

Productivity, Institutional Reforms and Trade in Brazil

Pedro Cavalcanti Ferreira
EPGE-FGV

Why countries are poor?

Countries are poor because :

- 1) They have less factors (inputs) than rich economies
 - 1.1.) less physical capital (machines, equipment and structures)
 - 1.2) less human capital (education and skilled labor)
- 2) They are less efficient than leaders in organizing production

Growth Accounting

- Let the production function be given by:

$$y_{it} = A_{it} k_{it}^{\alpha} h_{it}^{1-\alpha}$$

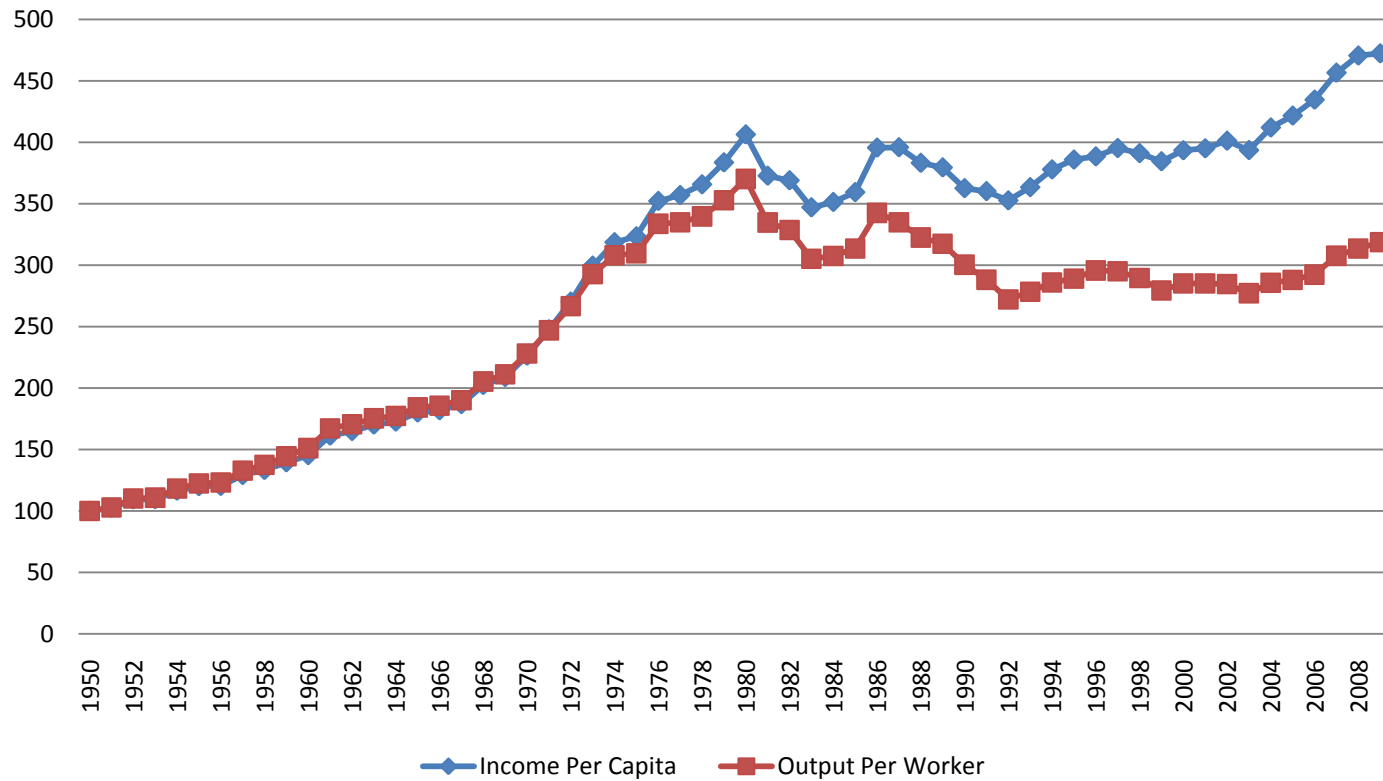
- k: Constructed with the perpetual inventory method using PWT data for investment measured in international prices
- h: Bils and Klenow (2000):

$$h = \exp \phi(s) = \exp \left(\frac{\theta}{1-\psi} s^{1-\psi} \right)$$

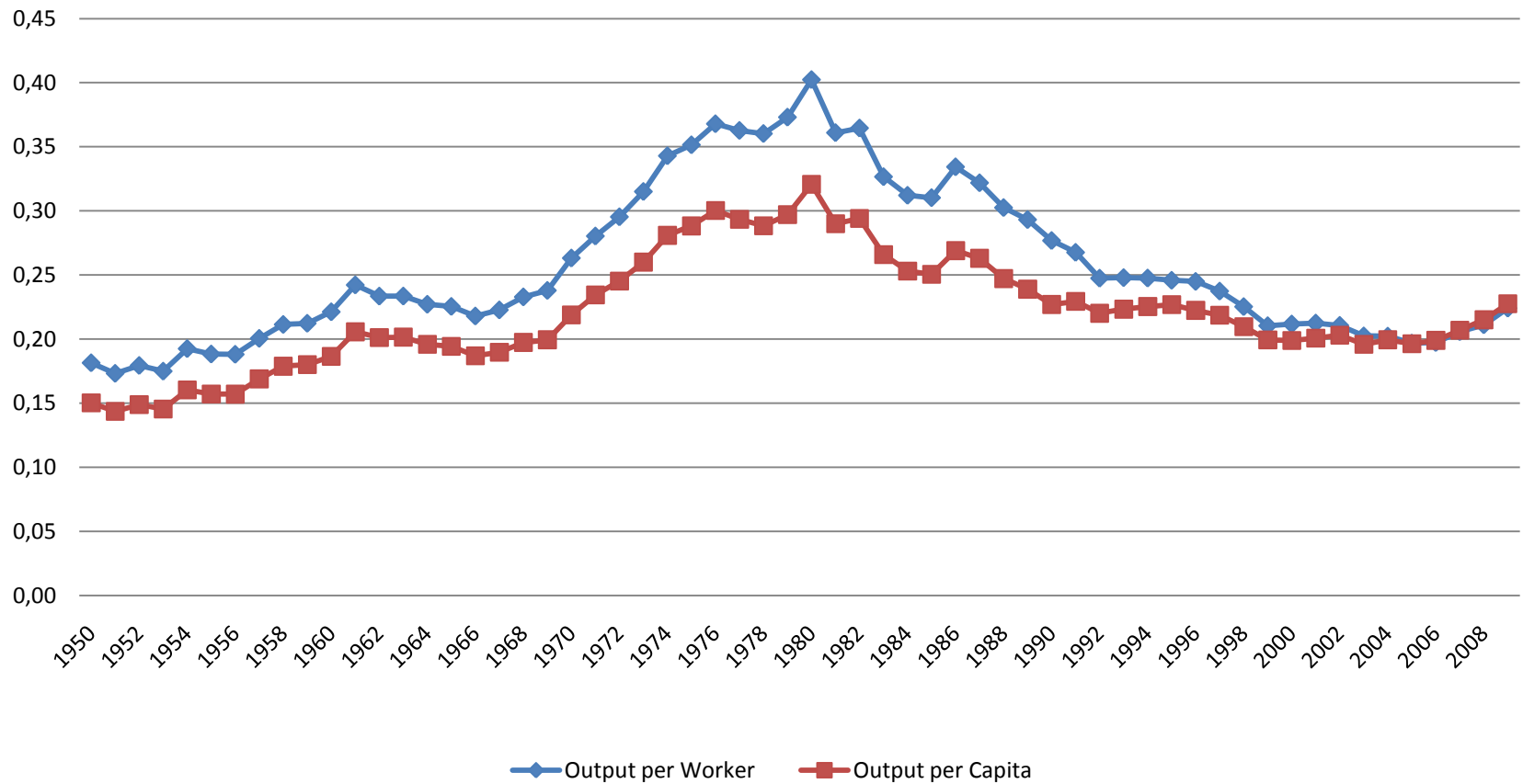
- TFP (“efficiency”) is obtained as a residual:

