

---

# Effects of AI and Robotics on the Future of Employment

Comentários

---

Naercio Menezes Filho

Inspir, USP e ABC

**O IMPACTO DA INTELIGÊNCIA ARTIFICIAL E  
ROBÓTICA NO FUTURO DO EMPREGO E TRABALHO**  
Academia Brasileira de Ciências – RJ – 30/10/2017

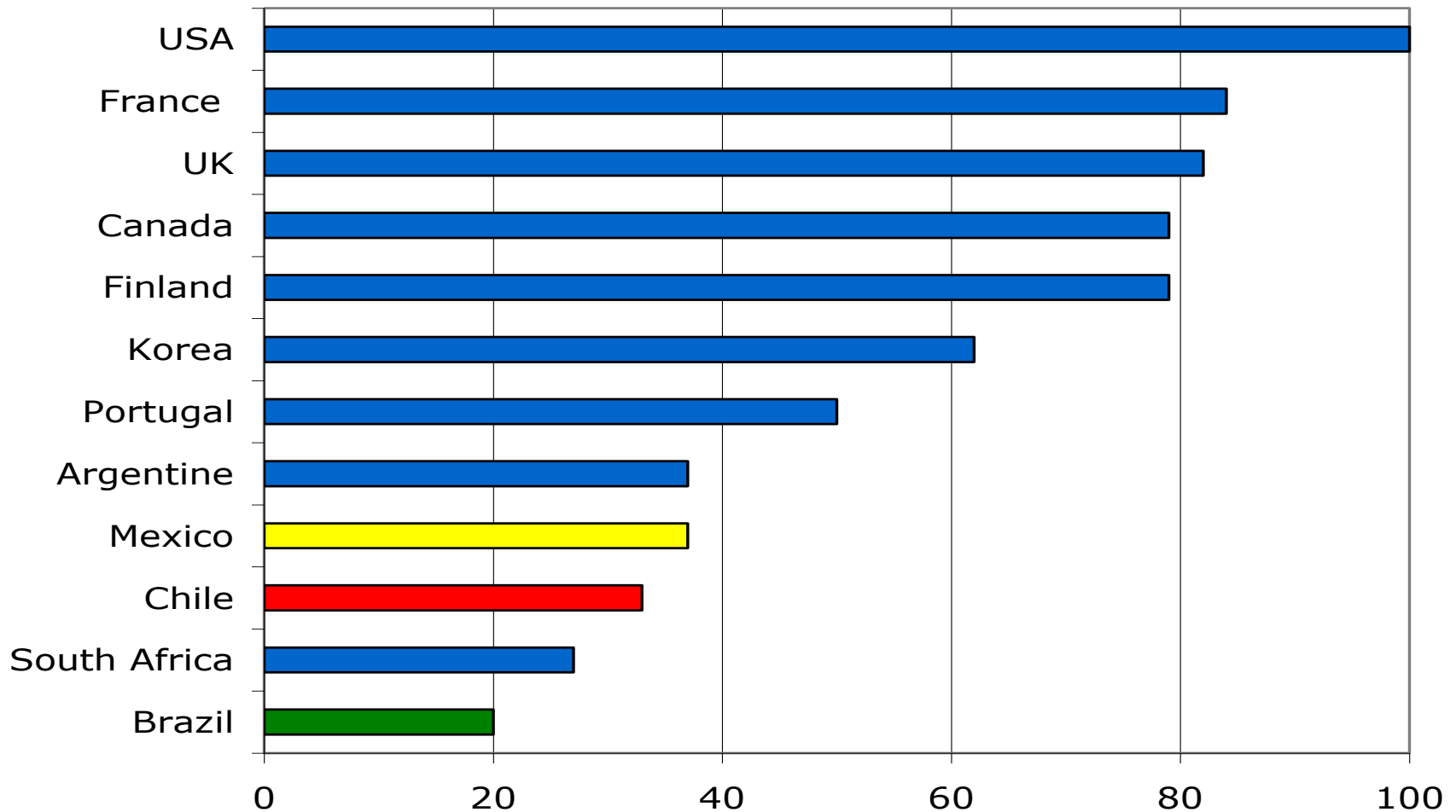
# Number of Multipurpose Industrial Robots per 10,000 workers

Country	2015	2016	2017*	2018*	2019*	2020*	2017/ 2016	CAGR 2018 - 2020
America	38,134	41,295	48,000	50,900	58,200	73,300	16%	15%
North America	36,444	39,671	46,000	48,500	55,000	69,000	16%	14%
- United States	27,504	31,404	36,000	38,000	45,000	55,000	15%	15%
- Canada	3,474	2,334	3,500	4,500	3,000	5,000	50%	13%
- Mexico	5,466	5,933	6,500	6,000	7,000	9,000	10%	11%
Brazil	1,407	1,207	1,500	1,800	2,500	3,500	24%	33%
Rest of South America	283	417	500	600	700	800	20%	17%

Será?

