

Productivity and Structural Change: Brazil's Trajectory from Catching-up to Falling-Behind

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- 1) Theoretical approaches on productivity and long-term economic growth
- 2) Stylized facts facts on productivity and long-term growth trajectories
- 3) Policy implications
- 4) Brazil's Evidence: a trajectory from catching-up to falling-behind
- 5) Conclusion

Two theoretical approaches in dispute over identifying the main drivers:

1) Neoclassical approach: productivity and long-term growth driven by supply-side forces, mainly capital accumulation (physical and human) and technical progress.

Solow (1956; 1957); Romer (1986); Lucas (1988)

2) Structuralist approach: productivity and long-term growth driven by demand-side forces

Kaldor (1966); Thirlwall (1979); McCombie and Thirlwall (1994)

Recently, new theoretical efforts have been made to link demand and supply sides into the theory of economic development, but such a process is also driven by aggregate demand in the Structuralist view; aggregate supply tends to accommodate demand-led growth path (Fazzari et al., 2018).

Structuralist approach emphasizes 4 stylized facts on productivity and long-term growth trajectories

- i) Economic development as a process through which resources (especially labor) is shifted from low productivity sectors to the high ones (mainly manufacturing).

Lewis (1953)

That is to say, economic development is driven by structural change.

McMillan and Rodrik (2011)

- ii) Manufacturing is the main engine of growth, because it is the only one (nowadays together with the high tech segments of the service sector) to operate under static and dynamic economies of scale.

So, it is the sector that drives the average aggregate productivity growth until the efficiency gaps between sectors are closed.

Kaldor (1966).

Structuralist approach emphasizes 4 stylized facts on productivity and long-term growth trajectories



- iii) Even when the economic growth is sustained and the country reaches a middle per capita income, there is still significant productivity gaps between sectors.
In other words, development is a process through which a country transitions from “immaturity” to “maturity” level. When a country reaches such a level and very high per capita incomes, the resources tend to shift from manufacturing to the service sector.
Kaldor (1966).

- iv) If this dynamic growth process is prematurely reversed by the so-called early de-industrialization phenomenon, the average aggregate productivity growth tends to reduce or even become stagnant, because resources are generally shifted from manufacturing (or even agriculture and manufacturing) to the low productivity segments of the service sector.
Palma (2005).

Policy implications:

Generally, theories of economic development set aside economic policies. However, productivity, structural change and economic growth are barely driven only by free market forces.

Development requires industrial policy in a broad sense (industrial & technological policies, education, job training etc.)

Policy implications:



Three broad theoretical arguments for industrial policy:

- i) **Neoclassical:** industrial policy is justified for correcting market failures (understood as an economy's departure from Walrasian and Pareto equilibrium positions).

Horizontal policies, because government failures can be worse than market failures.
Corden (1974).

- ii) **Nationalist argument for infant industry protection:** Under pure free trade, industrialization cannot take off. Thus, in order to overcome economic backwardness, it is necessary to protect infant industries during the catching up process (through tariffs, subsidies and other protection mechanisms) .
Hamilton (1791), List (1841), John Stuart Mill (1848).

Nowadays, this argument is still a concern for very poor countries or other late-late-latecomers. It is still accepted by multilateral institutions (GATT Article XVIII – “allows developing countries to restrict trade to promote infant industries and to protect the balance-of-payments (and imposing weak conditionalities)).

But such an argument does not apply to middle-income countries anymore.

Policy implications:

iii) **The technological gap argument:** more appropriate to middle-income countries (like Brazil) that have experienced premature de-industrialization.

Cimoli and Porcile's (2010) model suggests that:

- a) The larger the **level** of the technological gap (Gerschenkron's, 1962 argument) and the **more diversified** the productive structure of South developing countries, the quicker they can dynamically close the gap with the North developed countries.
- b) The **diversification** of the productive structure must be towards goods of **higher long-term income-elasticity of demand**

WHAT YOU SPECIALIZE IN MATTERS!

- c) However, the South countries' technological gap can only be dynamically close if, and only if, the goods in which they diversify and specialize (their exports) have higher long-term income-elasticity of demand than the goods in which North countries specialize (South countries' imports).

If not, CATCHING-UP PROCESS WILL BE ABORTED BY BALANCE-OF-PAYMENTS CONSTRAINTS!

In other words:

$$\frac{\widehat{Y}_S}{Y_N} = \frac{\varepsilon_X}{\pi_M}$$

Thirlwall's law, where the numerator is the income-elasticity of demand for South exports, and the denominator is the income-elasticity of demand for South imports.