$$A_{it} = \frac{y_{it}}{k_{it}^{\alpha} h_{it}^{1-\alpha}}$$

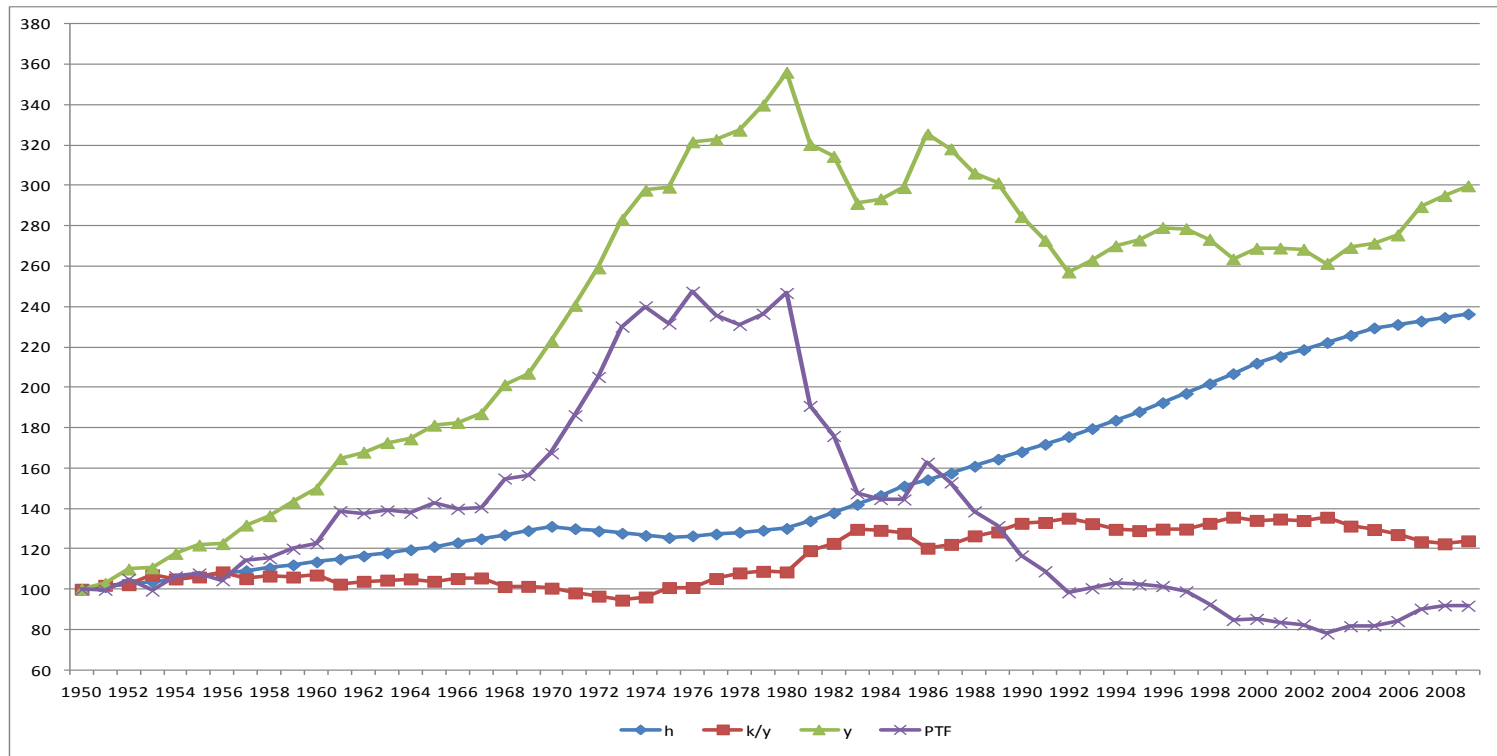
Output per Worker and Per Capita in Brazil, 1950-2009



Relative Output per Worker and Per Capita in Brazil, 1950-2009 (USA = 1)

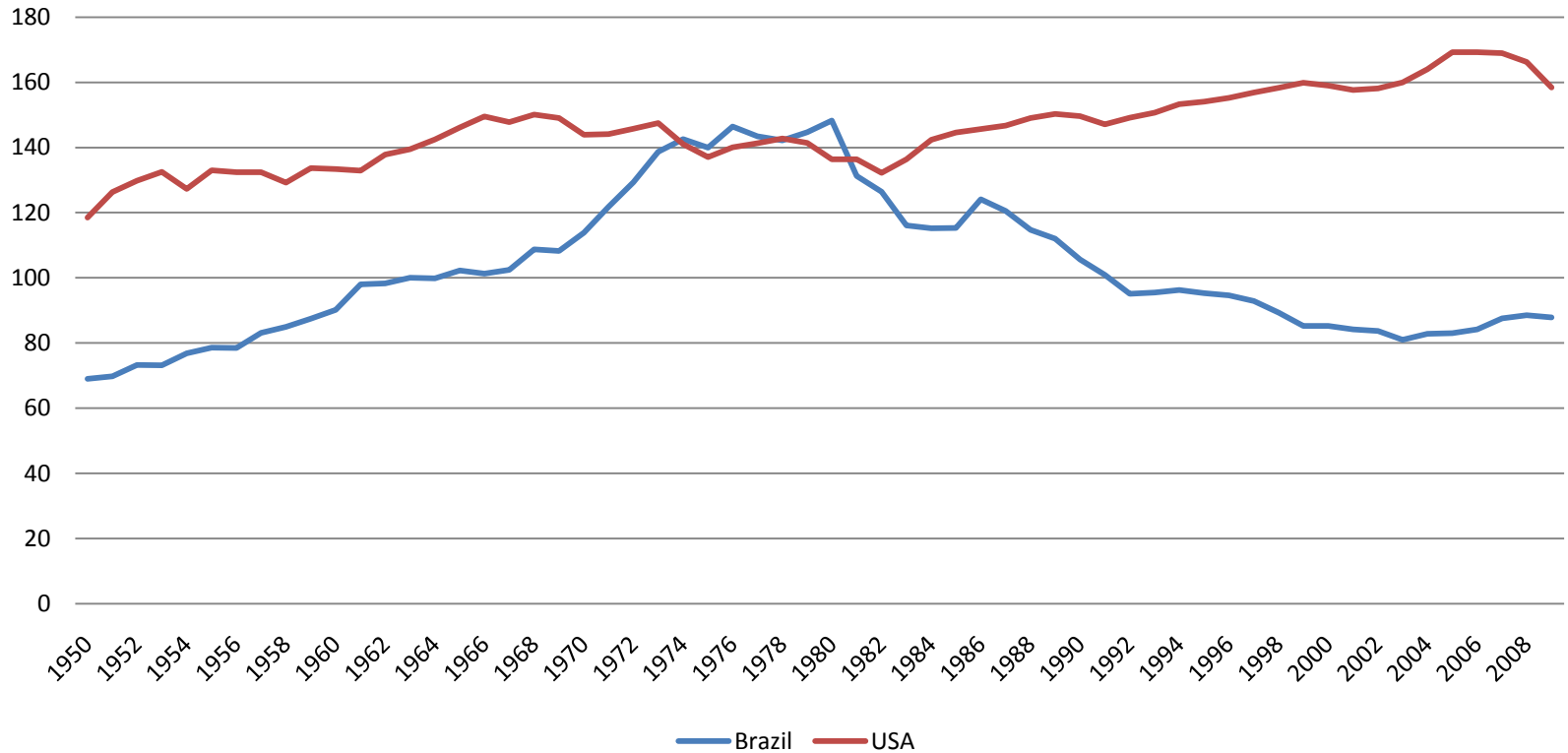


Evolution of Product per Worker and the Sources of Growth in Brazil, 1950-2009



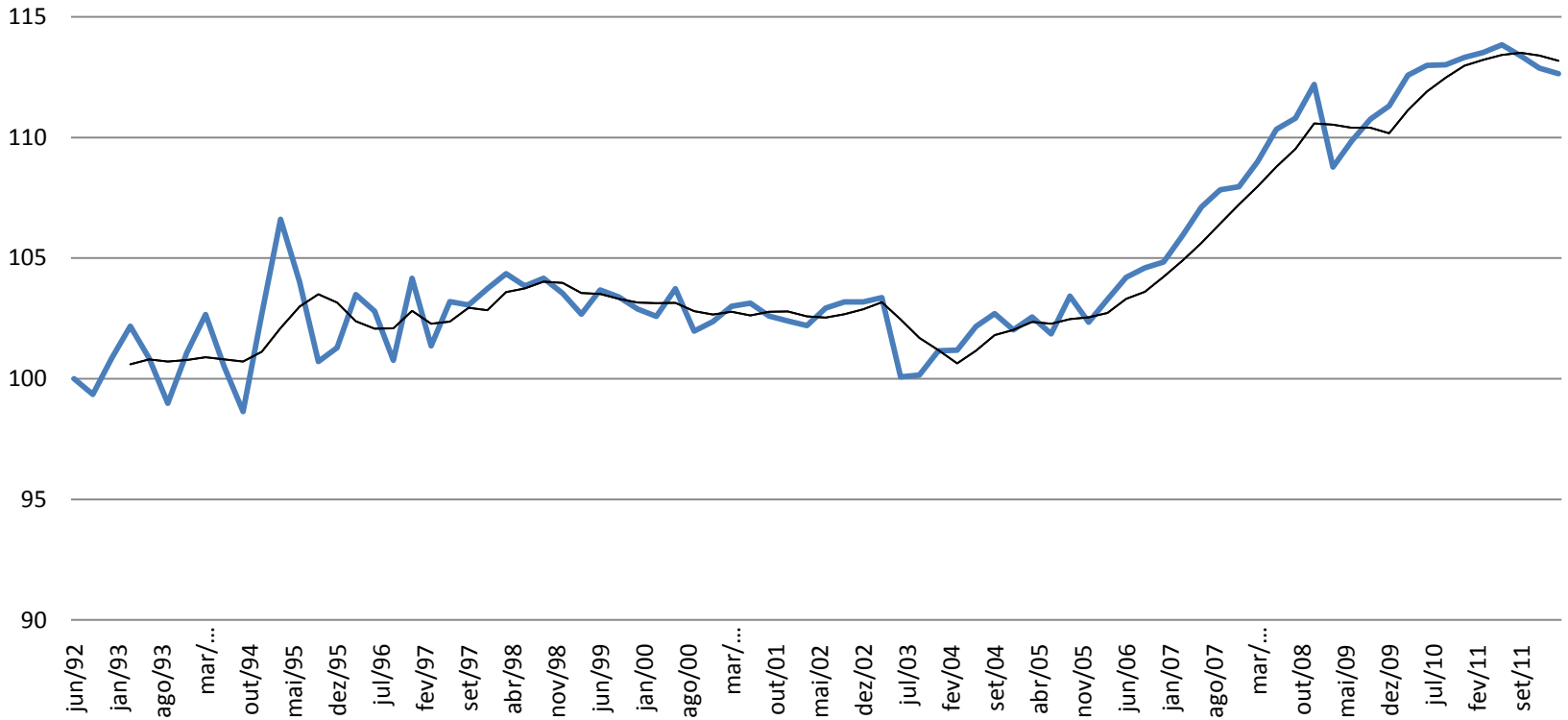
- The graph shows the **importance of TFP** to the growth dynamics of the Brazilian economy.
- During the period of strong growth, TFP also expanded at high rates, especially during the "miracle" years between 1968 and 1973.
- TFP contribution to (per worker) GDP growth, from 1950-80 , depending on the methodology, was 45% to 70% . From 2000-10 it was around 50%.
- Moreover, the period of lower productivity between 1980 and 2000 is associated with a strong decline in efficiency.

