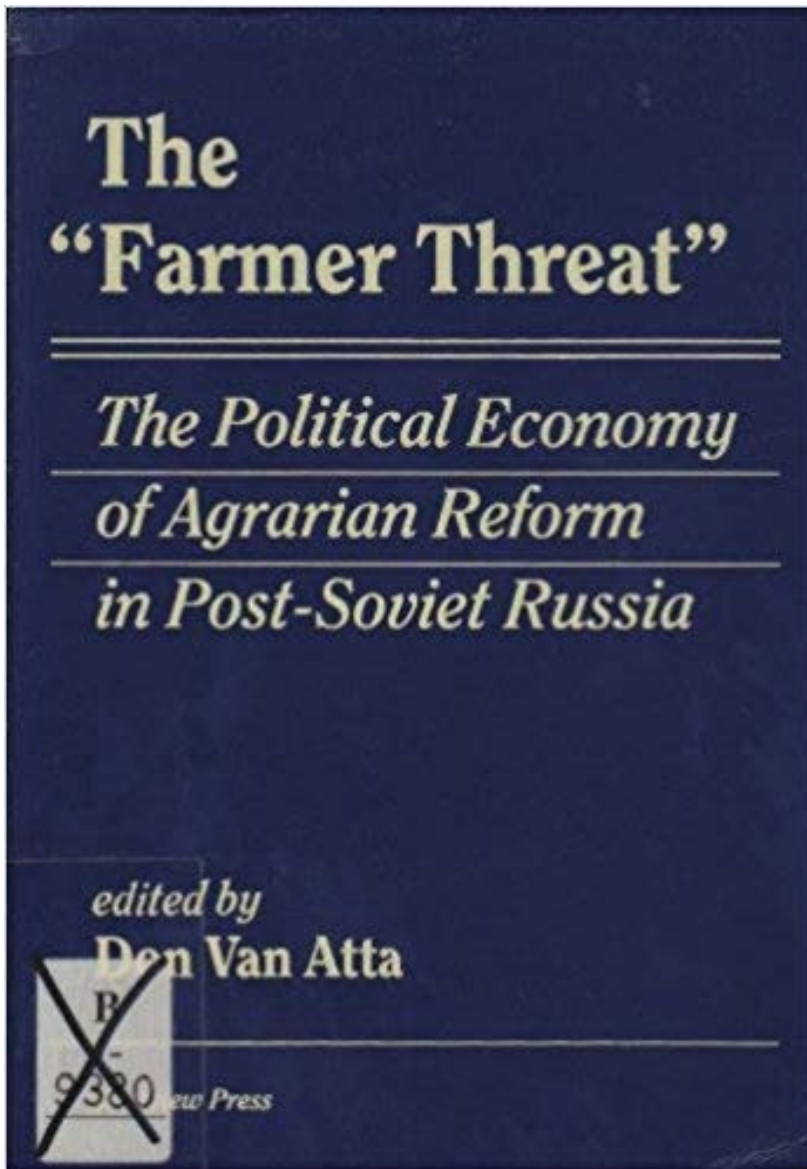




Martin Petrick

# An elusive quest? 25 years of search for the right farming model in post-Soviet Central Asia

Based on joint work with Nodir Djanibekov



Westview Press, Boulder 1993

# Conventional views on the right farming model

Two pillars of the “family farm theory”:

