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Improving certainty in consolidated farms: A perspective of afforestation of marginal croplands in Uzbekistan

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Outline

- Introduction
- Analysis at various levels
    - Field
    - Farm
    - Bimodal
- Results
- Conclusions

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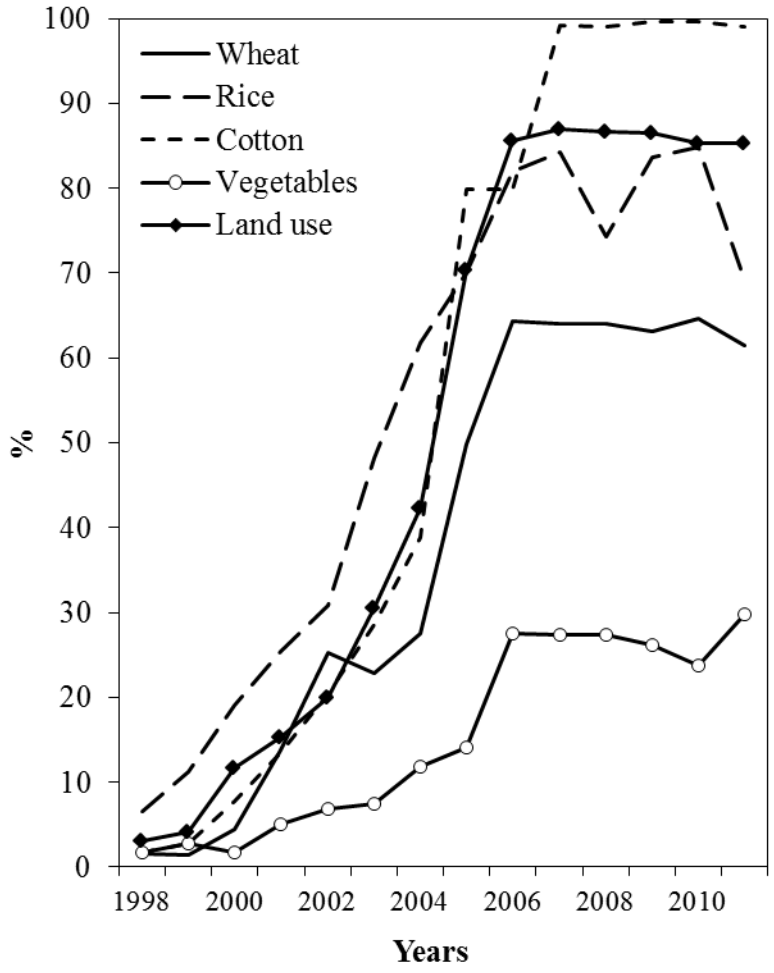
Study area

- Irrigated agriculture: 35% of GDP
- Marginal croplands: 23% of arable area
- Main crop on marginal land: cotton
- Farms possess: ~90% of arable land
- Semi-subsistence households possess: ~10% of arable land

