. In

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<sup>6</sup> SM/HM chains have recently become an important direct purchaser of products from dairy companies. All interviewed processing companies were directly selling their products to SM/HM chains (the share ranged from 2% to 60% of total sales and has been increasing in recent years).

Warmińsko-Mazurskie, where there were no such regulations, the role of wholesalers in dairy product distribution is of much lower importance.

In general, interviewed experts were of the opinion that the wholesale sector's role is diminishing in the dairy industry's marketing chain. In both regions, the share of wholesale turnover with large retail chains and with processing companies has decreased significantly. Both foreign and national large retail chains have begun opening their own distribution centres<sup>7</sup>, and large processing companies tend to sell directly to retailers. However, the wholesale segment is still an important intermediary between processors and small retailers (local chains and independent shops) in the surveyed regions.

When describing the relationship between wholesale and other sectors, it is important to mention that both dairy processors and retailers prefer cooperation with large wholesale companies. According to our respondents, the main reason for this is the possibility of reducing transaction costs, including transport and negotiations costs. Another important reason are marketing costs. Thus, dairy products from large processors constitute a majority of the turnover of large wholesale companies.

However, dealing with small processing companies does have certain advantages. They offer wholesale companies access to specific and original dairy products, or to regional products with trademarks that are recognised by regional consumers. Dairy goods produced locally are delivered mostly to the regional retail segment, but also to several SM/HM chains located in the region. Thus, consumption patterns could provide a chance for small dairy producers.

### **2.3 Retail segment**

According to interviewed respondents, the most important changes that took place in the retail segment are: The growth and geographical expansion of large retail chains, the concentration process, increased competition, increased demand for dairy products, and improvement in an assortment of dairy products. Representatives of retailers in both regions also stressed organisational changes. As in the case of the wholesale sector's restructuring, these changes were mostly caused by the transition process at the beginning of the 1990s.

The growth and geographical expansion of numerous SM/HM chains resulted in the weaker position of local chains and independent shops, as well as very strong competition between large retailers. That may explain why the largest competitors for the surveyed national retail chains in both regions are SM/HM chains. However, there are some differences between the regions. The local government in

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<sup>7</sup> In one surveyed foreign SM/HM chain that does not have its own distribution centre, deliveries from large wholesalers amounted to ca. 10%; from large processing companies ca. 80%; and imports ca. 10% of total deliveries in 2005.

the Podlaskie region has hindered the development of foreign SM/HM chains because of possible damage to the environment. This is why foreign discount shop chains are perceived as the main competitors for the surveyed retailers in the Podlaskie region. On the other hand, SM/HM chains are the most important competitors for the surveyed retailers in the Warmińsko-Mazurskie region.

The above differences between regions show the importance of government policies (introduced both at the local and national level) in determining the retail segment's structure. It is worth mentioning that these policies also have an indirect impact on the other food chain segments because of the retail sector's bargaining power. Despite these clear linkages, none of our respondents indicated government policy and state intervention as one of the most important drivers of restructuring in the dairy sector.

Due to strong competition, the concentration process of both SM/HM chains and national local chains has recently begun. For example, national cooperative chains<sup>8</sup> (selling under the same brand in all of Poland) whose representatives were surveyed in both regions, have started to consolidate their distribution systems. Another example of the concentration process is the local SM chain in the Warmińsko-Mazurskie region. Recently, the company joined two other local chains and currently has 16 outlets (in 1997 there was only one). They also plan geographical expansion. Another strategy is to specialise in fresh products.

All interviewed retail representatives stressed quality improvement and increased demand for dairy products. According to the director of a local SM chain in the Warmińsko-Mazurskie region, even though prices drive consumption decisions, the pattern of dairy product consumption has been changing. "People start to be aware of what they eat," he said. "In the last few years, demand for traditional dairy products<sup>9</sup> increased 20-30% per year."

#### **2.4 Power relationship in downstream segments**

Dairy processing companies have historically had a dominant position in the dairy industry. But their position is diminishing progressively. Notwithstanding this fact, cooperation between processors, although generally assessed positively, could still be strengthened<sup>10</sup>. Despite continued rapid consolidation in this sector, it is increasingly the retail sector that dictates the rules, shaping the structure of the processing industry and thereby influencing milk producers' production

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<sup>8</sup> Which operated before transition process and which was privatised and split at the beginning of 1990s.

<sup>9</sup> Dairy products without any artificial flavours common in Poland like: Cottage cheese, sour milk, etc.

<sup>10</sup> The respondents stressed especially need for common effort to influence government policy more efficiently.

decisions. Large retailers often set high requirements and dictate what, when, how and how much is to be produced. Nevertheless, even these food retailers are under strict and constant pressure since, according to our interviewees, ultimate power is increasingly in the hands of consumers, who are ever more demanding with regard to factors such as nutrient definitions, organic status, traceability of products, etc. (OECD, 2005).

All interviewed persons stated that a new trend in consumption patterns is visible. Consumers are paying more attention to dairy product quality. One respondent said, "Before, consumers wanted to buy yellow cheese. Now they want to buy, let's say, Gouda. And more often they want to buy Gouda from a given dairy processor." Consumers also look for fresh products and are beginning to avoid dairy products with long expiration dates. In addition, regional products become more and more popular (even in some SM/HM chains). In the opinion of the interviewees, this could be a chance for small dairy processors.

### **3 CHANGES IN PRODUCTION AND MARKETING AT FARM LEVEL<sup>11</sup>**

This part of the paper presents the restructuring process that has taken place over the last decade in the highest upstream segment of the dairy supply chain, i.e., at the farm level. It is important to note that changes in this stage of the chain took place not only in the production sphere (level of output and production practices) but also in the way milk is being marketed, as well as the whole institutional environment in which farms operate.

#### **3.1 Main changes: Production**

To begin with, an increase in average herd, cow efficiency and consequently in farm production has been observed. These changes were accompanied by an outstanding improvement in milk quality. The process of increasing specialisation in milk production has also been remarkable. Interestingly, this tendency seems to be common for both smaller and larger farms in at least two surveyed regions. The former, however, due to relatively small-scale production, need to look for additional non-agricultural income sources. The latter holdings, on the other hand, rely on farming income alone.

Regarding production practices used by farmers, the recent decade has brought about a radical shift towards modern technology usage (cooling tanks, milking machines, etc.) and changes in feeding practices (shift to silage feeding). In this context an important division within farms has emerged. On the one hand, there are those who invested in new equipment, and on the other hand, those who stayed with obsolete machinery and more traditional methods of farming.

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<sup>11</sup> This section is based on a chapter of JAN FALKOWSKI's PhD dissertation which is being prepared at the Warsaw University.

Conducted interviews seem to indicate that only the former group will be able to survive in milk production in the long run. This, in turn, implies that the latter will ultimately have to quit and look for other sources of income.

This observation leads to the statement that notwithstanding the tremendous outflow of farmers from the dairy sector, which has taken place since the very beginning of transformation, a further decrease in the number of dairy farms should be expected in the future<sup>12</sup>. On the one hand, it should provide more scope for coping with the problem of excessive production fragmentation. On the other hand though, it calls for efficient measures to be implemented in order to provide those who quit with alternative job opportunities. As was indicated in the conducted interviews, most farmers that decided to quit milk production either shifted to other agricultural activities or took advantage of earlier pensions provided within the ‘structural rents’ programme<sup>13</sup>. The most common agricultural activity undertaken by those who left the milk sector is beef production. Those who left agriculture for good rented out their land or, less frequently, developed agro-tourism and now farm only for subsistence purposes.

### **3.2 Main changes: Marketing channels**

Simultaneous to the changes taking place in the production sphere, new trends have been observable with respect to farmers’ milk usage and marketing choices. First, a gradual increase in the share of milk being marketed has been visible. From 1995-2005, this number increased from roughly 70% to 80% (IERiGŻ, var. vol.). Three marketing channels have been used for milk sales, of which direct milk collection from the farm has become the most important. On the other hand, sales using collection points, as well as direct sales to consumers, have been decreasing in significance. It must be stressed, however, that collection points, although regarded as at most a temporary solution, still constitute an important alternative for milk marketing, especially for smaller farms. According to estimates, the share of milk sold directly to consumers decreased from nearly 15% of total production in 1995 to roughly 4% in 2005 (IERiGŻ, var. vol.). The share of milk collected from the farm showed the opposite tendency, increasing from 5% in 1993 to 20% in 2001 (NOWAKOWSKI, 2002). It should be stressed, however, that in recent years this trend has significantly sped up. As evidence, one may take the fact that in surveyed regions (in 2006) milk collected directly from the farm ranged from 76%-100% of the dairies’ supplies.

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<sup>12</sup> As shown in Table 1, in 1990 there were 1.8 million farms that had cows in Poland. In 2005 this number amounted to 711,000, whereas only 344,000 sold milk on the market. The latter figure may therefore be taken as an upper estimate of the number dairy farms one can expect in Poland a few years from now.

<sup>13</sup> According to surveyed farmers, the group of those who quit was dominated by smaller producers with herds up to 10 cows.

### **3.3 Main changes: Institutional environment**

Finally, it is worth noting that significant changes have taken place with respect to the institutional environment within which farms have been operating. On the one hand, these changes have consisted of introducing a milk quota system after Poland's accession to the EU. On the other hand, they have embraced all the necessary adjustments that had taken place within the dairy industry long before accession, starting in the mid-1990s. The aforementioned adjustments were shaping the new institutional environment, which was being shaped through various governmental policies, such as the quality premium programme, as well as numerous measures being undertaken by processors themselves. The latter have comprised a whole range of assistance programmes targeted at farmers in order to encourage them to undergo thorough modernisation. In that sense, they should not only be seen as mere support programmes, but also, or perhaps predominantly, as measures trying to correct for various market imperfections that have prevented or discouraged farmers from investing. As such, they have taken the form of preferential credits, the provision of collateral or inputs, as well as the provision of consultancy and traineeship. Last but not least, they have comprised premiums for high quality milk or large deliveries (DRIES and SWINNEN, 2004).

### **3.4 In search of causes**

When looking for the causes of the abovementioned changes, one encounters several obstacles. This is because those spheres under examination, i.e., production, marketing and institutional, seem to be highly interdependent. Therefore, it seems plausible to expect that changes taking place in one of them are very likely to stimulate adjustments in other spheres, creating the appropriate feedback. Consequently, changes in all of them take place, practically speaking, at the same time. This in turn, makes it very difficult to state which of them could be regarded as leading and which as following. Conducted interviews seem to allow for posing the hypothesis that changes in the institutional environment have led to changes in other spheres.

The spiritus movens behind changes in the institutional environment, not counting the introduction of a milk quota system, was certainly the fierce competition that the local dairy sector faced, both within and outside of Poland. Factors which played a role here include, among others, recognition of more and more strict quality standards (especially at the European level) and, to a lesser extent, foreign companies investing in the Polish dairy industry.

Regarding the production sphere, several reasons could contribute to changes that have taken place there. An increasing specialisation in milk production might be seen as a result of substantial investments that needed to be undertaken in order to meet quality standards. In effect, other production activities could lack the necessary funding. Evidence from the conducted interviews provided

further explanations. In both examined regions, the dairy industry had been among few processing industries that survived the process of transformation into a market economy. Moreover, after shutting down rural collection points during the 1990s, selling opportunities for agricultural products other than milk became significantly confined<sup>14</sup>. In addition, increasing internal and external competition forced farmers to look for the most efficient use of their endowments. Both regions under examination possess land of relatively poorer quality, which is most suitable for grassland and hence milk production.

An increase in the average herd size, and consequent increases in farm production could also be linked to milk quality issues. This is because investments in quality improvement, if they were to become profitable, required a sufficient scale of production. Moreover, it is reasonable to suspect that an increase in herd size was at least partly related to anticipating the introduction of the quota system. In order to reach the highest quota limits, farmers aimed to increase their production before the reference year. In addition, herd increases may also be linked to a deterioration in profitability, which induced farmers to take advantage of economies of scale. Last but not least, farmers were encouraged to increase their herds by dairies that aimed to optimise their supplies. In order to achieve this, dairies provided farmers with several measures, the two most common being extra payments for large quantities delivered and low-interest heifer/cow loans<sup>15</sup>. As presented in Table 3, the largest processors were the most successful in attracting large producers.

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<sup>14</sup> During communism, state-owned rural collection points, being the only opportunity for farmers to sell their goods, played a very important role. Once the old system collapsed, however, they lost significance and a majority of them went bankrupt. This resulted in the necessity of establishing new ties with market institutions, a task with which many farmers failed to cope. For milk, separate collection points existed. After the market economy was introduced, farmers' ties with the dairy industry were not broken up, since it was processors who were managing milk collection points. Consequently, compared to other farmers, milk producers were in a relatively better situation.

<sup>15</sup> It is important to note that support offered by dairies has not been confined to the second half of the 1990s, but became a long-term policy (DRIES and SWINNEN, 2004) and is expected to continue in upcoming years.

**Table 3: Share of small and large producers in total number of deliverers, as well as share of milk delivered through traditional channel with respect to dairy size, 2005**

|                  | Small producers (%) | Large producers (%) | Milk collected via collection points |
|------------------|---------------------|---------------------|--------------------------------------|
| Large dairies    | 34-42               | 11.5-14             | 9-21                                 |
| Mid-size dairies | 37-46               | 5-11                | 0-24                                 |
| Small dairies    | 46-67               | 2-6.6               | 3.6-18                               |

Source: Authors' calculations based on 10 interviews with dairy representatives<sup>16</sup>.

Regarding the process of milk producer polarisation, it could surely be related to households' access to capital and farmers' mentality. In addition, dividing farmers into 'modern' and 'backward' seems to be related to age. Farmers' reluctance to undertake investments often stems from the fact that they are just waiting to become eligible for their pensions, and once they receive it, they intend to quit their production. Furthermore, it seems that a lack of investments in the household might also be related to having no successors (FRENKEL, 2006). In addition, recent findings indicate that farmers tend to prefer their children to work in urban centres than on farms (HARDT, 2006). In this context, a lack of investments on the farm could be seen not as a consequence of having no successors, but as a conscious choice to withdraw from milk production.

With respect to the causes of changes in the marketing sphere, one may link them to changes in the institutional environment, as well as in the production sphere. One reason is surely related to the issue of milk quality. Selling to collection points became too risky because of the free-rider problem and a lack of mutual trust between farmers. On the other hand, in many cases an increased scale of production made deliveries to collection points, if not impossible, then certainly inconvenient. The other thing which contributed to their decline was the collection points' own perception of being profit-making institutions intermediating between the farmers and processors. A dairy representative described this phenomenon as follows: "Farmers leave collection points since they do not want to have another middleman. They think that without this intermediary, they could obtain higher prices and therefore perceive it as a 'robber'."

#### 4 CONCLUSIONS AND POLICY RECOMMENDATIONS

The paper aimed to describe the main causes and impacts of dairy restructuring in Poland. Based on national statistics and a qualitative study conducted at the regional level, an attempt was made to highlight the main characteristics of

<sup>16</sup> The term 'small producers' refers to farmers delivering less than 25,000 litres per year, whereas 'large producers' refers to farmers with annual deliveries exceeding 120,000 litres.

changes that have taken place along the supply chain. Integration with the EU – including Common Agricultural Policy (CAP) implementation – has been the main driving force behind dairy sector restructuring in Poland over the last decade. Some of the main elements of this process were: Obligatory quality improvements; pre-accession investment assistance; export opportunities; milk price increases; the introduction of direct payments; and the introduction of a milk production quota system.

It is expected that this process of policy-driven restructuring will continue in the near future, as new regulations requiring additional investments from either the processing or the milk producing sector, will become binding. Policy-driven restructuring will also be caused by reform to the organisation of the EU dairy market, resulting from both future debate on the CAP, as well as WTO negotiations.

In the process of restructuring the dairy food chain, the relative size of actors along the whole supply chain has played an important role. Large retail chains and wholesalers seek large deliveries to lower their costs of transport and marketing. This in turn puts pressure on processors and ultimately on farmers. Size also acts as a factor that strengthens bargaining power during negotiations. Since size is also often positively correlated with access to funds (internal or external) it substantially facilitates the modernisation process.

The questions then remain: Under which conditions can small farms survive; how this can be facilitated (or stimulated); and should it be facilitated at all? There is an obvious investment decision (related to size) necessary to gain access to modern marketing channels, i.e., the purchase of a cooling tank. Apart from this physical capital investment, the quota system puts an additional financial constraint on small farmers wishing to expand, as the cost of buying one extra unit of quota weighs relatively harder on smaller producers than on larger ones.

The agricultural market, including dairy production, is a subject of Common Market Organisation, and thus is an important part of CAP. There is a limited scope for domestic policy to influence this market. However, there are some suggestions and implications for policy formation at the country and the European level concerning the dairy sector. The following preliminary policy recommendations can be given:

- The regional allocation of quotas puts an artificial limit to the ongoing farm restructuring process. It is important to notice that this may also influence the speed of restructuring at the dairy processing level. Therefore, *reorganising milk quota distribution* in the country should be considered.
- The adverse effect of regulations regarding quota allocation at the regional level is further exacerbated by difficulties in finding land for sale, or even for rent, as the direct payment allocation inhibits farmers from parting with their land. There is an urgent need for more efficient measures that aim to *develop*

*non-agricultural income* sources in rural areas. This would encourage and enable less efficient farmers to quit milk production.

- Since small farmers lose in competition with larger ones regarding standard milk products, an alternative could be producing unique, traditional products. Therefore, *strengthening rural development measures* concerning production and promotion of niche and regional products, as well as cooperation between farmers, should be seriously taken into consideration.
- Notwithstanding the outstanding improvements in providing financial capital to rural areas, a lack of funds remains one of the most important barriers to development at the farm level. Therefore, money management through *financial education* should be strongly promoted among farmers.
- Significant changes with respect to dairy market organisation can be expected in the future. Therefore, it is necessary to prepare *various scenarios of the dairy sector's situation* after 2014, taking into account the likelihood of a more liberal setting.

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# **POLICY DESIGN AND EFFECTS**



## **STRATEGIES TO FACE THE SOCIO-ECONOMIC CRISIS IN A RURAL TERRITORY: THE CASE OF THE BARONNIES PROVENÇALES (DRÔME, SOUTHEAST FRANCE)**

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### **ABSTRACT**

While intensive agriculture is well developed in most of the Western Europe, some territories face hardship because of their natural and demographic weaknesses. To tackle these problems, local actors have transformed environment and landscapes into territorial resources which add value to their produce and justify development projects and subsidies from national and European levels. Through the case of the Baronnies Provençales, we see what measures can be taken, their benefits and limits. If environment and landscapes are real driving forces for rural development, they are not enough to ensure its sustainability.

**Keywords:** Mid-altitude mountains, landscape, AOC, France.

### **1 INTRODUCTION**

As the European Union carries on with its enlargement, some rural territories in long-time Member States still strive to integrate. Because of their location, relief, climate or low demographical density, they cannot develop the highly productive and competitive agriculture that remains, to many territories, the main development support. These territories do not have access to the main subsidies of the Common Agriculture Policy (CAP). Therefore, local actors must find alternative ways of bringing in money to assure a survival and a sustainable development for their territories.

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In this context, environment and landscape become social resources on which they can base local development projects. At the European and national levels, a series of measures make this possible by granting subsidies or aids to actions which aim at protecting the environment or the landscapes. Yet these initiative have their limits when it comes to building a really sustainable development dynamic. A rural territory development coordinator in southern France expresses in a lapidary way a widespread thought: "When someone tells me that a territory has landscapes, lavender and goat cheese, I understand it has nothing at all". Yet landscapes, like other environmental resources, may be efficient resources to build a sustainable rural development. It is worth therefore understanding the conditions of this efficiency. Are there connections and/or contrasts between these development supports and more classical ones, like the agro-food sector ?

A case study about the Baronnies Provençales should show us how French rural territories are addressing their socio-economic problems by transforming environmental process and landscape in territorial resources and what side effects can be observed.

## **2 METHODOLOGY**

This paper gives a view of our researches in the Baronnies in the first semester 2006. These are aimed at studying how landscapes are changing and how these changes are seen and dealt with by local actors. Given the interdisciplinary nature of the subject, our methodology includes techniques from both nature and social sciences, such as landscape and photo interpretation, vegetation survey and semi-directive interviews. Besides the studies that we carried out ourselves, we benefited from works previously conducted by fellow researchers from LADYSS and CEMAGREF<sup>1</sup>.

The deliberate choice of tackling the sustainable development in a rural territory issue through landscape allows us to grasp at a time:

- The dynamics which cover the observed territory and leave their traces in the landscape;
- How evolutions in the territory are perceived by the actors who live there or take care (at least partially) of its management and
- The image of their territory that the local actors show to visitors or external populations.

Our field work was organised in two landscape/vegetation observation missions and an interview mission. The first observation mission, in March 2006, was a crossing of the Baronnies from Sisteron to Buis-les-Baronnies, thus following a

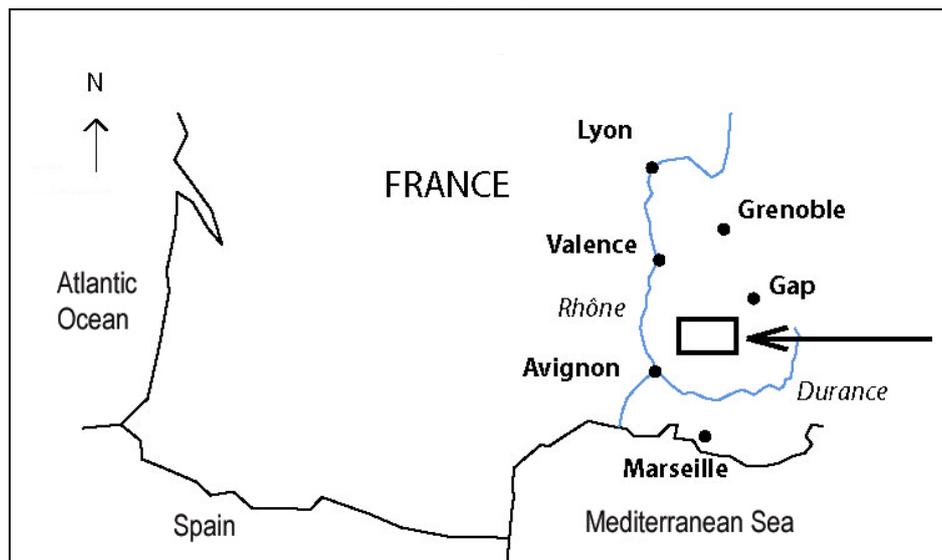
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<sup>1</sup> Specially those of COHEN and REY (2005) and DUFAU (2004), both in the Méouge Valley.

gradient from a mountainous environment to a Mediterranean one. Structures and contents of the different landscapes were observed. It led up to a typology of the different kinds of valley landscapes (mainly Jabron, Méouge, Ouvèze and Menon). The second one, in May, covered about the same itinerary. It allowed us to specify botanic contents of landscape (21 samples in main plant formations: Pine-wood, brush, scrub land, grassland...) and differentiate phases in brush encroachment.

