Misallocation and Productivity in Uruguay

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GDP per Capita in Uruguay

Country	Relative GDP per capita 1960	2009	Annualized Growth (%)
Uruguay	0.45	0.31	1.37
Latin America	0.30	0.23	1.53
USA	1.00	1.00	2.10

Key questions:

- What factors (employment, capital, productivity,...) account for this poor economic performance?
- Why are these factors low?

GDP per Capita in Uruguay

- Not low employment-to-population ratio

Country	1960	2009
Uruguay	0.32	0.47
Latin America	0.31	0.40
USA	0.38	0.46
Ratio UY/US	0.84	1.01

- Not capital or human capital accumulation (capital-output ratio fell from 2.1 to 1.5, accounting for most of the fall in GDP per worker)
- A total factor productivity problem!

$$\frac{A_{UY}}{A_{US}} = .79$$

A Model of TFP Differences

A Simple Illustrative Model

- Standard framework is the neoclassical growth model augmented to incorporate heterogeneous production units as in Hopenhayn (1992)
- One good is produced each period
- The production unit is an establishment
- An establishment is a decreasing returns to scale technology, for simplicity assume it requires only labor input:

$$y = s^{1-\gamma} l^{\gamma},$$

  where s is the productivity of the establishment and l the labor input
- Assume only two types of establishments s_L and s_H, and a fixed number of establishments of each type, $N = N_L + N_H$

Efficient Allocation

- Planner allocates labor across establishments to maximize output subject to total labor normalized to 1,

$$\max Y_e = \sum_i s_i^{1-\gamma} l_i^{\gamma} N_i,$$

  subject to $\sum_i l_i N_i = 1$
- This problem implies labor allocation

$$l_i = \frac{s_i}{\sum_i s_i N_i}$$

- It implies that the marginal product of labor (and labor productivity y_i/l_i) is equalized across establishment types

$$\gamma s_i^{1-\gamma} l_i^{\gamma-1} = \gamma \left(\sum_i s_i N_i \right)^{1-\gamma}$$

Misallocation

- Idiosyncratic distortions create misallocation by distorting establishment size
- Assume output of high productivity establishments is taxed at the rate τ
- Equilibrium labor allocations are given by:

$$l_L = \frac{s_L}{(s_L N_L + (1-\tau)^{1/(1-\gamma)} s_H N_H)},$$

$$l_H = \frac{(1-\tau)^{1/(1-\gamma)} s_H}{(s_L N_L + (1-\tau)^{1/(1-\gamma)} s_H N_H)}$$

- In this distorted case, real marginal products are not equalized across establishments

$$\gamma \frac{y_H}{l_H} > \gamma \left(\sum_i s_i N_i \right)^{1-\gamma} > \gamma \frac{y_L}{l_L}$$

and aggregate output and productivity are lower than efficient

Potential Sources of Misallocation

- Non-competitive banking systems
- Credit market imperfections
- Level of financial development
- Size restrictions
- Regulations and taxes
- Product and labor market regulations
- Industrial policies
- Public enterprises
- Imposition and enforcement of trade restrictions
- Corruption

Evidence of Misallocation

Hsieh and Klenow (2009)

- Micro data of manufacturing plants in China, India and the United States
- Calculate wedges of marginal products of capital and labor
- Evaluate the extent of misallocation by calculating output loss as the ratio of actual output relative to efficient output

Hsieh and Klenow (2009)

TABLE VI

TFP GAINS FROM EQUALIZING TFPR RELATIVE TO 1997 U.S. GAINS

China	1998	2001	2005
%	50.5	37.0	30.5
India	1987	1991	1994
%	40.2	41.4	59.2

Notes. For each country-year, we calculated $Y_{\text{efficient}}/Y$ using $Y/Y_{\text{efficient}} = \prod_{s=1}^{S} \left[\sum_{i=1}^{M_s} \left(\frac{A_{si}}{\overline{A}_s} \right. \right.$ $\left. \left. \frac{\overline{\text{TFPR}}_s}{\text{TFPR}_{si}} \right)^{\sigma-1} \right]^{\theta_s/(\sigma-1)}$ and $\text{TFPR}_{si} \equiv \frac{P_{si} Y_{si}}{K_{si}^{\alpha_s} (w_{si} L_{si})^{1-\alpha_s}}$.

We then took the ratio of $Y_{\text{efficient}}/Y$ to the U.S. ratio in 1997, subtracted 1, and multiplied by 100 to yield the entries above.