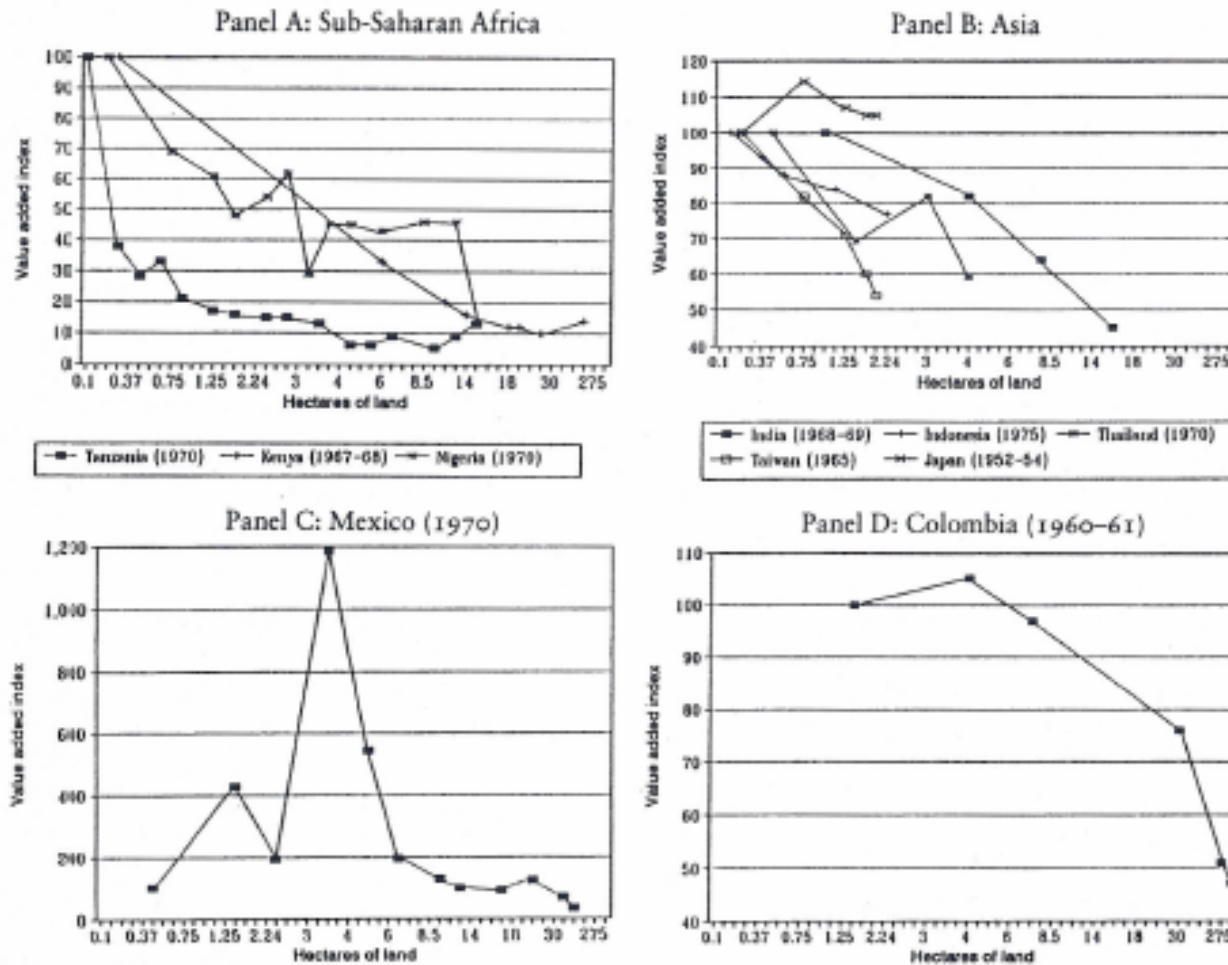
- No scale economies beyond labour capacity of a family
- Growth of labour force beyond family size inhibited by supervision costs