Concerning the interviews, they were made with 19 representatives of public institutions (national, regional and local) and a farmer association<sup>2</sup> in February. All the chosen institutions deal with agriculture and/or forestry, two activities that structure the physiognomy of the territory in the Baronnies. These actors make rules, control, give advice or finance projects in these fields. Therefore, they take part in defining problems, priorities and solutions. Interviews with farmers have already been made in an exploratory campaign in the Méouge Valley (DUFU, 2004) and will soon be carried out in the whole territory, thus enabling to establish a link between the visions of these two kinds of actors.

**Figure 1: The Baronnies Provençales, in Southeast France**



Source: Authors.

<sup>2</sup> Association syndicale autorisée des Amis de l'arbre, Chambre d'agriculture, Centre régional de la propriété forestière, Direction départementale de l'agriculture et de la forêt, Direction départementale de l'équipement, EDF, Le Dauphiné Libéré (local newspaper), Office national des forêts, Syndicat d'aménagement des Baronnies and three mayors (one in the western side and two on the eastern one).

### **3 A TERRITORY IN CRISIS**

The Baronnies are a 1225 km<sup>2</sup> mid-altitude mountainous territory in the South-east of the Drôme Department (see Figure 1). Placed in the convergence of the Mediterranean Provence and the alpine domain, the region is not high enough for the high mountain activities (ski, hiking, etc.) nor low enough to profit from the coast-related tourism. The territory presents a gradient of climate (warmer in its Western part, colder in the East), relief (lower on the West, higher in the East) and cultures (a bigger diversity in the West side than in the East side). The main types of landscape are shown in Figure 2.

After a peak of population in the second half of the 19<sup>th</sup> century, the territory saw huge waves of migration towards urban areas during and after the World Wars, which was a widespread tendency in rural France at the time. The population decrease was however more important here than in most of other French territories: Today, we count no more than 17 inhabitants per km<sup>2</sup> in the Baronnies, while the average in rural France is 35 inhabitants per km<sup>2</sup>.

Nowadays, the Baronnies face increasing economic difficulties caused by international competition. The successive enlargements of the European Union have been catastrophic to this territory whose topographic and climatic conditions do not allow for high agricultural productivity. Furthermore, it does not have valuable resources which could allow the local actors to take part in already structured economic sectors (world heritage sites, snow activities etc.). Even if the demographic fall has been stopped, the socio-economic situation is tricky and many farmers still go out of business for financial reasons. The situation is worse in the eastern part of the territory, where the climate and the relief are harder, thus limiting the possibilities for the farmers and reducing the accessibility and the economic interest for the area.

The consequences of this socio-economic crisis can be seen in the landscape: The decrease of the human population and the drop of the agricultural activities have furthered the brush encroachment. Since the middle of the 19<sup>th</sup> century, the afforestation rate has increased between 30% and 70% depending on the zones (CONSERVATION DU PATRIMOINE DE LA DRÔME, 2006). In the extreme South-east of the territory, 27% of the surface of the Méouge Valley saw its vegetation thicken from 1948 to 1991 (COHEN and REY, 2005). Nowadays, half the surface of the Baronnies are covered by forest-like vegetation (INVENTAIRE FORESTIER NATIONAL, 1997). Even if protection forests planted from the end of the 19<sup>th</sup> century have contributed to this dynamic, they are a minor factor compared with the agricultural and demographic decline (COHEN and REY, 2005).

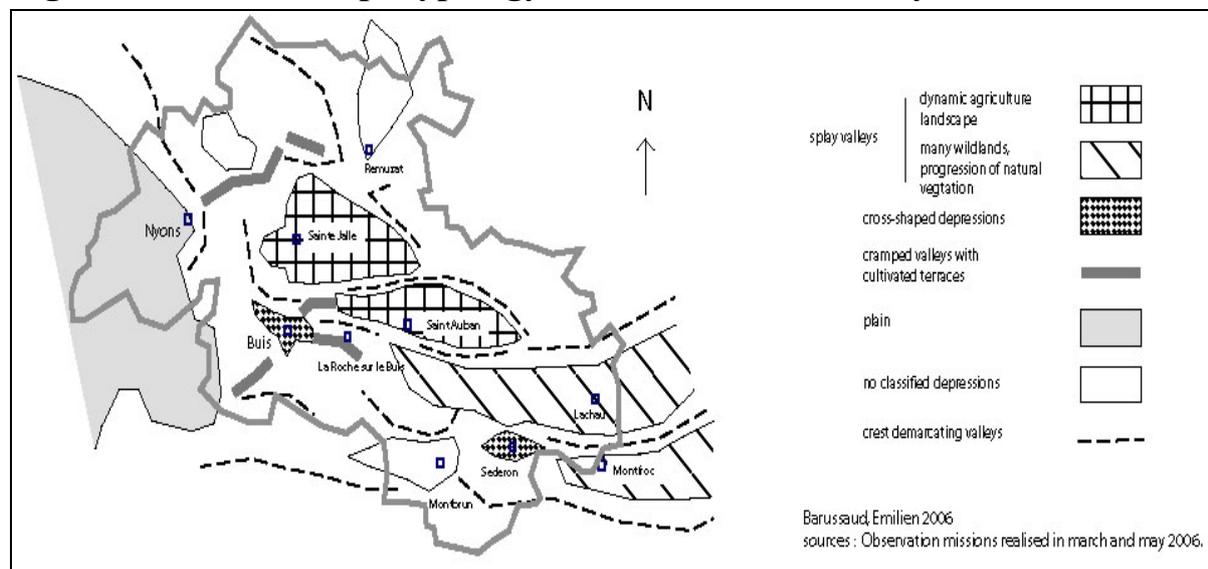
This phenomenon, which has been observed throughout France and in Mediterranean mountain regions in neighbour countries, preoccupies local populations and public institutions for its repercussions. Indeed, it increases the forest fire

risk, reduces the biological diversity and jeopardizes certain species. Besides, it generates landscape closing, a threat to the symbolic, "traditional" Mediterranean landscapes which are highly appreciated in present-day Europe beyond the borders of the Baronnies. Finally, research shows that people living in areas where brush encroachment exists feel that they are losing control over the vegetation and that their identity is threatened (COHEN, 2003).

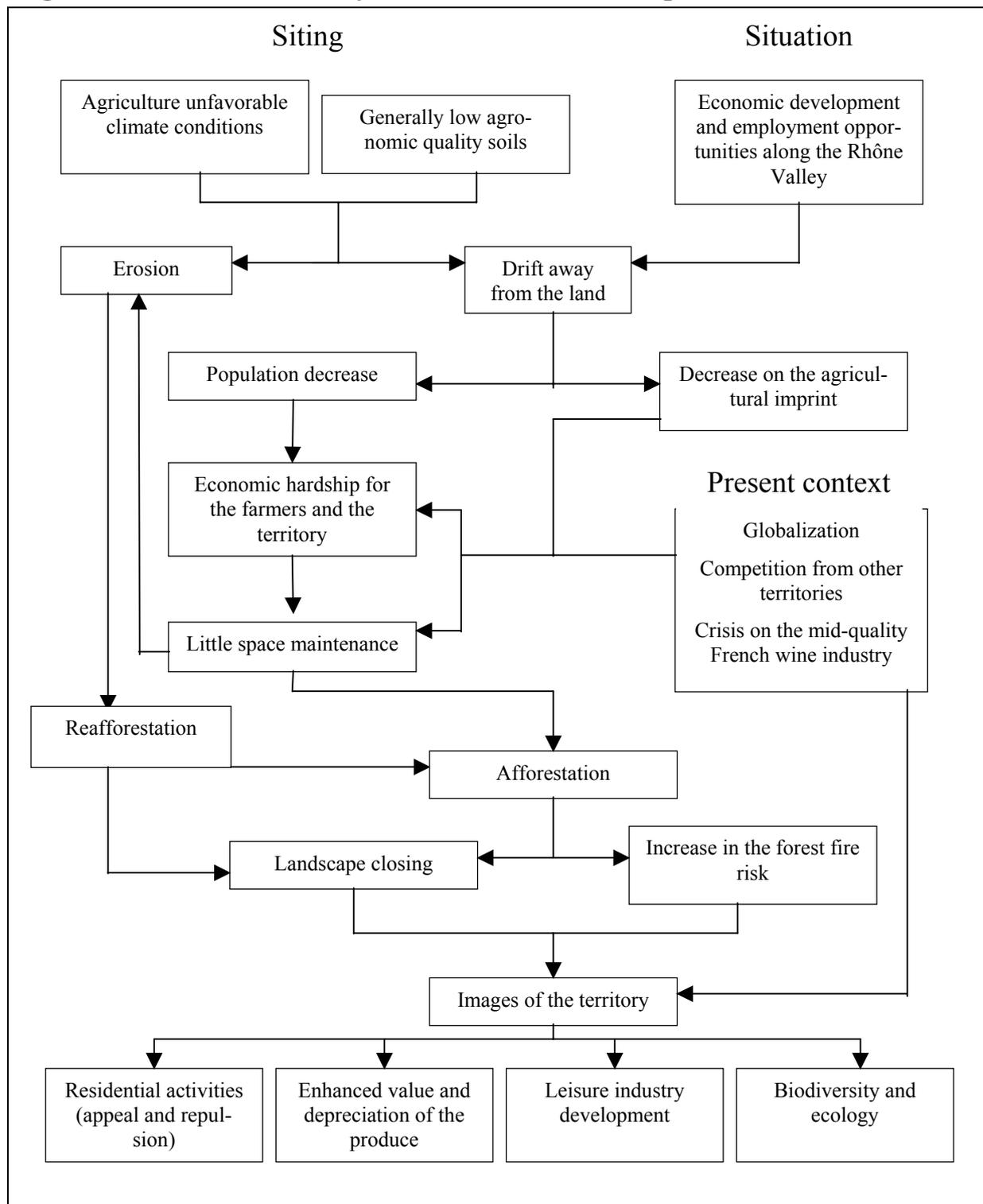
In the Baronnies, our interviews show that the brush encroachment anguishes people because it is the visual translation of the hardship in which their territory lives. At the same time, they fear that the landscape closing could make the situation even worse by reducing the attractiveness and the accessibility of the region. The forest fire risk is another great concern even if, in reality, the threat is not as big as in neighbour Mediterranean areas (POLETTI, 2006).

As we will see, the brush encroachment is often among the arguments that justify territorial projects in the Baronnies. These are always linked to agriculture, following a trend observed in rural territories all over France (see figure 3). Indeed, since multi-functionality became a key concept for the European rural world, farmers have been seen as "environmental managers" (BERNARD, 1995; and CHASSANY, 1999) and landscape conservation now depends on the maintenance of this profession.

**Figure 2: Landscape typology of the Baronnies' valleys**



Source: Authors.

**Figure 3: The various dynamics and their consequences in the Baronnies**

Source: Authors.

#### 4 STRATEGIES TO FACE THE SOCIO-ECONOMIC PROBLEMS

The problems we listed above have been addressed by local professional, political and governmental instances. Because the Baronnies can not produce in a low-cost

basis, its agriculture targets specific niches with high quality standards. The local produce benefits from a range of labels and certifications, the highlight being the *Appellation d'origine contrôlée* (AOC) Olives and Olive Oil from Nyons (the biggest town of the territory, in its Western end).

#### 4.1 The quality labels: AOC, AOP and IGP

An AOC refers to the region or village from where a product comes. So that the label is issued, the quality or characteristics of a product must be due to its geographical production environment (considered in a broad sense, which includes both natural and human factors). Even if there are a few AOC for manufactured products, the label concerns mainly the agri-food sector: Wine, spirits and cheese are the most common examples.

The *Appellation d'origine protégée* (AOP) is an European equivalent of the AOC issued to agricultural and food products other than wine and spirits. The *Indication géographique protégée* (IGP) relates to a region or place where a specific product is made and applies if the product bases a part of its specificity on this geographical origin.

Schematically, the AOC and AOP apply if the specificity of the product comes essentially from its geographical origin, while for the IGP, only a partial connection between the two elements is necessary. Both the labels were created in 1992.

In the Baronnies, the AOC Olives and Olive Oil from Nyons is an important part of the territory development dynamics. Firstly, because it shows a collective organisation among farmers who managed to add value to their products in order to meet quality standards (GILLY et al., 2000). Secondly, the AOC serves as a symbol of the territory. Indeed, in France, this label is known and appreciated by many consumers. By purchasing the olives or olive oil from Nyons, these consumers also buy a symbolic part of the territory. Finally, in return, the territory and the image that it supplies (i.e. the landscape) become value added elements for the olive products. The authentic and traditional character attributed to the firsts benefits, through a transfer effect, the later. Landscape and olives are therefore indissociable.

A team of economists has well shown how the associated promotion of quality products and environmental services can create a sustainable territorial development model (HIRCZAK et al., 2005). In the case of the Baronnies, they emphasize that, for the agricultural products which have managed to find an efficient niche, the quality of the produce and that of the territory are indissociable. They form a "goods and services shopping cart" (PECQUEUR, 2000).

## 4.2 Parc naturel régional, pays and agri-environmental operation

Following a widespread tendency in present-day France, the local actors also take part in comprehensive territorial projects, such as the recently launched *Pays Une Autre Provence* («Another Provence» *Pays*) and the *Parc naturel régional des Baronnies provençales* (Natural Regional Park of the Baronnies Provençales), still in discussion. These institutions are aimed at creating new territorial configurations and balances. Their role is to create and lead collective dynamics around territory projects that should be built and negotiated by local actors. They can also concentrate financial resources and allocate them according to locally defined priorities and strategies. Their final objective seems to be to foster a more sustainable management of territories.

Another strategy is the development of the rural tourism in the region. Many farms offer accommodation, restaurants and/or direct selling of their own products. This develops a diversification of the income. It also complements the high quality standard strategy adopted for the agriculture by attaching a positive territory image to the region's produce.

At the same time, the local institutions surf in the wave of multi-functionality to integrate environmental issues in their territorial projects. This is how the bush encroachment was in the centre of a Local Agri-Environmental Operation held in the Baronnies from 1997 to 2002. The operation was focused on olive tree terraces and sheep breeding farms. The subsidies obtained were used to improve the infrastructures in the sheep farms and clear the olive parcels from the scrub.

In all these projects, the landscape and the environment serve as supports to the local development. They are resources for the tourism, offer an image of the territory and its produce, and justify public aids in the form of territorial or development projects.

## 4.3 Positive results: Improving the sustainability of the territory

These strategies appears to help solving the socio-economic problems that the Baronnies faces. At least a part of the territory experiences a certain reborn. During the last decade, local actors from both public and private sectors built up a new territorial offer around the olive oil through a range of services which shape and specify a local identity. The economists are optimistic in their conclusions: "The territory flourishes around the olive oil, with a diversified offer on wine, aromatic plants, lavender, rural tourism, landscape etc." (PECQUEUR, 2006).

Of course, development is made day after day and it is not always easy for a territory to find its own specificity. Still, this case shows an interesting track to renew sustainable development public policies in rural territories (BENKO, 2006). High quality standards and labels seem to be an efficient way of facing market constraints in many sectors (the olives being the most successful case). Together

with the diversification strategy, they increase the financial security of the farms and help maintaining a lively local economy, which should be profitable for the whole population (not only the farmers).

The Local Agri-Environmental Operation has saved one or two farmers from bankruptcy, according to one of our institutional sources. The Rhône-Alpes Region points out the participative process to define the beneficiaries of the project as a very positive aspect (JAUNEAU, 1997). The operation gave local actors the opportunity to discuss about the future of their territory, the first step towards a sustainable development.

#### 4.4 Side effects: Excluded people and issues

On the other hand, development projects based on environment and landscape do not always take every aspect of the territory into consideration. The issues which are excluded from the social and political process can be split into two categories: Those that cannot be seen and those which are not represented by a group of actors.

In the first category, we place the issues that are not observed neither on the landscape nor in the social claims – that is, what does not pose problem in the local level and therefore is not addressed by local institutions. Some of these issues may nevertheless be a problem in a larger scale.

The second category refers to issues that bother a part of the population which do not have enough social capital to build up or integrate an interest group. This seems to be the case of the farmers living in the East of the territory, who suffer most from the socio-economic crisis. This zone is too cold for the leading products of the goods and services shopping cart (olive and wine). The main regional routes are far away, which harm the tourism industry development. This means that these actors do not benefit from the territorial identity that they contribute to create through their farming activities and their space maintenance.

After all, we can wonder about the perennality of these landscape amenities, highly estimated as a value added to certain products but kept partly by actors facing hardship and whose activities are, in the long run, compromised. This aspect lightens the optimism of the previously mentioned analyses. While the bush encroachment is stronger in the eastern zone (BARUSSAUD, 2006), the financial aids and the development projects do not seem to place their priorities here.

The mayors from the East are by the way quite sceptical about the territory projects such as the Pays or the *Parc Naturel Régional*. They feel they are left on their own while the West benefits alone from the programmes (POLETTI, 2006). But they do not seem to have much political weight outside their own villages and therefore their demands are not well represented. As for the mayors from the West, they seem to believe that the development benefits everybody.

Concerning the high quality labels such as the AOC, they have excluded from the market several farmers who can not meet the standards. Indeed, the specifications often require investments that some people, already on the edge of profitability, are not able to do. Once again, the problem is bigger in the East than in the West. But, most of the time, the poorer farmers also lack the social and political resources that could help turning their problem into a local issue. The decision makers are aware of the situation, but do not see what they could do about it.

As for the Local Agri-Environmental Operation, its technico-administrative approach has clear limits when it comes to ensuring a real sustainability to the territories (BERNARD *op. cit.*). The budget allocated and the duration (only five years) are unsuitable for the long-term solutions needed. Therefore, the operation appears more as an emergency measure than as a real development programme.

The tourist promotion, on its side, might be accelerating the increasing in the number of second homes in the territory, whose consequences are feared by the local inhabitants. These point out the second-home owners as responsible for an explosion in the estate prices and thus the impossibility for youngsters to buy a farm and assure the continuity of the socio-economic life in the Baronnies. This problem, quite widespread in French rural space today, has already touched nearby territories. However, it is uncertain to what extent it is really a consequence of the second-home buyers.

Finally, not all the environmental problems of the Baronnies are addressed in the local actors' strategies. The most notable example is the badland erosion, observed by scientists but ignored in the local policies. The farmers themselves seem quite aware of the problem, although they do not know what its consequences are beyond the borders of their land. On the other hand, the local decision makers do not consider the erosion to be a problem in the territory. This situation may be explained by the little space the badlands take in the landscape.

Nevertheless, research has shown that, in spite of their size, at least some of these badlands are dynamic enough to cause the raising of the bed of the Durance River and the silting of the dams. This environmental question, underestimated in the local level, is addressed in the regional scale (that of the Durance basin management) by national institutions like EDF and the CEMAGREF. Thus, if local actors do not feel concerned by the subject, it is probably because they do not suffer the consequences of the erosion and because the problem is treated by national bodies.

## 5 CONCLUSION

Environment and landscape are often used as bases for the development of rural territories facing hardship. They have indeed become a driving force that enables them to bypass their natural or social weaknesses. However, they are not enough to ensure a sustainable rural development. Other factors, like the organisation of the actors or the social capital, must be associated to the process, so that all the issues identified at the local level can be addressed. In other words, each inhabitant should feel empowered to express their concerns and these ought to be taken into consideration in the territorial programmes.

As for the problems which are not identified by local actors, a diagnosis from an external body could bring them out. In this case, it would be up to the regional or national-level institutions to deal with them, as it is presently the case with badland erosion.

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## EMPIRICAL ASSESSMENT OF FUZZY INTERVENTION-LOGICS: THE CASE OF RURAL DEVELOPMENT IN EAST GERMANY

*ANNE MARGARIAN\**

### ABSTRACT

The assumptions of classical economic development theories often do not hold in situations of structural break, or under different exogenous restrictions that induce policy intervention. Evaluation and policy advice therefore have to rely on situation-specific ad-hoc theories that do not claim general validity but are well-adopted to prevailing circumstances. This paper proposes that when evaluating rural development, the intervention-logics of politics could serve as an ad hoc theory. In order to test these theories, which often include many endogenous and intervening variables – as well as conflicting goals – structural equation modelling as a methodical approach is proposed. It is then applied to the evaluation of macroeconomic effects of farm investment aid in East German rural areas.

**Keywords:** Structural equations, rural development, policy-evaluation.

### 1 INTRODUCTION

Evaluation and political advice often have to deal with situations where the assumptions of standard theories do not hold because it is exactly then that politicians feel the need to interfere: Political measures are implemented in order to reinforce economic dynamics and stabilise social situations. How is political advice and policy-evaluation in the field of rural development possible in the absence of a sound theoretical framework?

While an explanation of observed effects often has to be searched for on the micro-level using data from single households and enterprises, the goals of politics often are, or should be, measurable on the macro level of the economy and society. For the evaluation of rural development policy, the following conclusions have been drawn:

1. Considering the nature of evaluation and policy advice, i.e., they are applied sciences with practical tasks, indicators for assessing the effectiveness of political measures and/or assessing intervention logics might well come

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from a highly aggregated level. This is often necessitated by a lack of knowledge of the micro-foundation of observed phenomena. This strategy of macro level indicators is currently being followed by the European Commission in their new evaluation guidelines (EUROPEAN COMMISSION, 2006).