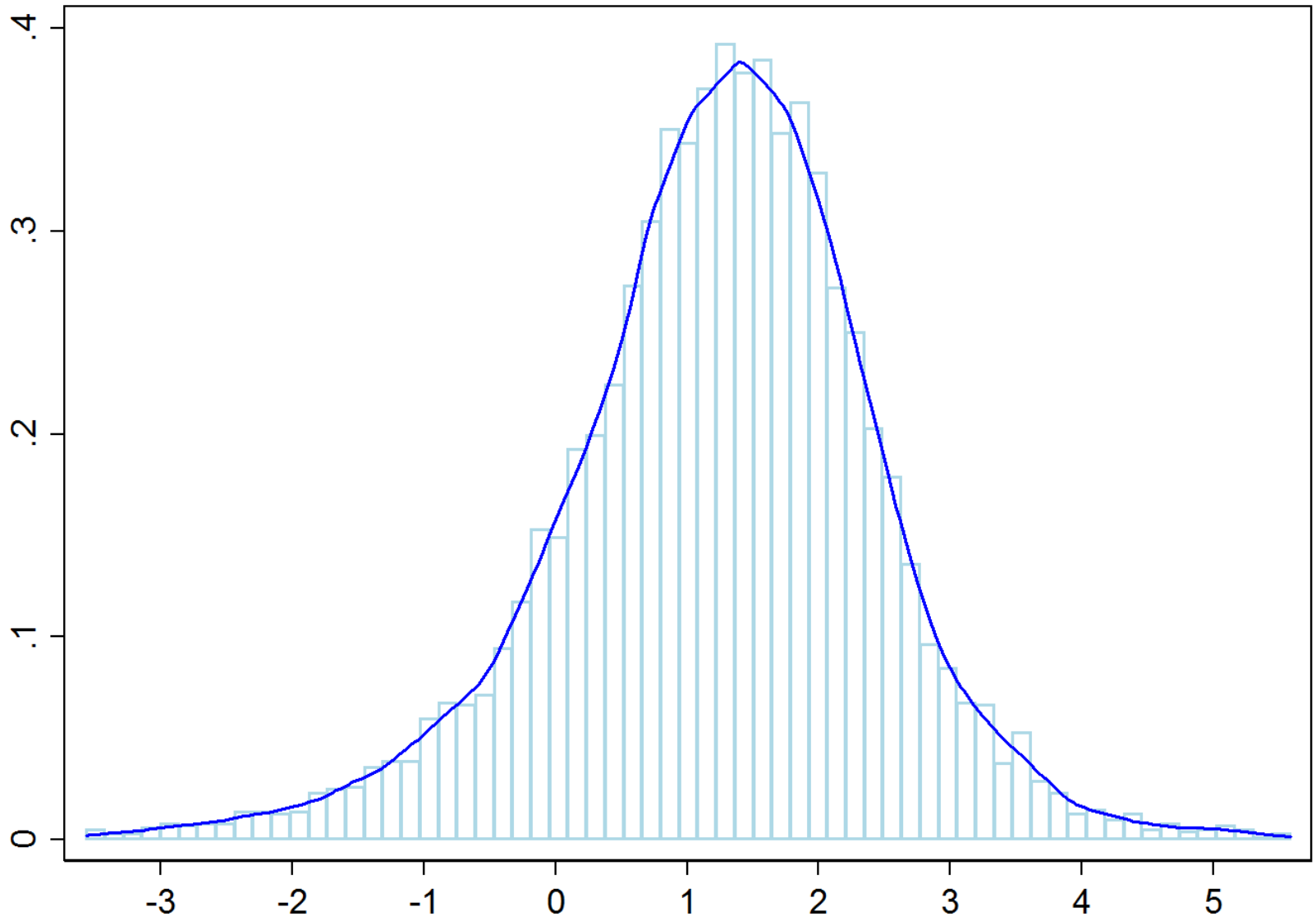
Evidence from Uruguay

- Resource misallocation in Uruguay by Casacuberta and Gandelman (2009) and in Latin America by Buso el al. (2014) and Pages (2010)
- Eliminating wedges in capital and labor in manufacturing plants in UY relative to wedges in the US implies an increase in TFP of 22%