Brewster 1950; Chayanov 1966; Schmitt 1991; Hayami/Otsuka 1993; Lipton 2009

Long-standing model for agricultural policy making in most Western economies

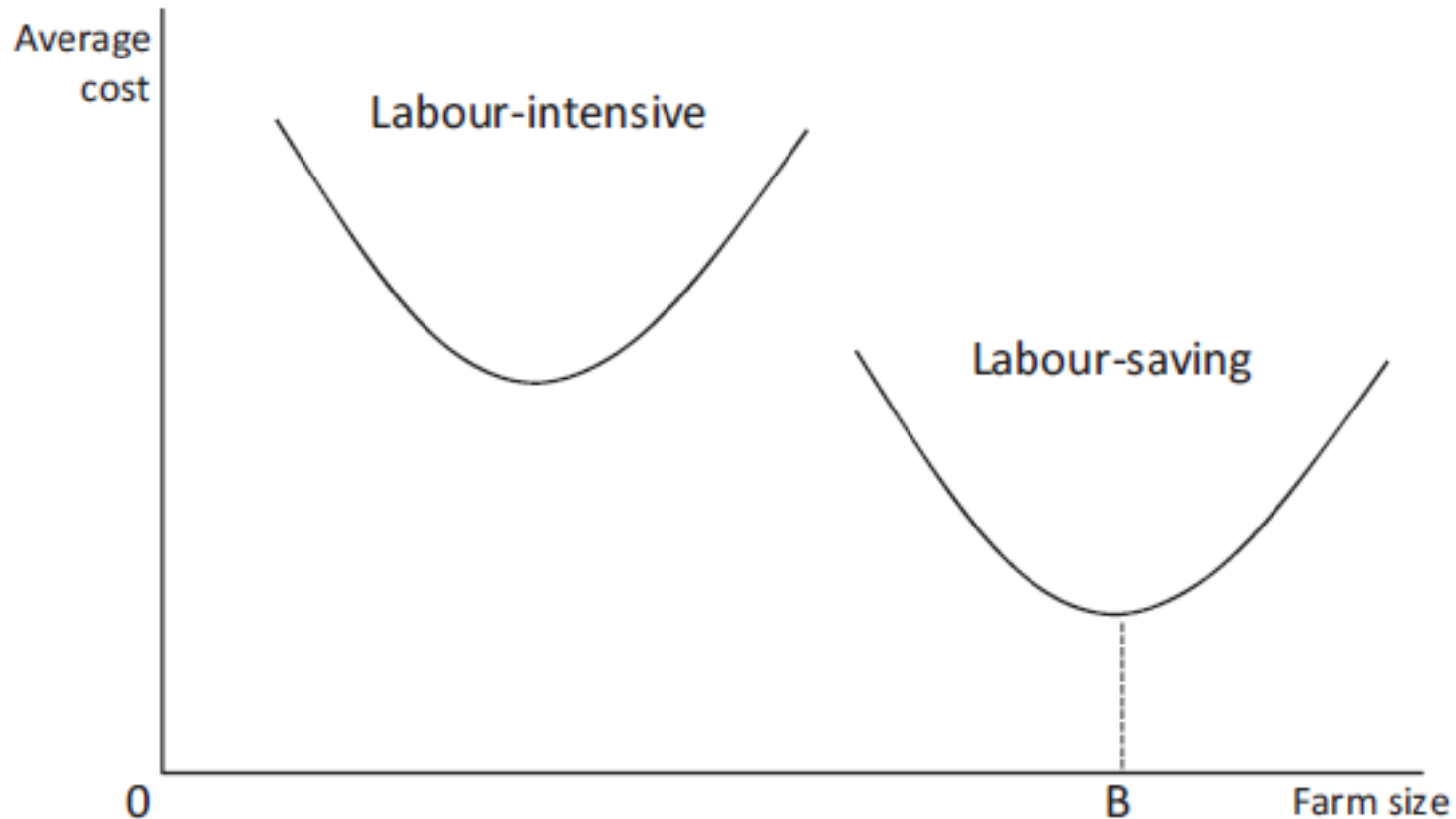
Blueprint for land reforms in developing countries endorsed by IMF, World Bank etc.

# The inverse productivity-farm size relation (IR)



Source: Tomich, Thomas P.; Kilby, Peter; Johnston, Bruce F. (1995): Transforming Agrarian Economies. Opportunities Seized, Opportunities Missed. Ithaca, London: Cornell University Press, p. 126.

# A positive relation in “modern” economies



Source: Otsuka, Keijiro; Liu, Yanyan; Yamauchi, Futoshi (2016): The future of small farms in Asia. Development Policy Review 34, p. 448.