2. Due to the lack of general theories that adequately fit situations with disturbed standard assumptions, policy advice, as well as evaluation, has to rely on ad hoc theories, which do not aim for general validity but are well-adjusted to the specific phenomena under observation and the prevailing circumstances<sup>1</sup>. The intervention logic designed by politicians in order to implement its measures (or to justify their implementation) could serve as such an ad hoc theory to be tested by policy-evaluation.

Following are two main problems that hinder evaluation from successfully testing political intervention logics quantitatively with existing data:

1. The proposed indicators on the macro-level are, due to their aggregation level and the way they are arrived at, prone to measurement error, insensitive to unobservable micro-changes, and questionable in the method by which they measure what they are supposed to measure.
2. The ad hoc theories of political intervention logics are not usually proper scientific theories, especially in that they might not be worked out analytically in a one cause-one effect scheme.

The proposed methodological approach that seems to suit these problems especially well is structural equation modelling (SEM). This approach seems especially appropriate theoretically, since it is a confirmatory type of analysis and evaluation is supposed to test existing intervention-logics. Moreover, it allows for the consideration of many statistical problems that evolve from the complexity of social systems such as error term dependencies, accounting for intervening effects (SINGER et al., 2003), simultaneous models and multicollinearity among indicators (SUHR, 2001).

Experience with SEM is rather restricted concerning the evaluation of politics in rural development. However, this approach has been frequently applied in marketing and in studies concerning the success factors of enterprises. One example from agriculture is DAUTZENBERG (2005). There are disciplines where much more experience exists with the application of SEM, among them studies concerning genetics or psychology, but also special economical branches such as travel behaviour research<sup>2</sup>. One study on the impact of social capital on economic

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<sup>1</sup> A sceptical view regarding the validity of assumptions of standard economic theory can be detected among experienced evaluators (MARGARIAN, 2006). Due to immediate and open feedback from politics, evaluation often tests for the adequacy of underlying assumptions, for example by questioning recipients.

<sup>2</sup> See, for example GOLOB (2001).

development in Italy (SABATINI, 2006) remarkably closely resembles the potential of SEM as discussed in this paper. As for the scope of the paper, it clarifies the possibilities of a database extended by primary data and by the application of latent variables. There are excellent textbooks on structural equation modelling, among them BOLLEN (1989) and LOEHLIN (2004), the latter of which gives more weight to application. Moreover, user-friendly software exists. For example, Proc CALIS from the SAS-system has been used in this paper. A pioneering and highly-developed tool is LISREL, but with MX, there also exists a high potential form of freeware.

Regarding the structure of this paper, first, a short theoretical introduction with respect to the fundamental aspects of structural equations without latent variables is given. This is illustrated by an example derived from one possible intervention logic of farm investment aid (AFP) for rural development in Eastern Germany (Section 2.1). The estimation of this model will be presented in Section 2.2., and the results will be discussed in Section 2.3. Then, problems with the approach, specifically with respect to the presented application, are discussed and possible extensions presented in Section 3. Final conclusions are drawn in Section 4.

## 2 STRUCTURAL EQUATIONS WITH OBSERVED VARIABLES

### 2.1 Theoretical foundation and application

Political measures often lack one single consistent intervention-logic<sup>3</sup>. In contrast to other methods, the analysis of variances via structural equations enables the scientist to reconstruct complex intervention-logics, including multiple and conflicting goals, super-goals and sub-goals<sup>4</sup>. Structural models allow for feedback loops, as well as for intervening variables, and the demand for a measure can be modelled simultaneously with the observed effects. Direct, indirect and total effects can thus be calculated.

The basic model<sup>5</sup> is (BOLLEN, 1989, p. 80-81)

$$\mathbf{y} = \mathbf{B}\mathbf{y} + \mathbf{\Gamma}\mathbf{x} + \boldsymbol{\zeta} \quad , \quad (1)$$

where

$\mathbf{B}$  = m\*m coefficient matrix

$\mathbf{\Gamma}$  (Gamma) = m\*n coefficient matrix

<sup>3</sup> An older but still very valuable discussion of the problem of political measures and their justification and logical foundation can be found in HOMANN (1980).

<sup>4</sup> For an exemplary discussion of the normative validation of policies' goal-systems, see MARGARIAN (2006a).

<sup>5</sup> In Sections 2.1 and 2.2, the paper relies heavily on BOLLEN (1989) in its technical parts.

$\mathbf{y} = \mathbf{p} \cdot 1$  vector of endogenous variables

$\mathbf{x} = \mathbf{q} \cdot 1$  vector of exogenous variables

$\zeta$  (Zeta) =  $\mathbf{p} \cdot 1$  vector of errors in the equations.

In these structural models with observed variables, it is assumed that the observed variable exactly resembles the underlying construct without measurement errors.

These models can be presented fairly easy in so-called path-diagrams<sup>6</sup>. Ideally, once an intervention-logic has been formulated as a path-diagram, it should be discussed with politicians in order to identify its weak points, i.e., high insecurity, or possible misunderstandings and interpretation. The intervention logic of farm investment aid (AFP) in some East German states can be described as follows: The subvention of capital on farms for certain investments supports the preservation of jobs. Moreover, investments are supposed to support farm activities that produce high gross product per hectare, thus supporting the local economy and also preserving jobs. Farm investment aid is not directed to special farms through administration, but rather distributed by demand. This capsulated description of one possible intervention logic shows that:

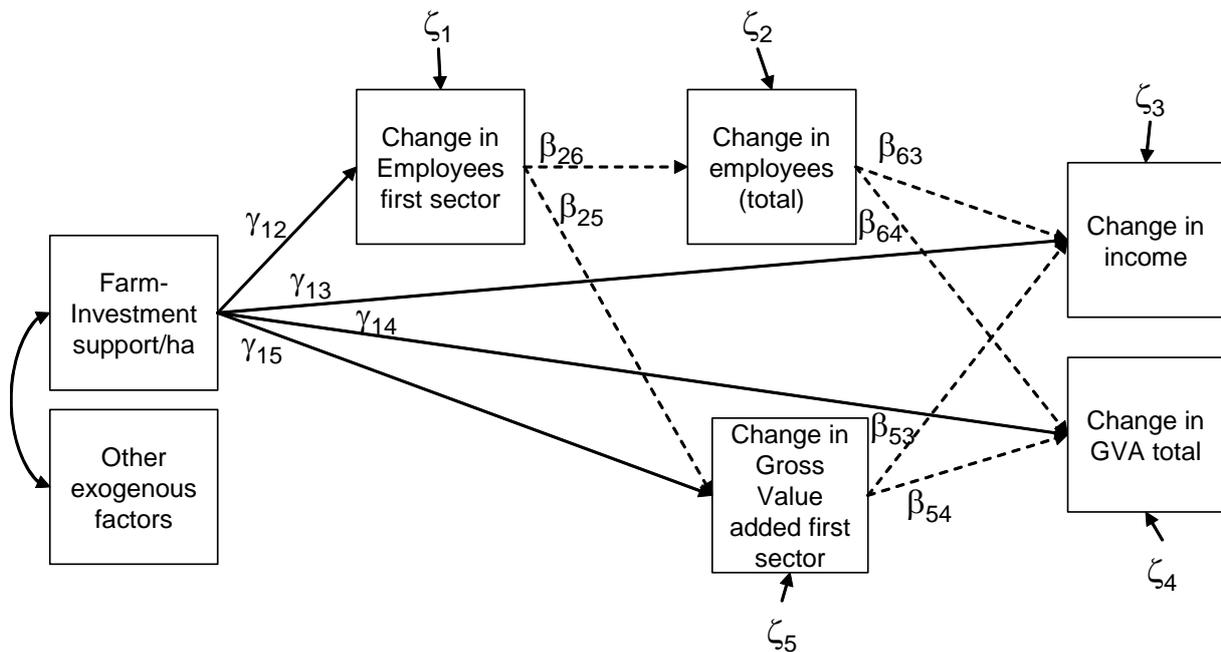
1. There are two direct result variables, growth of agricultural GVA and preservation of jobs in the sector.
2. These are only the subgoals for the supergoals of strengthening the local economy and residents' income. Therefore, agricultural GVA and jobs not only represent result variables, but are also supposed to serve as intervening variables.
3. AFP itself, since its distribution is guided by demand and might partly be caused by both the GVA produced in a region and the number of jobs on farms, is therefore not exogenous to the model.

The problem is depicted in Figure 1 as a path-diagram, while for simplicity, the endogenous character of AFP is not considered; other exogenous variables are left out. Also, the expected direct effects of AFP are symbolised by bold lines, while indirect effects are portrayed by dotted lines. The direct connection to changes in total income is due to the fact that farm investment support is supposed to be accounted for as an income position in private farms; the direct connection with changes in total GVA is due to the often stated assumption by politicians, that investment aid via multiplier effects stimulates the economy as a whole.

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<sup>6</sup> There are software programs which enable the researcher to set up their model via graphic interfaces. A second possibility for formulation is transforming the paths into equations, one for every endogenous variable. A third possibility has been selected by the author to assist with clarity should models grow complex: Direct formulation via matrices (see below).

**Figure 1: Simplified Path Diagram of intervention-logic**



Source: Author, in the style of BOLLEN (1989).

While single-direction arrows depict directions of causality, double-headed arrows show correlations among variables. Since connections between endogenous variables are supposed to be formulated explicitly in the structural part of the model, correlations (double-headed arrows) are only admitted on exogenous variables. If we formulate this model with matrices, it would look like this, according to Formula 1:

$$\begin{array}{cccccc}
 y_1 & 0 & 0 & 0 & 0 & 0 & y_1 & \gamma_{11} & \zeta_1 \\
 y_2 & 0 & 0 & 0 & 0 & 0 & y_2 & \gamma_{21} & \zeta_2 \\
 y_3 & \beta_{31} & \beta_{32} & 0 & 0 & 0 & *y_3 & + 0 *x_1 & + \zeta_3 \\
 y_4 & \beta_{41} & \beta_{42} & 0 & 0 & 0 & y_4 & \gamma_{41} & \zeta_4 \\
 y_5 & 0 & 0 & \beta_{53} & \beta_{54} & 0 & y_5 & \gamma_{51} & \zeta_5
 \end{array} \tag{2}$$

With the vector of  $y$ 's represent the five endogenous variables in the path diagram, the  $\beta$ 's represent causal influences among endogenous variables,  $\gamma$  is the influence of the exogenous variable  $x$  (farm investment support) and  $\zeta$  as error terms' non-observed external forces that cause changes in the endogenous variables. No covariances are assumed between the error terms, so the covariance matrix of the  $\zeta$ 's, a matrix called  $\Psi$  (Psi), is diagonal. Additionally, matrix  $B$  has  $\beta$ 's only in the portion beyond the diagonal. These characteristics illustrate an important property of our model: It is recursive. Recursive models do not contain reciprocal causation or feedback loops. Models with this characteristic are easier to handle since identification is less of a problem, i.e., there should always be a singular solution. In addition to  $B$ ,  $\Gamma$  and  $\Psi$  in the model with observed variables, we have to consider one more type of matrix in order to fully specify

the model: The matrix  $\Phi$  (Phi), which contains the covariances between the exogenous variables.

## 2.2 Data and estimation

In order to test this intervention-logic, an appropriate model must be designed. This model must account for more factors than depicted in the simplified path diagram above. In this model, development between 1999 and 2003 in the districts under scrutiny is explained by the initial situation (baseline indicators for 1999), development of the other respective indicators, and the possible influence of AFP.

Development in 76 rural districts of the Eastern German states is compared. From the 113 total districts, all urban districts have been excluded. Moreover, a test on normality of the included variables showed that for the variables aggregated income in a region and development of engaged persons, single outliers existed. The corresponding districts have therefore been eliminated from analysis, since an analysis of variances generally reacts rather sensitively to non-normality. Similarly, to reach a normal distribution, districts with a positive development of their number of inhabitants have been excluded from the analysis (eight districts). Ultimately, 77 districts remained in the sample. The model has been confirmed for this data set. It has been suspected, however, that possibly some unknown reasons, which are not accounted for in the model, lead to the reported lack of AFP support in eight of the districts. Therefore, the analysis was carried out a second time without these districts in the sample. Thereby, the fit of the models became much better and, while significant changes in the estimate of other parameters did not occur, within these supported areas the variable for "income" turned out to be significantly positively related to the distribution of funds. Estimates based on this sample of 68 districts are presented in the following.

Employed data came from various sources: The macroeconomic account on the level of districts (ARBEITSKREIS VOLKSWIRTSCHAFTLICHE GESAMTRECHNUNGEN DER LÄNDER, 2007); data from the census of agriculture in 1999 and 2003; a collection of regional indicators published by BBR (2000, 2005); and from an evaluation report on the investment support of food processing and marketing enterprises (WENDT et al., 2006). Data on the distribution of AFP funds have been provided by state ministries. Means and standard deviations of the baseline indicators from 1999, as well as of the calculated proportional developments between 1999 and 2003 are presented in table 1. While the rate of change usually followed approximately normal distributions, baseline indicators have been transformed to their natural logarithm for use in the model.

**Table 1: Description of variables used in the models**

| Variable                              | Unit                                | N  | Mean     | Standard-deviation | Min      | Max      |
|---------------------------------------|-------------------------------------|----|----------|--------------------|----------|----------|
| AFP-Support per ha 00-02              | €                                   | 76 | 6.95     | 8.51               | 0.00     | 43.63    |
| Employees primary sector per ha 99    | Persons                             | 76 | 0.05     | 0.03               | 0.02     | 0.18     |
| Agricultural GVA per ha 99            | 1,000 €                             | 76 | 0.96     | 0.17               | 0.65     | 1.54     |
| Proportion of employed inhabitants 99 | Employed /inhabitan                 | 76 | 0.38     | 0.03               | 0.31     | 0.45     |
| GVA per inhabitant 99                 | 1,000 €                             | 76 | 12.92    | 1.31               | 10.01    | 16.35    |
| Income per person in 99               | €                                   | 76 | 12738.26 | 567.38             | 11624.00 | 14587.00 |
| Food-processing Enterprises           | absolute number                     | 68 | 2.37     | 2.18               | 0.00     | 12.00    |
| Change in income-tax per person       |                                     | 76 | -0.07    | 0.11               | -0.29    | 0.20     |
| Change in GVA                         | difference from 03 to 99 related to | 76 | 0.05     | 0.07               | -0.13    | 0.28     |
| Change in number of employed persons  | baseline 99                         | 76 | -0.07    | 0.04               | -0.17    | 0.02     |
| Change in agricultural GVA            | baseline 99                         | 76 | -0.06    | 0.10               | -0.32    | 0.21     |
| Change of employees in agriculture    |                                     | 76 | -0.15    | 0.12               | -0.50    | 0.10     |

Notes: Changes are calculated from 1999 to 2003.

Source: Author's calculation based on BBR (2000, 2005), agricultural census and ARBEITSKREIS VGR (2007).

The situation in 1999 is shown by the following exogenous variables: GVA per person; the proportion of employed persons from all inhabitants; income per person; GVA of agriculture per hectare; agriculturally-employed people per hectare; and the number of food processing enterprises. The amount of support in a certain district is assumed to be influenced by these regional characteristics and therefore becomes endogenous to the model. It is supposed that the GVA of agriculture/ha, (since demand for funds is dependent on production types in a region, as well as income, since investment has to be co-financed by the farmers) as well as the number of food processing enterprises, have an influence. It is important to account for the latter, since they belong to the primary sector. Generally, it has been assumed that baseline indicators exceed the influence on their own development and on some of the other endogenous variables due to the close interdependencies among them. For the same reason, covariances among all exogenous variables are also estimated. The model becomes non-recursive (see above) with respect to one relationship: Change in employment is allowed to induce change on the development of total gross value-added and conversely, the development of GVA is allowed to influence the development of overall employment (reciprocal causation). No covariances among error terms and no feedback relations are assumed, however. Due to the indicator's higher sensitivity towards capital subventions, and to prove that there actually are measurable effects of the

measure, the variable "development of total income" has been replaced by "development of income tax". The remaining (endogenous) part of the model has been formulated according to the path diagram above. The correlation matrix on which the estimation is based is shown in Table 2.

**Table 2: Correlation matrix of the model**

|                                    | 1    | 2     | 3     | 4     | 5     | 6     | 7     | 8    | 9    | 10    | 11    | 12 |
|------------------------------------|------|-------|-------|-------|-------|-------|-------|------|------|-------|-------|----|
| <b>1</b> Change Income-tax         | 1    |       |       |       |       |       |       |      |      |       |       |    |
| <b>2</b> Change GVA                | 0.15 | 1     |       |       |       |       |       |      |      |       |       |    |
| <b>3</b> Change number of employed | 0.23 | 0.57  | 1     |       |       |       |       |      |      |       |       |    |
| <b>4</b> Change agric. GVA         | 0.19 | -0.32 | -0.12 | 1     |       |       |       |      |      |       |       |    |
| <b>5</b> Change agric. employees   | 0.03 | -0.16 | 0.09  | 0.15  | 1     |       |       |      |      |       |       |    |
| <b>6</b> AFP/ha                    | 0.22 | -0.10 | -0.01 | 0.19  | 0.25  | 1     |       |      |      |       |       |    |
| <b>7</b> Employees in agric. 99    | 0.04 | 0.07  | 0.06  | 0.02  | -0.47 | -0.19 | 1     |      |      |       |       |    |
| <b>8</b> agricultural GVA/ha 99    | 0.02 | 0.17  | 0.10  | -0.20 | -0.15 | -0.38 | 0.52  | 1    |      |       |       |    |
| <b>9</b> Income per person 99      | 0.51 | 0.18  | 0.36  | -0.03 | 0.12  | 0.07  | 0.27  | 0.41 | 1    |       |       |    |
| <b>10</b> share of employed        | 0.13 | -0.23 | -0.05 | 0.29  | 0.10  | 0.17  | 0.32  | 0.19 | 0.25 | 1     |       |    |
| <b>11</b> GVA per person           | 0.10 | -0.19 | 0.01  | 0.03  | 0.33  | 0.20  | -0.08 | 0.07 | 0.31 | 0.57  | 1     |    |
| <b>12</b> food-processors          | 0.31 | -0.08 | -0.12 | 0.28  | 0.07  | 0.18  | -0.15 | 0.00 | 0.27 | -0.02 | 0.043 | 1  |

Source: Author's calculation with Proc Corr (SAS).

In the estimation process, this Correlation matrix, or, preferably, the corresponding matrix of covariances, has to be reproduced as closely as possible. BOLLEN (1989, pp. 85-88) shows how the covariances between endogenous variables, exogenous variable and endogenous and exogenous variables can be reconstructed based on Formula 1. For each of these parts of the total matrix of covariances, one arrives at single formulas that consist of matrices  $\Phi$ ,  $\Gamma$ ,  $\Psi$ , and  $B$ : The variances and covariances are functions of the model parameters. SEM employs various estimation procedures. The most common are generalised least-square (GLS), maximum likelihood (ML) and unweighted least-square (ULS)<sup>7</sup>. In this paper, ML has been used mainly for better possibilities for the assessment of model fit, even though the sample size might be judged as being too small. For comparison, additional ULS estimates have been calculated. The resulting estimates are comparable in magnitude and sign.

<sup>7</sup> For a discussion of the pros and cons of the different estimation types, refer to BOLLEN (1989, pp. 107-116).

## 2.3 Results

Due to the rather large number of variables used in the model, a path diagram is not being presented as a whole, but only for clarification of single relations. Instead  $B$ ,  $\Gamma$  and  $\Phi$  are presented with the names of corresponding variables in rows and columns. The matrix  $\Psi$  remains diagonal, so that the unexplained Variances  $\zeta$  are presented in vector form. Figure 2 presents matrix  $\Phi$  with correlations between the exogenous variables of the first model.

**Figure 2: Covariances between exogenous variables within the model ( $\Phi$ )**

|                                  | employees first<br>sector per ha 99 | GVA first<br>sector per ha<br>99 | Income per<br>person 99 | employ-<br>ment 99 | GVA per<br>person 99 | Food-<br>processors |
|----------------------------------|-------------------------------------|----------------------------------|-------------------------|--------------------|----------------------|---------------------|
| employees                        | 1.00                                |                                  |                         |                    |                      |                     |
| first sector<br>per ha 99        | 0.17                                |                                  |                         |                    |                      |                     |
|                                  | 5.79                                |                                  |                         |                    |                      |                     |
|                                  | [p7]                                |                                  |                         |                    |                      |                     |
| GVA first<br>sector per<br>ha 99 | 0.52                                | 1.00                             |                         |                    |                      |                     |
|                                  | 0.14                                | 0.17                             |                         |                    |                      |                     |
|                                  | 3.77                                | 5.79                             |                         |                    |                      |                     |
|                                  | [p13]                               | [p8]                             |                         |                    |                      |                     |
| Income<br>per person<br>99       | 0.27                                | 0.41                             | 1.00                    |                    |                      |                     |
|                                  | 0.13                                | 0.13                             | 0.17                    |                    |                      |                     |
|                                  | 2.17                                | 3.10                             | 5.79                    |                    |                      |                     |
|                                  | [p18]                               | [p14]                            | [p9]                    |                    |                      |                     |
| employ-<br>ment 99               | 0.32                                | 0.19                             | 0.25                    | 1.00               |                      |                     |
|                                  | 0.13                                | 0.12                             | 0.13                    | 0.17               |                      |                     |
|                                  | 2.49                                | 1.52                             | 1.96                    | 5.79               |                      |                     |
|                                  | [p22]                               | [p19]                            | [p15]                   | [p10]              |                      |                     |
| GVA per<br>person 99             | -0.08                               | 0.07                             | 0.31                    | 0.57               | 1.00                 |                     |
|                                  | 0.12                                | 0.12                             | 0.13                    | 0.14               | 0.17                 |                     |
|                                  | -0.69                               | 0.57                             | 2.40                    | 4.03               | 5.79                 |                     |
|                                  | [p25]                               | [p23]                            | [p20]                   | [p16]              | [p11]                |                     |
| Food-<br>processors              | -0.15                               | 0.00                             | 0.27                    | -0.02              | 0.04                 | 1.00                |
|                                  | 0.12                                | 0.12                             | 0.13                    | 0.12               | 0.12                 | 0.17                |
|                                  | -1.21                               | 0.03                             | 2.14                    | -0.20              | 0.35                 | 5.79                |
|                                  | [p27]                               | [p26]                            | [p24]                   | [p21]              | [p17]                | [p12]               |

Notes: Due to the symmetric character of the matrix, only the lower half is presented. The estimated value is given in the first line, standard-deviation in the second and corresponding t-value in the third. The fourth line shows the name which the parameter was given in the estimation procedure.