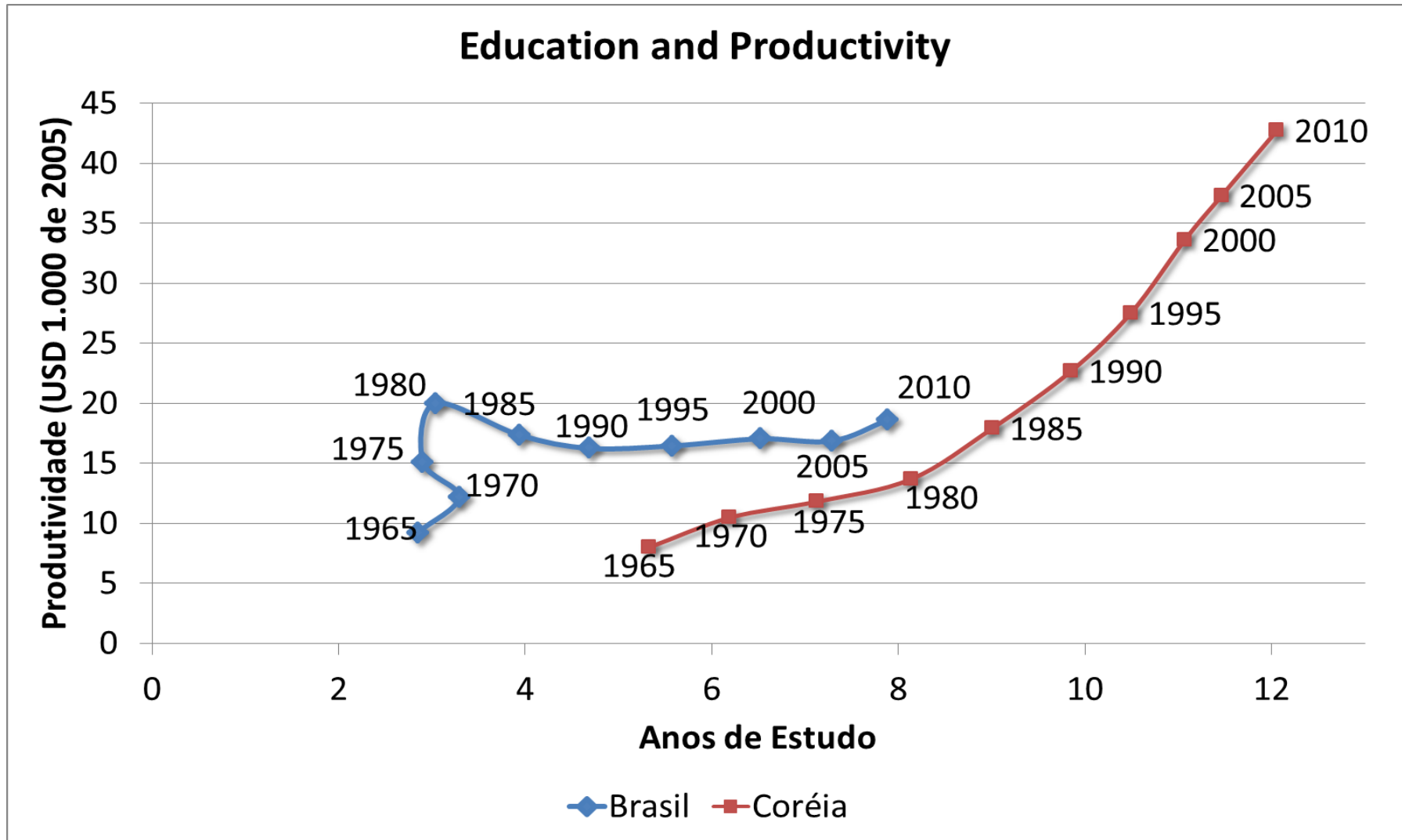
# Produtividade Baixa no Brasil

Relative Labor Productivity (GDP per Worker) - 2010

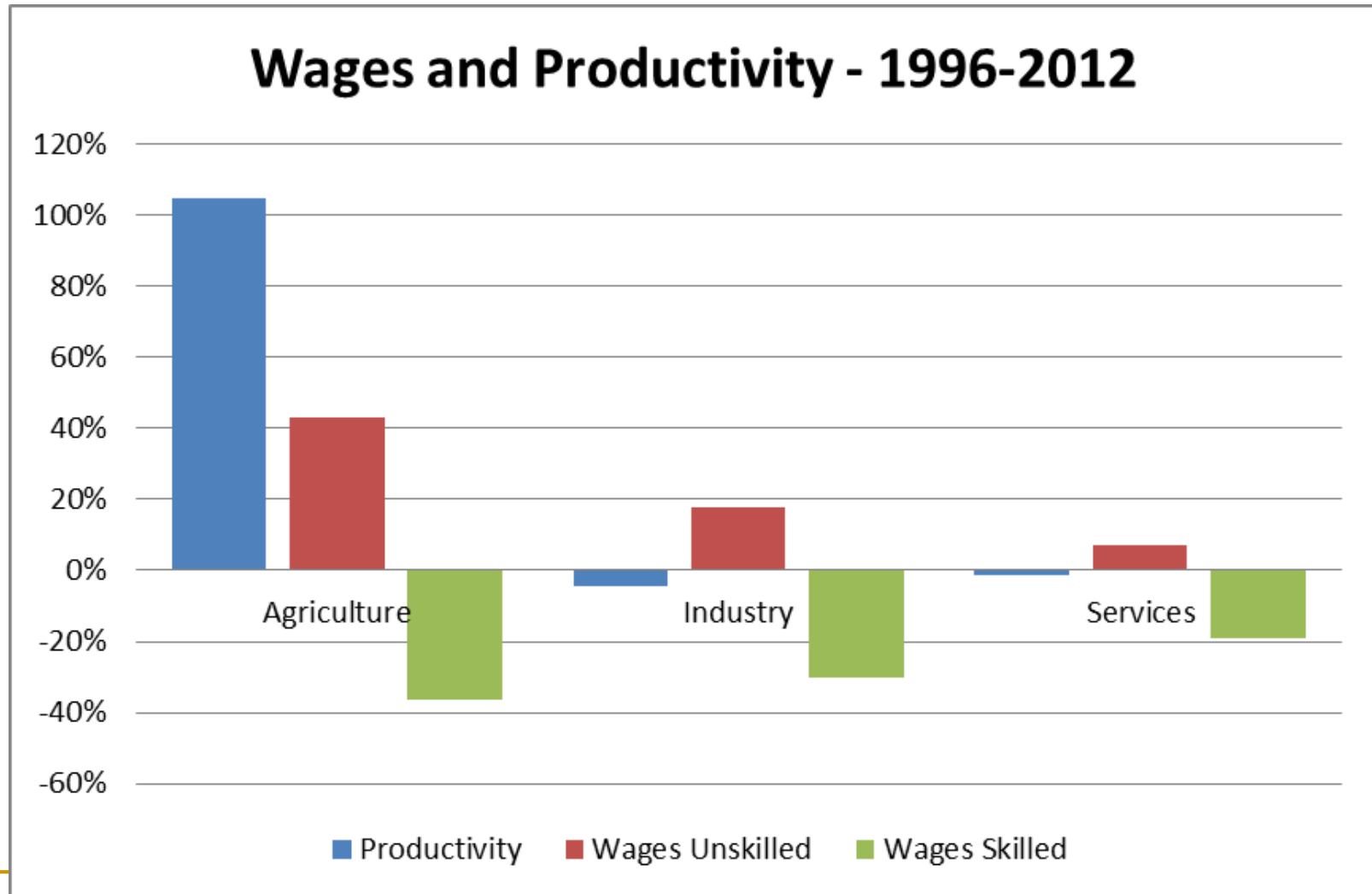


Source: Conference Board (2011)