# Individual (family) farmers in Central Asia



Vakhsh river valley, Tajikistan



Samarkand, Uzbekistan



“Virgin Lands”, Kazakhstan

# Research questions

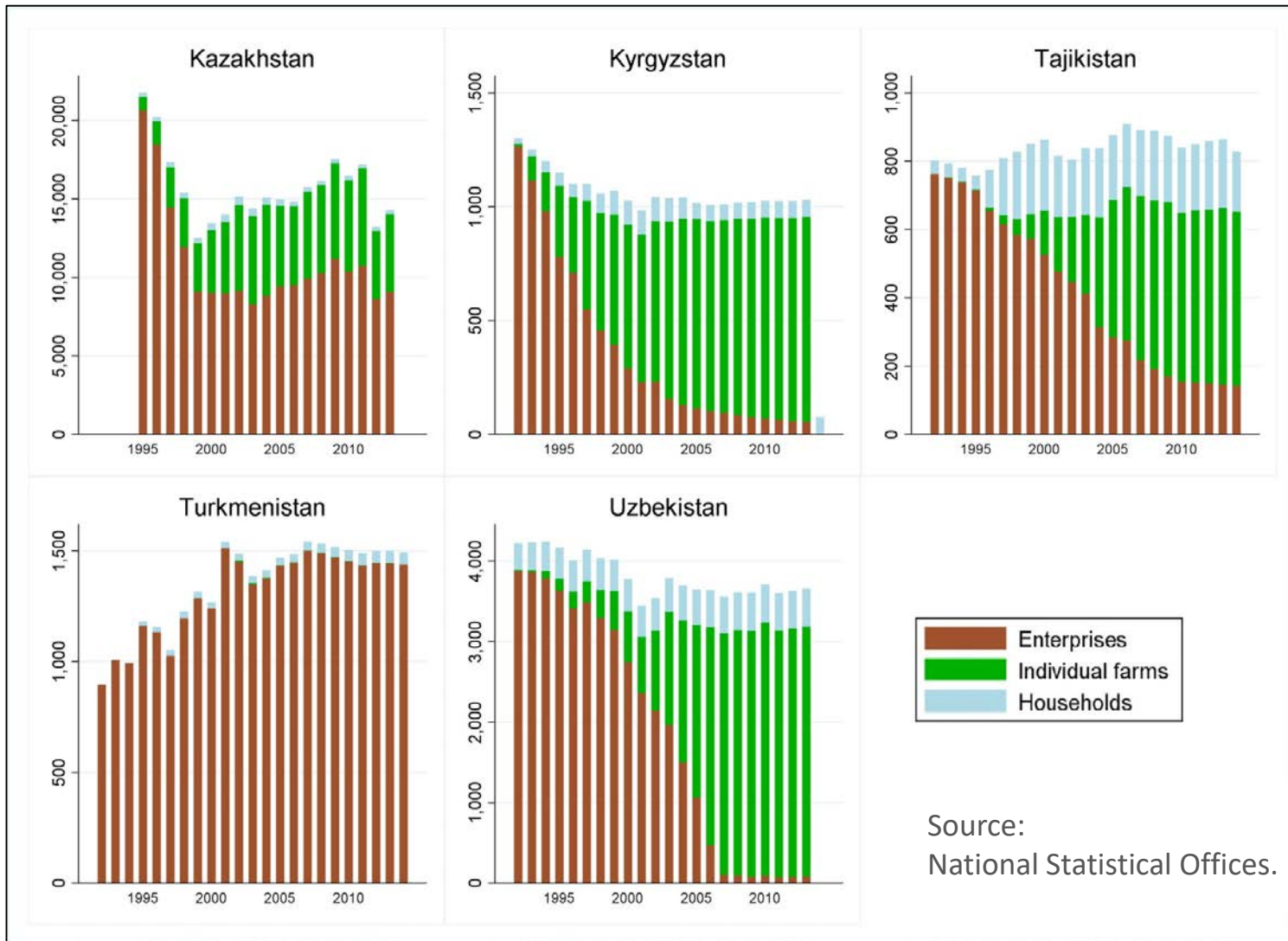
**How did farm performance evolve in five Central Asian countries over the past 25 years?**

- Do we observe an IR in Central Asia?
- Does the IR differ by farm type?
- How did land reforms affect the IR?

...using a new database of province-level farm performance.

# Land use by farm type in Central Asian countries

## Thousand ha





# Hypotheses

**H1:** Yield levels decrease with farm size (= there is an IR)

**H2:** Land market reforms weaken the IR

**H3:** Households display higher yield levels than individual farms

**H4:** Corporate farms display lower yield levels than individual farms

## Land market reform indicator (“turnaround year”)

Country	Year	Reform measure
Kazakhstan	2005	New land code, private property in land
Kyrgyzstan	1994	Reorganisation of enterprises, land share determination
Tajikistan	2007	Reinforced reform implementation
Turkmenistan	1996	Land allocation to individuals
Uzbekistan	2008	Farm consolidation programme

Sources: Petrick et al. (2013), Lerman & Sedik (2009), Hierman & Nekbakhtshoev (2018), Lerman & Brooks (2001), Djanibekov et al. (2012).

# Data

## Province level data on yield & farm size for:

- 4 output types (wheat, cotton, melon, Gross Ag Output for crops),
- up to 23 years 1992-2014,
- 42 provinces in five countries,
- 3 farm types,

made available by National Statistical Offices in the framework of AGRIWANET project ([www.iamo.de/agriwanet](http://www.iamo.de/agriwanet)).



# Methodological approach

- Bivariate nonparametric regression of yield levels on farm size (“smoothing”).

- Multiple linear regression model:

$$Y_i = \alpha + \beta a_i + \gamma X_i + \epsilon_i,$$

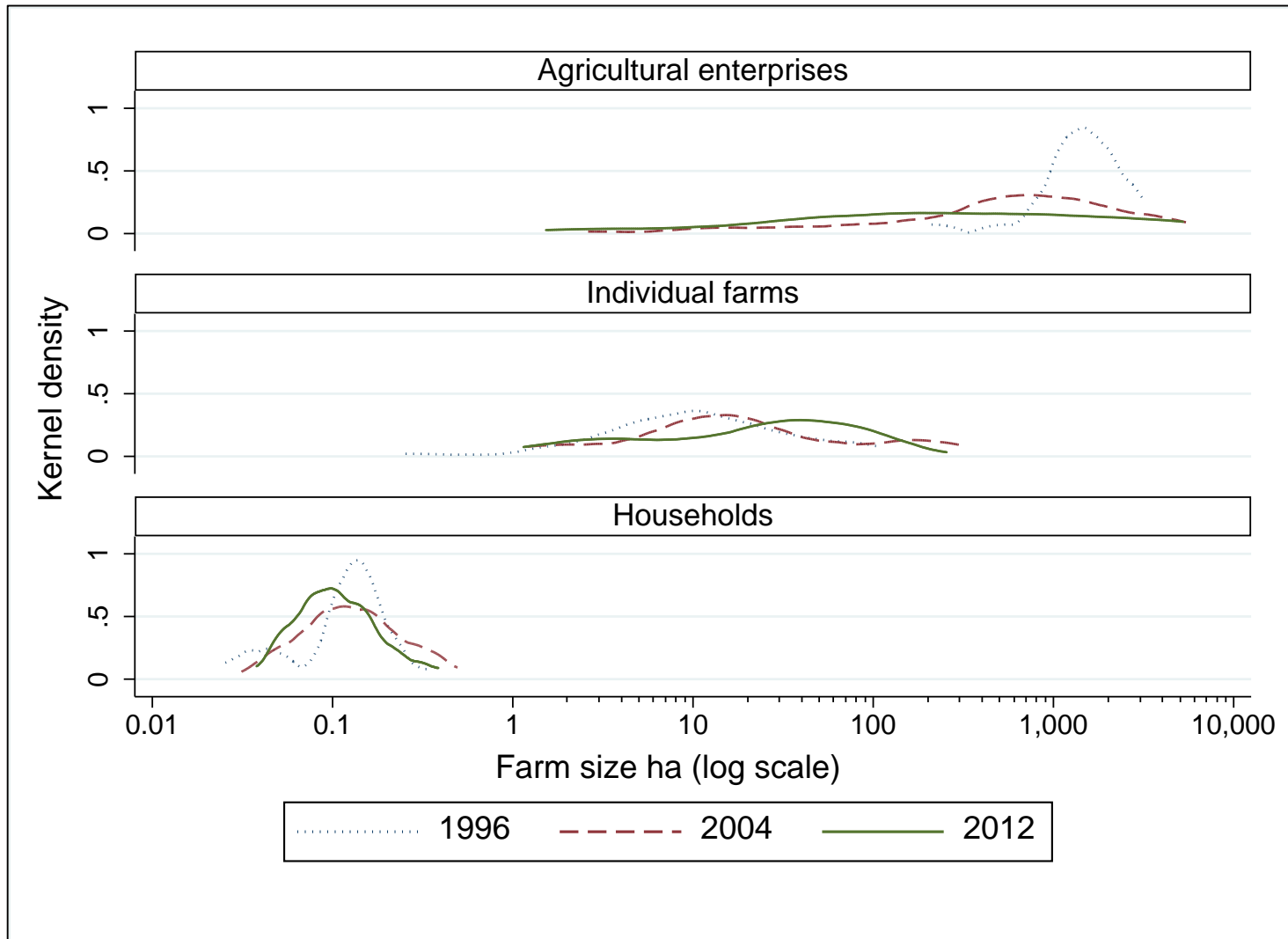
where  $Y$  is yield level,  $a$  log farm size,  $X$  covariates,  $\alpha$ ,  $\beta$ ,  $\gamma$  parameters,  $\epsilon$  an i.i.d. error term.

The IR prevails if  $\beta < 0$ .