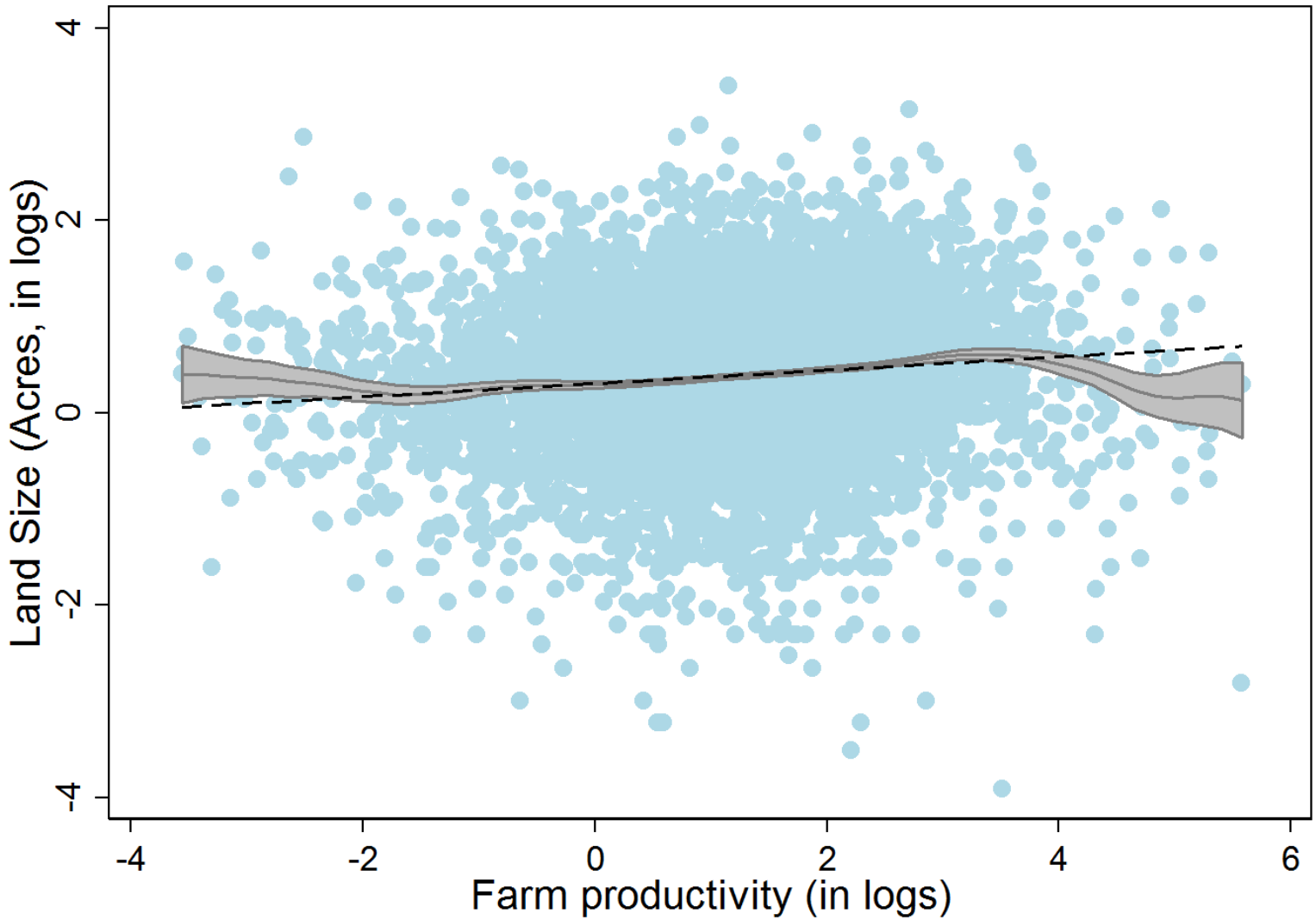
Misallocation in Agriculture

- Based on Restuccia and Santaeulalia-Llopis (2014)
- Large representative household data from Malawi with excruciating detail of agriculture outputs and inputs of farmers
- Malawi is a very poor country where most people work in farming
- Use micro data to measure household-farm productivity controlling for a wide array of factor inputs, land quality, output and other transitory shocks