Source: Author's calculation with Proc Calis (SAS).

Even though the correlations are not extraordinarily high, it can be said that the estimation of covariances could not have been dropped from the model without severely affecting its fit. From the 15 estimated covariances, only a few are clearly insignificant: Total gross value added in a district in 1999 does not seem to be correlated with the proportion of employees in the first sector of 1999, the gross value added in the first sector in a district in the same year, or with the number of food processing enterprises in the district. The latter neither shows significant covariance with the gross value-added in the first sector, nor with the

employment situation. Figure 3 depicts matrix  $\Gamma$ , which shows the influence that the exogenous variables (the same variables from Figure 2) exert on endogenous variables.

**Figure 3: Estimated influences from exogenous on endogenous parameters**

|  | employees first<br>sector per ha 99 | GVA first sector<br>per ha 99 | Income per<br>person 99 | employ-<br>ment 99     | GVA per<br>person 99   | Food-<br>processors    |
|--|-------------------------------------|-------------------------------|-------------------------|------------------------|------------------------|------------------------|
| <b>change in<br/>income-tax</b>                  | 0.00<br>0.00<br>0.00                | 0.00<br>0.00<br>0.00          | 0.43<br>0.11<br>3.79    | 0.00<br>0.00<br>0.00   | 0.00<br>0.00<br>0.00   | 0.14<br>0.11<br>1.31   |
|  |                                     |                               | [g6]                    |                        |                        | [g18]                  |
| <b>change in<br/>GVA</b>                         | 0.00<br>0.00<br>0.00                | 0.00<br>0.00<br>0.00          | 0.13<br>0.14<br>0.91    | 0.00<br>0.00<br>0.00   | -0.22<br>0.10<br>-2.13 | 0.00<br>0.00<br>0.00   |
|  |                                     |                               | [g7]                    |                        | [g14]                  |                        |
| <b>Change in<br/>employment</b>                  | 0.00<br>0.00<br>0.00                | 0.00<br>0.00<br>0.00          | 0.38<br>0.12<br>3.19    | -0.10<br>0.12<br>-0.83 | 0.00<br>0.00<br>0.00   | -0.21<br>0.11<br>-1.96 |
|  |                                     |                               | [g8]                    | [g11]                  |                        | [g20]                  |
| <b>Change in<br/>GVA first<br/>sector</b>        | 0.24<br>0.15<br>1.62                | -0.38<br>0.13<br>-2.82        | 0.00<br>0.00<br>0.00    | 0.28<br>0.11<br>2.45   | 0.00<br>0.00<br>0.00   | 0.32<br>0.11<br>2.91   |
|  | [g1]                                | [g3]                          |                         | [g12]                  |                        | [g15]                  |
| <b>Change in<br/>employment<br/>first sector</b> | -0.62<br>0.12<br>-5.20              | 0.10<br>0.13<br>0.76          | 0.19<br>0.11<br>1.66    | 0.21<br>0.11<br>1.98   | 0.00<br>0.00<br>0.00   | 0.00<br>0.00<br>0.00   |
|  | [g2]                                | [g4]                          | [ga]                    | [g13]                  |                        |                        |
| <b>AFP-funds<br/>per ha</b>                      | 0.00<br>0.00<br>0.00                | -0.47<br>0.12<br>-3.96        | 0.23<br>0.12<br>1.87    | 0.00<br>0.00<br>0.00   | 0.00<br>0.00<br>0.00   | 0.11<br>0.11<br>1.01   |
|  |                                     | [g5]                          | [g9]                    |                        |                        | [g17]                  |

Notes: The estimated value is given in the first line, standard-deviation in the second and corresponding t-value in the third. The fourth line shows the name that the parameter was given in the estimation procedure.

Source: Author's calculation with Proc Calis (SAS).

The assumption that the level of a baseline indicator influences its own development (see above) has been confirmed. For initial condition and development, we observe a negative relationship for employees in the first sector, for GVA in first sector and for overall GVA. This means that with respect to these indicators, we observe a converging development between different rural districts, which is much clearer for the primary sector. Interestingly, there exists a positive relationship between disposable income in 1999 and the development of income tax payments in the following years. With respect to the economic condition of rural district inhabitants, we therefore observe diverging development. The single most influential exogenous variable is income per person in 1999. It must be admitted that some of the causal influences of this indicator have been introduced ad hoc in order to improve the model's fit. The validity of these assumptions could then only be tested on a different sample. The positive causal influence from income on the change in employment in the first sector surely deserves further investigation. As assumed, the GVA of the primary sector per

hectare influences the distribution of AFP funds. Money seems to flow into areas with a lower intensity than the primary sector. On the other hand, the flow of funds is also related to the disposable income of people in a region. This could be explained by the fact that especially in regions with a high share of family farms, investments are financed in part through disposable income and thereby only realised if the income situation allows it. The presence of food processing industries has a very positive influence on the development of gross value-added in the primary sector, and a significant negative influence on employment in this sector. Rationalisation seems to proceed fastest in these districts. Slightly more funds flow into areas with more food processors. Figure 4 shows the relationship between the endogenous variables, i.e., the estimates of the  $\beta$ -Parameters in Matrix B.

**Figure 4: Estimated relationships between endogenous parameters (B)**

|  | change in<br>income-tax | change in<br>GVA | Change in<br>employment | Change in GVA<br>first sector | Change in employ-<br>ment first sector | AFP-funds<br>per ha |
|--|-------------------------|------------------|-------------------------|-------------------------------|--|---------------------|
| change in<br>income-<br>tax                  | 0.00                    | 0.00             | 0.11                    | 0.15                          | 0.00                                   | 0.14                |
|  | 0.00                    | 0.00             | 0.11                    | 0.10                          | 0.00                                   | 0.10                |
|  | 0.00                    | 0.00             | 1.00                    | 1.43                          | 0.00                                   | 1.41                |
|  |                         |                  | [b1]                    | [b3]                          |  | [b7]                |
| change in<br>GVA                             | 0.00                    | 0.00             | 0.31                    | -0.27                         | 0.00                                   | 0.00                |
|  | 0.00                    | 0.00             | 0.25                    | 0.10                          | 0.00                                   | 0.00                |
|  | 0.00                    | 0.00             | 1.24                    | -2.63                         | 0.00                                   | 0.00                |
|  |                         |                  | [b2]                    | [b4]                          |  |                     |
| Change in<br>employe<br>ment                 | 0.00                    | 0.27             | 0.00                    | 0.00                          | 0.11                                   | 0.00                |
|  | 0.00                    | 0.24             | 0.00                    | 0.00                          | 0.10                                   | 0.00                |
|  | 0.00                    | 1.10             | 0.00                    | 0.00                          | 1.09                                   | 0.00                |
|  |                         | [b0]             |                         |                               | [b5]                                   |                     |
| Change in<br>GVA first<br>sector             | 0.00                    | 0.00             | 0.00                    | 0.00                          | 0.17                                   | -0.05               |
|  | 0.00                    | 0.00             | 0.00                    | 0.00                          | 0.13                                   | 0.12                |
|  | 0.00                    | 0.00             | 0.00                    | 0.00                          | 1.35                                   | -0.42               |
|  |                         |                  |                         | [b6]                          | [b9]                                   |                     |
| Change in<br>employe<br>ment first<br>sector | 0.00                    | 0.00             | 0.00                    | 0.00                          | 0.00                                   | 0.12                |
|  | 0.00                    | 0.00             | 0.00                    | 0.00                          | 0.00                                   | 0.11                |
|  | 0.00                    | 0.00             | 0.00                    | 0.00                          | 0.00                                   | 1.05                |
|  |                         |                  |                         |                               |  | [b10]               |
| AFP-<br>funds per<br>ha                      | 0.00                    | 0.00             | 0.00                    | 0.00                          | 0.00                                   | 0.00                |
|  | 0.00                    | 0.00             | 0.00                    | 0.00                          | 0.00                                   | 0.00                |
|  | 0.00                    | 0.00             | 0.00                    | 0.00                          | 0.00                                   | 0.00                |

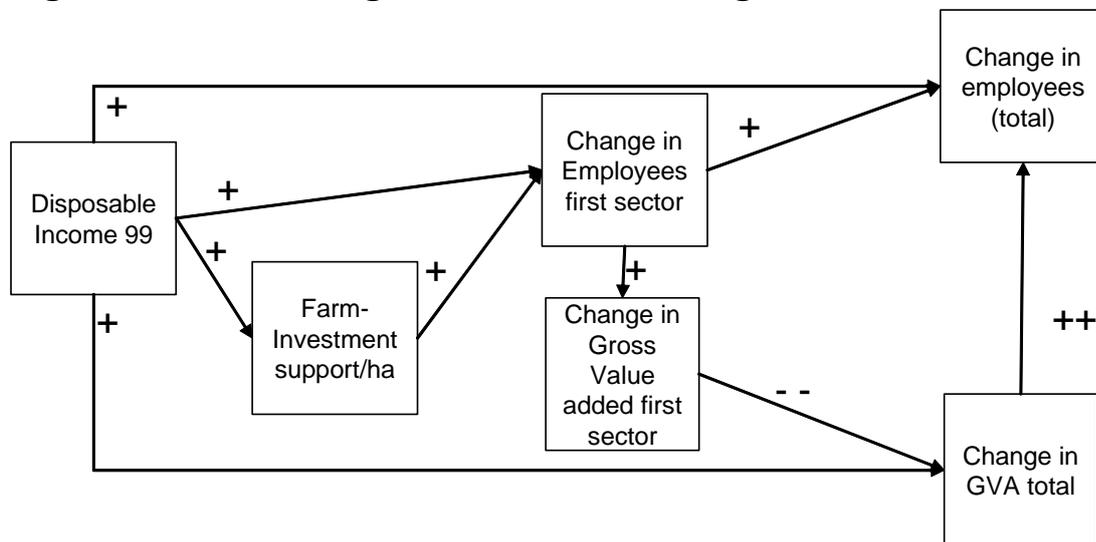
Note : See Figure 3.

Source: Author's calculation with Proc Calis (SAS);

Contrary to the stated aim of agricultural investment aid, the measure does not seem to influence the intensity of agricultural production (change in GVA first sector), at least in the short run. The significant and predicted influence on income tax payments confirms the fact that the model would principally be capable of detecting structural influences of the measure, if there were any. Actually, the model shows a small positive influence on the development of employment in

the first sector. This, as expected, has a slightly positive influence on overall employment and a slightly positive influence on development of GVA in the primary sector. This then leads to significantly higher income tax payments. The model shows that in rural districts, agriculture seems to be one of the major sources of income tax development. More interesting here, though, is that an increase in gross value-added in the primary sector seems to occur at the expense of the development of overall GVA. This confirms the fact that every Euro can only be spent once. Furthermore, it can be seen that while a change in employment in the first sector only provokes minor development of overall employment, a change of total GVA has a greater positive influence on the development of employment. Figure 5 shows the most important findings of the model with respect to the intervention-logic.

**Figure 5: Path Diagram for central findings of the first model**



Source: Author's picture.

The graphic should make clear that jobs in agriculture are costly in terms of foregone opportunities: If disposable money is directed towards investments in other than the primary sector, GVA and the number of jobs develop more positively. On the contrary, investments into the primary sector only have minor positive influence on job development. At the same time, the development of the overall economy is slowed by the concentration on agricultural investments; this is depicted by the strong negative estimate for the arrow leading from change in GVA in the first sector, to change in GVA total.

The last estimates to be presented are remaining variances of the endogenous variables ( $\zeta$ s). They are:

- Change in income tax 0.65
- Change in GVA 0.62
- Change in employment 0.61

- Change in GVA of primary sector 0.73
- Change in employment in primary sector 0.65
- and AFP funds per ha 0.79.

Therefore, about 32% of the total variance of the endogenous variables has been explained. As matrix  $\Gamma$  in Figure 3 shows, development strongly depends on the initial situation, which explains the biggest part of the variances.

How dependable are the model's results? The assessment of fit is one of the major weak points of SEM. Chi-square is only applicable for GLS- and ML-estimation in the case of multinormality. In fact, multinormality is seldom tested for, even though BOLLEN (1989) proposes a matrix-algebraic approach. Moreover, Chi-square relies on sample size, therefore for large sample sizes it might become difficult to find a model that cannot be rejected (GOLOB, 2001). On the other hand, Bollen writes that for small  $N$ s, there is evidence that chi-square is often too large, leading to rejections of the model. As a guideline for minimal sample size, he writes: "A useful suggestion is to have at least several cases per free parameter," (p. 268). In the literature, usually the application of a bundle of measures of fit is proposed for overcoming problems of each single one. This is done in Table 3. I closely follow both procedures and style from DAUTZENBERG (2005).

**Table 3: Assessment of model fit**

| Criterion                           | Abbreviation              | empirical value | Threshold |
|-------------------------------------|---------------------------|-----------------|-----------|
| Goodness of Fit Index               | <b>GFI</b>                | 0.96            | >0.9      |
| GFI Adjusted for Degrees of Freedom | <b>AGFI</b>               | 0.86            | >0.9      |
| Root Mean Square Residual           | <b>RMR</b>                | 0.05            | <0.1      |
| Parsimonious GFI                    | <b>PGFI</b>               | 0.33            | 0.0-1.0   |
| RMSEA Estimate                      |                           | 0.00            | <0.08     |
| Chi-Square                          | <b>chi<sup>2</sup></b>    | 18.36           |           |
| Chi-Square DF                       | <b>df</b>                 | 23.00           |           |
| Pr > Chi-Square                     |                           | 0.74            |           |
| Probability of Close Fit            |                           | 0.87            |           |
| Chi-Square/ DF                      | <b>chi<sup>2</sup>/df</b> | 0.80            | <3.0      |
| Independence Model Chi-Square       |                           | 259.92          |           |
| Independence Model Chi-Square DF    |                           | 66.00           |           |
| Independence Model Chi-Square/ DF   | <b>chi<sup>2</sup>/df</b> | 3.94            |           |

Source: Author's table based on output from Proc Calis (SAS) and in close resemblance to DAUTZENBERG (2005).

It can be concluded from Table 3 that the model reached a good fit with respect to all criteria despite the "adjusted for degrees of freedom wellness of fit index" (AGFI). The chi-square seems high, but in relation to the remaining degrees of freedom of the model, it is nevertheless highly satisfactory. Moreover, the probability of rejecting the 0-hypothesis of a non-fitting model is high; the test therefore has not proven the model to be incorrect. A comparison with the independence model chi-square also shows that compared to a zero-parameter baseline model, the fit improved significantly, since the chi-square dropped from 260 to 18. For more information on this criteria, the reader is referred to BOLLEN (1989) and SAS (1999).

### 3 RESTRICTIONS OF THE MODEL

One main problem with the proposed approach of modelling structural relationships at the level of highly aggregated macro-variables is that in SEM, the researcher is supposed to model causal relations between variables, not correlations. The higher the aggregation level of observation, the more complex are the hidden interrelationships that underlie the observable correlations between variables. It might not be possible to exactly picture these interrelationships, which probably include reciprocal causalities and feedback loops, without running into problems with identification. Moreover, the problem of excluded variables remains in SEM<sup>8</sup>. The more global the model, the more difficult it might become to include all relevant causes for developments and, in our case, for the distribution of funds. Especially in the latter case, over- or underestimations of a measure's effects would result. Another drawback of highly aggregated models is that single indicators might represent more dimensions of a situation than the researcher is aware of. One example is the baseline-income variable in the presented model, which proved to have a highly significant influence on most of the endogenous variables even though some of the modelled relationships cannot be explained by direct causality.

However, structural equation modelling offers far more possibilities than discussed in the relatively simple example presented in this paper. In contrast to other methods, SEM provides the possibility to test for the probability of mutual causality such that the classical assumption that attitude causes action can be challenged by the contrary assumption that action (revealed preferences) causes attitudes<sup>9</sup>. This might turn out to be important in the treatment of the difficult question of evaluating take-along effects.

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<sup>8</sup> For an excellent discussion on the problems of pseudo-identification in statistical models, see BOLLEN (1989).

<sup>9</sup> A study showing the possibilities of SEM in an exemplary manner is DOBSON et al., (1978).

Probably the most important extension for evaluation is the inclusion of latent variables. The construction of latent variables enables the researcher to:

1. Build latent constructs which depict what really is supposed to be measured, for example the fuzzy goals of policy;
2. Assess the potential of single indicators in order to represent these latent constructs;
3. Relate latent constructs to each other rather than many single indicators, thereby reducing the model's complexity;
4. Construct models that represent the linear or non-linear development of single indicators over time and relate it to the development of other indicators.

Multi-level models, which enable the researcher to model dependencies in space and time directly<sup>10</sup>, can be formulated via SEM-models as latent-growth models (SINGER et al., 2003). The adoption of these more sophisticated techniques and the restriction of clearly limited research questions will surely help to overcome many of the existing problems.

#### **4 CONCLUSIONS**

The proposed SEM method produced satisfactory results if applied to the test of a simplified version of an intervention-logic of the measure of AFP. The empirical result stating that the measure exceeds a measurable positive influence only on the development of income tax payments, and to a much lower degree on the development of jobs in agriculture, is theoretical acceptable. The intervention-logic's assumption that AFP would increase a district's gross value-added in agriculture has been refused for the short-term period. Moreover, the model provides us with the insight that more jobs in agriculture are connected with more positive development of GVA in agriculture in a district. This development, on the other hand, means relinquishing growth of overall GVA. Creating agricultural jobs is expensive. However, since we do not know whether investment alternatives really existed, we cannot say whether it is too expensive. With respect to global questions of rural development, the model's results hint that agricultural development is of rather minor importance for the overall economic development in the analysed rural areas. These results have to be treated with caution, however, since social aspects were not part of the model.

It became clear that one drawback of the approach of testing the political intervention-logic directly, as if it were a scientific theory, is that in order to make it testable, the scientist will have to fill in the blank spaces of non-named parameters

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<sup>10</sup> For an example of an application that assesses structural change in agriculture, see MARGARIAN (2007).

and causal links. The lack of a theoretic foundation then questions the application of SEM. On the other hand, in the process of setting up the model, deficits in knowledge and in the causal fundamentals of interventions become obvious. SEM has another methodical advantage: It makes obvious all the assumptions of linear regressions<sup>11</sup> hidden in other models. Therefore, SEM could prove very valuable in combination with other methods.

There are many possible extensions of the proposed approach; one of the most important is the inclusion of latent variables. The presented model can only be seen as a first step in the assessment of the potential of SEM for policy-evaluation in the field of rural development. However, it might well be worth continuing in this direction.

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<sup>11</sup> A thorough discussion, though not explicitly related to SEM, of "hidden assumptions" in "simple models" is given in KEANE (2006).

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## COMPREHENSIVE RURAL DEVELOPMENT IN CHINA: STRATEGY AND IMPLEMENTATION CHALLENGES

*ACHIM FOCK* \*, *KARIN FOCK* \*\*

### ABSTRACT

China's national rural development strategy is developing rapidly. The current strategy of a 'New Socialist Countryside' complements and balances the traditional focus on agricultural growth, farmers' income and food security with broader, non-farm, social and environmental objectives. Broadly speaking, this development follows that of developed countries, though at a higher speed. The paper analyses how these policies have evolved as well as the institutional obstacles that their implementation is facing. Despite the particularities of its political system China nevertheless encounters many of the problems and institutional challenges many other countries have in implementing a comprehensive rural development strategy. China and other countries such as in Europe have much to learn from each other, and more research in this area would be warranted.

**Keywords:** China, rural development, institutions.

### 1 INTRODUCTION

Agricultural and rural development policies are evolving worldwide. A general trend is that the traditional focus on agriculture shifts to more comprehensive rural development strategies that also addresses broader 'structural' and 'regional' issues. For instance, the OECD (2006) describes the recent trends in developed countries as a "new rural paradigm" and emphasises the "focus on places instead of sectors" as one of its key features.

These trends towards broader rural development policies reflect developments such as growth of the non-farm sectors and shrinking importance – in relative terms – of agriculture; pressures to reduce policy protection of the agriculture sector; increasingly integrated agro-food chains; globalization and rapid developments in information and communication technology, meaning rural areas in,

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and between countries are ever 'closer'; and increasing environmental and social concerns.

Obviously, the developments pose new challenges and institutions have to adjust to the changed paradigm. In particular, policies and administrative structures need to reflect the increasing interdependencies that exist between sectors, regions, and stakeholders at all levels. First, regions with local particularities find themselves at diverse stages of economic development and have at times diverging interests that need to be reconciled. Second, local governments have a key role in implementing rural development policies and conflicts of interests with higher levels governments pose challenges. Third, comprehensive approaches require a strong level of cooperation and partnerships between sectors that is challenging to achieve in practice. Consequently, policies and mechanisms need to be put in place to develop political solutions between differing interests of a multitude of stakeholders.

Like other countries, China has increasingly moved its traditional rural policy focus on agriculture to a more comprehensive rural development approach. This is well reflected in the country's current strategy of building a 'New Socialist Countryside'. Not surprisingly, China faces some of the problems just listed. The main objective of this paper is to analyze the main implementation challenges that China faces in implementing this approach and to show to what extent China's experiences are relevant to other countries and *vice versa*.

Chapter 2 describes China's rural policy development process, sketches the evolution of agricultural and rural policies, and outlines the country's current rural development strategy and program. Chapter 3 analyses the main institutional challenges China is facing in implementing its rural development policies. The paper concludes with lessons China and other countries could learn from each other in encountering similar challenges of formulating and implementing a comprehensive rural development strategy.