Which industrial policy?

Rodrik (2009): “**Industrial policy: don’t ask why, ask how**”.

For middle per capita income countries whose catching-up process has been reversed by premature de-industrialization, the previous argument is aligned with the case for reindustrialization. The goal is restructuring the “old” damaged manufacturing industries, as well as connecting it with the Information and Communication Technologies (ICT) and with the new digital revolution (the so-called 4D Technology).

However, this is not an easy task. Since globalization has reduced (but not removed) the scope for sectoral protection, this industrial policy requires:

- a) Relatively low levels of sectoral and intersectoral tariff protection: ad valorem tariffs should be fixed in levels necessary for boosting innovation and preventing learning from being contested by undesirable imports.
- b) Subsidies to R&D as well as government investment in education and job training: Due to their spillover effects, they are considered horizontal by Neoclassical economics.
- c) And last, but not least, a fine coordination between industrial policy and the macroeconomic regime: this means that the catching up process will not be sustained in a context of HIGH REAL INTEREST RATES AND CURRENCY OVERVALUATION TRENDS (Nassif et al., 2018)

Brazil's Evidence: a trajectory from catching-up to falling-behind

*“Here everything seems under construction and in ruins
Everything is boy and girl abandoned in the streets
The asphalt, the bridge, the viaduct, all howling at the moon
Nothing continues”*

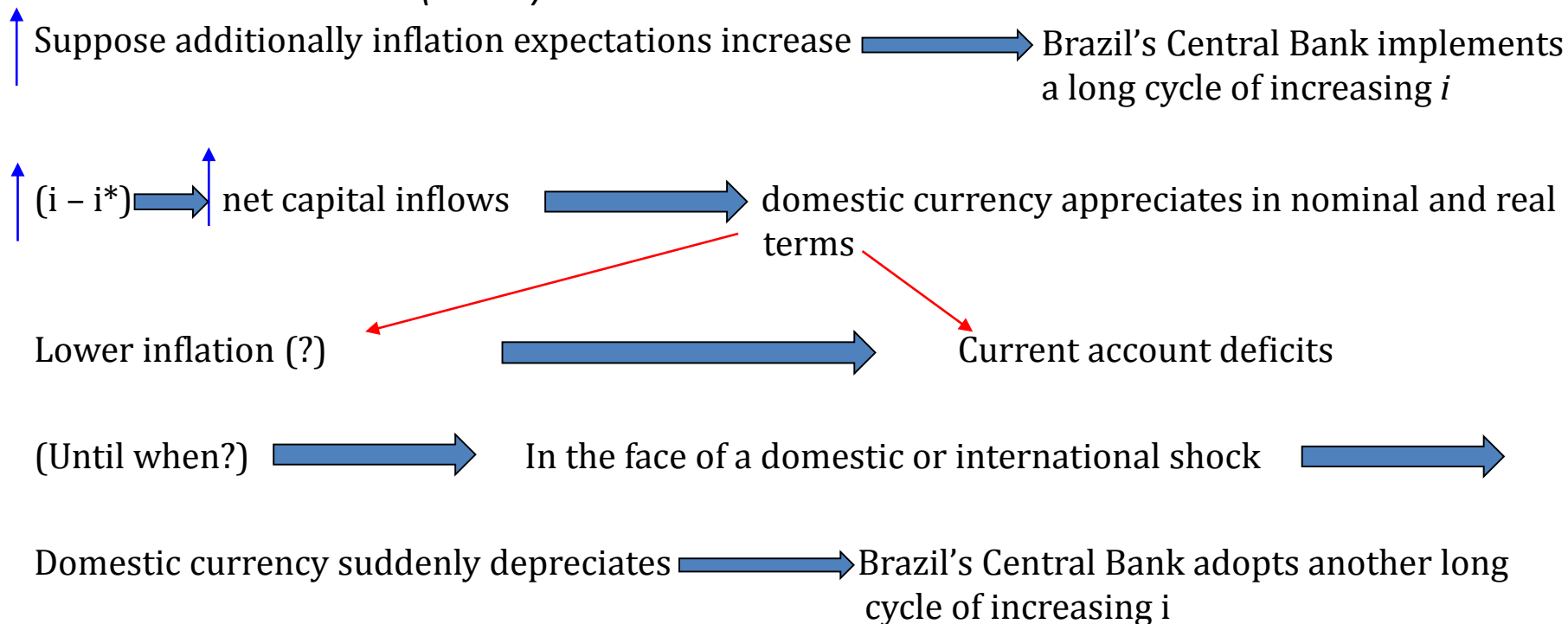
Caetano Veloso, Our of order, 1991.