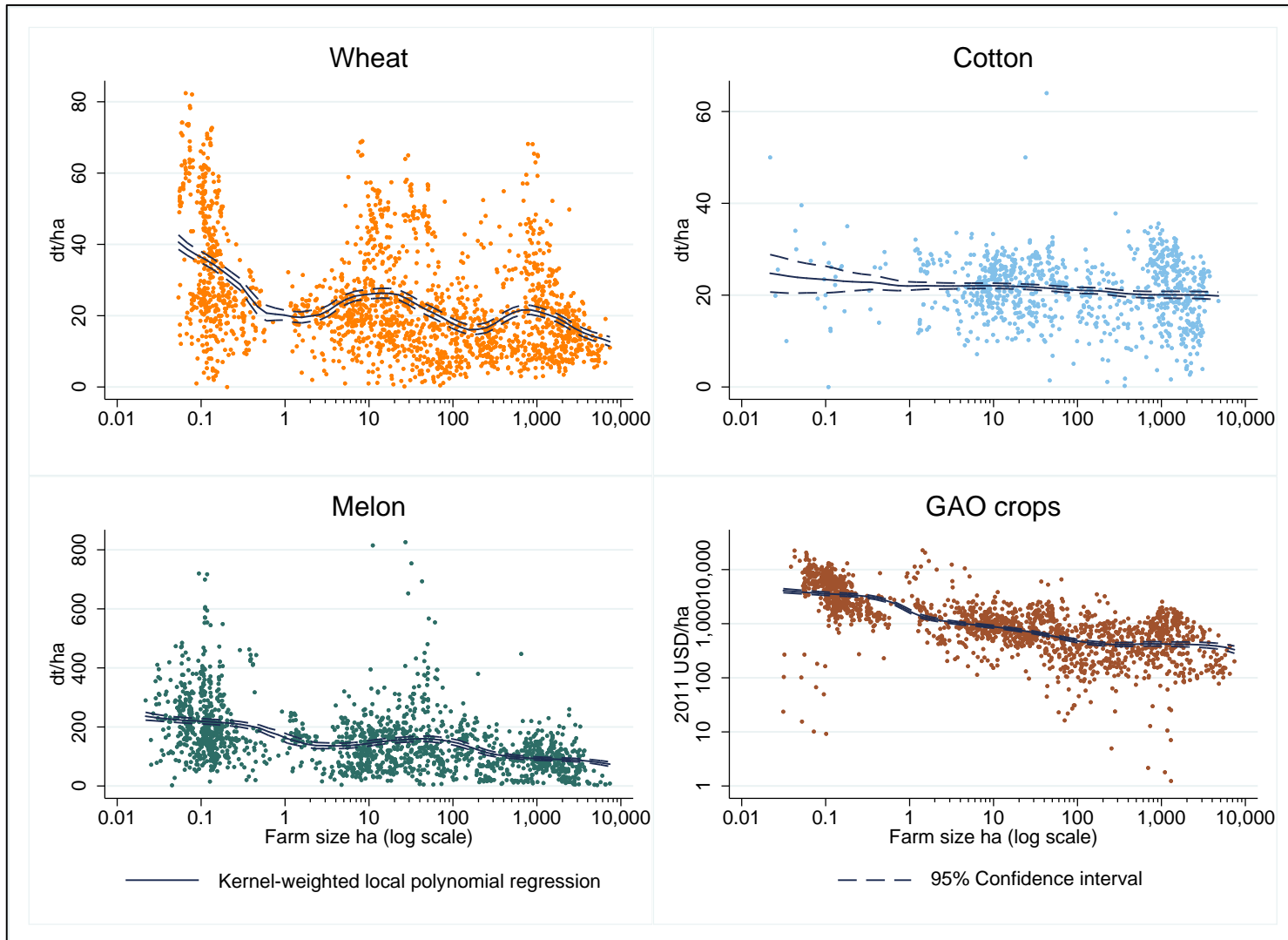
Interaction terms allow testing the IR by farm type.

Covariates include provincial & year effects & climate data.

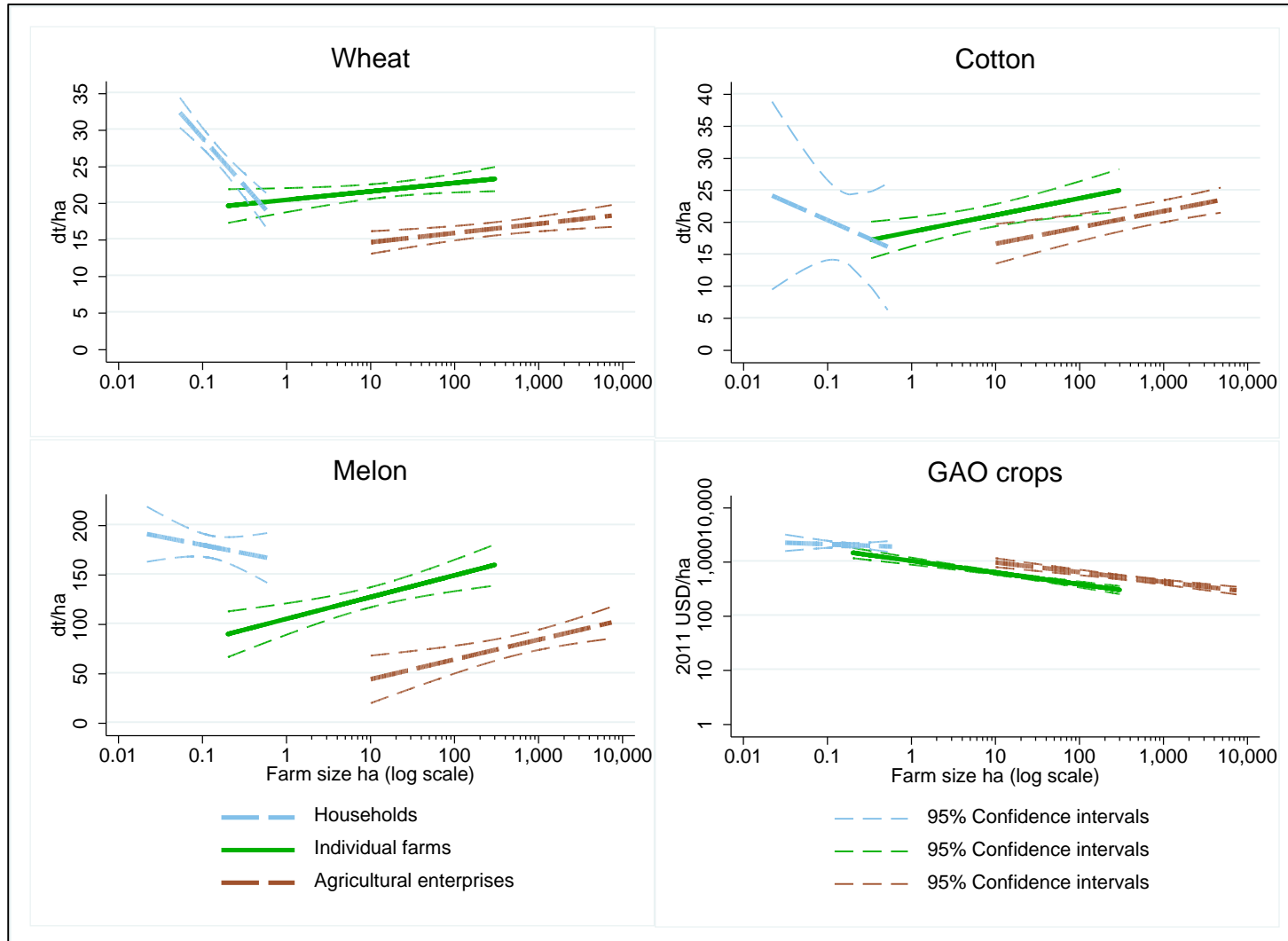
# Distribution of farm sizes 1996, 2004 and 2012