TFP, 1950-2009



TFP in Brazil today is between a third and half of U.S. TFP

Total Factor Productivity



TFP increased in the last decade but has stagnated in 2010 and is now falling

Relative output per worker (2000, USA = 100)

	Original	Simulated: with American Capital	Simulated: with American Capital and Education
Brazil	29%	42%	69%
Singapura	72%	72%	98%
Espanha	68%	72%	96%
Argentina	40%	53%	64%
India	10%	25%	39%
Zambia	4%	11%	17%

PPP values (PWT)

Larger gains: TFP and Human Capital

Development Decomposition of Brasil wrt USA

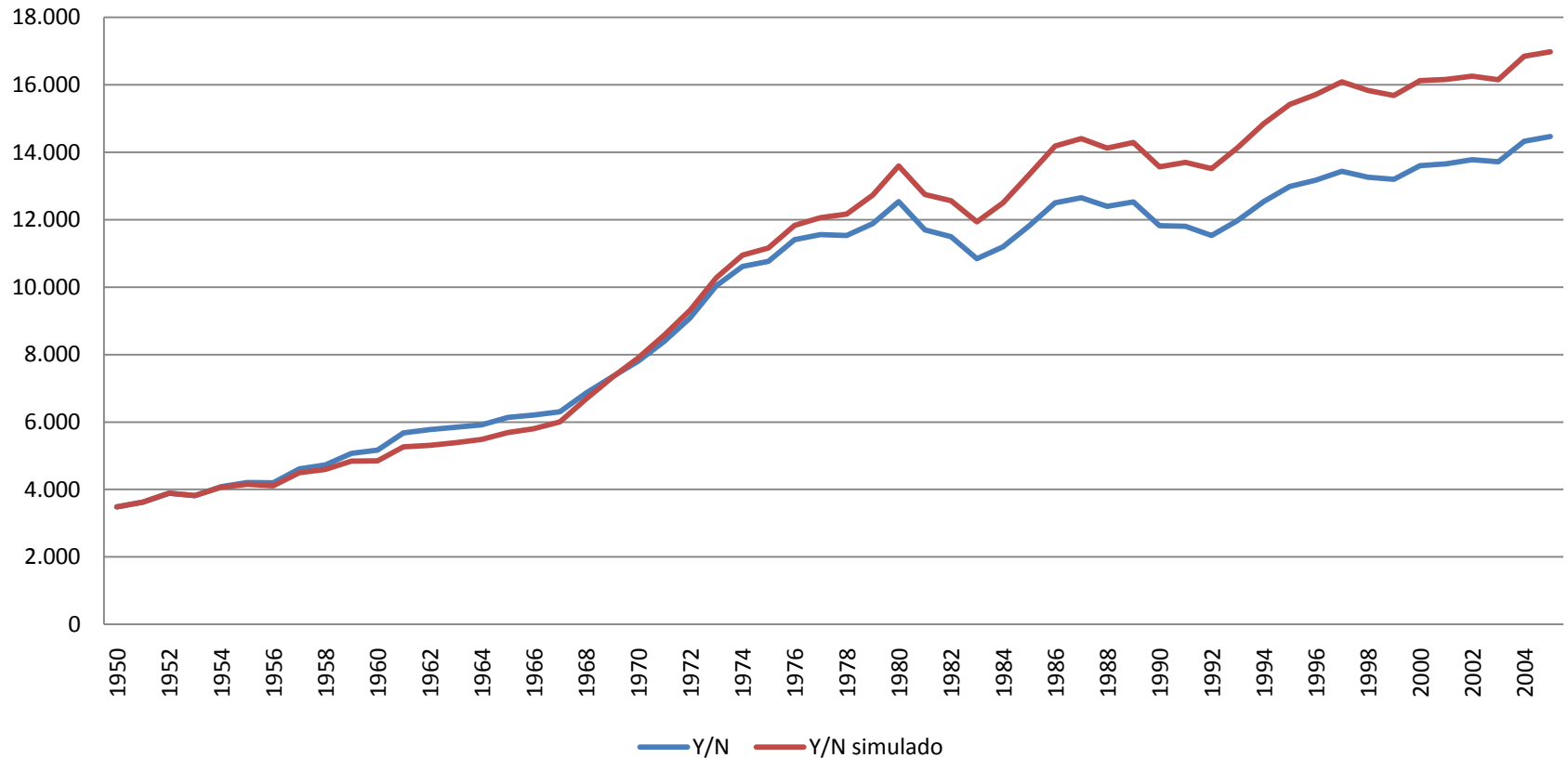
	TFP	h	k
2000	69,4%	37,1%	-6,5%
2009	64,4%	27,1%	8,5%

- When constructed using capital-output ratio, TFP explains two thirds of the productivity difference with respect to the USA
- Alternatively, when constructed using capital-labor ratio, TFP explains 45% of the productivity difference with respect to the USA

➤ Useful Exercises

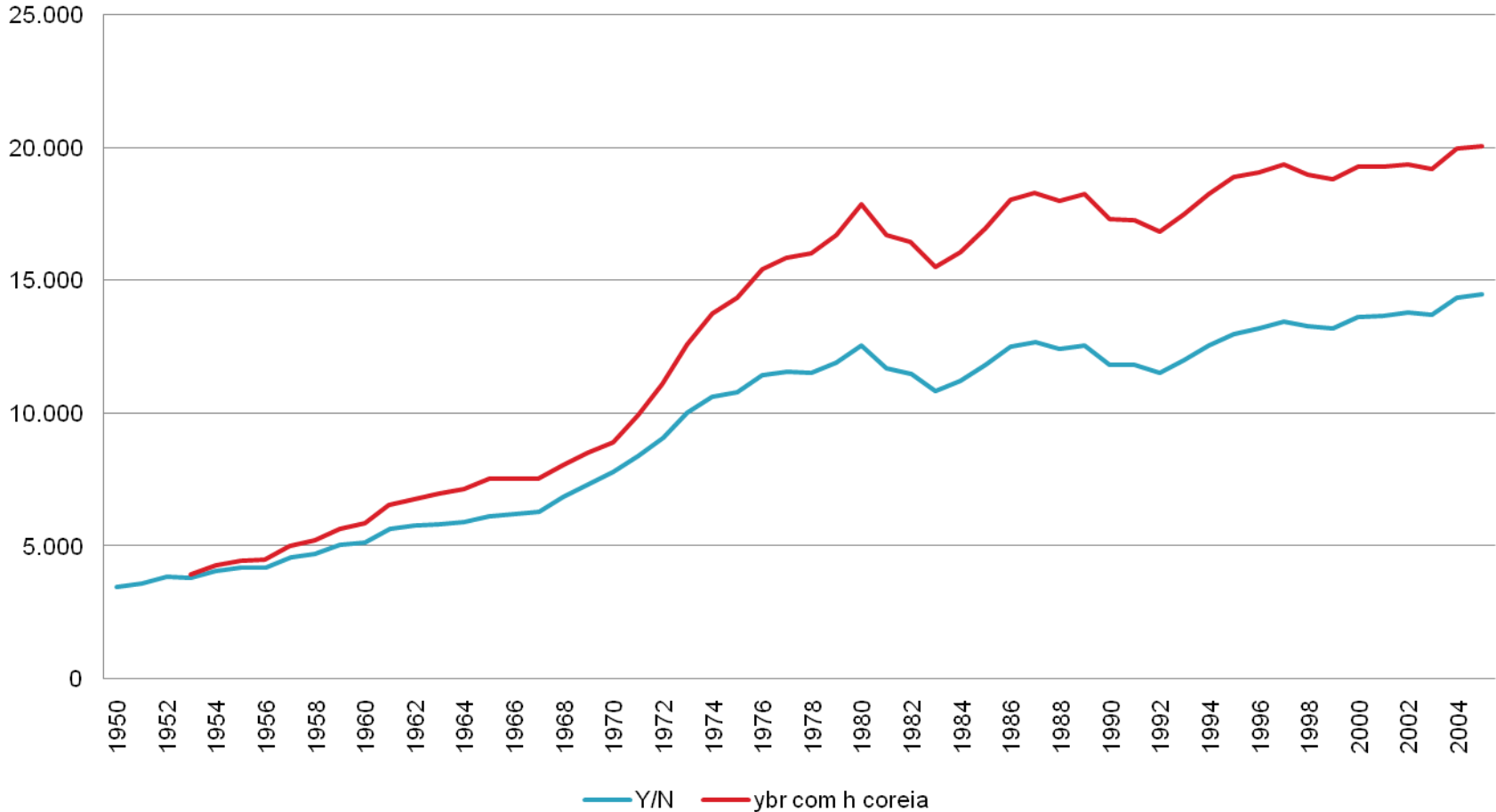
1. What would be output per worker in Brazil if we had the same education and investment rate than South Korea?
2. Counterfactual exercise : change, one at a time, in the production function, Brazilian education level and investment rate by the corresponding variable in Korea and check how much output varied.
3. This will give us a “Brazil with Korean education” (or investment) and allow us to isolate the impact of each factor.