Three stylized facts on Brazil in the recent decades:

- 1) The macroeconomic regime (in Brazil, the so-called macroeconomic tripod: inflation targeting, targets for primary fiscal surplus and flexible exchange rate regime): still aligned with the New Macroeconomic Consensus that has already become old since the 2008 Global Crisis.

Think about the uncovered interest rate parity and suppose there are relatively sound macro indicators, like in Brazil in 2004-2005. :

$$(i - i^*) = e^e + RP$$



In the long run, neither price stability nor growth!

Three stylized facts on Brazil in the recent decades:

2) Clear correlation between the RER and CA balances:

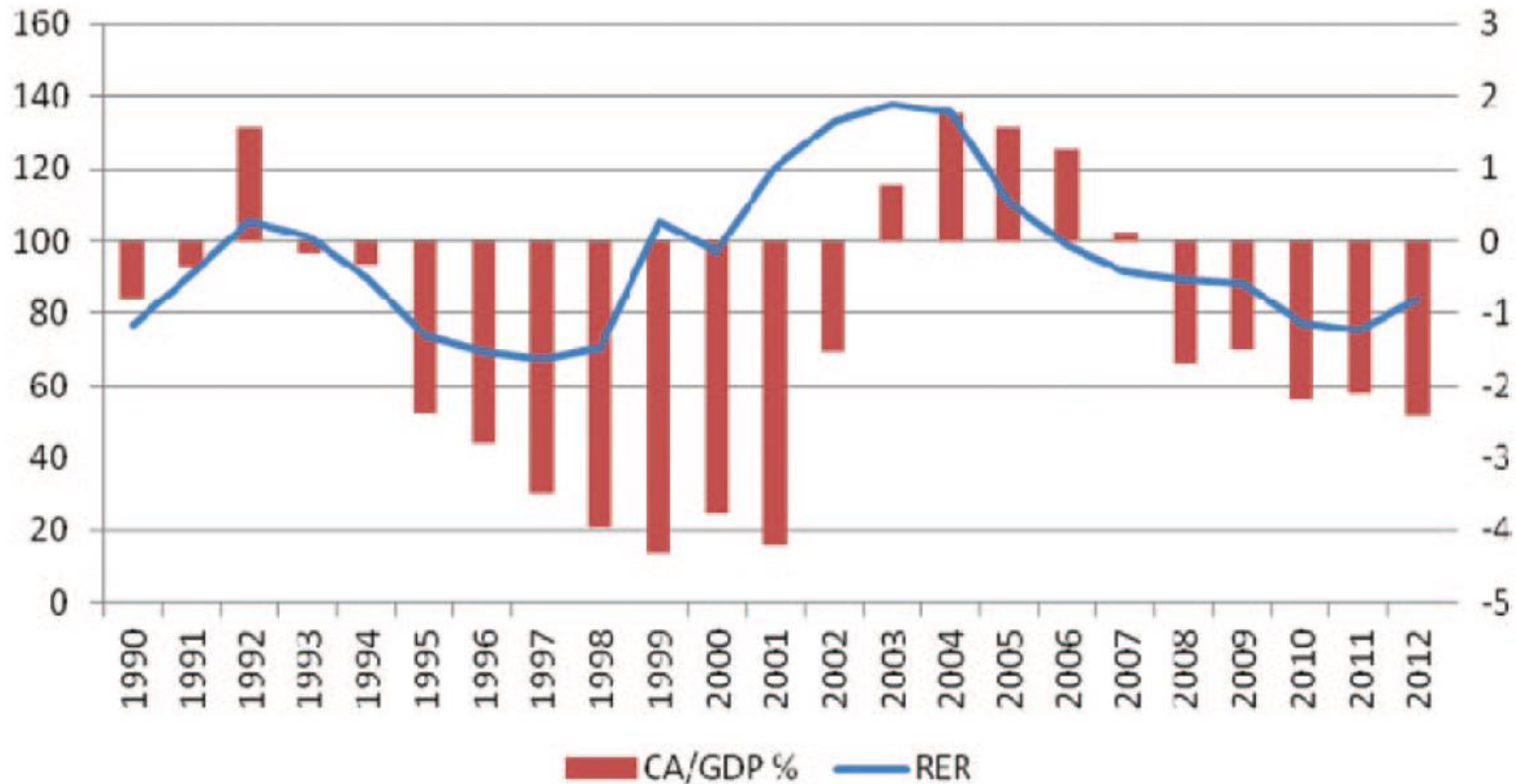