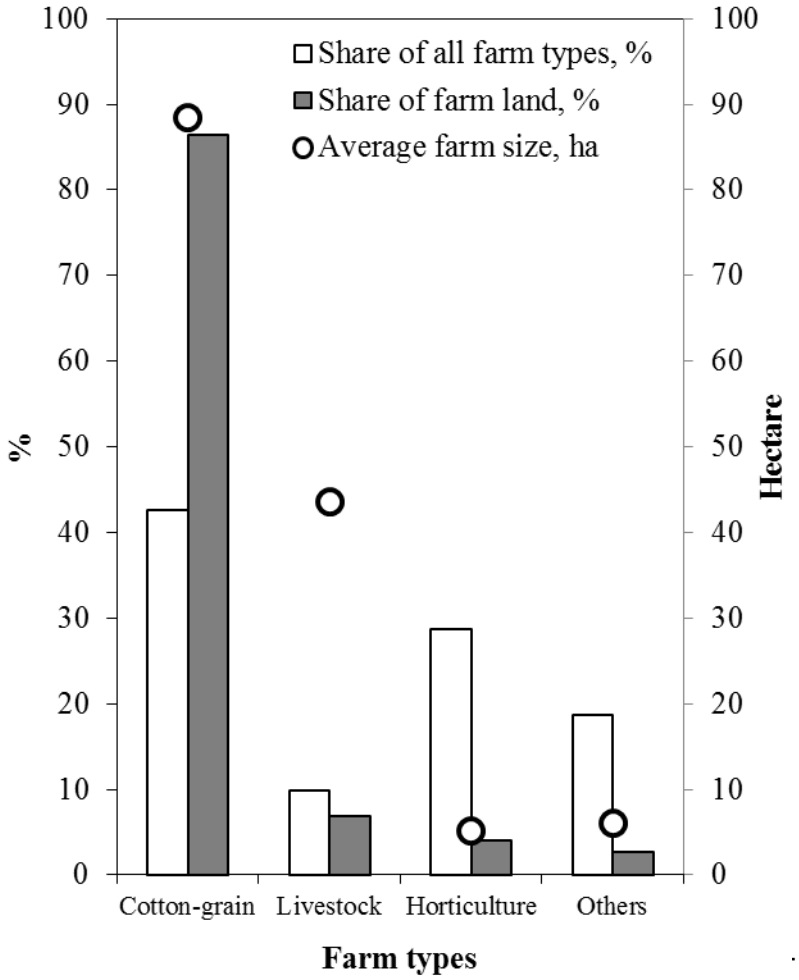
Source: MAWR (2001, 2010); Dubovyk et al. (2013)

Cotton and wheat growing farms (Khorezm province)

Share of private farms in total land use and crop production (1998-2011)



Private farm categories (2011)



Source: Djanibekov et al. (forthcoming)

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Afforestation of marginal croplands (1)

- Russian olive (*Elaeagnus angustifolia)*, Euphrates Poplar (*Populus euphratica*), Siberian elm (*Ulmus pumila)* showed a high potential on marginal croplands
- Require less irrigation than crops due to reliance on groundwater
- Multiple products: fuelwood, fruits, leaves as fodder, carbon revenues through Clean Development Mechanism (4.76 USD tCO_2^{-1})

Photos: Khamzina et al. (2012)

Source: Lamers et al. (2008); Khamzina et al. (2006; 2009)

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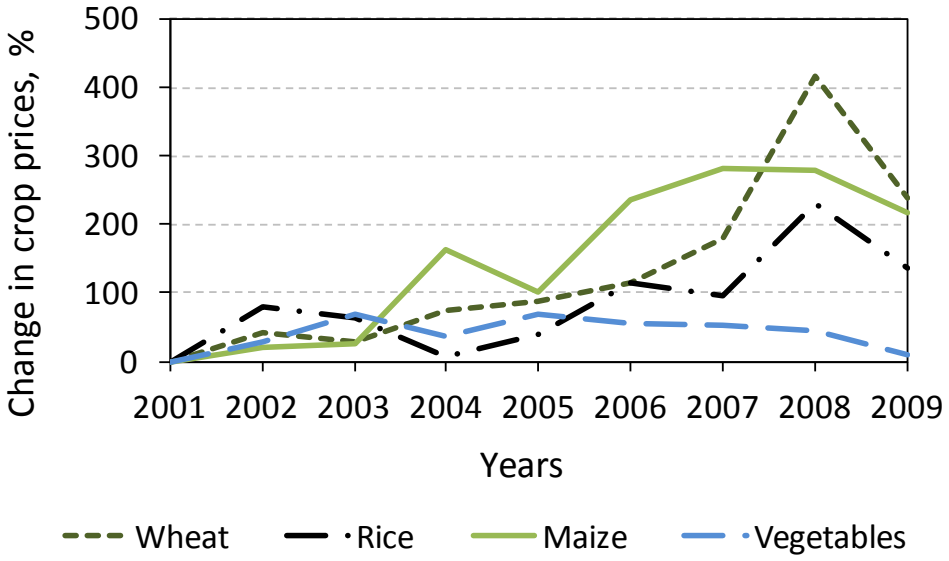
Afforestation of marginal croplands (2)

- Uncertainty in incomes of land uses
- Farmers follow the state cotton procurement policy: 50% of farmland, cotton output, state purchase price → low flexibility in land use
- Household incomes depend on employment at farm → spillover effects