“Counter-Factual Brazil” with Korean investment rates



Brazil would be 18% richer if we had experienced the investment rates of South Korea.

“Counter-Factual Brazil” with Korean education levels



Brazil would be 40% richer if we had the schooling rates of South Korea

Conclusion up to now:

Main problems of Brazil are **productive efficiency** and **human capital**

Human capital: quantity and specially quality

Not that investment is not important, but it is endogenous and depends on efficiency (TFP), skills, distortions, etc.

Serious problem: **TFP is low and is falling since 2010**

Low productivity requires **institutional changes** and reduced distortion

Within this framework, **industrial policy** and subsidies for private investment have little impact.

Obviously, lower cost of capital formation affects investment, at the cost of **worsening income distribution** and **increasing distortions**.

Rather than **picking companies** and sectors, adopt horizontal policies.

Examples: **Tax reform**, **Infrastructure**, greater trade **openness**; Micro-institutional reforms; regulation (doing business); Education

Problem and Solution 1: Taxes

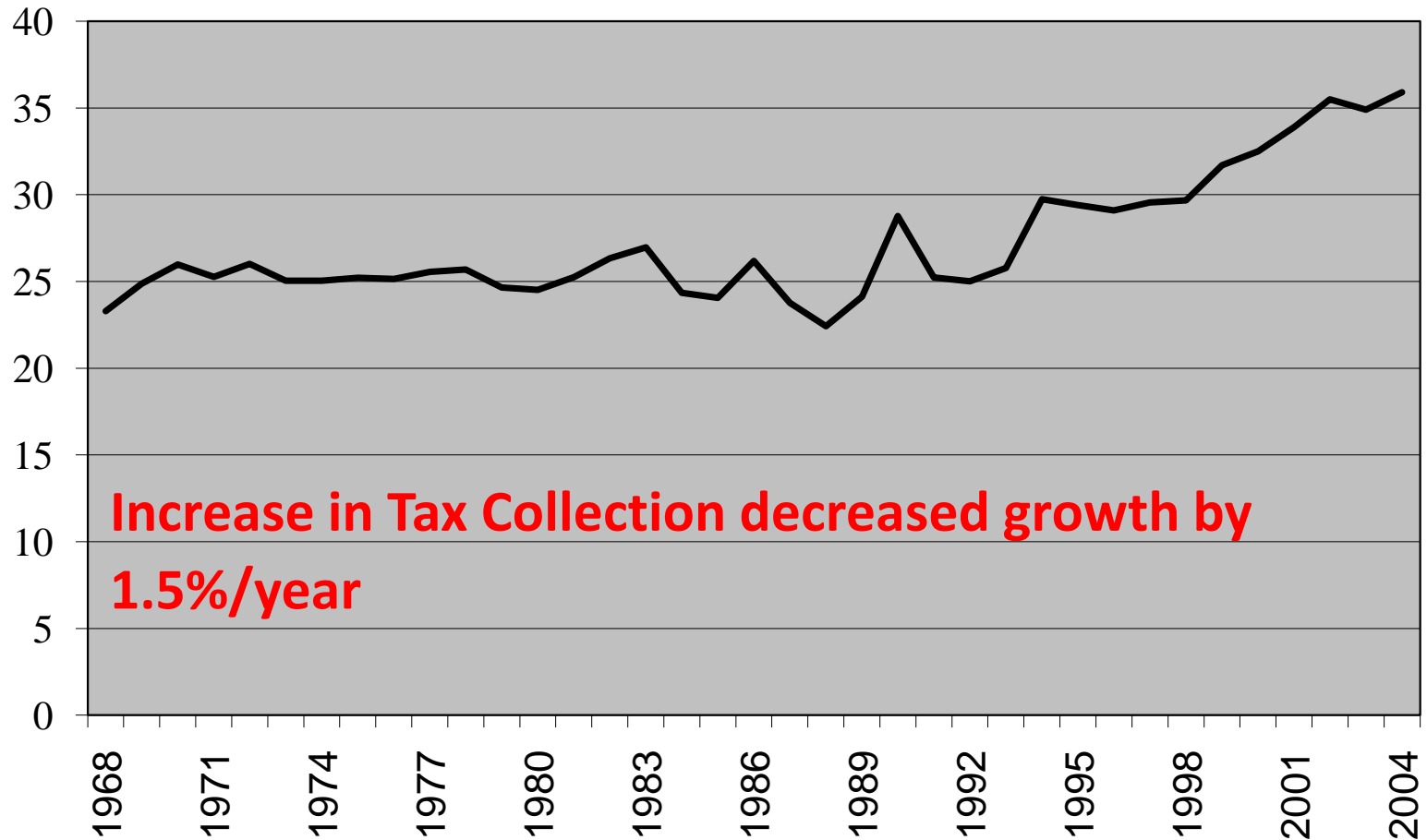
Tax collection and tax structure, are not only high, but extremely distortive, and payment very burdensome and confusing.

Doing Business: Brazil's rank of **PAYING TAXES** is 150 (out of 183 economies):

Time to (prepare, fill and pay) taxes: 2600 h/year. (Latam: 382)

Labor tax and contributions: 40% of profit. (Latam: 14.6%)

Tax Collection (% of GDP)



And it is not getting simpler or smaller .

Problem and Solution 2: Infrastructure

Plenty of evidence of productive impact (on GDP and TFP) of infrastructure

However: **low investment**, **low quality** and **high cost** (e.g., energy)

- PAC: investment money is not spent!
- **Politization** of government agencies (Docas and DNIT, for instances), with serious management problems

Solution: **Privatization** (still, problems here)

Infrastructure Investment In Brazil (% GNP)

	1971/1980	1981/1989	1990/2000	2001/2010
Total (% GNP)	5,42	3,62	2,29	2,32
Energy	2,13	1,47	0,76	0,67
Telecommunications	0,8	0,43	0,73	0,65
Transportation	2,03	1,48	0,63	0,71
Water and Sanitation	0,46	0,24	0,15	0,29

source: Castelar (2012) e Frischtak (2011).

Problem and Solution 3: Misallocation and Regulation

Hsieh and Klenow (2009) estimate that reducing distortions in the allocation of factors among Chinese firms generated a 2% increase in TFP between 1989 and 2005.

There is still room for improvement: elimination of these distortions could increase product 115%.

De Vries (2008) estimates that removing distortions in the Brazilian retail sector would increase its productivity by 200%.

Ease of Doing Business: relative rankings (2012)

	Ease of Doing Business	Starting a Business	Enforcing Contracts	Paying Taxes	Getting Credit	Dealing with Construction Permits
Brazil	126	120	118	150	98	150
United States	4	13	7	72	4	17
Chile	39	27	67	45	48	90
Mexico	53	75	81	109	40	43
South Korea	8	24	2	38	8	26
China	91	151	16	122	67	179
India	132	166	182	147	41	181

Poor and excessive regulation causes poor allocation of resources across firms, and have strong impact on TFP.

From 1995 to 2005 **economic and institutional reforms** were implemented in Brazil, which led to improved incentives, lower distortions and a better business environment:

privatization of services, regulation, fiscal responsibility law, new bankruptcy law, new real estate law, inflation target, antitrust law, etc.

Result: HIGHER GROWTH IN 2000-2008.