# Puzzle: Educação sem Produtividade

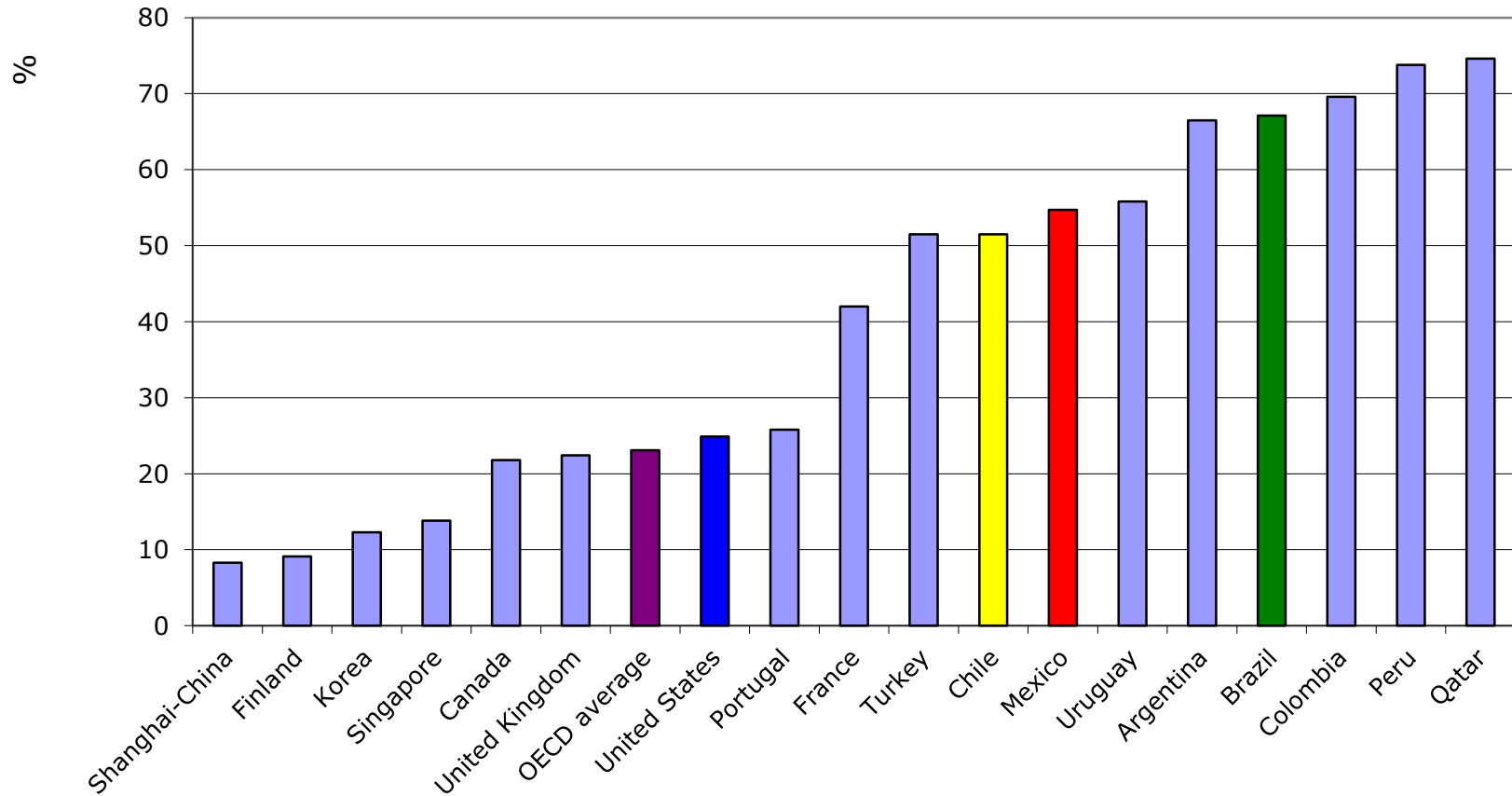


# Crescimento Salarial – Não-qualificados

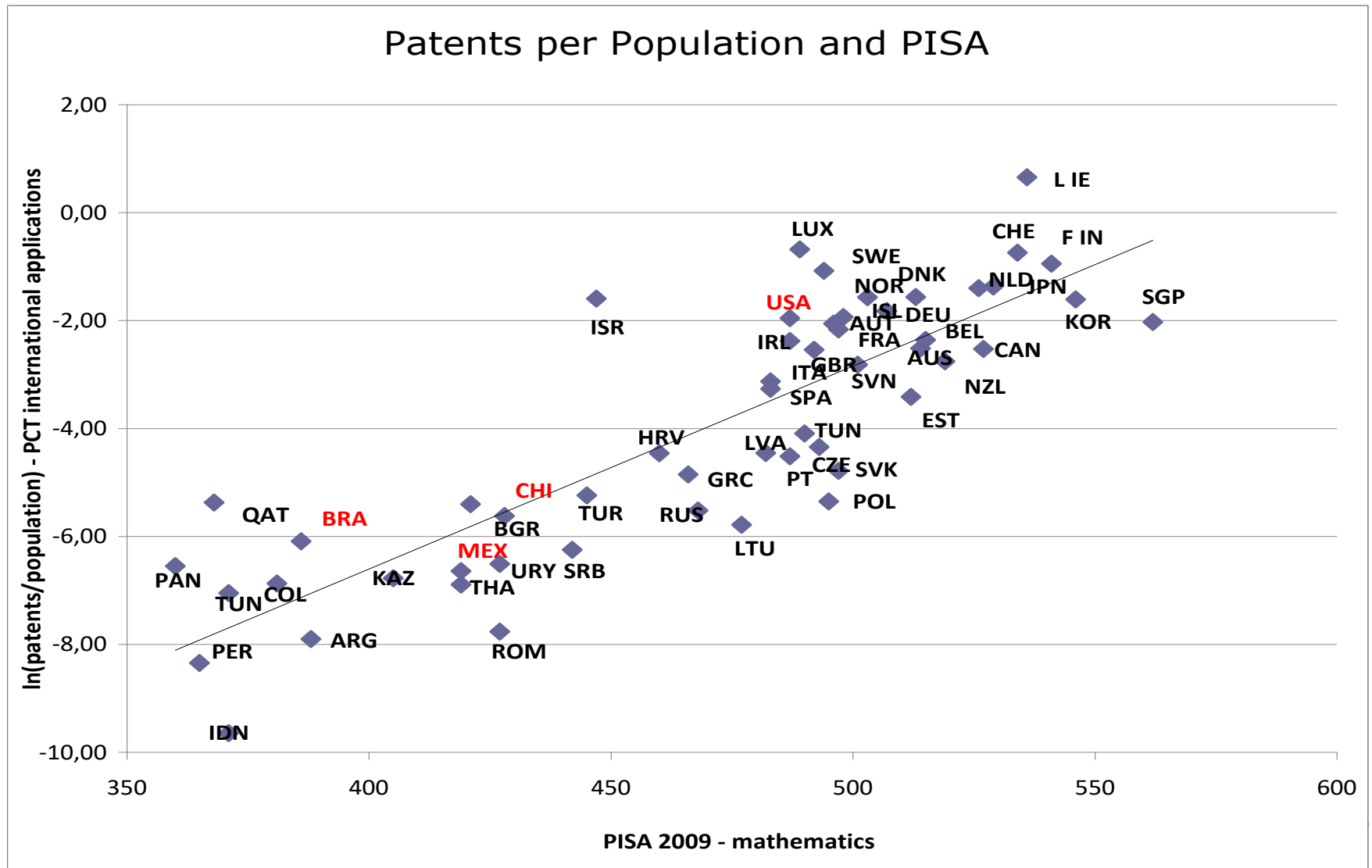


# Aprendizado é Muito Baixo

PISA 2012 – Below level 2

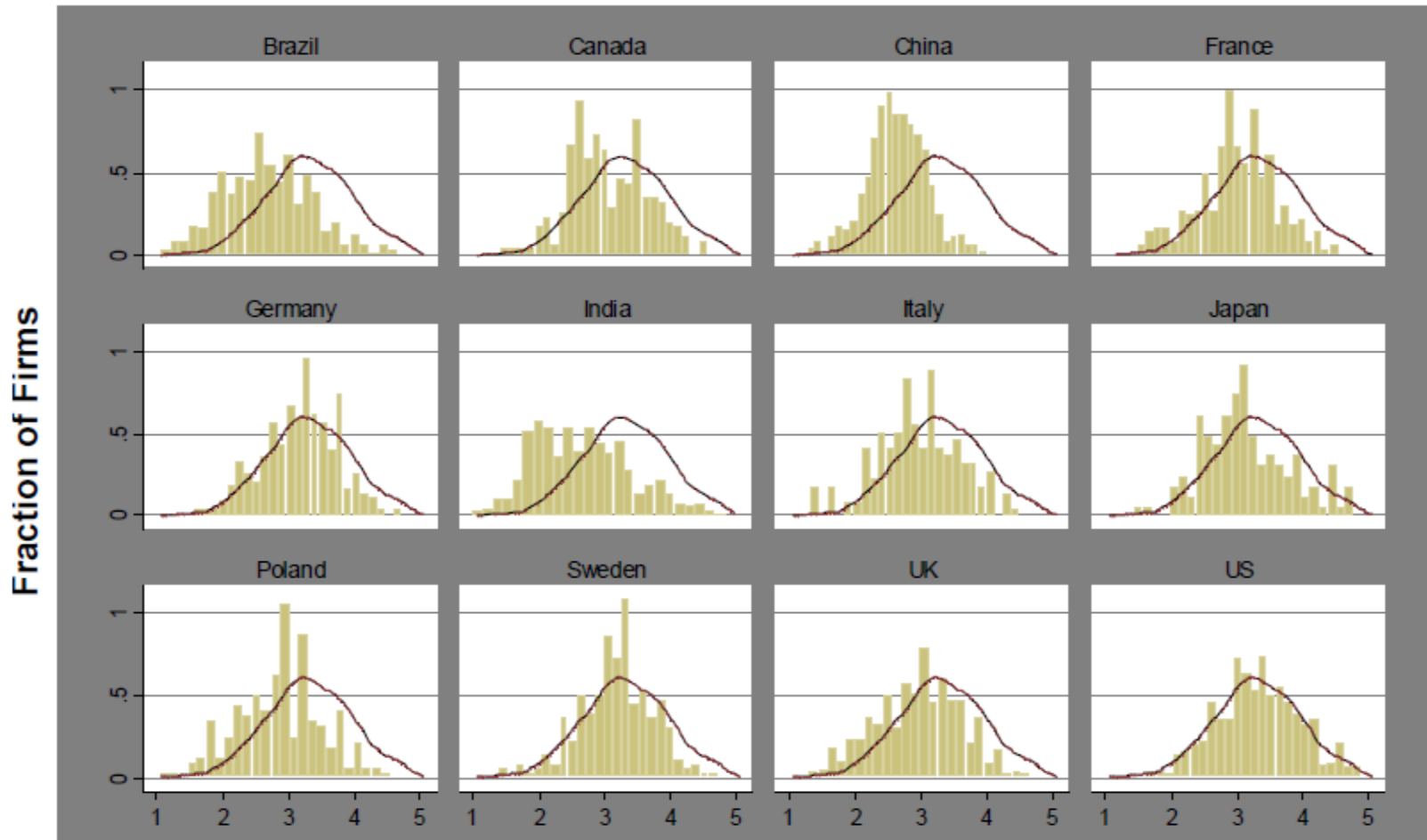


# Aprendizado e Inovações



# Práticas Gerenciais Atrasadas

## MANAGEMENT PRACTICE SCORES ACROSS FIRMS



Firm level average management scores, from 1 (worst practice) to 5 (best practice)