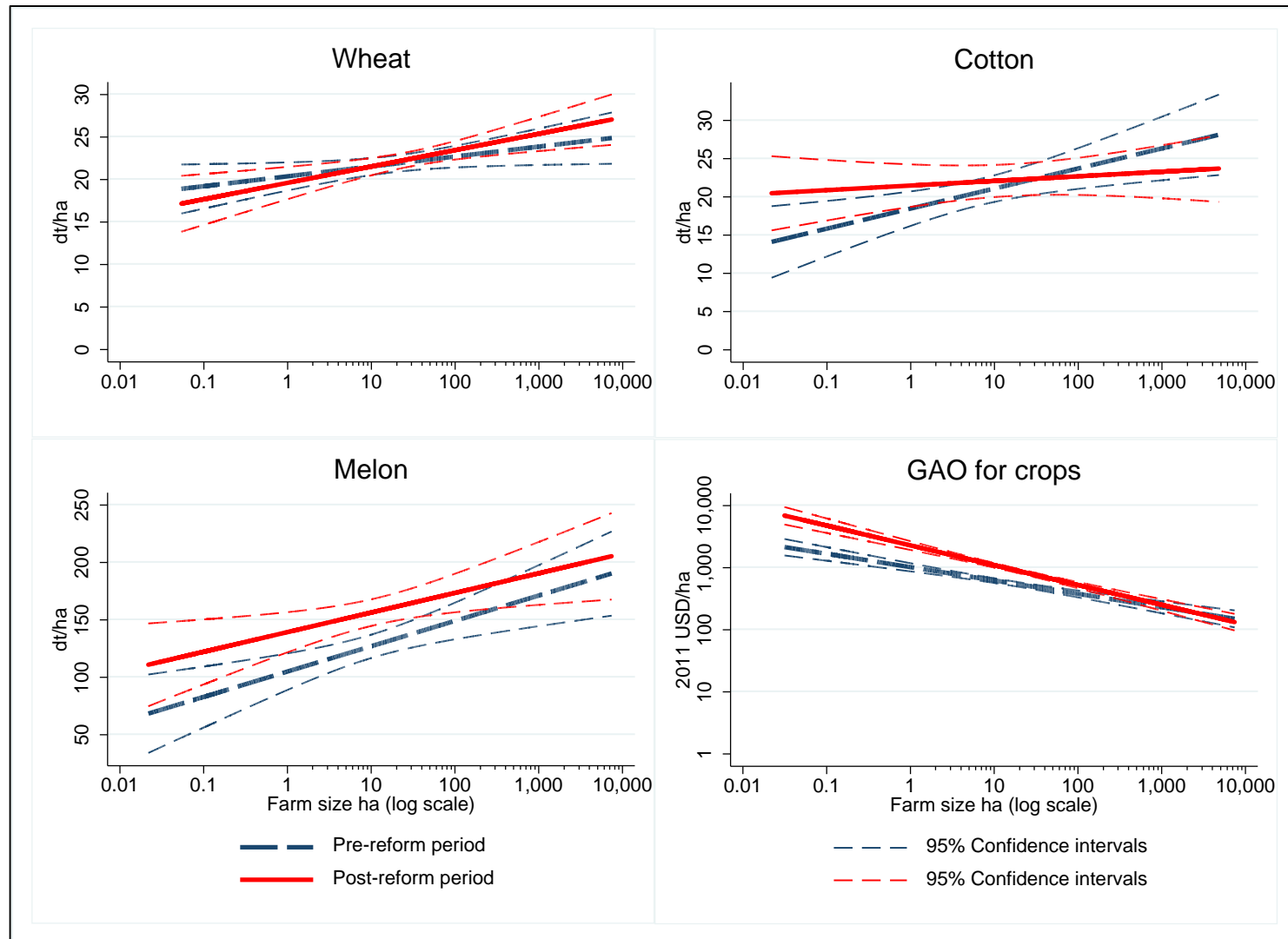
# Nonparametric regression of yields on farm size