- Sound macro policy of course helped, as well as China and a favorable international economy and increase in education

Problem and Solution 4: more openness

Protection to domestic production and subsidy will not increase productivity and competitiveness, much the opposite.

After **trade liberalization of 1987-1992** productivity and TFP in manufacture increased very fast , in some sectors more than doubled in ten years.

The imposition of new restrictions to trade will most probably decrease productivity and TFP, and of course welfare.

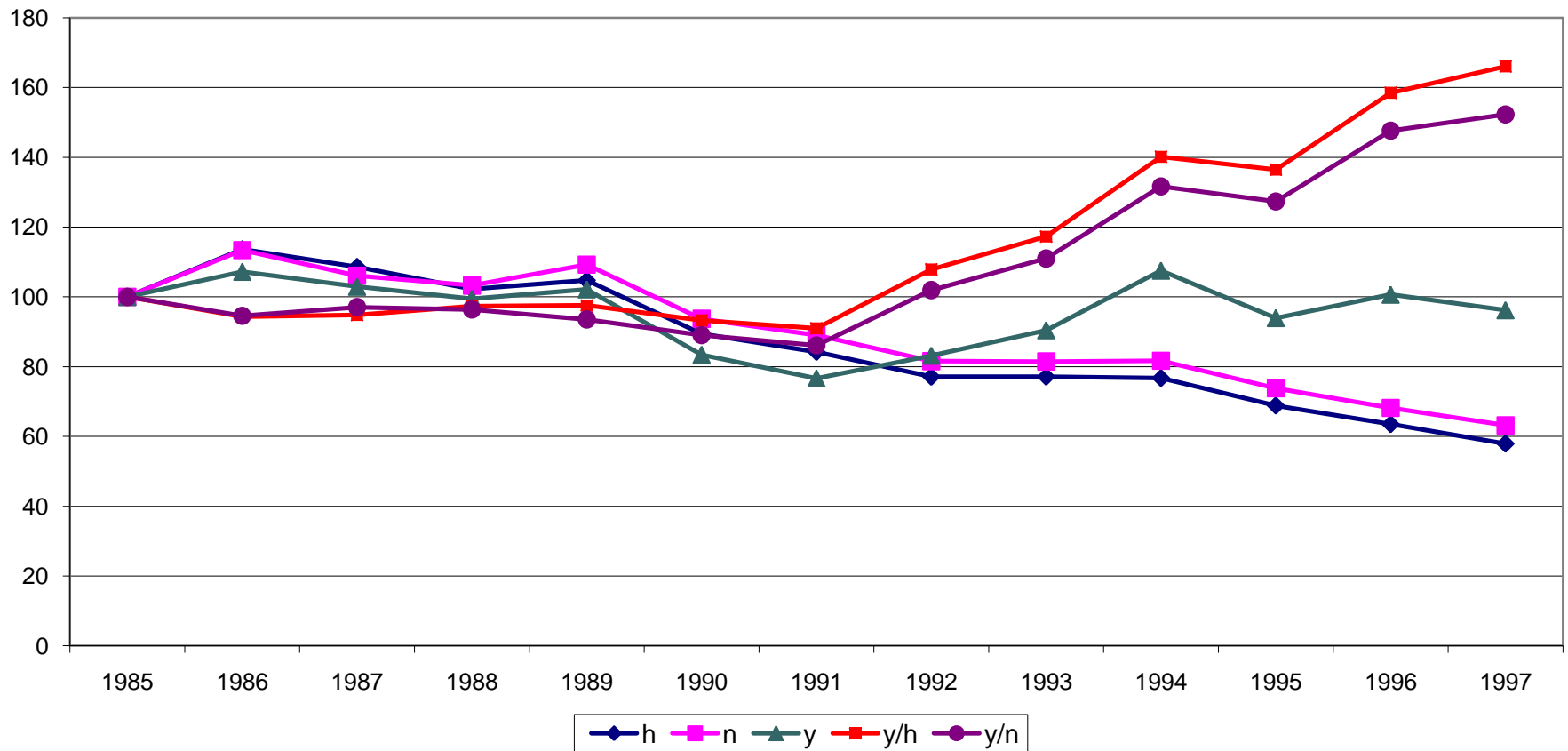
Impact of Trade : trade liberalization in Brazil

Average Nominal Tariffs

Industry	year		
	1987	1990	1997
Nonmetal mineral products	98.7	24.5	7.30
Metalworking	72.8	23.7	12.80
Machinery	62.1	39.5	13.90
Electronic and communication equipment	100.4	39.6	14.55
Transportation and motor vehicles	115.9	55.9	16.70
Paper and paper products	82.2	23.1	11.90
Rubber products	101.7	49.6	12.80
Chemicals	34.2	13.4	8.23
Pharmaceuticals	42.2	26	10.00
Perfumes, soap and candles	184.4	59.2	10.00
Plastic products	164.3	40	16.50
Textiles	161.6	38.8	15.80
Clothing, fabric products and footwear	192.2	50	19.60
Food	84.2	27.4	12.15
Beverages	183.3	75.1	14.50
Tobacco	204.7	79.6	9.00
average	117.81	41.59	12.86

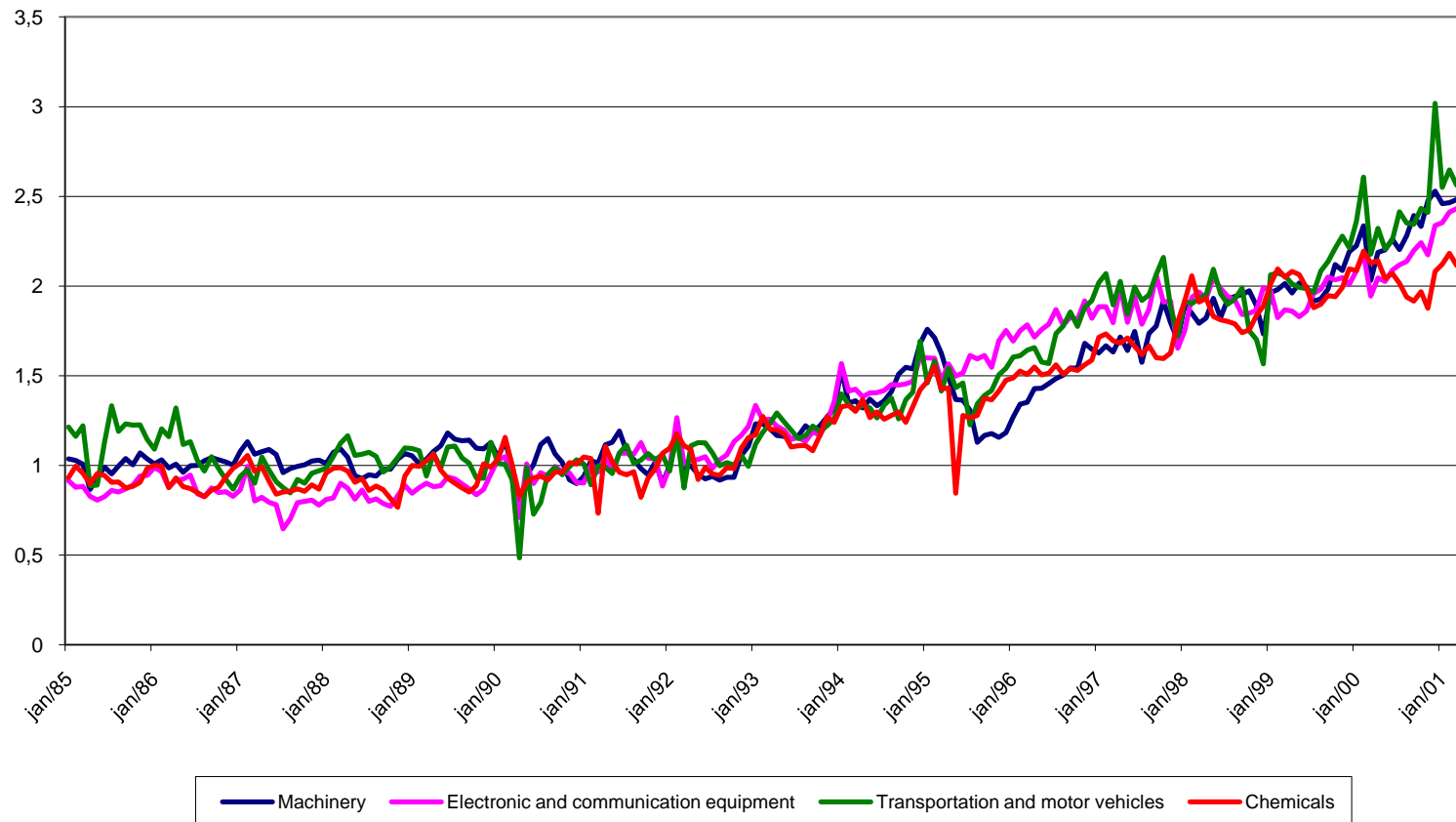
Impact of Trade : Trade Liberalization in Brazil

Labor Productivity (Industry Average, 1985-1997)