Note: The bars are the histogram of the actual density. The line is the kernel of the US density for comparison. Portugal, Ireland and Greece omitted for presentational reasons, <http://www.nber.org/reporter/2008number4/bloom.html>



---

# Brazil Outsourcing Innovation to China

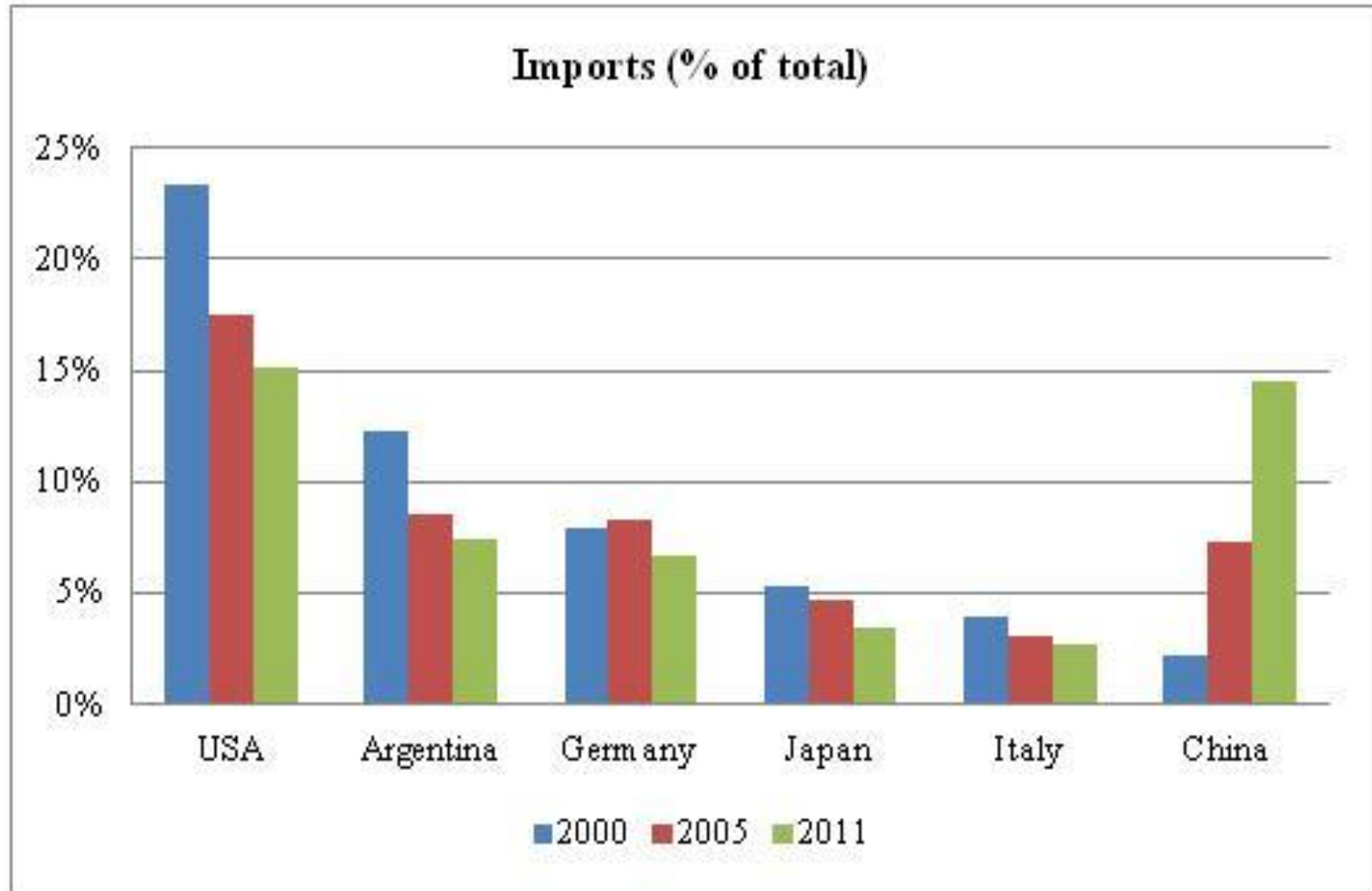
- Alfaro, Chen, Lucchesi, Menezes-Filho (2017)
  - Expansion of China's participation in the world trade has received particular attention lately
  - Studies on the effects of import competition from China found opposite effects on firms' innovation outcomes
  - While Bloom et al (2016) show that Chinese import competition increased firms' patenting in Europe
  - Autor et al (2016) document a negative impact on the patenting activities of U.S. firms.
-