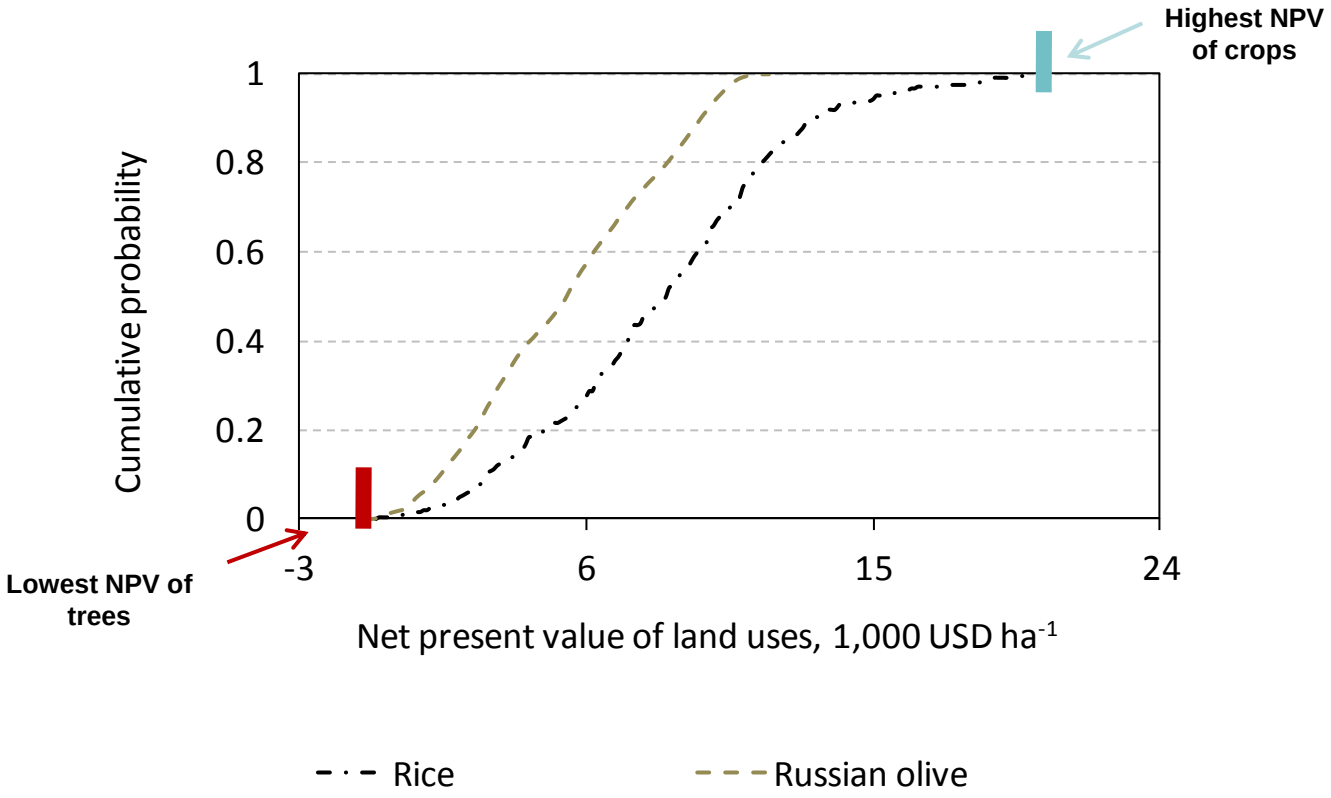


Research questions and methods

		Analysis
(1)	What are the costs and benefits afforestation?	Costs and benefits at field and farm level
(2)	What are the impacts of afforestation on rural livelihoods?	Bimodal system (Farm and household)
(3)	What policies are needed to facilitate the adoption of more sustainable land use on marginal lands – afforestation?	