Impact of Trade : trade liberalization in Brazil

Labor productivity: sectors (1985-2001)



Impact of Trade : trade liberalization in Brazil

TFP Annual Growth Rates		
Industry	Period	
	1985-90	1994-1997
Nonmetal mineral products	-3.03%	5.42%
Metalworking	-2.89%	4.44%
Machinery	-2.11%	0.57%
Electronic and communication equipment	-2.93%	2.72%
Transportation and motor vehicles	-9.08%	5.67%
Paper and paper products	-4.28%	1.98%
Rubber products	-4.56%	4.67%
Chemicals	-5.01%	4.80%
Pharmaceuticals	-4.15%	-0.36%
Perfumes, soap and candles	-0.40%	1.37%
Plastic products	-6.43%	8.44%
Textiles	-5.72%	1.49%
Clothing, fabric products and footwear	-5.34%	3.01%
Food	-3.26%	3.36%
Beverages	-1.10%	2.14%
Tobacco	-1.07%	3.47%
average	-3.83%	+3.32%

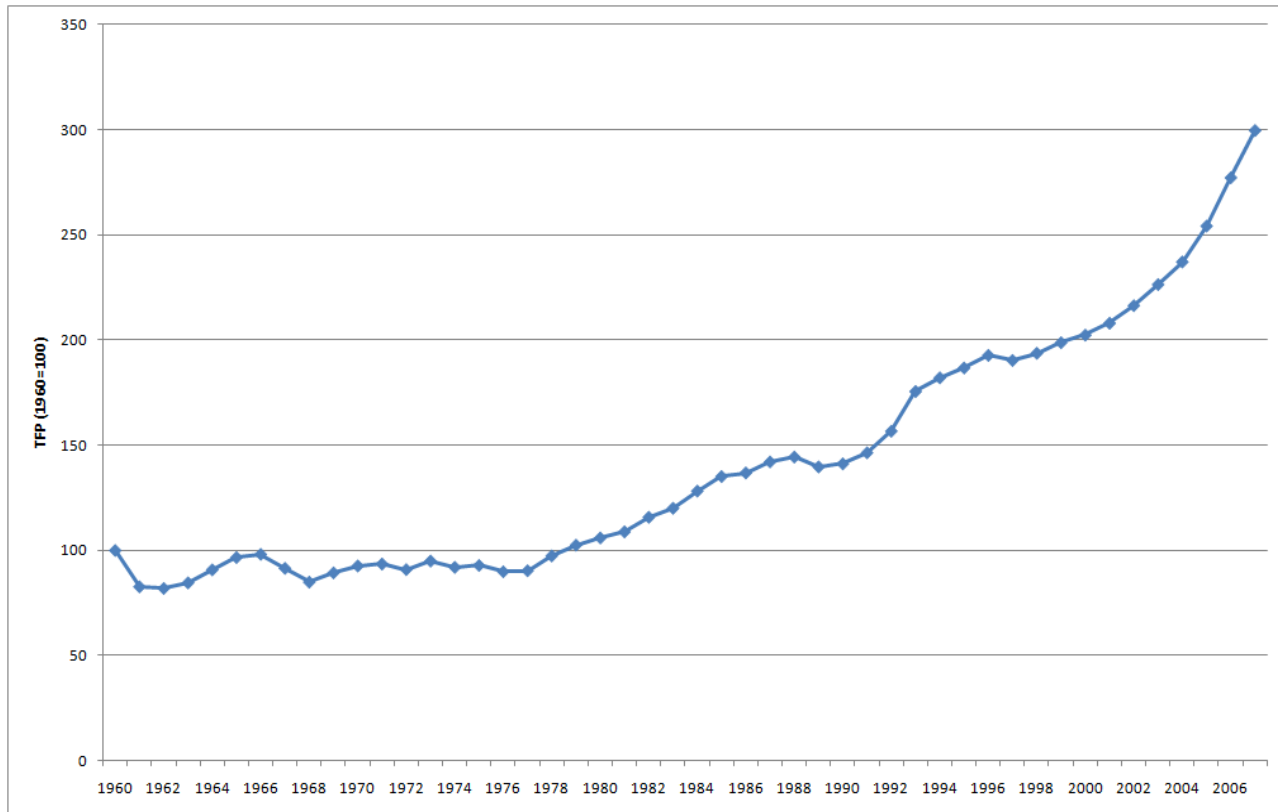
Impact of Trade : trade liberalization in Brazil

Trade liberalization and productivity

Dependent Variable	Independent Variables	
	Effective Rate of Protection	Machinery Imports
Labor Productivity	-0.14 (-5.92)	0.29 (7.55)
Total Factor Productivity	-0.16 (-3.93)	0.16 (2.30)

Trade and Institutional Reform: China

China: a TFP miracle



Trade and Institutional Reform: China

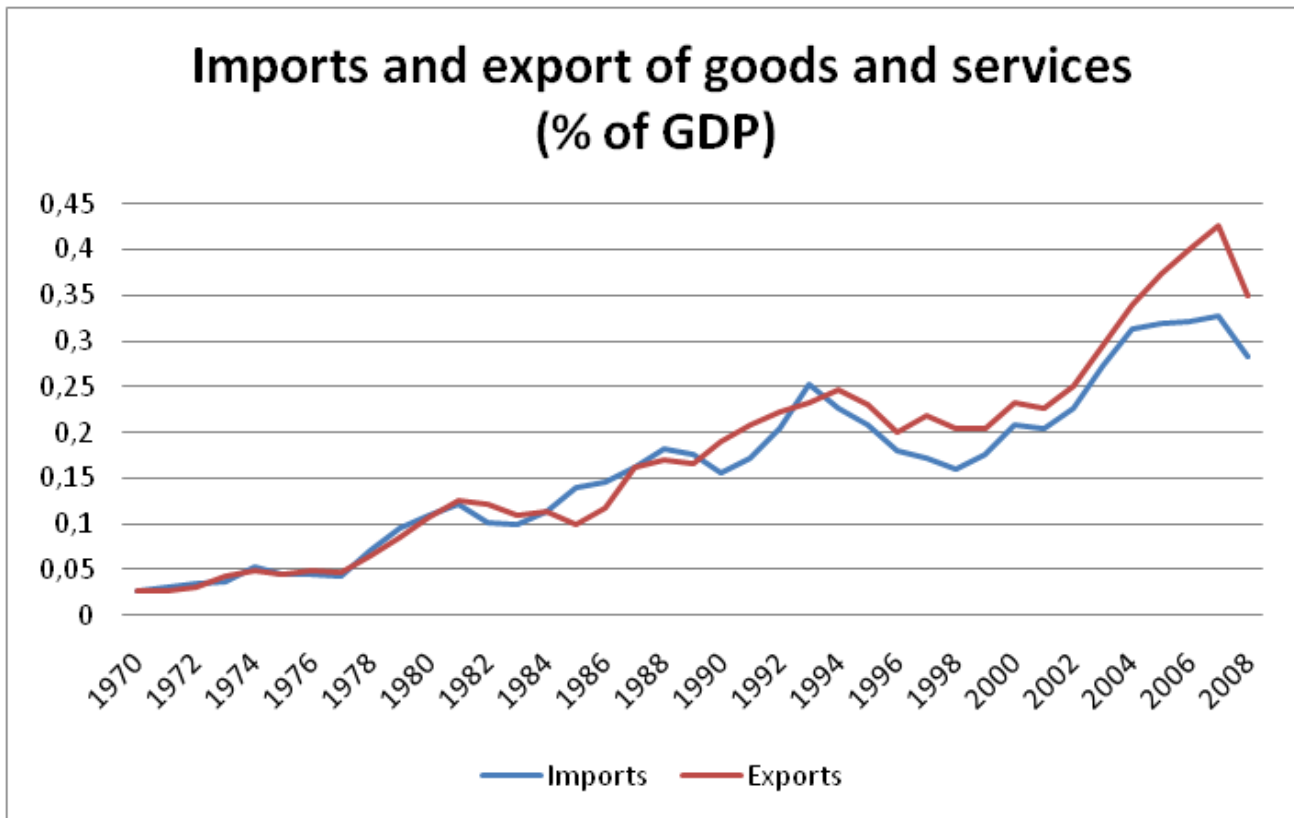
Growth Account, China

	Contribution to Growth			
	y	k	h	PTF
1960-1977	0.022	0.013	0.011	-0.001
		(56.6%)	(50.0%)	(-6.5%)
1978-2007	0.077	0.030	0.008	0.039
		(39.3%)	(10.0%)	(50.8%)
1960-2007	0.056	0.023	0.009	0.023
		(41.9%)	(16.3%)	(41.8%)

Impact of Trade 2 (and institutional reform): China

- TFP growth is associated with institutional reforms and structural changes;
- China went from a long period of stagnation to one of extremely fast growth: "from Malthus to Solow"
- **Institutional reforms** caused this transition.
- **Trade** had (and has) a decisive role.