# Predicted yields by farm type



# Predicted yields pre- vs. post-reform period





# Conclusions

- **Within** groups of individual & corporate farms, yield levels **increase** with farm size, IR is rejected!
- Yield levels **between** farm types and within households consistent with conventional arguments
- **Convergence** towards productive medium-sized farms (partly) due to gradual (land market) liberalisation
- Cotton more static than wheat & melon
- IR in GAO may be due to changing crop mix

# Implications

- Commercial farms in CA **exhibit features of “modern” agriculture** (such as caused by capital-intensive technology)
- **Little scope** for productivity-improving land redistribution
- Introduction of individual (family) farms broadly **successful**
- Evidence consistent with lower productivity of **hired workers** on corporate farms
- Gradually intensifying reform progress may help to **further lift** productivity of smaller commercial farms

## References

- Brewster, John M. (1950): The Machine Process in Agriculture and Industry. In *Journal of Farm Economics* 32, pp. 69–81.
- Chayanov, Alexander V. (1966): *Theory of Peasant Economy*. Homewood, IL: Richard D. Irvin.
- Djanibekov, Nodir; van Assche, Kristof; Bobojonov, Ihtiyor; Lamers, John P.A (2012): Farm Restructuring and Land Consolidation in Uzbekistan: New Farms with Old Barriers. In *Europe-Asia Studies* 64, pp. 1101–1126.
- Hayami, Yūjirō; Otsuka, Keijiro (1993): *The economics of contract choice. An agrarian perspective*. Oxford: Clarendon Press.
- Hierman, Brent; Nekbakhtshoev, Navruz (2018): Land reform by default: uncovering patterns of agricultural decollectivization in Tajikistan. In *Journal of Peasant Studies* 45 (2), pp. 409–430.
- Lerman, Zvi; Brooks, Karen M. (2001): *Turkmenistan. An Assessment of Leasehold-Based Farm Restructuring*. Washington, DC: World Bank (World Bank technical paper Europe and Central Asia environmentally and socially sustainable development series, 500).
- Lerman, Zvi; Sedik, David (2009): *Agricultural Recovery and Individual Land Tenure: Lessons from Central Asia*. Budapest: FAO Regional Office for Europe and Central Asia (Policy Studies on Rural Transition, 2009-3).
- Lipton, Michael (2009): *Land Reform in Developing Countries. Property rights and property wrongs*. London: Routledge.
- Otsuka, Keijiro; Liu, Yanyan; Yamauchi, Futoshi (2016): The future of small farms in Asia. In *Development Policy Review* 34, pp. 441–461.
- Petrick, Martin; Wandel, Jürgen; Karsten, Katharina (2013): Rediscovering the Virgin Lands: Agricultural investment and rural livelihoods in a Eurasian frontier area. In *World Development* 43, pp. 164–179.
- Schmitt, Günther (1991): Why is the agriculture of advanced Western economies still organized by family farms? Will this continue to be so in the future? In *European Review of Agricultural Economics* 18, pp. 443–458.
- Tomich, Thomas P.; Kilby, Peter; Johnston, Bruce F. (1995): *Transforming Agrarian Economies. Opportunities Seized, Opportunities Missed*. Ithaca, London: Cornell University Press.
- van Atta, Donald (Ed.) (1993): *The "Farmer threat". The political economy of agrarian reform in post-Soviet Russia*. Boulder, CO: Westview Press.

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**Thank you for your attention!**