## 2 RURAL DEVELOPMENT POLICY IN CHINA

### 2.1 Policy processes

The development of policies in China generally follows a gradual approach,<sup>1</sup> often based on local-level pilots. Agricultural and rural policies are no exception. This pragmatic way of policy formulation has been firmly established ever since Deng Xiaoping put China on a transition to a market economy. The approach proved to be very successful. Most impressive is the degree to which the

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<sup>1</sup> For a more detailed analysis of the process of policy-making in China see, for example, SAICH (2004).

goal of rapid economic development, which dominated the policy agenda almost unchallenged until recently, has been achieved. It also achieved a high level of political consensus and, arguably, avoided instability. Consequently, this approach is deeply entrenched in China's policy formulation.

At times 'gradual approach' means 'piecemeal' rather than 'comprehensive'. China's accomplishments in agricultural and rural development have shown that – overall – the policy formulation process in China resulted in successful interventions. However, occasionally the gradual policy formulation process results in a number of uncoordinated efforts which are not always effective, and sometimes not in line with a broader strategy. As policy-making has moved from 'opening up' and 'liberalization', i.e. dismantling of institutions, to a phase of rapid institution-building, this has become more evident. Comprehensive institutional policy reforms are more difficult to formulate in a 'gradual' approach, and the necessary political will is harder to build than China's hierarchical system would suggest.

China's gradual approach often builds on local-level pilots, which, if successful, are scaled-up nationwide. While the Party and government leaders firmly control the national policy formulation process, testing and piloting is widely used in China before deciding on and implementing policies in the entire country. China's vast territory and huge population allows tests of considerable scale for various rural policies throughout its numerous county, townships, and villages. Policy diversity at local levels is fully accepted and sometimes promoted by the central level. It is also based on the significant power at the local level and a sense of competition between local governments that try out various reforms.

Many times, locally implemented pilots become so successful that other local governments decide to replicate them so that policies already build up some momentum from the bottom before the central government introduces them. However, more systematic testing and piloting of alternative measures as well as rigorous monitoring and evaluation systems are not yet widely used for decision making and it is not always transparent for outsiders how pilots turn into country-wide policies.

Policy makers increasingly use research to inform themselves, but such 'scientific' elements of policy making are not yet the rule and generally on an *ad hoc* basis. Moreover, although governments at all levels might request scientific input and order scientific studies to inform their decision making, this frequently turns out to be a one-way process rather than expert consultation. Similarly, while policy stakeholders find more and more platforms to voice their concerns, broad and active stakeholder involvement in policy formulation is still rare.

Frequently, China's rural development strategy states general policy principles with more details being developed by subsequent piloting and research in the early implementation process. The 'building of the New Socialist Countryside'

might serve as an example. It seemed little more than a slogan when first introduced by the central Government. However, the rhetoric showed the emphasis national leaders put on improving the situation in rural China, and officials at all levels, but also think tanks, research institutions, and other parts of the society, refined the concept and filled it with increasingly comprehensive content. Today, as is shown below, the development of a 'New Socialist Countryside' represents a (still evolving) broad-based rural development strategy for China.

## 2.2 Policy development

Although China does not have a democratic system, the pragmatic, gradual approach to policy development nevertheless reacts to and follows closely developments on the ground. With agriculture productivity at extremely low levels in mid-1970s and food security becoming a real threat with ever growing population, agricultural policy reforms were driving China's overall development at the beginning of its transition to a market economy. The first big agriculture sector reform was the introduction of the household responsibility system, which moved the responsibility for agricultural production away from the commune system to individual households. After initial local, and often spontaneous 'piloting' of household responsibility this reform was allowed to be rolled out nation wide, formally endorsed and supported at the national level through the 1982 No. 1 Document by the Central Committee, and further formalized and strengthened in two more No.1 documents of 1983 and 1984 (DU, 2006). Next, agricultural prices and markets were liberalized and unified procurement and sale for many products abolished. Other reforms further moved China to a monetized market economy with price incentives, such as the decision to start to collect agricultural tax in cash rather than in kind. After *de facto* introducing these policies in many areas they were subsequently reflected in the 1995 No. 1 Document, which focussed on the liberalization of prices and markets.

As a consequence of these early agricultural policies reforms, agriculture grew at very high rates in the first half of the 1980s, and even realized higher than average growth rates. With agriculture having been revived, the political focus now shifted on those who, in Deng's words, would be allowed to 'get rich first', in particular through industrialization and urbanization. For the following decade, the strategies for economic development built on manufacturing, including in rural areas through TVEs (Township and Village Enterprises), and resulted in strong urban growth.

In the 1990s, issues related to agriculture and rural development were again climbing to the top of the policy agency. As China had reached the level of a low-middle income country, the income and wealth gap between rural and urban areas had been rising to an extent that started to create tensions in the Chinese society. More and more, rural areas were perceived as 'left behind' and suffering

from 'unjust' policies, including fees and, more recently, land-takings. Also, was increasingly recognized that environmental problems were severe, including in rural areas where agricultural and other sectors were competing over natural resources, in particular land and water.

Concerns about rising rural-urban inequality and inequity and continued issues of food security brought agriculture back to the top of the political agenda. At the beginning of this decade, the Rural Fee Reform was implemented, one of the most fundamental agriculture sector reforms since the 1980s, quickly followed by the abolition of agriculture taxes. Subsequently, the importance of rural development was underlined by issuing four more No. 1 documents since 2004 that increasingly stressed the comprehensiveness of the agriculture and rural issues. The No.1 Document 2006 building a 'New Socialist Countryside' then considerably broadened the rural strategy by including rural infrastructure, education, health and other services and by emphasizing the need to balance between economic development and the environment.

### **2.3 Developing a 'New Socialist Countryside'**

China's national policies for agriculture and rural development over the next years are guided by the Eleventh Five Year Plan.<sup>2</sup> This Plan reflects the call for 'building of a New Socialist Countryside', a concept well outlined in the earlier No. 1 Document for 2006 (CCCPC and STATE COUNCIL, 2005).<sup>3</sup>

The Document refers to key issues such as the difficulties related to the widening income gap between rural and urban residents, as well as 'vulnerable' rural infrastructure and lagging rural social services; and starts by calling for "coordinat[ion of] urban and rural economic and social development to steadily advance the construction of a socialist new rural area". The need to strengthen rural infrastructure and rural social services feature as prominently as the "promot[ion of] modern agriculture development" and income increase for farmers. Finally, the document also emphasizes important rural reforms such as the rural tax and fee reform and reform of public finance; and emphasizes governance issues at the grassroots level as well as the leadership role of the Party.

This national strategy is being implemented through many new programs and reforms, as well as significant and rapidly rising fiscal transfers for rural

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<sup>2</sup> The proposal of the plan was passed by the 5<sup>th</sup> Plenary Session of the 16<sup>th</sup> Central Committee of the Chinese Communist Party and approved by the National People's Congress in March 2006.

<sup>3</sup> The more recent No. 1 Document for 2007 has again a stronger focus on agriculture, but it stands firmly in the overall wider policy context, and should be seen as a means to 'foster the development of a New Socialist Countryside'. The Eleventh Five-Year Plan for the period 2006 to 2010 as well as other policy documents and speeches of senior leaders leave no doubt that China is decisively following a comprehensive approach of rural development.

development. The central Government has been rolling out new programs in almost all sectors of rural development: Support to agriculture, including direct subsidies for grain producers as well as for improved seeds varieties and breeds and agricultural mechanisation; numerous investments into rural infrastructure and for environmental causes; a New Cooperative Medical System for the rural population; a renewed commitment to free rural compulsory education; a new rural social security programs, to name a few.

In parallel, numerous administrative reforms aim at improving the effectiveness and efficiency of the government system. For instance, the central government is strengthening its efforts to mitigate the vast inequality of fiscal resources across regions; is shifting responsibilities from the township to county level; and is promoting reforms in the management of public services provision.

Given the size of China and its policy development approach, it is not surprising that this strategy and programs as formulated by the central government are not uniformly reflected and implemented throughout the country. Even though China is a unitary state, huge variations exist and are reinforced by the fact that much of the political power lies with the local governments.

### **3 INSTITUTIONAL CHALLENGES**

In its intention to combine economic and social objectives, the national rural development strategy of developing a 'New Socialist Countryside' faces a number of institutional challenges. As discussed above, the strategy reflects social as well as economic objectives and tries to balance not only rural with urban areas but also the developments in the various regions.<sup>4</sup> In essence, to effectively accomplish the economic and social goals on the agenda, China's administrative structure, that been so successful in achieving the previously dominating objective of economic growth, will have to adjust to the broader policy goals. Many changes have already happened or are ongoing. However, not everything has yet moved in the right direction. Moreover, the focus on rural areas poses a particular challenge as these are to a considerable extent governed by the lowest tiers of the administrative system – remote from the central government and its national goals.

First, the multi-tier 'nested' hierarchy of the administrative structure poses the particular challenge of ensuring minimum implementation standards of national goals and policies across the country. In general, the central government shows the general policy direction, but leaves the detailed specification of policies and

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<sup>4</sup> WEN JIABAO (2004) introduced the concept of the five 'balances', those between balancing urban and rural development, balancing development among regions, balancing economic and social development, balancing development of man and nature, and balancing domestic development and opening wider to the outside world.

programs to the provinces; these then interpret policies and programs in the context of their location and often complement them with province-specific regulations. Municipalities and prefectures add another layer so that national ‘guidance’ is ‘filtered’ through several tiers of government before it reaches the level dominant in the implementation of rural policies, i.e. counties and townships. Administrative villages, though formally ‘self-governing bodies, are often seen by rural citizens as yet another layer of ‘government’.

Local governments’ own objectives are sometimes competing for attention and resources with objectives formulated at the central level. In particular, the traditional more narrow focus on growth through industrial development is stronger in municipalities, counties, and townships than at the national level. This objective, its importance for overall well-being notwithstanding, serves also more parochial local interests of establishing a local tax base, providing more direct benefits to a politically stronger urban constituency and even directly to local government employees themselves. Social and environmental problems created by such approach are not always fully seen and perceived as partly ‘exportable’.

The multi-layered administrative structure is one reason why local governments can and often do strongly pursue their own interest without harsh repercussions to not implementing national priorities. Contradictions are generally not made explicit given the strongly hierarchical government (and personnel) system – though cases of ‘misunderstanding’ and ‘misinterpretations’ of national policies at the local levels happen – but they are nevertheless strong and pose a major challenge to fully implementing the ‘New Socialist Countryside’.

Second, huge fiscal inequality across local jurisdiction is a substantial obstacle for many poorer areas in central and Western China to comply with national mandates. These inequalities are a result of China’s intergovernmental fiscal system that leaves major government responsibilities to the lowest tiers of government, including the most resource-intensive sectors such as education, health and other social services. At the same time, own resources at the county and township level are traditionally low, in particularly in poorer areas. Local government do not have tax-setting nor (legal) borrowing authority. The Rural Fee Reform and the subsequent abolishing of agricultural taxes have further reduced the abilities of ‘grassroots’ government to raise funds. The increase in land-related non-budget resources is limited in poor areas and, given less transparency and higher-level control, used for local governments’ interests rather than to achieve national rural development objectives. While the central government is increasingly mandating higher standards for a more balanced rural development strategy, the additional fiscal resources it provides are insufficient (WORLD BANK, 2007).

Third, policy measures intending to assuage the above fiscal difficulties are themselves problematic. Given the above mentioned difficulties of achieving full implementation of national policies at the local level, the central government

has increasingly tried to address particular rural issues through specific interventions designed and, at least partly, financed by the central level. For instance, rural infrastructure or environmental programs such as afforestation are increasingly being financed through national-level programs. The rapid increase in rural roads or household-level biogas use, for example, would not have been possible without these programs.

This approach has significant problems: Firstly, it creates inefficiencies due to violating the 'subsidiarity' principle by not sufficiently taking into account local knowledge on the type of public services most needed; secondly, the approach strains the administrative structure through the large number of transfers and programs that have to be implemented. Finally, it binds scarce local budget resources as matching funds required at a minimum for administration and implementation of such programs.

Fourth, another significant challenge for implementing China's comprehensive rural development strategy is cross-sectoral as well as cross-regional coordination and cooperation. To achieve the multi-objective development goals, coordination and cooperation across sectors is needed at all stages from planning over implementing to monitoring and evaluation. China does not have a comprehensive rural development or decentralization department to perform this function. Coordination often happens only at the highest level and through the Party and is inadequate at the working level.

Similarly, China lacks the mechanism for effective coordination and cooperation across jurisdictions at the same level of government. Institutions such as associations of county governments do not exist. Partnerships between counties to solve regional issues are extremely hard to forge horizontally. The traditional hierarchical structure with upward reporting as well as the 'mode of competition' between localities fostered in the environment of growth as dominant objective are clear obstacles to horizontal partnerships. However, given significant spillover effects in an increasingly integrated rural society and economy, horizontal cooperation is important.

Fifth, a final challenge to implementing the 'New Socialist Countryside' strategy is the enforcement mechanisms. The administrative system relies strongly on the personal responsibility system rather than institutional responsibility to deliver defined outputs. Moreover, too many personal incentives of government employees are skewed. Most importantly, the generation of fees by public service units is generally converted into financial remunerations for their employees. Even without these limitations, enforcement mechanisms that rely almost exclusively a personal responsibility system, lose their effectiveness when objectives are becoming more multi-dimensional. The greater complexity requires, in addition, rigorous monitoring and evaluation systems and an incentive system for agencies.

## 4 CONCLUSIONS

Many analysts stress that China is unique and hard to compare with other countries. China itself also stresses its ‘Chinese characteristics’. And indeed, the political structure and state system, vastness of the territory, size of its population, and the speed of China’s reforms and developments make China very special. Similarly, rural development in China and its challenges are unique, if one takes into the account its size – China accounts for almost 24 percent of the world’s rural population – the enormous inequalities and inequities, and the speed with which agriculture and rural areas are transformed.

Nevertheless, China’s rural development strategy and, in particular, the institutional challenges implementing it have many more parallels with those of other countries than many might expect. Rural policies tend to happen at a higher speed than in most other countries – partly reflecting the country’s fast socio-economic developments – but are nevertheless responding to many issues which are far from being unique to only China. In particular, in its evolving national rural policy strategy China has rapidly recognized the strong linkages between the rural and wider economy; the increasing global integration, on the one hand, and need for local solutions, on the other; and the need to balance environmental and social development objectives with economic ones.

Countries in which agriculture performance and living conditions in rural areas have fallen back widely behind urban areas can learn from China’s rural development success that, first, a strong market oriented approach that builds on liberalizing markets, user rights for land, and relatively low subsidies is successful. It needs, however, to be complemented with adequate social and other policies. Second, investments in institution building and rural infrastructure and services should not to be pushed back too far to avoid too large gaps in income and living standards between rural and urban areas to develop. Third, a strongly decentralized government structure offering leeway to lower levels of Government to experiment and implement central policies is advantageous in identifying good policies and taking into account diverse local circumstances.

Similarly, in its challenges in implementing its rural development strategy, China can also look to other countries. First, China can strengthen the ‘scientific’ elements of the policy formation process by e.g. more systematic piloting, much more rigorous and independent M&E, and an even more systemic link between research and policy-making at all levels of government. Second, with a view to better balance diverse interests between central and local levels of governments, regions, and sectors, China can learn from others to stronger ‘institutionalize’ participation and coordination of various stakeholders. Third, China could look into more sophisticated systems to hold levels of governments and government agencies accountable, through e.g. financial incentives or changes in

authority or autonomy given to them, supported by more sophisticated monitoring and evaluation systems.

The institutional challenges to implement a broader rural development strategy – essentially stemming from the need to balance various local and sectoral interests – have parallels in China and many other countries.

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## WHO IS BENEFITING FROM RURAL DEVELOPMENT POLICIES?

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### ABSTRACT

Beneficiaries of rural development policies in the German states Schleswig-Holstein, Lower Saxony, North Rhine-Westphalia and Hesse are analysed. Beneficiaries are identified by means of the formal incidence analysis. This includes a breakdown of public expenditures with respect to the type of supported activities, regions, socio-economic groups and economic sectors. The descriptive analysis is complemented by an econometric analysis of determinants of regional fund distribution. The results show that the distribution of funds is largely determined by the type of supported activities, which direct funds to regions with corresponding agricultural structures and environmental and socio-economic conditions. Beneficiaries of rural policies reviewed extend from mainly farms or farm-related institutions in North Rhine-Westphalia to mainly non-farm related institutions in Schleswig-Holstein.

**Keywords:** Rural development policy, regional incidence, evaluation, Germany.

### 1 INTRODUCTION

The paper presents results from the evaluation of rural development policies of the German states Lower Saxony (LS), Hesse (HE), North Rhine Westphalia (NRW) and Schleswig-Holstein (SH) in Germany. Rural development policies pursue multiple objectives, for example, related to agri-environmental issues, to the agricultural structure and to the wider rural economy, by supporting a broad spectrum of farm and non-farm related activities. Within the period of interest, 2000 to 2004, public rural development expenditures of the four states under consideration were about 1.6 Billion Euros. Evaluation activities, launched by the European Commission, aim to clarify whether implemented policies are appropriate means to achieve intended targets.

The legal framework for rural development programmes (RDP) is provided by the Rural Development Regulation of the European Commission (EC) No. 1257/1999. In Germany the federal states are in charge of implementing

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RDPs according to their specific needs. Although Schleswig-Holstein, Lower Saxony, North Rhine-Westphalia and Hesse are all situated in the northwestern part of Germany, the situation of rural areas differs regarding their agricultural structure and their environmental and socio-economic conditions. Implemented programmes provide a wide variety of approaches and strategies to rural development.

The evaluation of rural development policies necessarily includes an analysis of beneficiaries. Central questions in this respect are: 1) Who has been supported? 2) Where are the supported projects situated and 3) What kind of activities have been supported? These questions are answered by employing the concept of the incidence analysis. The analysis comprises all measures implemented according to the Rural Development Regulation. The analysis clarifies the strategy of the RDP implemented; who is seen as a major actor, and which topics are of major concern in rural development.

## **2 CONCEPTS, METHODS AND DATA**

### **2.1 Incidence analysis**

The concept of incidence analysis originates from the field of public finance and was adopted by regional and development<sup>1</sup> economists to analyse the distribution of public expenditures across regions or other entities (ECKEY, 1995, p. 269). Although there are several levels of incidence, for the purpose of this study it is sufficient to distinguish between formal and effective incidence. The formal incidence reflects how public expenditures are distributed across regions or other entities, whereas the effective incidence measures the achieved effects, after adjustments processes have taken place. The presented analysis covers the formal incidence of rural development expenditures.

The formal incidence of rural development expenditures is analysed with respect to the type of supported activities (axes), regions, socio-economic groups and economic sectors. Table 1 illustrates the assignment of supported activities to each category. The classification by axis considers the thematic direction of measures. Axis-A-measures aim at the improvement of the productive structure of agriculture and forestry. They include, for example, the farm investment aid scheme. Axis B covers activities focussing on the development of non-farming activities or infrastructure in rural areas. A flagship measure is the village renewal programme. Support compiled under Axis C aims at the improvement and maintenance of the agri-environment. Most prominent measures are agri-environment programmes and the less favoured areas scheme.

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<sup>1</sup> The method is known as Benefit Incidence Analysis (BIA) in the field of development economics (WORLD BANK, 2006).

**Table 1: Classification of supported activities with respect to supported activities (axes), socio-economic groups and economic sectors**

| Supported core activities*                                 | Axes |   |   | Socio-economic groups |         | Economic sectors |                 |
|--|------|---|---|-----------------------|---------|------------------|-----------------|
|  | A    | B | C | Farm households       | Other** | Agriculture      | Other**         |
| Farm investment aid  | ■    |   |   | ■                     |         | ■                |                 |
| Vocational training  | ■    |   |   |                       | ■       | ■                |                 |
| Less favoured areas schemes                                |      |   | ■ | ■                     |         | ■                |                 |
| Agri-environmental schemes                                 |      |   | ■ | ■                     |         |                  | ■               |
| Investment support for processing and marketing facilities | ■    |   |   |                       | ■       | ■                |                 |
| First afforestation of farmland                            | ■    |   |   | ■                     |         | ■                |                 |
| Other forestry measures                                    | ■    |   |   | ■                     |         | ■                |                 |
| Land consolidation   |      | ■ |   |                       | ■       |                  | ■               |
| Village renewal  |      | ■ |   |                       | ■       |                  | ■               |
| Agricultural infrastructure                                |      | ■ |   |                       | ■       | ■ <sup>1)</sup>  | ■ <sup>2)</sup> |
| Tourism  |      | ■ |   |                       | ■       |                  | ■               |
| Nature conservation  |      |   | ■ |                       | ■       |                  | ■               |
| Coastal protection, flood prevention                       |      | ■ |   |                       |         |                  |                 |

Notes: \* Supported activities vary among states.

\*\* 'Other' groups/sectors may also include farm households/agricultural sector.

1) Lower Saxony. 2) Schleswig-Holstein.

Source: Authors' illustration.

Administrative regions are not included in Table 1 because rural development activities are supported in all 142 administrative regions ("Landkreis") of the states of interest. The considered socio-economic groups of beneficiaries include farm households and non-farm institutions (entitled as 'other'), as well as the agricultural sector and non-agricultural sectors (entitled as 'other'). While supported activities to the benefit of 'other' entities/sectors may also be available for farm related institutions, measures assigned to 'farm households' or to the sector 'agriculture' are exclusively available to them.

## 2.2 Data

Table 2 gives an overview of analysed data and their sources. The analysis is based upon aggregated expenditure data for the period 2000 to 2004. Variables explaining the formal incidence of expenditures mainly represent the year 1999 and are drawn from various sources.