Data	Description
Surveys	160 farms, 400 households, market
Tree growth parameters	Russian olive, Euphrates poplar, Siberian elm from experimental cite over 7 yrs
Irrigation-yield response function	Cotton, wheat, rice, maize and vegetables on marginal, average, good and highly productive soils

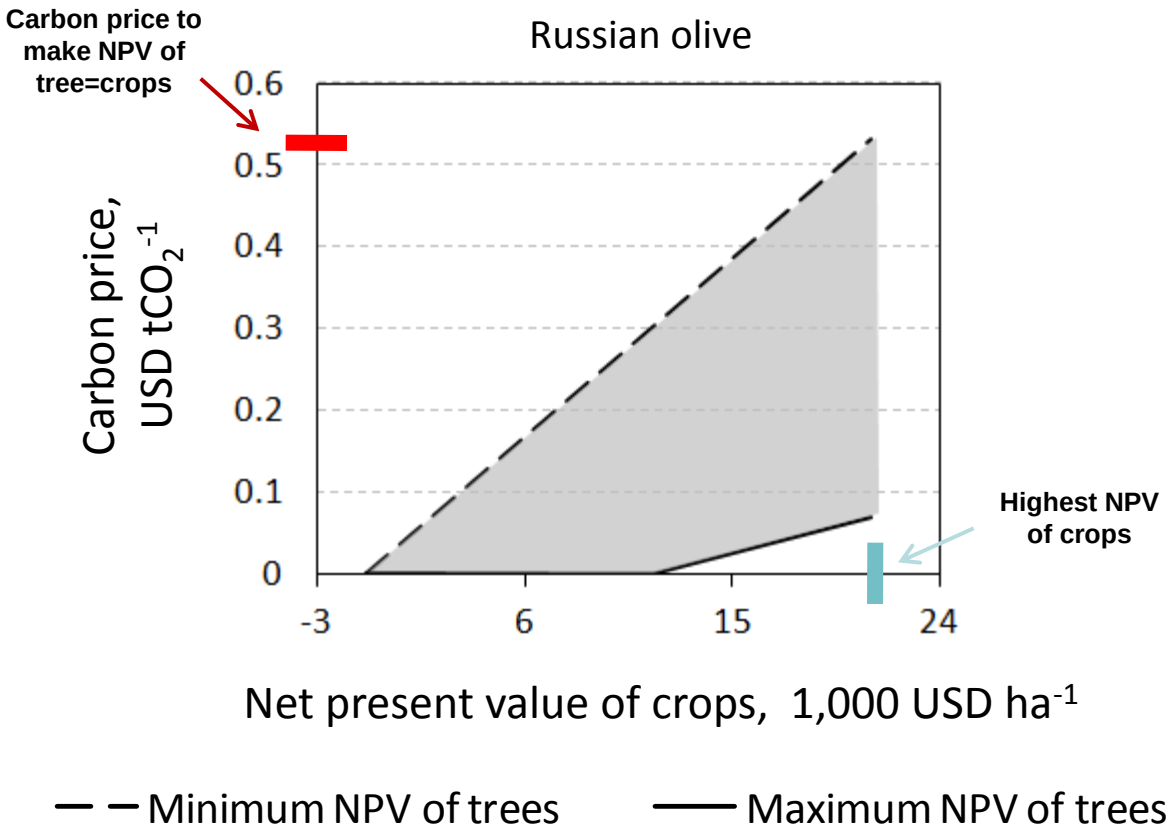
Results (1): Varying NPV of land uses



- Due to variability additional financial incentives are needed to initiate afforestation