---

# China Shock Hits Brazil

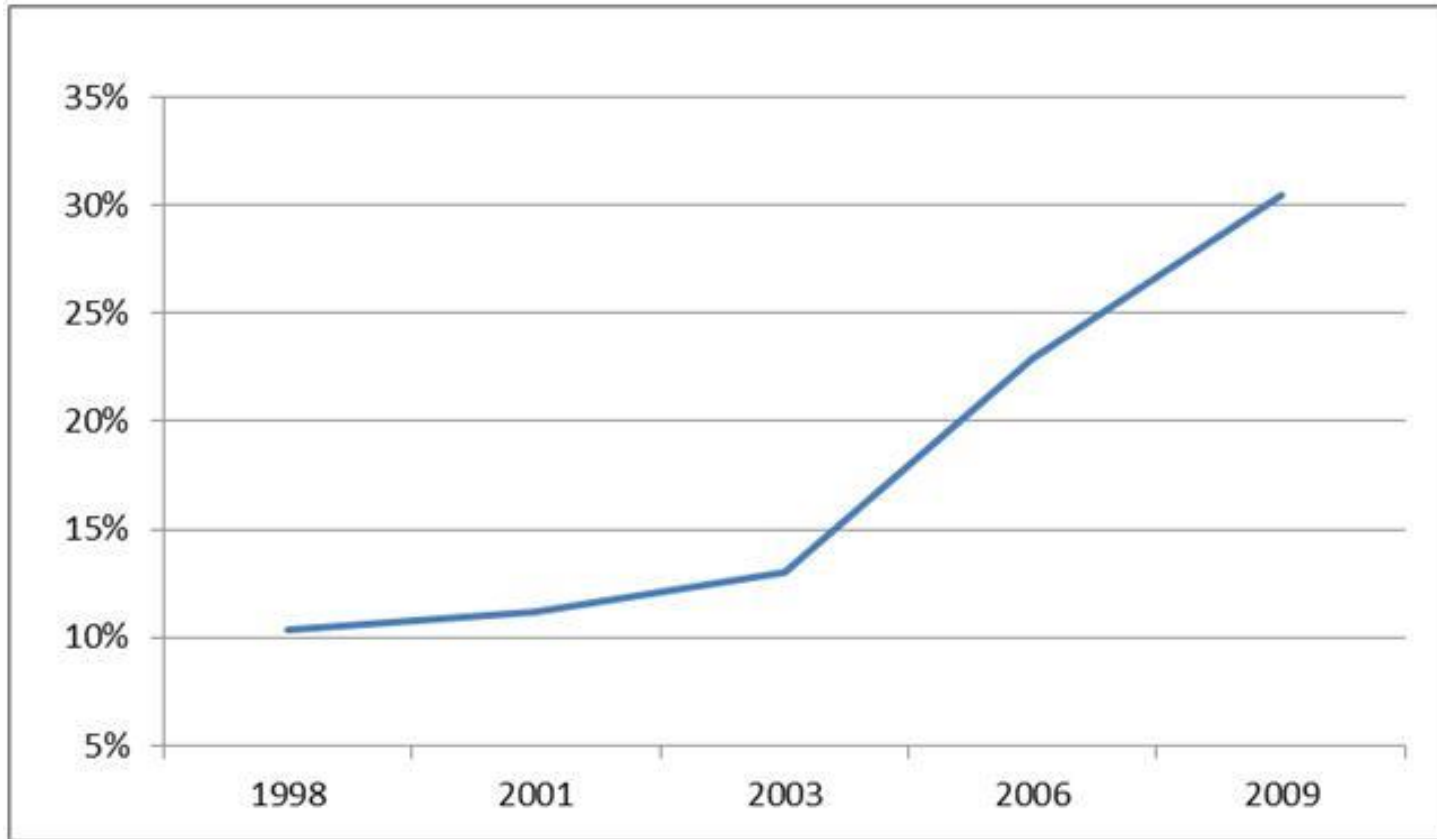
- Paper investigates how China's trade expansion has affected productivity and innovation activities of Brazilian firms
  - Our data allow us to identify which companies import input goods from China.
  - Distinguish between firms who source their inputs from China as opposed to those who are just exposed to import competition.
  - Disentangle the effect of increased import competition and the effect of enhanced sourcing opportunities.
  - Focus on broader and different measures of innovations
-