**Table 2: Descriptive statistics and data sources**

| Variable   | Variable Description                                 | Unit         | N   | Mean     | Standard Deviation | Year      |     |
|--|--|--------------|-----|----------|--------------------|-----------|-----|
| Expenditures A   | Public expenditures                                  | Billion Euro | 142 | 31.22    | 33.62              | 2000-2004 | 1)  |
| Expenditures A   | Public expenditures, Axis A                          | Billion Euro | 142 | 2.86     | 4.16               | 2000-2004 | 1)  |
| Expenditures B   | Public expenditures, Axis B                          | Billion Euro | 142 | 7.28     | 11.92              | 2000-2004 | 1)  |
| Expenditures C   | Public expenditures, Axis C                          | Billion Euro | 142 | 5.39     | 7.20               | 2000-2004 | 1)  |
| <b>Model Axis A: Agricultural production structure</b> |  |              |     |          |                    |           |     |
| Expenditures A   | Public expenditures, Axis A                          | Euro/ha      | 142 | 109.80   | 376.79             | 2000-2004 | 1)  |
| Share forest   | Share of forested land                               | %            | 142 | 22.28    | 15.03              | 2000      | 2)  |
| Soil index   | Soil index (1=worst, 100=best)                       | Index        | 142 | 47.58    | 12.09              | 1999      | 3)  |
| Land rent  | Land rent  | Euro/ha      | 110 | 260.86   | 109.17             | 1999      | 4)  |
| Livestock density                                      | Livestock density                                    | Livestock/ha | 142 | 0.99     | 0.58               | 1999      | 5)  |
| Share horticulture farms                               | Share of horticulture farms                          | %            | 142 | 2.26     | 6.87               | 1999      | 6)  |
| Delta farms  | Change of farm numbers                               | %            | 141 | -3.16    | 3.01               | 1995-1999 | 6)  |
| Share full-time farms                                  | Share of full-time farms                             | %            | 142 | 59.92    | 39.88              | 1999      | 7)  |
| Dairy cow density                                      | Dairy cow density                                    | Livestock/ha | 142 | 0.04     | 0.10               | 1999      | 6)  |
| GVA/LU   | Gross value added per agricultural labour units (LU) | Euro/LU      | 142 | 6,318.63 | 20,167.98          | 1999      | 7)  |
| Labour units   | Number of agricultural LU                            | LU           | 142 | 2.41     | 1.73               | 1999      | 7)  |
| <b>Model Axis B: Rural development</b>                 |  |              |     |          |                    |           |     |
| Expenditures B   | Public expenditures, Axis B                          | Euro/capita  | 142 | 43.80    | 72.99              | 2000-2004 | 1)  |
| Unemploy   | Unemployment quota                                   | %            | 142 | 11.00    | 2.67               | 1999      | 8)  |
| Debt/capita  | Debt of municipalities per capita                    | Euro/capita  | 142 | 319.41   | 351.01             | 1999      | 7)  |
| GDP/capita   | Gross value added per capita                         | Euro/capita  | 142 | 28.41    | 37.67              | 1999      | 7)  |
| Wage   | Gross wage of industrial worker                      | Euro/annum   | 136 | 2,822.29 | 353.86             | 1999      | 7)  |
| Migration  | Net migration  | n            | 142 | 749.16   | 1246.50            | 1999      | 7)  |
| Rural  | Share of inhabitants in rural communities            | %            | 142 | 19.87    | 24.15              | 1999      | 9)  |
| Popdensity   | Population density                                   | Person/qkm   | 142 | 676.98   | 783.41             | 1999      | 7)  |
| Objective5b  | Objective-5b region                                  | 1=yes, 0=no  | 141 | 0.23     | 0.42               | 1999      | 10) |
| <b>Model Axis C: Agri-environment</b>                  |  |              |     |          |                    |           |     |
| Expenditures C   | Public expenditures, Axis C                          | Euro/ha      | 142 | 238.94   | 715.99             | 2000-2004 | 1)  |
| Share forest   | Share of forested land                               | %            | 142 | 22.28    | 15.03              | 2000      | 2)  |
| Share grassland  | Share of grassland                                   | %            | 141 | 33.87    | 22.33              | 1999      | 11) |
| Delta grassland  | Change share of grassland                            | %            | 141 | -0.38    | 2.25               | 1995-1999 | 11) |
| Soil index   | Soil index (1=worse, 100=best)                       | Index        | 142 | 47.58    | 12.09              | 1999      | 3)  |
| Share part-time farms                                  | Share of part-time farms                             | %            | 142 | 51.90    | 19.30              | 1999      | 7)  |
| N-surplus  | Nitrogene surplus                                    | kg/ha        | 101 | 100.67   | 32.05              | 1999      | 12) |
| Share Natura 2000                                      | Share of Natura 2000 area                            | %            | 142 | 5.85     | 7.20               | 2003      | 13) |
| <b>Regional dummy variables</b>                        |  |              |     |          |                    |           |     |
| SH   | Schleswig-Holstein                                   | 1=yes, 0=no  | 142 | 0.11     | 0.31               |           |     |
| LS   | Lower Saxony   | 1=yes, 0=no  | 142 | 0.33     | 0.47               |           |     |
| NRW  | North Rhine-Westphalia                               | 1=yes, 0=no  | 142 | 0.38     | 0.49               |           |     |
| HE   | Hesse  | 1=yes, 0=no  | 142 | 0.18     | 0.39               |           |     |

Abbreviations: Ha = Hektar of utilised agricultural area, LU = Labour units

Sources: <sup>1)</sup> ZAHLSTELLEN (2006), <sup>2)</sup> BBR (2005), <sup>3)</sup> DOLL (1999), <sup>4)</sup> LAND-DATA GmbH (2000), <sup>5)</sup> DESTATIS (div. Jgg.c), <sup>6)</sup> DESTATIS (div. Jgg.a), <sup>7)</sup> SÄBL (2004), <sup>8)</sup> BA (2005), <sup>9)</sup> BBR (2003), <sup>10)</sup> FÄHRMANN et al. (2003), <sup>11)</sup> DESTATIS (div. Jgg.b), <sup>12)</sup> LANGE et al. (2006) <sup>13)</sup> BfN (2006), BKG (2005).

### 2.3 Regression analysis

Determinants of the regional distribution of expenditures are analyzed by using multivariate linear regression models, written as

$$y_{t+1} = \alpha + \beta_1 x_{1t} + \beta_2 x_{2t} + \dots + \beta_K x_{Kt} + u_t$$

where  $y_{t+1}$  denotes the natural log of public expenditures (multiplied by 1,000) by axis at time  $t+1$ ,  $\alpha$  denotes the constant,  $\beta_K$  denotes the estimated coefficients for  $K$  explanatory variables measured at time  $t$ . Regression analyses are conducted by using linear and robust linear regression procedures provided by SAS/STAT 9.1. The ordinary linear regression procedure uses the least-square estimator, which minimizes the sum of the squares of the residuals:

$$Q(\theta) = \sum_{i=1}^n p\left(\frac{r_i}{\sigma}\right)$$

where  $r = y - X\theta$ . Outliers were present in all three estimated models. Outliers in the linear regression model are identified by studentized residual below (above)  $-2$  ( $2$ ). The model is refitted after the exclusion of outliers.

Another approach to detect outliers and to provide stable estimates in the presence of outliers is robust linear regression. The implement robust regression procedure uses an M algorithm, introduced by HUBER (1973). Instead of minimizing the sum of squares of the residuals, a Huber-Type M estimator minimizes the sum of less rapidly increasing functions of residuals:

$$Q(\theta, \sigma) = \sum_{i=1}^n \left[ p\left(\frac{r_i}{\sigma}\right) + a \right] \sigma, a > 0 \text{ (SAS INSTITUTE INC., 2004).}$$

## 3 EMPIRICAL RESULTS

The formal incidence of rural development expenditures is examined with respect to the type of supported activities (axes), administrative regions, socio-economic groups and economic sectors. Determinants of the distribution funds by axes A, B and are estimated in three separate models, one for each axis.

### 3.1 Regional distribution of expenditures

Map 1 illustrates the distribution of expenditures across regions in Schleswig-Holstein, Lower Saxony, North Rhine-Westphalia and Hesse. Expenditures are displayed for the entire programme and by axis. The light to dark grey shadowing indicates the type of region, whereby only the dark grey regions are rural regions as classified by the criteria of BBR (2003). About 13 % of the 142 regions are classified as rural regions, whereas the majority are classified as urban or

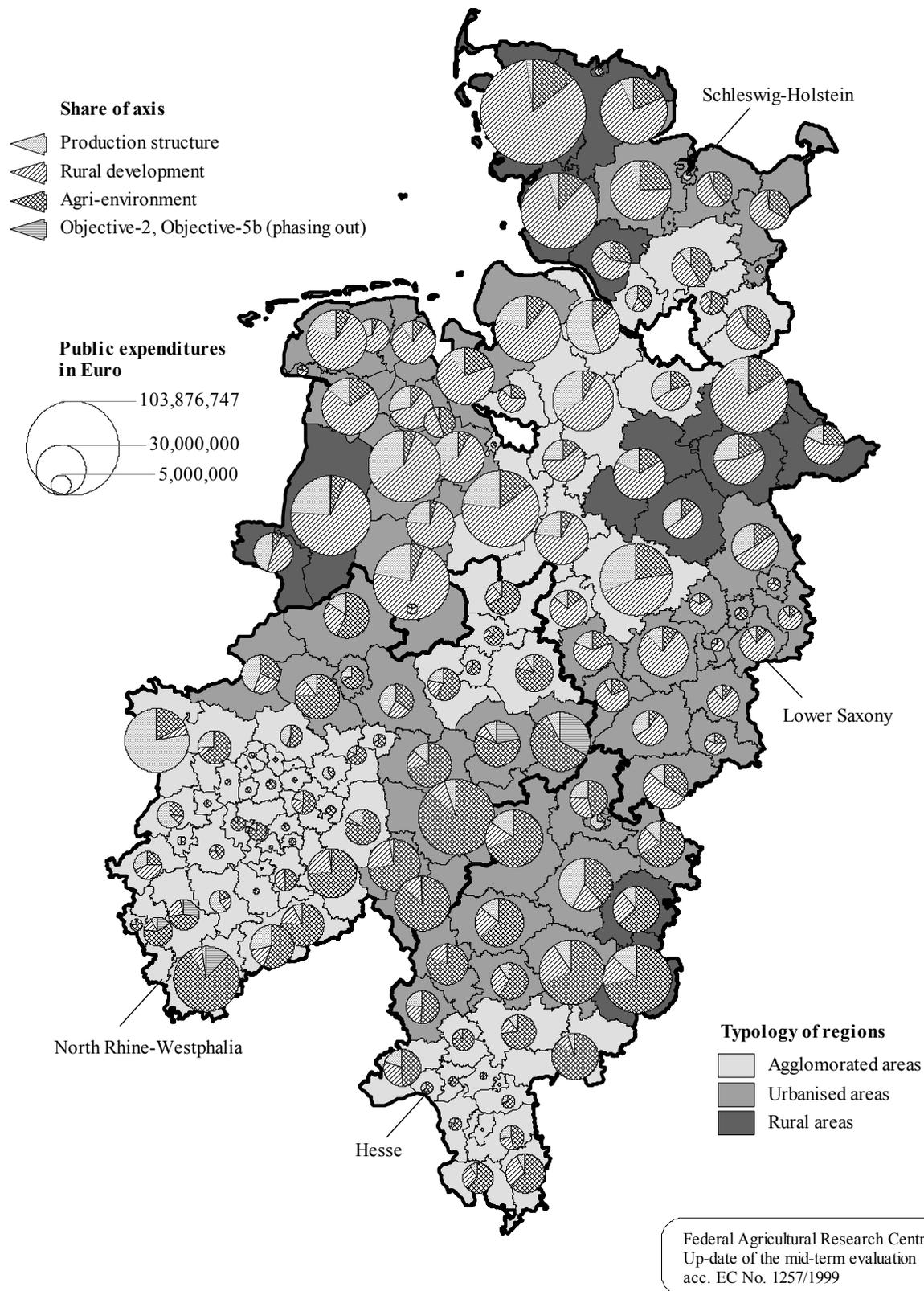
agglomerated areas. Nevertheless, Map 1 evidently illustrates that the amount of funds per region rises with an increasing notion of rurality.

The distribution of expenditures is determined by different, intervening factors. Total fund distribution per region is in the first place determined by its size and by the economic capacity of the state. Within the period of interest, 2000 to 2004, Lower Saxony spent 2.029 Million Euro public funds for rural development policies, followed by North Rhine-Westphalia (1.047 Mio. Euro) Hesse (703 Mio. Euro) and Schleswig-Holstein (653 Mio. Euro). These volumes reflect the prosperity of a state, as measured by the gross domestic product, which is e. g., higher in North Rhine-Westphalia than in Schleswig-Holstein. As known from the evaluation of RDPs in the states of concern, the volume of RDP funds is also influenced by the political importance placed on that policy field (FAL et al., 2006). In that sense, Lower Saxony allocates more public funds to RDP than Hesse does, reflecting a higher importance of agricultural issues on the political agenda.

The distribution of funds by axes is determined by the existing agricultural, rural and environmental structure of the region, which leads to a differentiated demand for measures of Axes A, B and C. Axis A is dominated by the farm investment programme, which has the highest acceptance in regions with intensive livestock production, as for instance in the western part of Lower Saxony and in the lower Rhine area (west of NRW). Most Axis A funds need to be co-financed by private capital, which is more likely to be available in prosperous agricultural regions.

Axis-B-measures comprise a wide variety of rural infrastructure, tourism and village renewal measures. They dominate rural development expenditures in most regions of Schleswig-Holstein, Hesse and Lower Saxony. Hesse, Schleswig-Holstein and Lower Saxony have a long tradition in implementing rural development policies. The RDPs are pointedly used as a tool to promote rural development. Some of the measures are, however, closely linked to the agricultural sector. For example Axis B in Lower Saxony also includes support for the construction of agricultural infrastructure (22 % of the total budget), which is mainly to the benefit of farmers.

**Map 1: Public expenditures of rural development programmes by axis in Schleswig-Holstein, Lower Saxony, North Rhine-Westphalia and Hesse (2000-2004)**



Source: Data of the Paying Agencies of the respective counties, budget years 2000, 2001, 2002, 2003, 2004.

Expenditures for environment-related programmes in Axis C are dominant in regions with less favourable conditions for agricultural production. Less favoured area payments are only available in designated areas with a low soil index. Agri-environment payments are in principle available on the entire farmland but have the highest acceptance in regions in which the intensity of the agricultural land use is below the state average. A minority of agri-environmental measures, aiming at habitat protection, water protection (LS) and the prevention of erosion (NRW), are targeted to defined areas. Regions with a high share of Axis-C-measures are mountainous areas in Hesse and in North Rhine-Westphalia. The request for Axis-C-funds is lowest in intensively used agricultural areas. Environment-related programmes are almost exclusively financed by means of public funds.

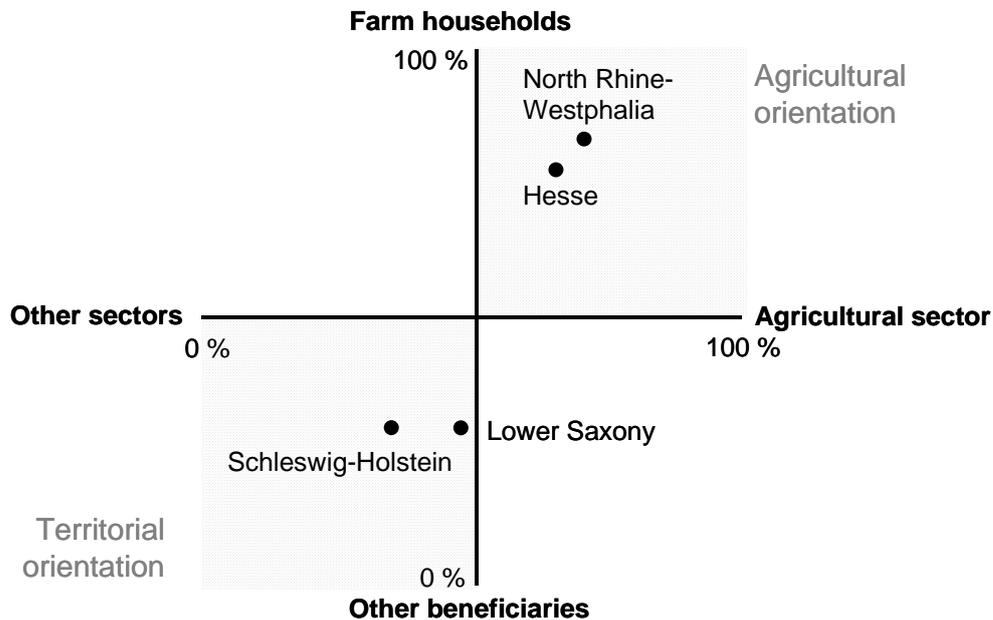
### **3.2 Formal incidence by socio-economic groups and sectors**

Figure 2 displays the share of public rural development expenditures differentiated by socio-economic groups and economic sectors. Socio-economic groups include the farming population represented by farm households, while the non-farming population represents the 'other' public or private institutions like rural communities or non-farming households (EU-KOM, 2000).

The share of rural development expenditures allocated to farms, or farm households respectively, is about 75 % (82 %) in Hesse (NRW) and about 28 % in Lower Saxony and Schleswig-Holstein. Agri-environmental schemes, the less favoured area scheme, the farm investment scheme and forestry measures (only NRW) account for the largest share of the rural development budget in Hesse and North-Rhine Westphalia. Rural development expenses in Schleswig-Holstein and Lower Saxony are dominated by expenditures for village renewal activities and for the improvement of the agricultural infrastructure.

Economic sectors are distinguished into the 'agricultural sector' and 'other' sectors'. Around half of the rural development expenditures in Lower Saxony and about two thirds of the total budget of North Rhine-Westphalia and Hesse are explicitly targeted to the agricultural sector. Dominant measures are the farm investment aid scheme, agri-environmental programmes, the less favoured area scheme (NRW, HE) and the forestry schemes (LS, NRW). Schleswig-Holstein spends only 38 % of total expenditures on the primary sector. Expenses for coastal protection are excluded in Schleswig-Holstein and Lower Saxony as they are not primary rural task to be financed from the rural development budget.

**Figure 2: Share of rural development expenditures by socio-economic groups of beneficiaries and by economic sectors**



Source: Authors' illustration.

Combining the incidence of expenditures by socio-economic groups and by economic sectors, rural development policies can be characterised by having a more agricultural (HE, NRW) or territorial orientation (LS, SH). This supports findings of BALDOCK et al. (2001), who underpin the broad variety of approaches to rural development in Europe. However, it should be noted that the importance of environmental objectives within rural policies in North Rhine-Westphalia and Hesse are not acknowledged adequately by this classification.

#### **4 DETERMINANTS OF THE REGIONAL DISTRIBUTION OF EXPENDITURES BY AXIS**

The following analysis complements the descriptive illustration of determinants of the regional distribution of rural development expenditures. Linear and robust linear models are estimated for each axis separately. To account for the varying size of the region, the regressor variable, funds by axis, are set into relation to the size of the target entity. Funds for Axis A and C are referenced to the amount of hectares of farmland as they are both related to the agricultural land use. Funds of Axis-B-measures are set into relation to the population size, as they are meant to benefit the socio-economic situation of rural areas (see also Table 2).

Model estimates are displayed in Table 3. The comparison of estimated linear and robust linear models reveals that the direction and magnitude of estimates is

very similar. The model interpretation is based upon robust estimates, as they are more reliable in the presence of outliers than.

Model Axis A estimates the determinants of the regional distribution of Axis-A-expenditures per hectare farmland. Axis-A-measures are directed to the improvement of the agricultural and forestry production structure. Thus, the regional distribution of expenses can be explained by characteristics of the existing agricultural/forestry structure. The robust model is statistically significant at the 1 % level or better, as measured by the F value. The model, as measured by the R square, explains about half of the total variance. The share of unexplained variance points out that important determinants are missing. They are likely to be found at individual farm or enterprise level and in indicators describing the dynamics of socio-economic developments.

Regions with a high share of forest receive significantly more funds per hectare than regions with a low share of forest. The management of forest in areas with a high percentage of forested areas constitutes an important part of the traditional land use. Forests have been and still are an important source of household income. As the traditional role of forest management is deeply rooted in these regions, the human capital for forest management is more readily available than in regions with a minor percentage of forested area. Hence, the amount of acquired funds for forest investments reflects the importance and the intensity of forest management in a region.

The lower the soil quality, indicated by the soil index, the higher the amount of expenditures per hectare allocated to a region. The rationale underlying this relationship is that supported farm investments are predominantly investments into livestock farms and into forests. Livestock farms are usually situated in regions with a medium to low soil quality, while arable farms mostly manage soils with highest indices. The livestock density reflects the regional specialisation to livestock keeping and is a determinant for the distribution of funds at the significance level of 5 %.

The share of full-time farms has a significant positive influence on the amount of public expenditures allocated to a region. This relation is plausible as full-time farms account for the largest share of total farm investments and farm operators need to constantly improve the productive base of their major source income. A high density of dairy cows per hectare significantly increases the amount of public expenses. This reflects the fact that the support of dairy farms has been an emphasis of the farm investment aid scheme. Further, the pace of the structural change significantly determines the distribution of funds. Decreasing farm numbers in the previous period, 1995 to 1999, seem to stimulate investments and hence, raise the demand for public investment aids. The effect is significant at the 1 % level.

The share of horticulture farms is a significant determinant for the distribution of public expenditures. Horticulture farms, as defined here, also include farms cultivating permanent crops such as wine. Farm investment support directed to horticulture farms is of high importance in Hesse and North Rhine-Westphalia, but not in Lower Saxony and Schleswig-Holstein. This regional separation may provide an explanation for the low significance of the estimate.

The gross value added per agricultural labour (GVA/LU) unit and the number of agricultural labour units do not provide significant determinants for the distribution of Axis-A-funds. The parameter estimates of the regional dummies indicate that, under similar agricultural structures, the allocation of a region in Lower Saxony significantly increases the amount of funds spent for RDP.

Axis-B-measures comprise activities directed to the socio-economic development of rural areas. Thus, the macro-economic indicators are most relevant explaining the distribution of funds as estimated in Model Axis B. The robust model is statistically significant at the 1 % level or better. The model explains about 67 % of the total variance.