Source: Djanibekov and Khamzina (in press) *Environ Resource Econ*

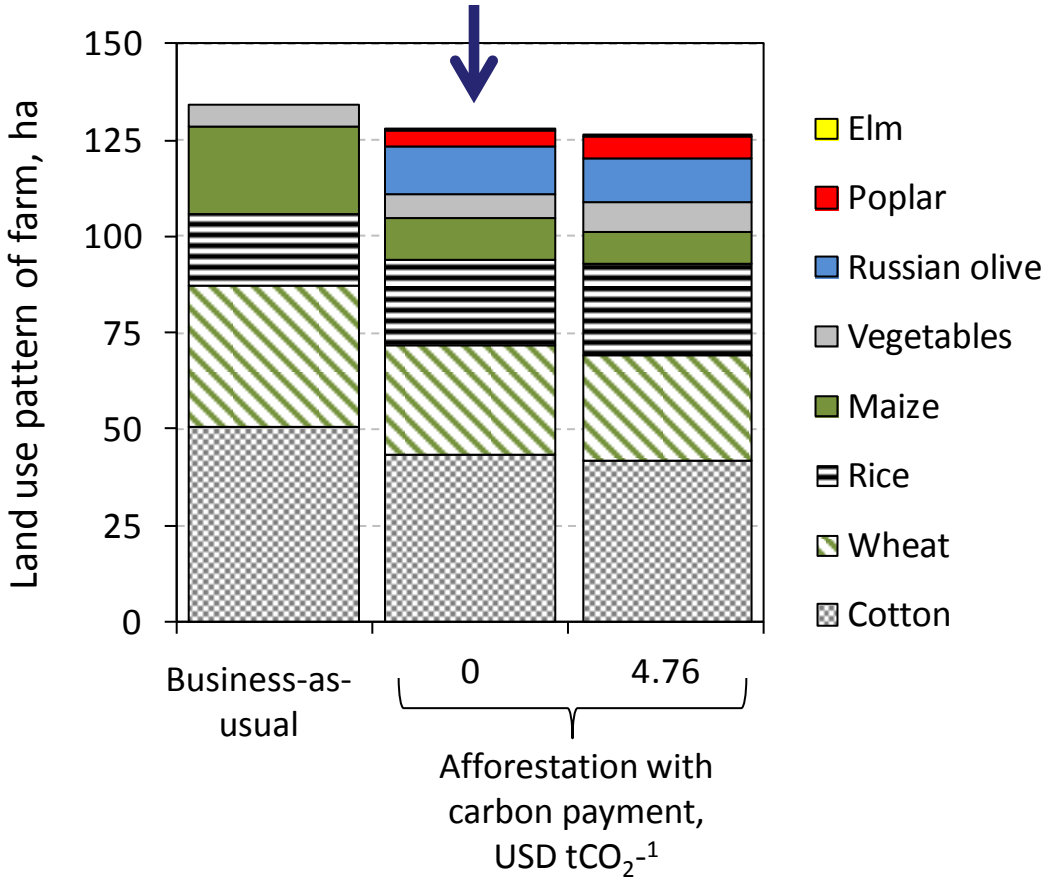
Results (1): Payment for carbon under uncertainty



- Variability in returns may require high carbon prices (110 times higher than the current value) to initiate afforestation

Source: Djanibekov and Khamzina (in press) *Environ Resource Econ*

Results (1): Farm land use



- Even without carbon revenues, trees are planted on marginal lands
- Afforestation: farm incomes are higher by 29 % than under the BAU