# China Shock



# China Shock

Figure 3: Share of Firms that import from China: 1998-2011

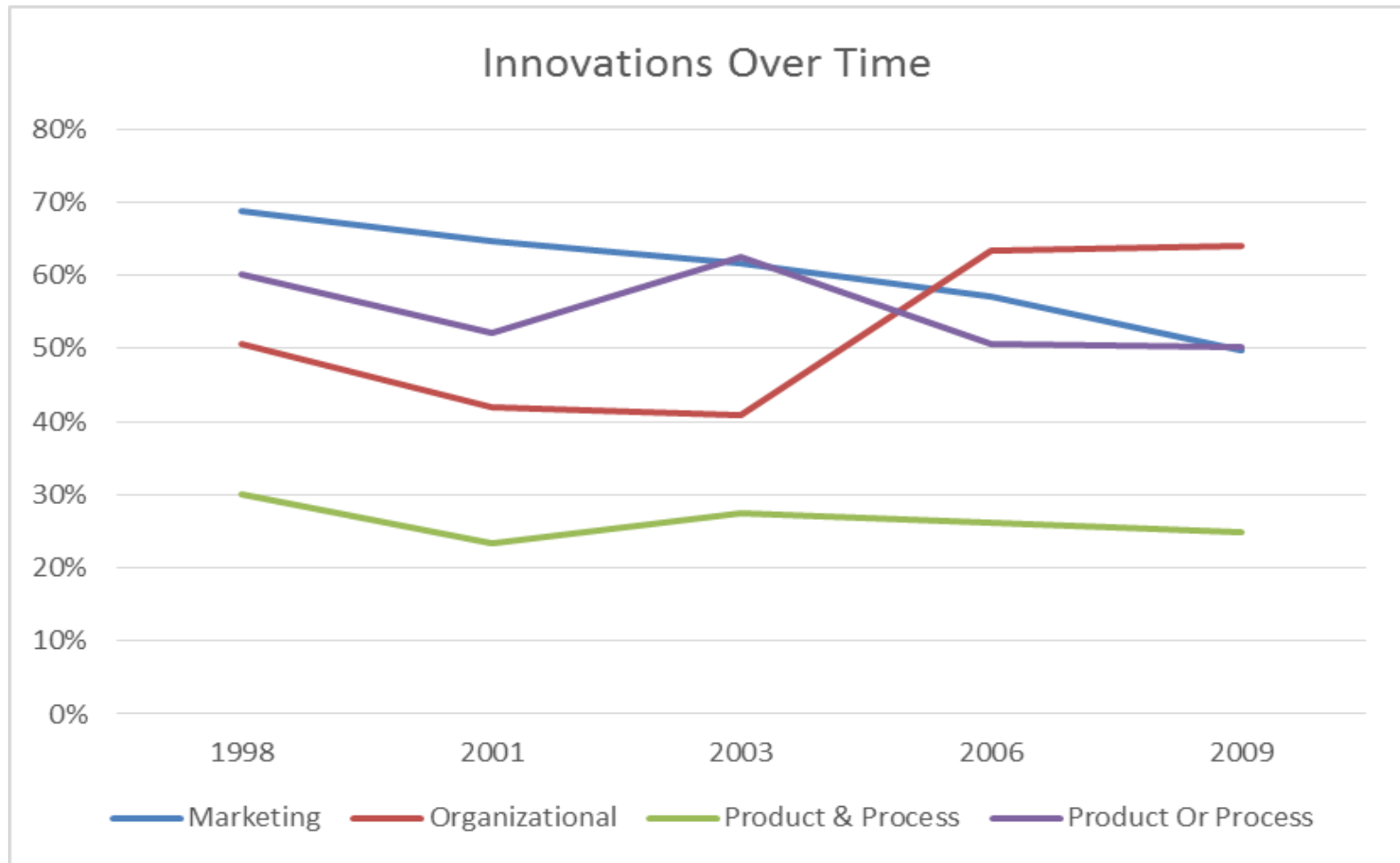


---

# DATASETS

- We match innovation survey (PINTEC) with Brazil's confidential manufacturing census (PIA) and trade data (SECEX) -> all at the firm-level from 1998-2011
  - Distinguish different forms of innovation: product, process, marketing, and organizational, plus R&D and IT
  - Capital stock, employment and sales
  - Imports from China at the firm and at the sector level
-

# Inovações ao longo do Tempo



# Importações da China Diminuem Inovações

Dependent Variables: Innovation: Organizational, Product and Process, Product or Process, Marketing				
	ORGANIZATIONAL	PRODUCT AND PROCESS	PRODUCT OR PROCESS	MARKETING
	(1)	(2)	(3)	(4)
	IV-FE	IV-FE	IV-FE	IV-FE
Firm Size	0.0475***	0.0248***	0.0464***	0.0278***
	-0,008	-0,00666	-0,0072	-0,00767
R&D	0.335***	1.074***	1.279***	0.377***
	-0,0931	-0,102	-0,0812	-0,0875
Physical Capital Intensity	-0,00148	0,00222	0,00158	-0,00165
	-0,00229	-0,00189	-0,00215	-0,00213
(China Imports value/Total sales) ratio	-5,091	-4.645*	-2,952	-5.909**
	-3,14	-2,808	-2,804	-2,972
Year dummies	yes	yes	yes	yes
Observations	32.519	32.519	32.519	32.519
R-squared	-0,005	-0,056	0,015	-0,065
Number of id	11.110	11.110	11.110	11.110
F test	126,20	30,60	108,00	71,03
root MSE	0,47	0,40	0,43	0,45
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