The most important determinant of the distribution of Axis-B-funds per capita is the population density of a region. A low population density coincides with the notion of rurality and confirms that rural development funds are predominantly spent in rural areas. This fact is further supported by the significant influence of the covariate 'rural', which represents the share of inhabitants in communities with a population density below 150 persons/sq. km. The significant negative influence of the state dummies of North Rhine-Westphalia and Hesse indicates that significantly fewer funds per capita are spent there than in Lower Saxony and Schleswig-Holstein.

No other factors are found to have a significant influence on the distribution of Axis-B-funds per capita. The rate of unemployment has a negative, but insignificant influence. Unemployment rates tend to be lower in rural areas of North Rhine-Westphalia and western Lower Saxony than in urban areas. This relationship is reversed for most parts of Hesse and Schleswig-Holstein. It was expected that former 'Objective-5b' regions would benefit more from Axis-B-funds than other regions as authorities implementing rural policies are already trained in the acquisition of funds. The factor 'Objective-5b' is positive but insignificant. Debts of communities per capita were thought to have a negative influence on the amount of Axis-B-funds allocated to a region. Communities, especially in Lower Saxony, are required to co-finance EU-expenditures for certain Axis-B-measures. If the financial situation of communities is very tense, their ability to finance rural development activities, which are beyond their legal duty, decreases. However, presented results do not support this hypothesis, as the debt per capita is a positive and insignificant determinant.

**Table 3: Parameter estimates by axes, explaining the distribution of rural development funds (2000-2004) across regions**

| Variable                                  | Linear regression                    |                          | Robust linear regression              |                 |
|---|--------------------------------------|--------------------------|---------------------------------------|-----------------|
|   | Estimate                             | t-value                  | Estimate                              | Chi-square      |
| <b>Model Axis A: Production structure</b> |                                      |                          |                                       |                 |
| Intercept                                 | 1072.86                              | 2.06 **                  | 957.82                                | 3.02 *          |
| Share forest                              | 12.63                                | 2.79 ***                 | 12.83                                 | 6.66 ***        |
| Soil index                                | -14.45                               | -2.48 **                 | -14.13                                | 4.71 **         |
| Land rent                                 | 0.29                                 | 0.53                     | 0.30                                  | 0.25            |
| Livestock density                         | 303.56                               | 2.44 **                  | 286.01                                | 4.29 **         |
| Share horticulture farms                  | 17.26                                | 2.16 **                  | 16.14                                 | 3.21 *          |
| Delta farms                               | -147.02                              | -3.69 ***                | -143.93                               | 10.53 ***       |
| Share full-time farms                     | 21.71                                | 4.11 ***                 | 23.06                                 | 15.94 ***       |
| Dairy cow density                         | 3767.47                              | 3.81 ***                 | 3717.52                               | 11.54 ***       |
| GVA/LU                                    | -0.01                                | -0.76                    | -0.01                                 | 0.73            |
| Labour units                              | 27.65                                | 0.64                     | 43.40                                 | 0.87            |
| LS  | 1300.43                              | 6.93 ***                 | 1321.41                               | 38.67 ***       |
| NRW                                       | 1016.12                              | 5.23 ***                 | 1002.90                               | 20.92 ***       |
| HE  | 1354.07                              | 5.28 ***                 | 1378.01                               | 22.61 ***       |
| <b>Model Axis B: Rural development</b>    |                                      |                          |                                       |                 |
| Intercept                                 | 6048.45                              | 6.76 ***                 | 4955.46                               | 23.55 ***       |
| Unemploy                                  | -32.66                               | -1.04                    | -25.39                                | 0.51            |
| Debt/capita                               | 276.30                               | 1.50                     | 226.18                                | 1.32            |
| GDP/capita                                | 10.40                                | 1.95 *                   | -1.01                                 | 0.27            |
| Wage                                      | -0.69                                | -2.81 ***                | -0.29                                 | 1.00            |
| Migration                                 | -0.07                                | -0.98                    | -0.04                                 | 0.36            |
| Rural                                     | 6.45                                 | 1.57                     | 10.20                                 | 4.01 **         |
| Popdensity                                | -2.41                                | -8.39 ***                | -2.27                                 | 140.99 ***      |
| Objective5b                               | 256.31                               | 1.47                     | 352.69                                | 2.17            |
| LS  | 118.46                               | 0.60                     | 70.78                                 | 0.08            |
| NRW                                       | -1542.36                             | -7.45 ***                | -1657.13                              | 44.57 ***       |
| HE  | -1315.31                             | -5.72 ***                | -1234.34                              | 20.93 ***       |
| <b>Model Axis C: Agri-environment</b>     |                                      |                          |                                       |                 |
| Intercept                                 | 3009.04                              | 6.65 ***                 | 2227.14                               | 24.65 ***       |
| Share forest                              | 18.52                                | 5.17 ***                 | 23.01                                 | 37.85 ***       |
| Share grassland                           | 13.46                                | 5.82 ***                 | 16.42                                 | 53.58 ***       |
| Delta grassland                           | 30.00                                | 0.76                     | -0.24                                 | 0.00            |
| Soil index                                | -0.81                                | -0.16                    | 7.64                                  | 2.39            |
| Share part-time farms                     | 21.50                                | 5.21 ***                 | 23.49                                 | 29.53 ***       |
| N-surplus                                 | -3.45                                | -2.07 **                 | -2.37                                 | 1.88            |
| Share Natura 2000                         | 9.71                                 | 2.05 **                  | 10.32                                 | 4.20 **         |
| LS  | -726.65                              | -5.49 ***                | -776.10                               | 31.84 ***       |
| NRW                                       | 428.04                               | 2.93 ***                 | 363.20                                | 5.48 **         |
| HE  | 44.87                                | 0.24                     | -54.42                                | 0.07            |
| <b>Fit statistics</b>                     |                                      |                          |                                       |                 |
|   | <b>No. Observation</b> <sup>1)</sup> | <b>R square (adj. R)</b> | <b>No. Observations</b> <sup>1)</sup> | <b>R square</b> |
| Model Axis A                              | 101                                  | 0.64 (0.58)              | 105                                   | 0.47            |
| Model Axis B                              | 96 <sup>2)</sup>                     | 0.89 (0.87)              | 124                                   | 0.67            |
| Model Axis C                              | 95                                   | 0.91 (0.90)              | 101                                   | 0.69            |

<sup>1)</sup> The number of observations used in model estimation varies due to missing values and the exclusion of outliers.

<sup>2)</sup> Administrative regions with zero costs are excluded from the analysis.

Notes: Asterisks denote statistical significance at 1 % (\*\*\*), 5 % (\*\*), or 10 % (\*) level.

For variable description see Table 2

The improvement of rural incomes and the maintenance of the rural population is a central concern of European rural development policy (EU-KOM, 2000). It is worthy to be noted, that the 'GDP/capita' does not significantly differ among rural and non-rural regions, but wages of industrial workers in rural areas are significantly lower than in agglomerated areas. Nevertheless, neither 'GDP/capita' nor 'wage' have an influence on the distribution of Axis-B-funds per capita. Only slightly, but insignificantly more funds are allocated to regions with out-migration.

The financially most important schemes financed under Axis C are agri-environmental measures and the less favoured area schemes (HE, NRW). Agri-environmental measures promote the adoption of environmentally friendly production systems, while the less favoured area scheme compensates low incomes due to natural disadvantages in order to ensure the maintenance of agricultural land use. Important determinants for the distribution of Axis-C-funds per hectare farmland are therefore related to the land use structure and the environmental situation. The robust model explains about 68 % of the total variance and is statistically significant at the 1 % level or better.

Agri-environmental programmes mainly comprise grassland-based schemes, such as, for example, the low input grassland management. The less favoured area scheme in North Rhine-Westphalia almost exclusively applies to grassland. Thus, the share of grassland has a significantly positive influence on the amount of Axis-C-funds per hectare farmland allocated to a region.

A high share of part-time farms significantly increases the amount of funds allocated to a region. Present target regions of Axis-C-measures are mainly those with unfavourable conditions for agricultural production. Although this is not indicated by the soil index, it can be explained by the high share of mountainous regions present in Hesse and North-Rhine Westphalia. Under given agricultural structures, the required labour input was not adequately paid off and farm operators or their successors had to extend off-farm work, leading to a high share of part-time farms. Another argument is that part-time farms are more likely to join environment-related farm programmes than full-time farms as their production intensity is already relatively low. In this way, part-time farms can further reduce farm labour input, while ensuring a stable income.

Factors reflecting the quality of environmental conditions are the nitrogen surplus, as measured by a soil surface balance, and the share of Natura 2000 areas. Regions exposed to high nitrogen balances do not receive more, but insignificantly less Axis-C-funds than regions with low nitrogen balances. This finding confirms the fact that most Axis-C-measures are targeted to regions with a low intensity of agricultural land use. This touches upon the issues of whether incentives or legal instruments should be used to reduce or prohibit environmental damage stemming from agriculture. Under present conditions, incentive

instruments such as agri-environmental programmes do not succeed in approaching regions with high nitrogen emissions. The share of Natura 2000 areas on the total farmland has a significantly positive influence on the amount of distributed funds. In Germany, the federal states are legally obliged to ensure the maintenance of a favourable conservation status of Natura 2000 areas. One important instrument in this respect are compensatory payments for farms managing land in Natura 2000 areas. There is also a tendency to target an increasing amount of agri-environmental measures to Natura 2000 areas.

## **5 DISCUSSION AND CONCLUSION**

To our knowledge, the presented analysis is the first to explore the formal incidence and its determinants of rural development expenditures on a regional level. The presented analysis demonstrates that the formal incidence of expenditures is predominantly determined by the emphasis of supported activities and the different agricultural, natural and socio-economic conditions present in a region. The econometric analysis showed that important determinants of regional fund distribution can be identified. Taking these findings into account, a better targeting of rural development policies could be achieved. This requires that objectives be defined and followed by the authorities in charge. Targeting is usually achieved by the definition of eligible regions and appropriate eligibility criteria. A good example are Axis-B-measures in Hesse, which are targeted to the most rural regions (see Map 1).

The analysis shows that the evaluation of rural development policies necessarily has to precede a formal incidence analysis. A holistic image of the effects of rural policies is only provided if the performance of programmes is made transparent.

Whether an agricultural, territorial or environmental orientation of rural development policies is appropriate needs to be judged against the background of the present agricultural, environmental and socio-economic conditions. North-Rhine Westphalia puts little emphasis on the development of the wider rural area, as their socio-economic lagging regions are not rural but urban. Instead, the focus on the preservation of landscapes and the environment is reasonable in densely populated states as NRW.

Although reviewed rural policies of the states under consideration are very different, there are some common trends. The persisting agricultural orientation of the rural development policies seems to be determined by 'path-dependence' rather than by a strategy adopted for rural development. None of the implemented agri-environmental measures succeeds in raising acceptance in regions with severe environmental problems caused by a highly intensive agriculture. Axis B rural development activities focus on the improvement of the rural infrastructure, while activities that directly support economic development and job creation are rarely to be found.

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## ANTICIPATED IMPACTS OF GMO INTRODUCTION ON FARM PROFITABILITY IN POLAND

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### ABSTRACT

The paper takes one significant element of agriculture production – the use of genetically modified organisms (GMO) – and considers it in relation to the overall profitability of agriculture in Poland. In so doing, the paper aims to examine Polish farmers' opportunity costs of being non-GM, were they free to use GMO. Specifically, the paper asks if, under *ceteris paribus* conditions, the use of GMO plants in Polish farms would influence their economic results. To answer this question, the scientific and theoretical assumption that GMO cultivation is permitted in Poland has been applied. The approach combines experience of the new biotech-based system of agricultural production with a modelling system that builds up and aggregates the impacts of individual farm responses under actual and assumed situations.

**Key words:** GMO, coexistence, farm profitability, farm model, Polish agriculture.

### 1 INTRODUCTION

Growing concerns are observable in Poland over the coexistence of genetically modified organisms (GMO) and non-modified organisms – both conventional and organic (non-GM). So far, GMO use is restricted in Poland. According to official data provided by the responsible authorities, currently there are no GMO cultivations in Poland (THE SCOPE ..., 2007). The use of GMO feeds is permitted, but under a special moratorium. However, since September 2004, the European Commission permitted, under strict conditions, GMO varieties to be grown in the European Union (EU). Poland, as an EU member state, asked for a temporary prohibition, citing the need to strengthen existing laws on GMO plant cultivation (PRESS RELEASE..., 2005). Lifting this prohibition was recently considered in the amended Legal act on genetically modified organisms (PROPOSAL OF AMENDMENT ..., 2007). But according to the position paper of the Polish government, the cultivation of GMO crops should be extremely limited or even

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excluded. Thus, the regulations proposed in the amendment provide a chance for minimising the risk connected to mixing plants' reproductive material, or the cross-pollination of GM and non-GM plants. It also enables the introduction of appropriate control measures (THE SCOPE..., 2007).

Nonetheless, there is much opposition at various levels to the introduction of GMO crops. As an example, all 16 Polish provinces have already announced that they aim for a total ban of GMO crops (GMO FREE ZONES..., 2007). On the other hand, there are many supporters of GMO use in Polish agriculture. These advocates claim that biotech-based agriculture could significantly increase yields and reduce costs; they also claim that it has many other positive impacts which could strengthen the competitiveness of Polish agriculture, as well as that of particular farms (TWARDOWSKI, 2007). In the most recent survey on the public perception of biotechnology, more than 50% of Poles are in favour of scientific research using biotechnology and genetic engineering in the production and processing of food. However, 65% of respondents are afraid that GMO in food products might have a negative impact on the environment and human health (PUBLIC PERCEPTION..., 2005).

It should be noted that agriculture is an open process, which means that perfect segregation of the various agricultural production types, namely conventional, organic or based on genetically modified organisms, is not possible in practice. When considering the different aspects of GMO and non-GM systems, it must be taken into account that in the EU, no form of agriculture should be excluded and the ability to maintain different agricultural production is considered as a prerequisite for providing a high degree of consumer choice (COMMISSION RECOMMENDATION, 2003).

Thus, to cope with the emerging GM challenge, which is either prohibition or implementation of GMO in Polish agriculture, biotechnology development policies of the EU, as well as the general trends of agricultural development, where biotech-based systems are expanding rapidly, should be taken into account (BROOKES and BARFOOT, 2006); naturally, the opinion of the Poles should also be considered. From the economic point of view, the total ban of GMO might directly influence the performance of Polish agriculture (ANIOL and BROOKES; 2005), as well as the existence of a black market for GMO in Poland (ZAKOWSKA-BIEMANS and MACIEJCZAK, 2005).

The approach applied in this paper combines the (very short) experience of the new biotech-based system of agricultural production with a modelling system that builds up and aggregates the impacts of individual farm responses under actual and assumed situations. As such, it is possible to gain an understanding of the likely movement in incomes for a variety of assumptions, together with changes in the balance of enterprises by farm type and in the aggregate, assuming farmers strive for, or are forced to adopt through competition, profit-maximising

strategies. The results provide an indication of the impact of GMO application on the performance of Polish agriculture, including the importance of different GMO crops on the maintenance and prosperity of different farm types. The employed comparative static approach does show the degree to which one significant element of agriculture production – the use of genetically modified organisms – could influence the sector.

## **2 THE MODEL**

In preparing this paper, an exhaustive investigation has been completed comparing the situations of 252 representative farms, with introduced or constrained GMO crops, using a linear programming optimisation technique. The model was constructed as an Excel spreadsheet and solved with the Solver function. The applied farm model uses over 80 decision variables and over 200 constraints. Each of the farm models optimise Net Farm Income (NFI) in a comparative static approach. A set of balances has been incorporated into the model to secure internal integrity of the results. The most important of these are rotational ties for crops. A animal feed nutrient balance is obtained whereby the model optimises the use of fodder and calculates the necessary supply of concentrates. The balance of animal places with buildings available is also included. By using the standards adapted to the technologies implemented in the modelled farms, the relationship between the labour force and tractors is achieved.

All parameters of the calculation were fed into the model in a disaggregated form. These included: farm enterprises with associated yields and input requirements, product prices, input costs, costs of land lease and production quotas, services, seasonal and permanent employment, and other financial burdens of the farms. It is also possible to program in any type and amount of payment from the Common Agricultural Policy (CAP).

### **2.1 Farm types**

The set of 252 farm types are representative of some 90% of the agricultural area in Poland; they have been assembled using statistical and FADN<sup>1</sup> data as well as expert knowledge. The farm types have been classified according to the following criteria:

- Intensity of production: Intensive and extensive;
- Soil quality: Good, medium and poor soils;
- Enterprise types: Cattle, pig, arable, mixed;

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<sup>1</sup> Farm Data Accountancy Network of EU.

- Size: (6 groups of arable farms, 8 groups of cattle and pig farms, 20 groups of mixed farms, assuming different sizes and also different proportions of pigs and cattle).

After calculating the optimal results for every farm type model in every scenario, the results were multiplied using the number of each type of farm in the total Polish farm population.

## 2.2 Scenarios

Two time horizons, which take into account the short-term (2006) and medium-term (2013) perspective, were assumed. For each time horizon, two scenarios were created: "Non-GMO", which assumes restrictions for GMO crop development, and "GMO", which assumes unlimited coexistence of GMO and non-GMO crops, i.e., no buffer zones. In "GMO" scenarios, the availability of basic GMO crops like Roundup Ready wheat, rapeseed, corn for grain, maize for silage and sugar beets has been assumed. The run of the calibrated model for 2006 served as a reference scenario (non-GMO situation) for solutions generated for "GMO 2006". This was done in order to explore the potential effects on financial performance of farms applying GMO. The run of the "non-GMO 2013" model was used as a reference for the future "GMO 2013" model in order to examine the influence of upcoming CAP changes regarding the GMO issue. Thanks to such assumptions, the model also reflected expected changes in agricultural policy, especially the level of support in line with the phasing-in of the current SAPS<sup>2</sup> payment scheme, as well as forecasted changes in prices and costs (MAJEWSKI et. al., 2006). In the medium-term perspective, adjustments in production structure have been assumed, while the short time perspective has been constrained to preserve current status. However, the analysis does not consider dynamic changes between 2006 and 2013, due to overall difficulties in distinguishing the single impact of introducing GMO crops from the impact of agricultural policy.

## 3 RESULTS

Calculated farm model results were aggregated to obtain estimates for the whole of Polish agriculture, as well as particular farm groups. The results have been compared separately for the short- and medium-term perspective. To examine the potential influence of GMO crops, a comparison of farm types has been made according to various intensities of production, specialisation and soil quality. In both time horizons, the introduction of GMO crops has a positive influence

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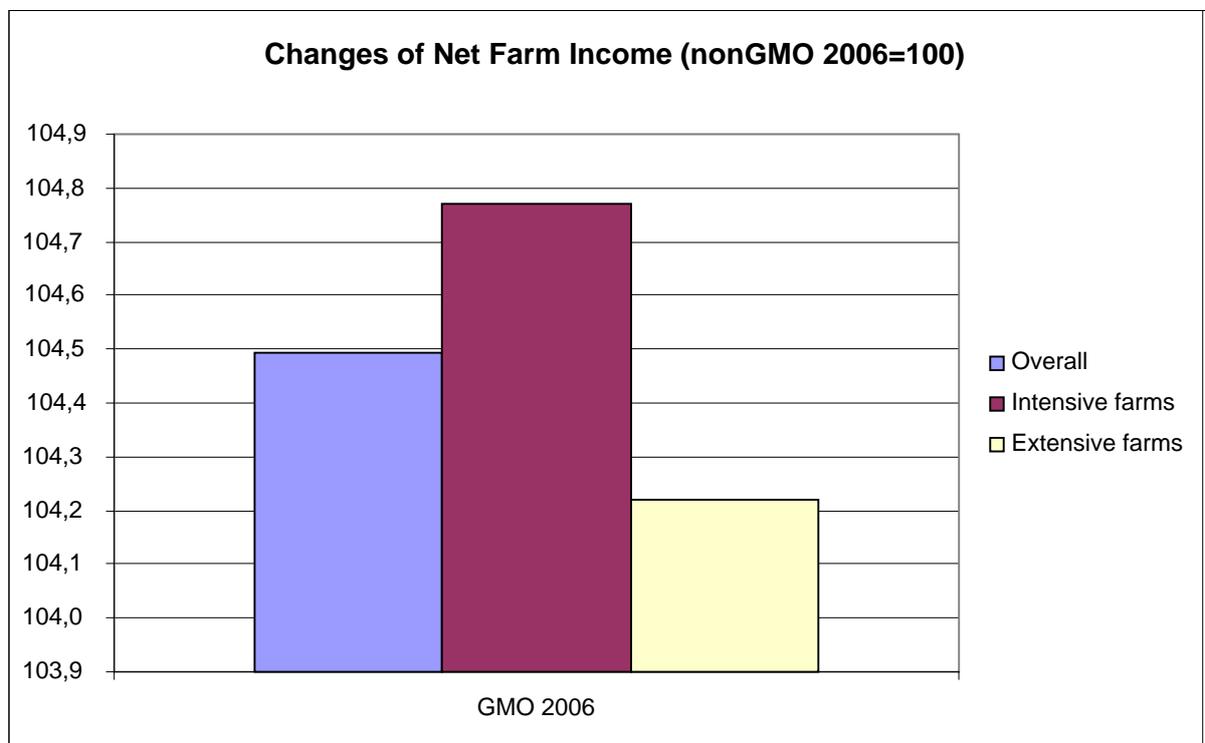
<sup>2</sup> Single Area Payment Scheme – direct payment scheme applied in most of EU New Member States.

for Net Farm Income. However, the effects are not evenly distributed among farms.

### 3.1 Impact in the year 2006

The increase of overall Net Farm Income due to the introduction of five GMO "Roundup Ready" crops in 2006 reached 4.5%. This proved, therefore, the potential of new biotechnologies. Although the calculated models show differences in growth rate between intensive and extensive farms, those differences are rather small (Figure 1).