China: The Importance of Trade

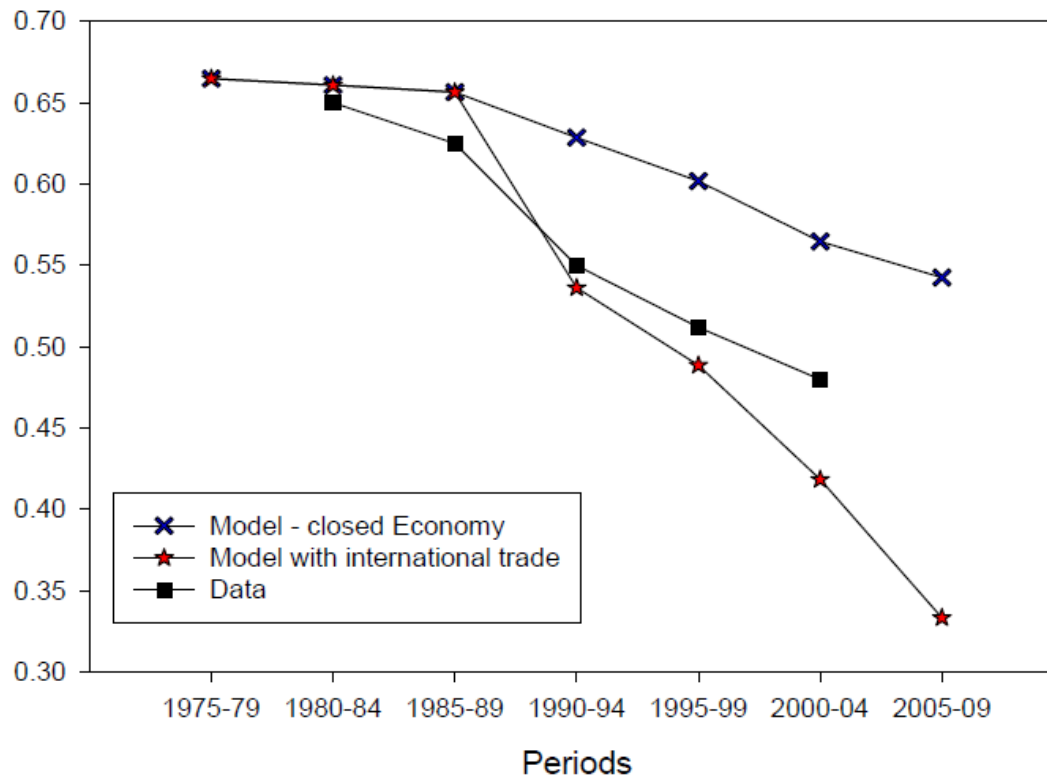


China: The Importance of Trade

- Increase of international trade: exports + imports went from less than 9% of GDP in the seventies to more than 60% today
- Trade allows shift of resources from agriculture (low productivity sector) to industry (high productivity sector);
- Without trade limit of growth would be given by domestic supply of food and raw material;

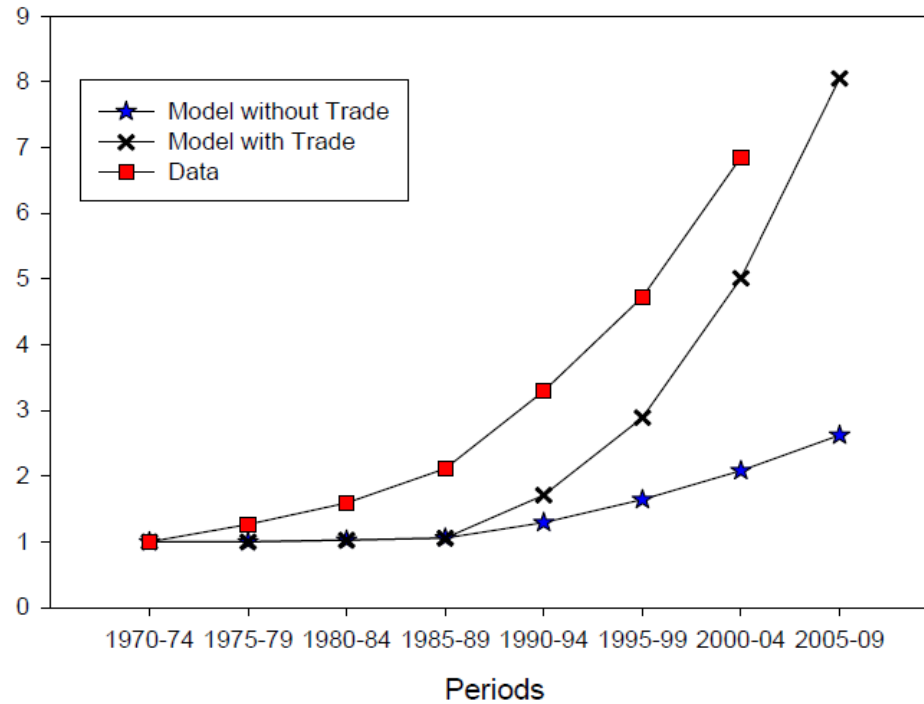
Simulation: Structural Transformation

Labor's share in the agricultural sector



Simulation: Output per capita

Output per capita - Model simulations



Without trade China growth would be much smaller

Importance of Trade: summing up

- Plenty of evidence of positive impact of international trade on growth and productivity
- in recent years we have observed an increasing hostility toward international trade in Brazil.
- New protectionist measures were implemented – higher taxes, domestic content, etc. – that potentially may affect growth.
- We still are one of the closest economies in the world

Conclusion: why productivity is low in Brazil?

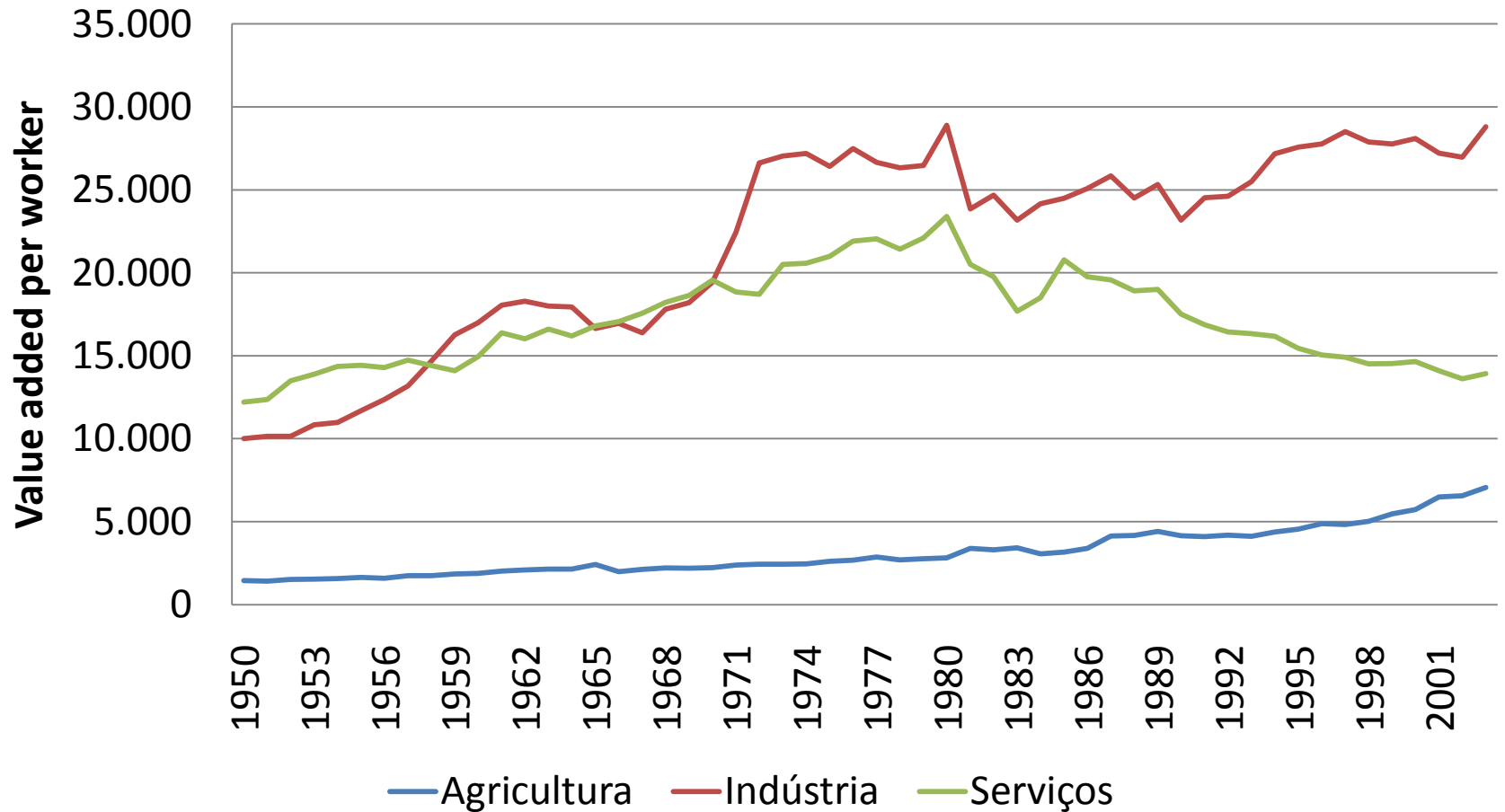
- Excess intervention
 - Increase in distortions
 - Protection from competition and international trade
 - infrastructure problems
- = decrease in efficiency (tfp) and low growth

Conclusion: why productivity is low in Brazil?