Source: Djanibekov and Khamzina (in press) *Environ Resource Econ*

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Discussion

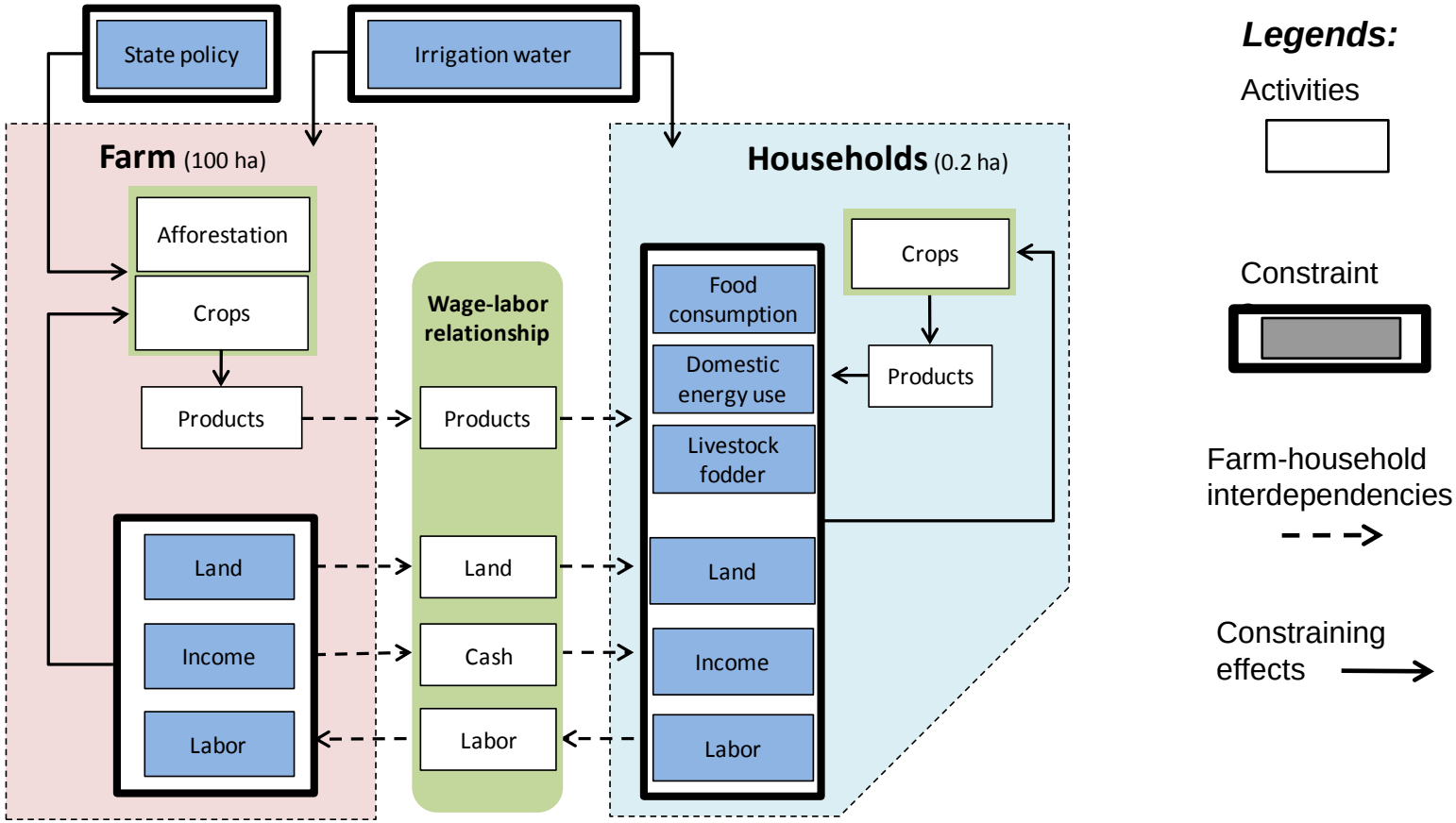
- When we consider **field level analysis** (1 ha scale) than we may infer that **additional support** is required **to incentivize afforestation**
- Using the expected utility approach (whole-farm level), the **modification of cotton policy leads to afforestation** and **increases farm incomes**

But…

- Since rural interlinkages exist, impact on rural livelihoods might be different

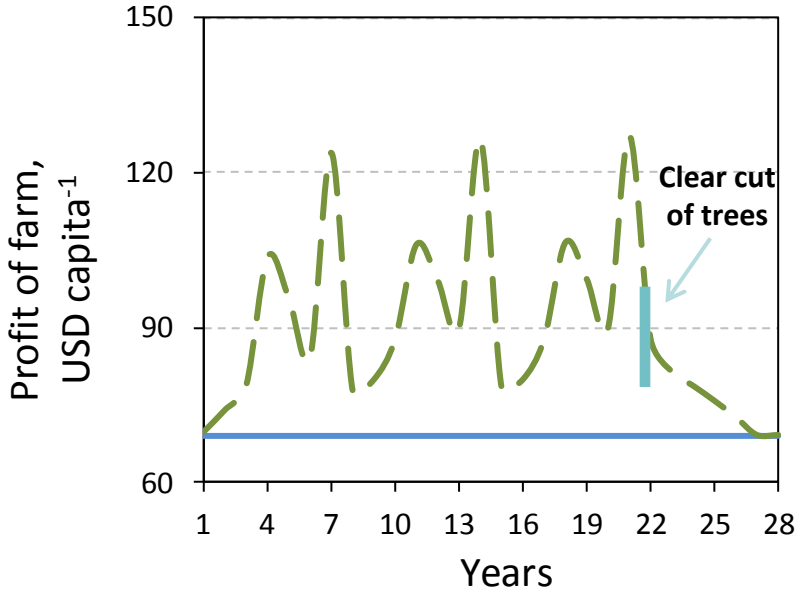
Spillover effects from farm to households: Framework