Farm Productivity, Malawi ISA-2010/11

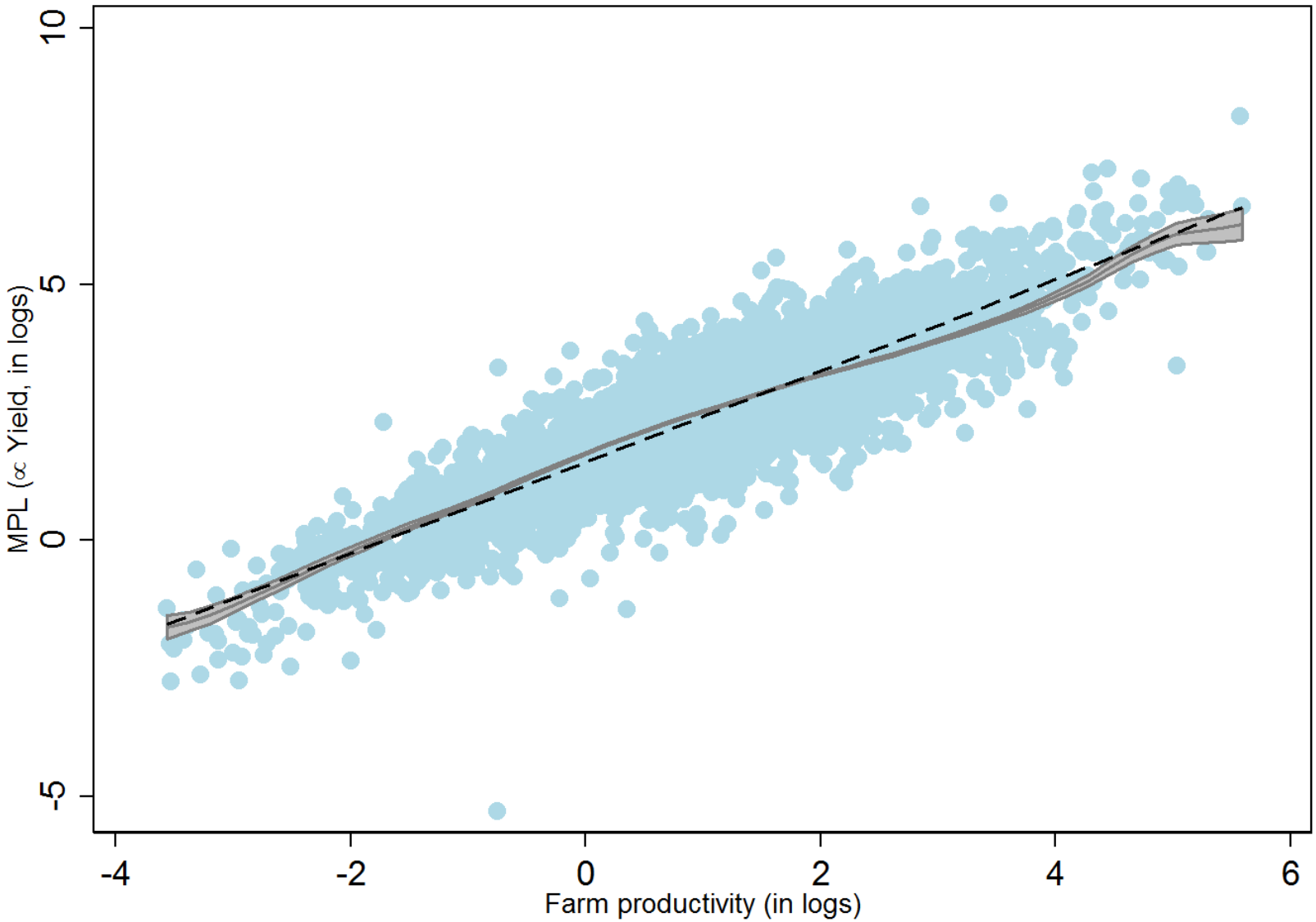


Land Size by Farm Productivity s_i



Notes: The correlations b/w land size and $s(\zeta_i, q_i)$ is .04, $s(0, 0)$ is .01, $s(\zeta_i, 0)$ is .09, and $s(0, q_i)$ is -.07.

Yield by Farm Productivity



Notes: The correlation is . 77 (N .70, C .71, S .81).

Misallocation and Productivity

- Efficient allocation of capital and land across fixed set of heterogeneous farmers in Malawi implies an increase in aggregate output (and total factor productivity) relative to actual of a factor of 3.6-fold
- Would unravel a major structural transformation of the economy, share of employment in agriculture would fall from 65% to 4% and agricultural productivity increase by 17-fold

Land Market Effects

Reallocation Results – Output Loss (Y^a/Y^e)

	By Marketed Land Share			By Marketed Land Type			
	No	Yes	All	Rented		Purchased	
	(0%)	($>$ 0%)	(100%)	Informal	Formal	Untit.	Titled
Output (Productivity):							
Losses	.2411	.5081	.6378	.5809	.5782	.1951	.7192
Gains	4.146	1.968	1.567	1.721	1.729	5.125	1.390
Observations	5,962	1,189	746	215	682	126	97
Sample (%)	83.4	16.6	10.4	3.0	9.5	1.8	1.3

Specific Policies and Institutions

Specific Policies and Institutions

- Firing costs
- Size dependent policies
- Trade and industrial policies
- Regulation, taxes and informality
- Financial frictions

Extension of Basic Framework

Broader Effects of Misallocation

- Enfasis has been on the factor allocation across existing production units
- But policies and institutions that create misallocation can also cause negative selection effects by distorting agents occupational decisions and technology decisions
- and within-establishment dynamic effects via investments in establishment-level productivity, innovation, etc.

Conclusions

- Development problem in Uruguay directly related to a productivity gap
- The mis(allocation) of factors across heterogeneous production units may explain differences in TFP
- A key challenge is to identify, measure, and assess the quantitative impact of specific policies and institutions creating misallocation and productivity losses
- These policies and institutions should be assessed in a broader framework that includes selection and establishment-level productivity effects