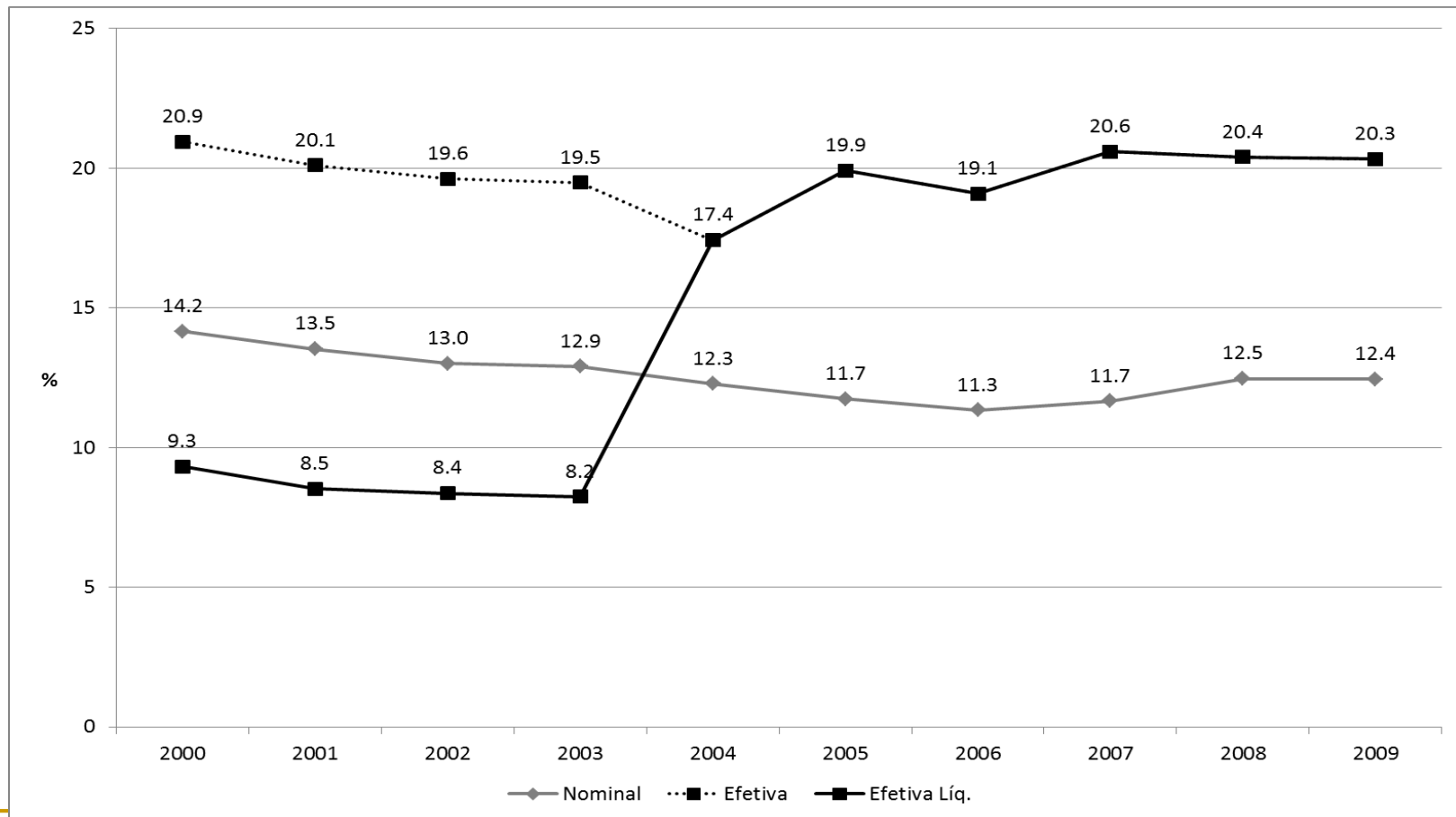
# Importações da China Diminuem Inovações

Dependent Variables: Innovation: Organizational, Product AND Process, Product OR Process, Marketing

	ORGANIZATIONAL	PRODUCT AND PROCESS	PRODUCT OR PROCESS	MARKETING
	(1)	(2)	(3)	(4)
	IV-FE	IV-FE	IV-FE	IV-FE
Firm Size	0.0476***	0.0249***	0.0465***	0.0279***
	-0,00764	-0,00627	-0,00703	-0,00711
R&D	0.382***	1.117***	1.307***	0.431***
	-0,0817	-0,0983	-0,0765	-0,0758
Physical Capital Intensity	-0,000792	0,00285	0,00198	-0,000859
	-0,00221	-0,00185	-0,00214	-0,002
China import competition	-3.180*	-2.901*	-1,844	-3.691**
	-1,86	-1,651	-1,701	-1,682
Year dummies	yes	yes	yes	yes
Observations	32.519	32.519	32.519	32.519
R-squared	0,05	0,011	0,037	0,024
Number of id	11.110	11.110	11.110	11.110
F test	138,90	30,92	108,30	77,54
root MSE	0,46	0,38	0,43	0,43



# Aumento de Proteção PIS/Cofins sobre Importados



# Proteção Tarifária Reduz Produtividade

Variáveis Independentes	Variáveis Dependentes			
	VBPI		VTI	
	MQO	PD	MQO	PD
Tarifas	-0.531*** (0.0326)	-0.160*** (0.0314)	-1.273*** (0.0691)	-0.368*** (0.0823)
Ln(CDP)	0.572*** (0.00358)	0.365*** (0.00675)		
Ln(L)	0.487*** (0.00496)	0.214*** (0.00644)	1.103*** (0.00588)	0.377*** (0.0149)
Ln(K)	0.0127*** (0.000524)	0.0158*** (0.00100)	0.0789*** (0.000876)	0.0303*** (0.00310)
<i>Dummies</i> de Ano	Sim	Sim	Sim	Sim
Constante	4.891*** (0.0336)	-0.0114*** (0.00275)	8.838*** (0.0235)	-0.0261*** (0.00866)
Observações	93,892	76,651	93,892	76,791
R <sup>2</sup>	0.878	0.408	0.528	0.024

Fonte: PIA/IBGE. Elaboração própria.

*Erro-padrão robusto entre parênteses*

*Significância dos coeficientes: \*\*\* 1%, \*\* 5%, \* 10%*

---

# Conclusões

- 1) Produtividade estagnada no Brazil há 35 anos, apesar da melhora educacional
  - 2) Proteção comercial, baixa qualidade da educação, “misallocation”, mercado de trabalho regulado.
  - 3) Outsourcing inovações para a China
  - 4) Crescimento no Brasil depende de choques que favorecem trabalho não-qualificado
  - 5) Baixa probabilidade adoção de robôs em larga escala
  - 6) Se políticas não mudarem, pouco risco para emprego de trabalhadores não qualificados – Reformas?
-