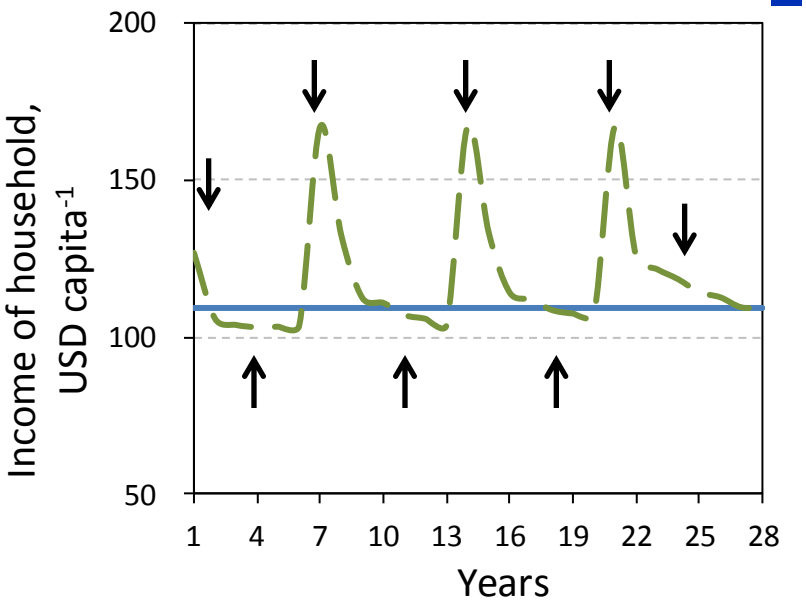
- Economies of farms and households are interlinked through wage-labor relations
  → spillover effects of farm afforestation



Source: Djanibekov et al. (2013) *Land Use Policy*; Djanibekov et al. (2013) *J Rural Stud*

Result (2): Rural livelihoods

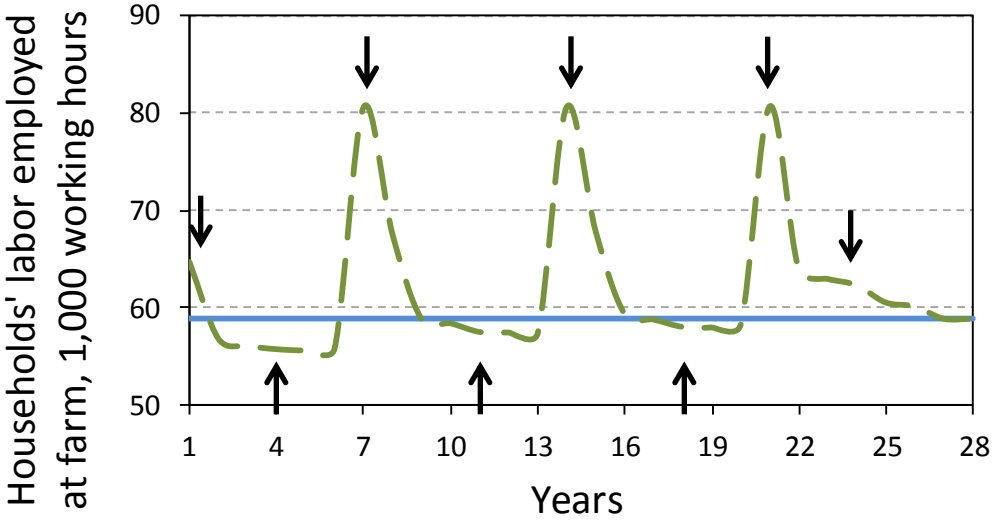




Scenarios

Business-as-usual

Afforestation



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Conclusions

- **Scale** of analysis **matters** ⟶ **different benefits** and **effects**
- **Flexibility in cotton procurement policy** by reducing the land area of cotton but remaining cotton output and price **leads to afforestation**
- **Afforestation** results in **immediate increase of farm profits**…but the **incomes of households are uneven** over the years
- Additional **policies are needed** to support incomes of households **during the period of reduced employment** at farms

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Thank you!