Excess intervention: Industrial Policy

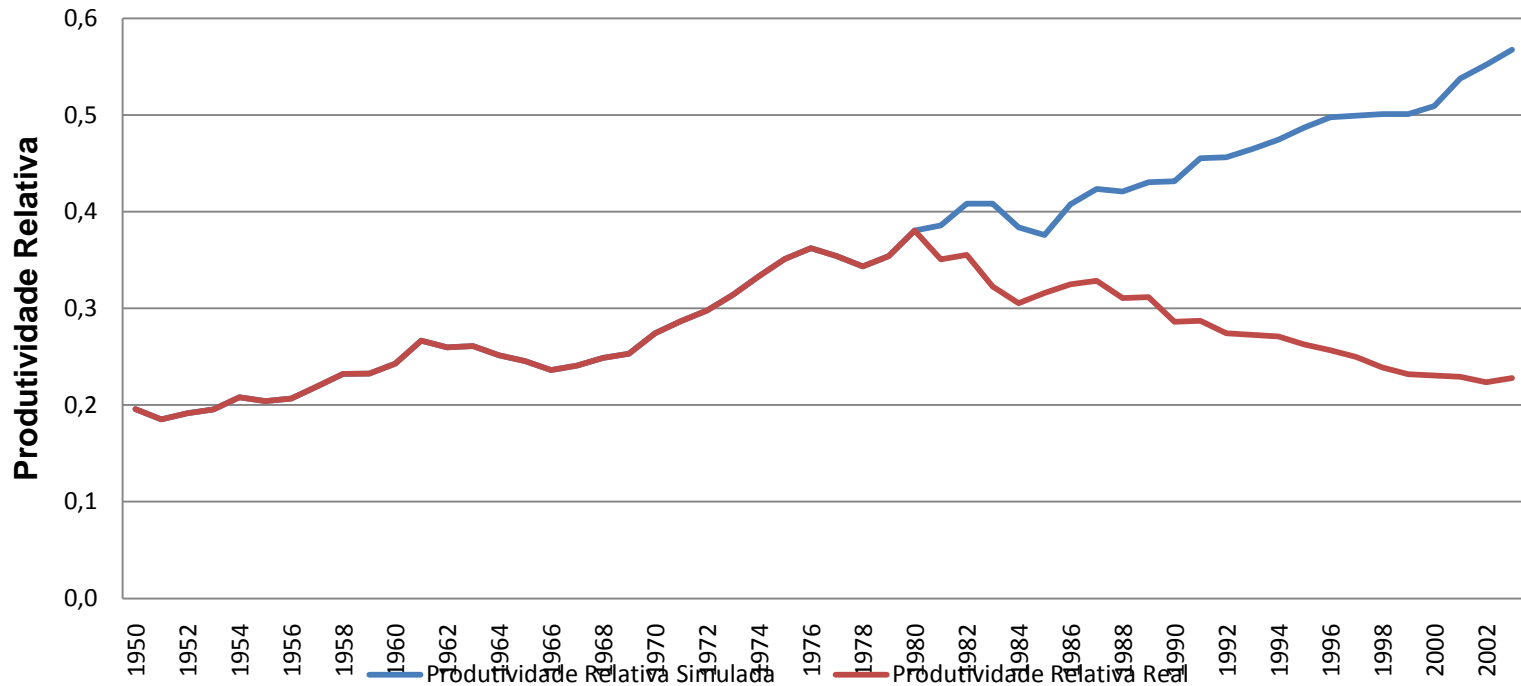
- Strong government intervention in the economy after 2008
- huge transfers from the Treasury to BNDES (cost: R\$15 bi/year)
- Industrial Policy (& Brasil Maior):
 - Picking winners (“Champions”),
 - Highly subsidized credit,
 - Domestic content,
 - Use of public banks as policy instruments (and Petrobrás)
 - Barriers to Trade
 - Barriers to Capital Flow,

But the problem is mostly in the services sector:



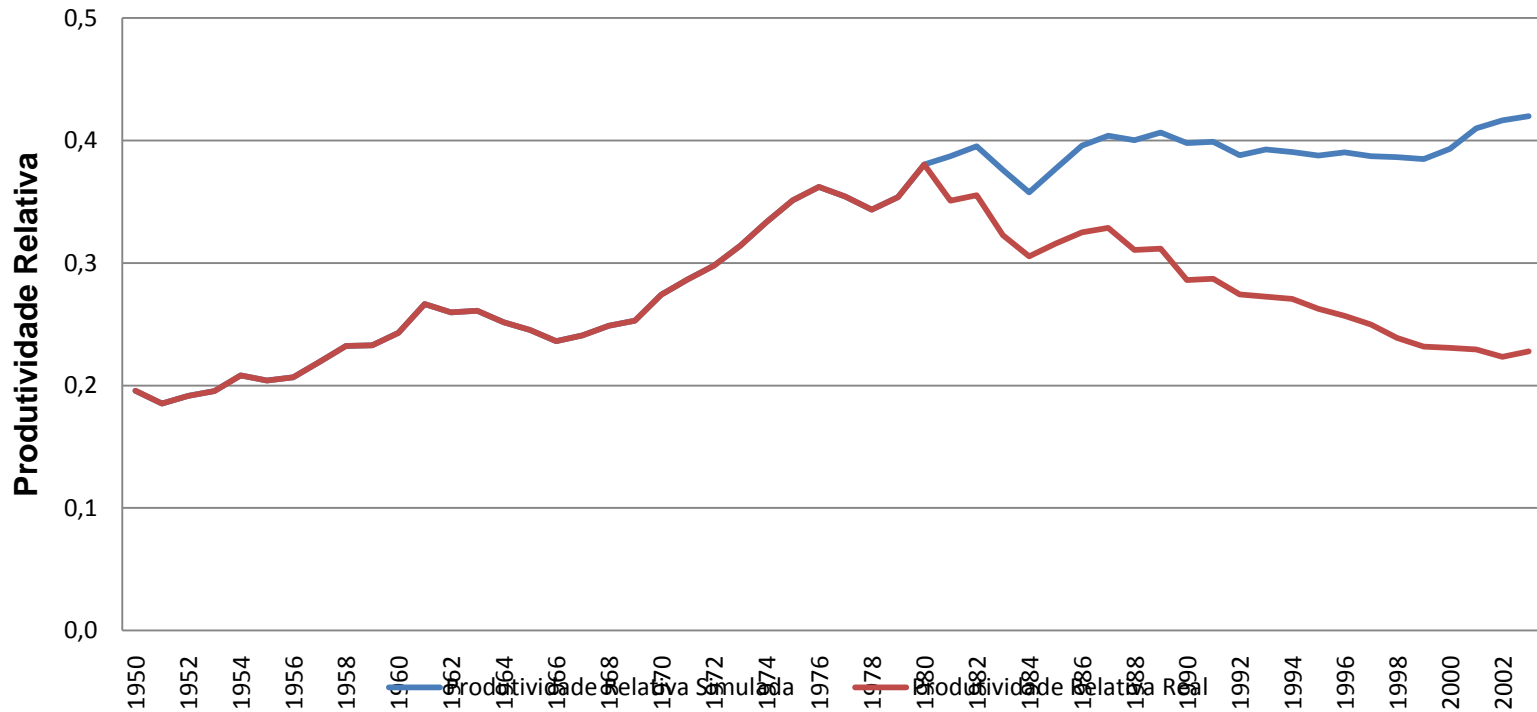
Declining productivity in the services sector since 1980

Counter-factual Brazilian output per worker with South Korean growth rates (Services)



If the Brazilian service sector had grown at South Korean rates (1981 - 2003), aggregate productivity in the country would be 57% of that of the U.S., not 23%.

Counter-factual Brazilian output per worker with South Korean growth rates (Manufactures)



A relevant gain, but smaller when compared to that of the Service Sector

Conclusion: why productivity is low in Brazil?

Analogy to:

reforms of **PAEG**, Brazilian Miracle, II PND and reverse of reforms, radicalization of import substitution, low growth and fall of TFP after the seventies.

Reforms of 1995-2005, higher growth but now partial reverse, trade restrictions: low growth and fall of TFP?

Conclusion: why productivity is low in Brazil?

Following the same logic: Not only inflation target but exchange rate target, growth target, interest rate target.

It is the end of macro-policy as we know it? (inflation target, floating exchange rate, and fiscal surplus?)

Not necessarily: still primary surplus and decrease of debt -GDP ratio

Hence: for the first time it is a possibility to have **low interest rate, low inflation and low growth**

And, of course, very little trade. As usual...