**Figure 1: Potential income effects of GMO crop introduction for 2006 by intensity of production**

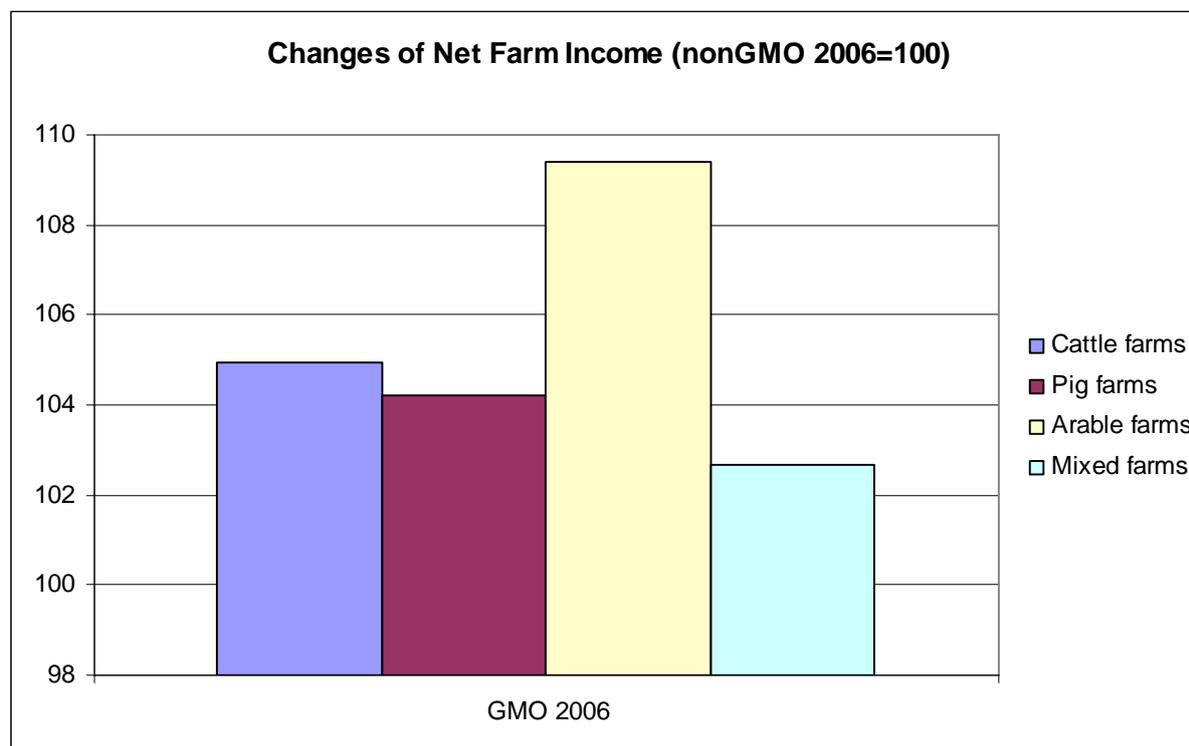


Source: Authors' calculation.

The model results show much stronger differentiation in the economic effects of GMO implementation in the case of farm specialisation.

The highest increase of NFI is observed in the case of arable farms. This could be explained by a higher share of crop production in total production, which might be influenced by GMO crops. Farm types that specialised in animal production also gained from the introduction of GMO, but due to a limited share of crop production in the production structure, the NFI increase is lower. The slightly better situation of cattle farms could be explained by utilising the potential of GMO fodder maize. Low profits on the side of mixed farms are caused by the relatively smallest share of crop production in terms of income creation (Figure 2).

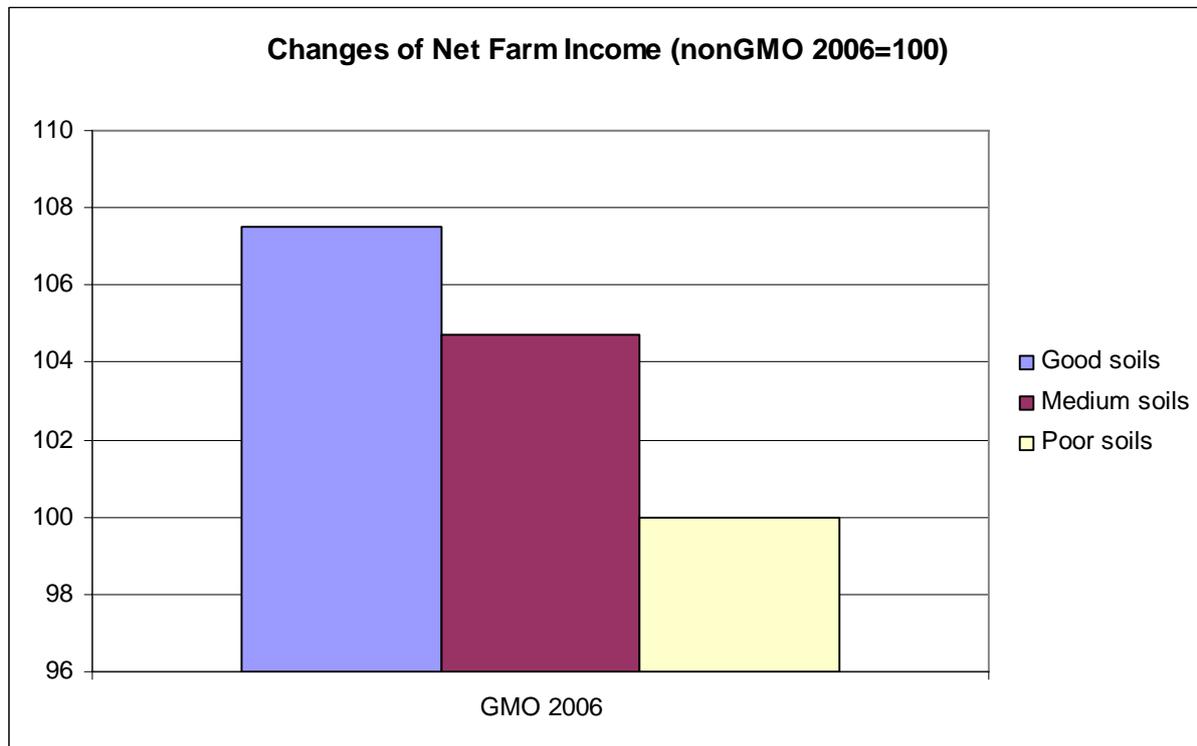
**Figure 2: Potential income effects of GMO crop introduction for 2006 by specialisation**



Source: Authors' calculation.

Results of the model calculated for farm types differentiated by soil quality show essential disparities in the economic effects of introducing GMO. Models of farms located on the best soils show the possibility of highest NFI growth due to GMO application. On the contrary, models of farms on poor soils do not show any benefits from possibly acquiring modified species. Looking at a set of currently available modified species, this phenomenon can be easily explained. Most GMO species require rich or medium soils for optimal growth. Limited yield growth potential, together with the relatively high costs of new technology do not create favourable conditions for applying GMO crops on poor soils (Figure 3).

**Figure 3: Potential income effects of introducing GMO crops for 2006 by soil type**



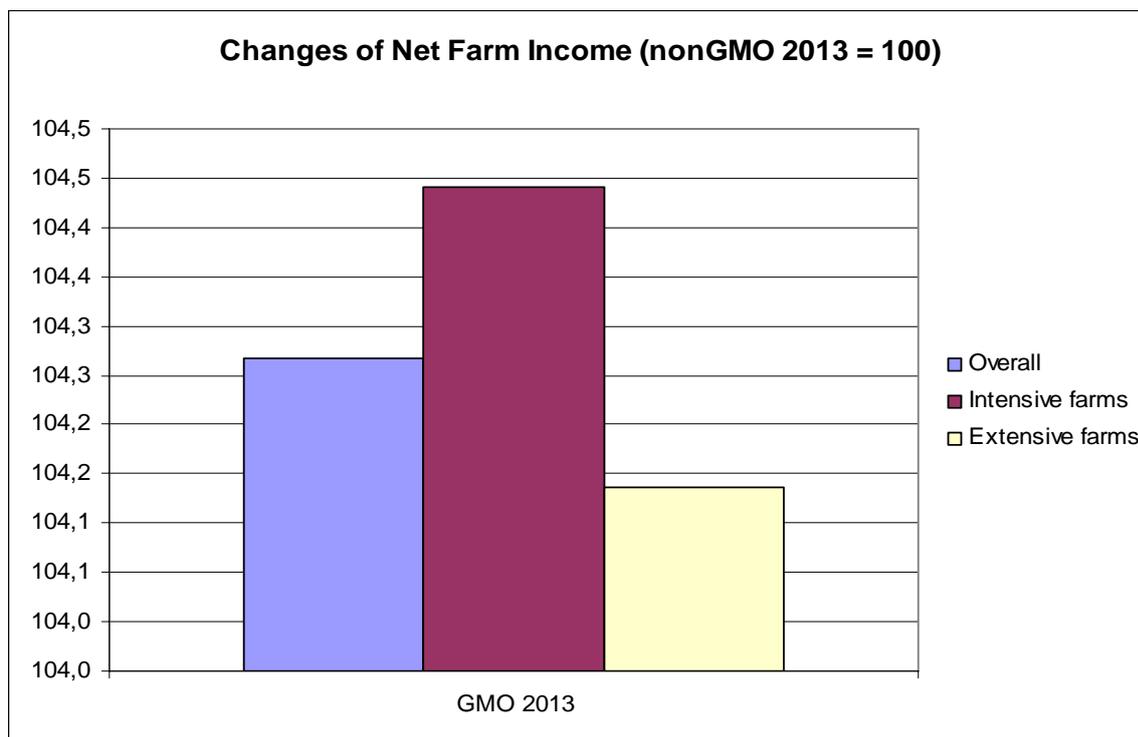
Source: Authors' calculation.

### 3.2 Impact in 2013

The results of models for 2013 confirm the outcomes of scenarios for 2006. The assumed introduction of full rates for the SAPS payment scheme and forecasted worsening of trade-off conditions in agriculture had no influence on the economic effects caused by implementing GMO crops. The observed relative gains are slightly smaller than in 2006. This could be explained by the increase of overall income due to increasing direct payment rates. (Figure 4-6).

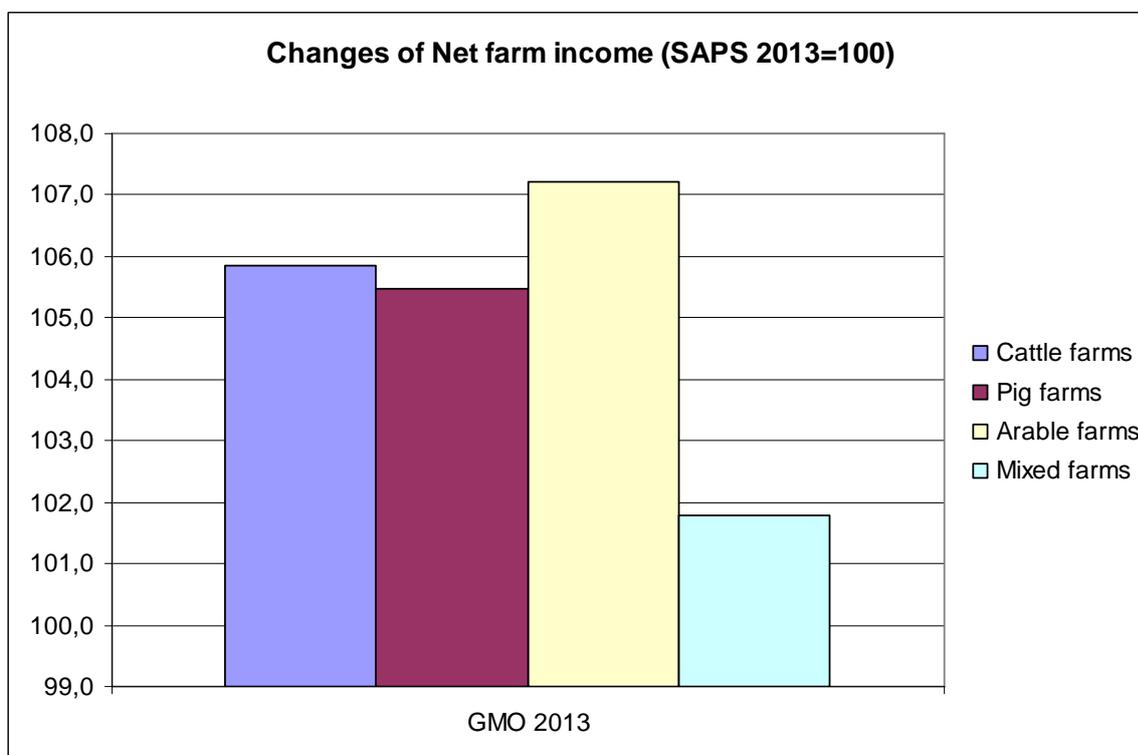
Further, relaxing some rotational constrains do not change relative NFI gains resulting from GMO application. Optimisation of the cropping structure, which leads to increased shares of corn and rapeseed at other cereals' expense (Figure 7) does not change the relationship between GMO and non-GMO species. In all farm types analysed in both time horizons, the relative income increase due to GMO introduction is hardly the same.

**Figure 4: Potential income effects of GMO crops introduction for year 2013 by intensity of production**



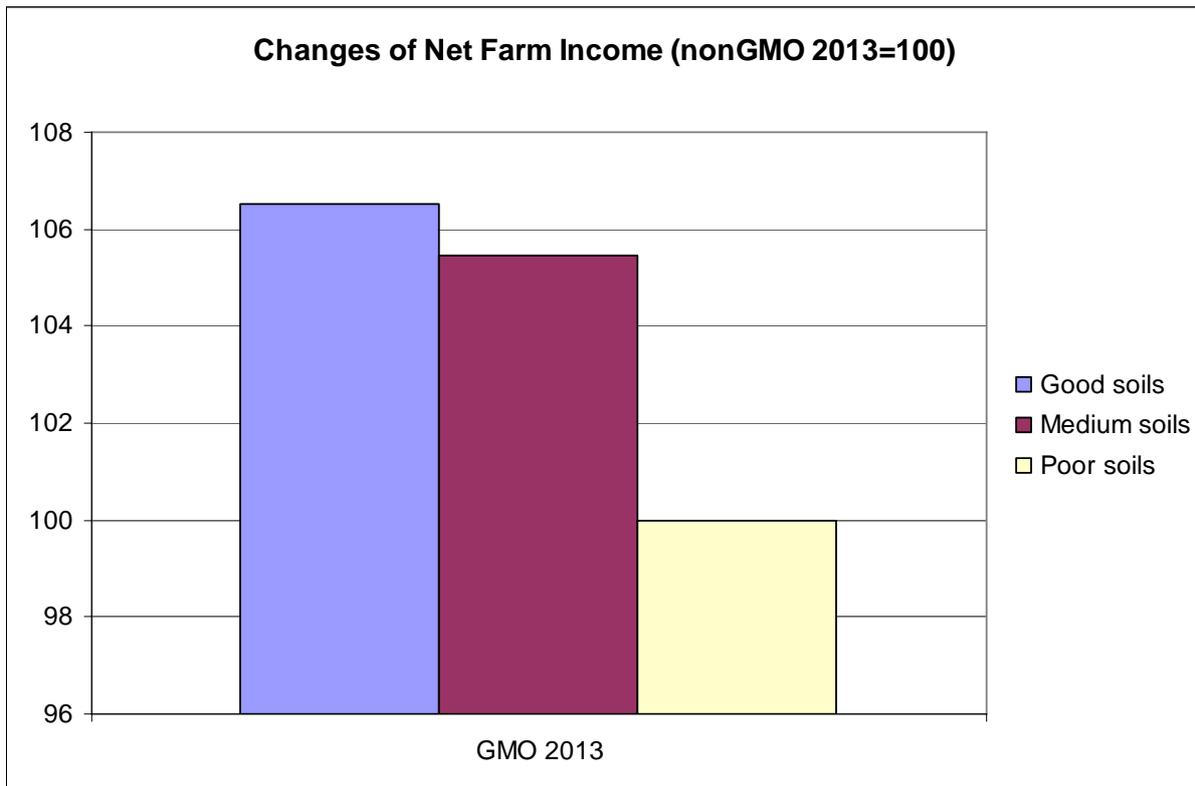
Source: Authors' calculation.

**Figure 5: Potential income effects of GMO crops introduction for year 2013 by specialisation**



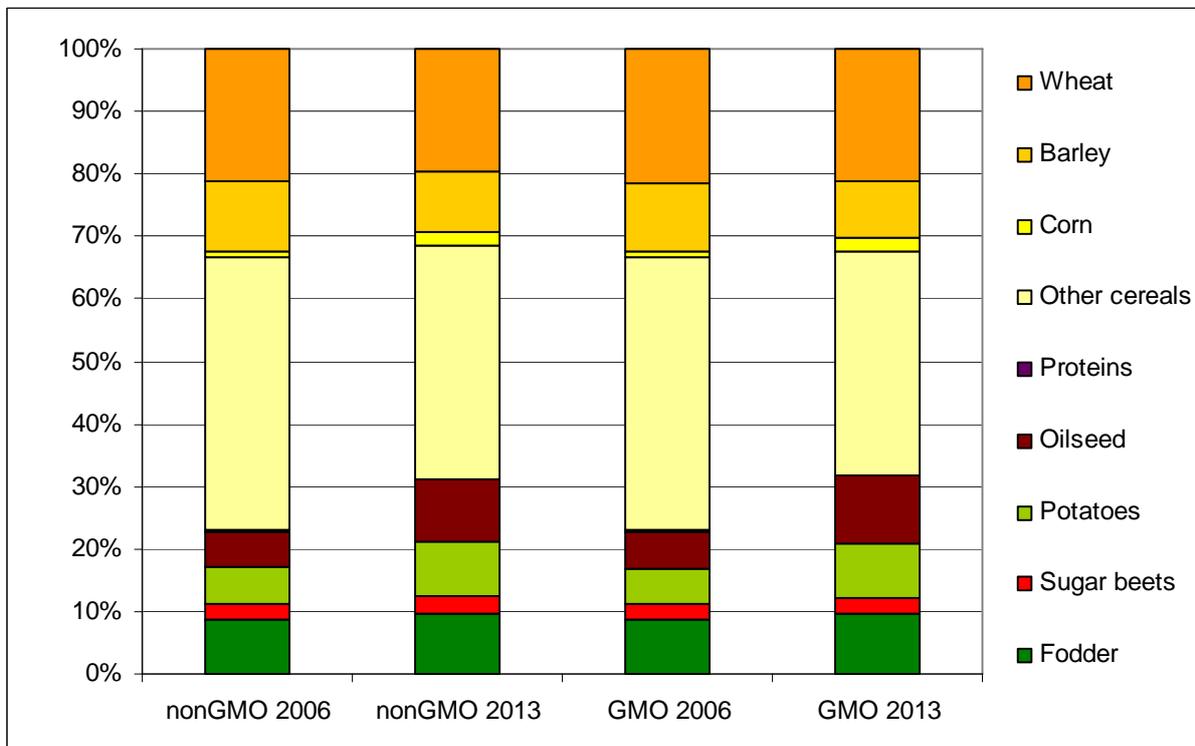
Source: Authors' calculation.

**Figure 6: Potential income effects of GMO crops introduction for 2013 by soil type**



Source: Authors' calculation.

**Figure 7: Cropping structure for GMO and non-GMO scenarios**



Source: Authors' calculation.

## 4 CONCLUSIONS

The paper took one significant element of agriculture production – the use of genetically modified organisms – and considered it in relation to a single factor – the overall profitability of agriculture in Poland. This was carried out under strict scientific rigor and under the theoretical assumption that GMO cultivation is permitted in Poland without any coexistence limitations. The authors aimed to discover whether, under *ceteris paribus* conditions, the use of GMO plants in Polish farms would have an influence on their economic results. The applied comparative static approach of an optimisation technique provided an opportunity to build up and aggregate the impacts of individual farm responses under actual and assumed situations, respectively, for 2006 and 2013.

The modelling results show that GMO crops would have an influence on the economic performance of Polish farms. It has been proven that from an economic point of view, the possibility of using GMO crops is likely to cause an increase of Net Farm Income. Nonetheless, it should be noted that this impact is not very crucial. The average farm income given the unrestricted availability of GMO technology is only 4.5% higher compared to the GMO-free strategy. The obtained results for 2006 show that in the short-term perspective, the effect of introducing GMO will be greater, due to a generally lower income level. In the medium-term perspective presented for 2013, which assumed changes in agricultural policy as well as adjustment in crop structure, the GMO effect of economic profitability for Polish farms is lower due to an overall NFI increase; this is the result of CAP phasing-in.

However, the influence of GMO on Polish farm profitability depends significantly on the intensity of production, soil conditions, and the type of production. These three factors are connected to the character of plant production. Firstly, in both the short- and medium-term perspectives, intensive farms obtain a higher income from introducing GMO compared to those which perform more extensively. Secondly, as GMO plants are more effective on good soil, farms that operate in such conditions will report higher income from GMO introduction than those with poor soil. Finally, the impact on the type of production can be described with apprehension. The more general approach shows that farms specialising in plant production report higher profitability than those with animal production. This is related to a higher share of crop production in income creation, which is highly influenced by GMO technology. The lowest income increase was found on mixed farms, which is due to their relatively smaller share of crop production in income creation. Taking into account only farms specialised in animal production, introducing GMO crops contributes more for cattle farms in comparison to pig farms. This is due to the possibility of acquiring GMO fodder maize.

As a final remark, it should be stressed that this analysis has only taken into account the effect of introducing GMO on the economic performance of Polish

farms. As such, it shows that the opportunity costs of being GMO-free for an average farm is equal to approximately 4.5% of its NFI. However, it is important to bear in mind that other issues, be they social, environmental, health or ethical in nature, are of equal importance for the emerging challenge of possible GMO implementation in Polish agriculture. In academic elaborations, only one of these issues can be analysed at a time, but one should remember that only examining all of them can provide a comprehensive view that might be a coherent guide for further development. Therefore, there is an urgent need to perform exhaustive studies to answer further arising questions.

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