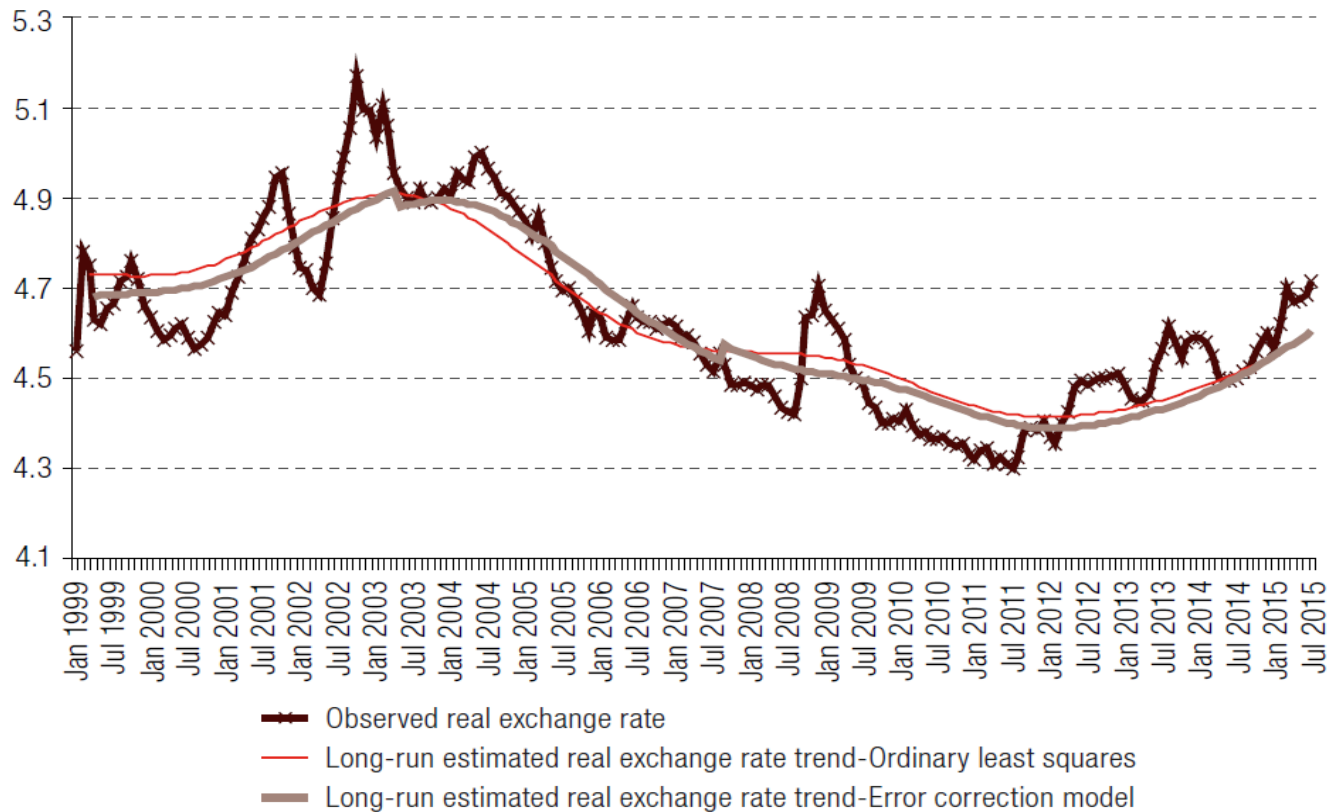
Fig. 2. Index of real effective exchange rate (RER) (June 1994 = 100) and current account balance as percentage of GDP (CA/GDP), Brazil, 1990–2012.

Source: Brazil's central bank.

Three stylized facts on Brazil in the recent decades:

3) Long-term real appreciation trend of the Brazilian currency:

Brazil: observed real exchange rates and estimated long-term real exchange rates, January 1999 to July 2015
(In logarithms)



Source: Nassif, Feijó and Araújo (2017)

Each country reaps what it sows!

Empirical evidence 1: Regressive specialization

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Reprimarization of the export basket

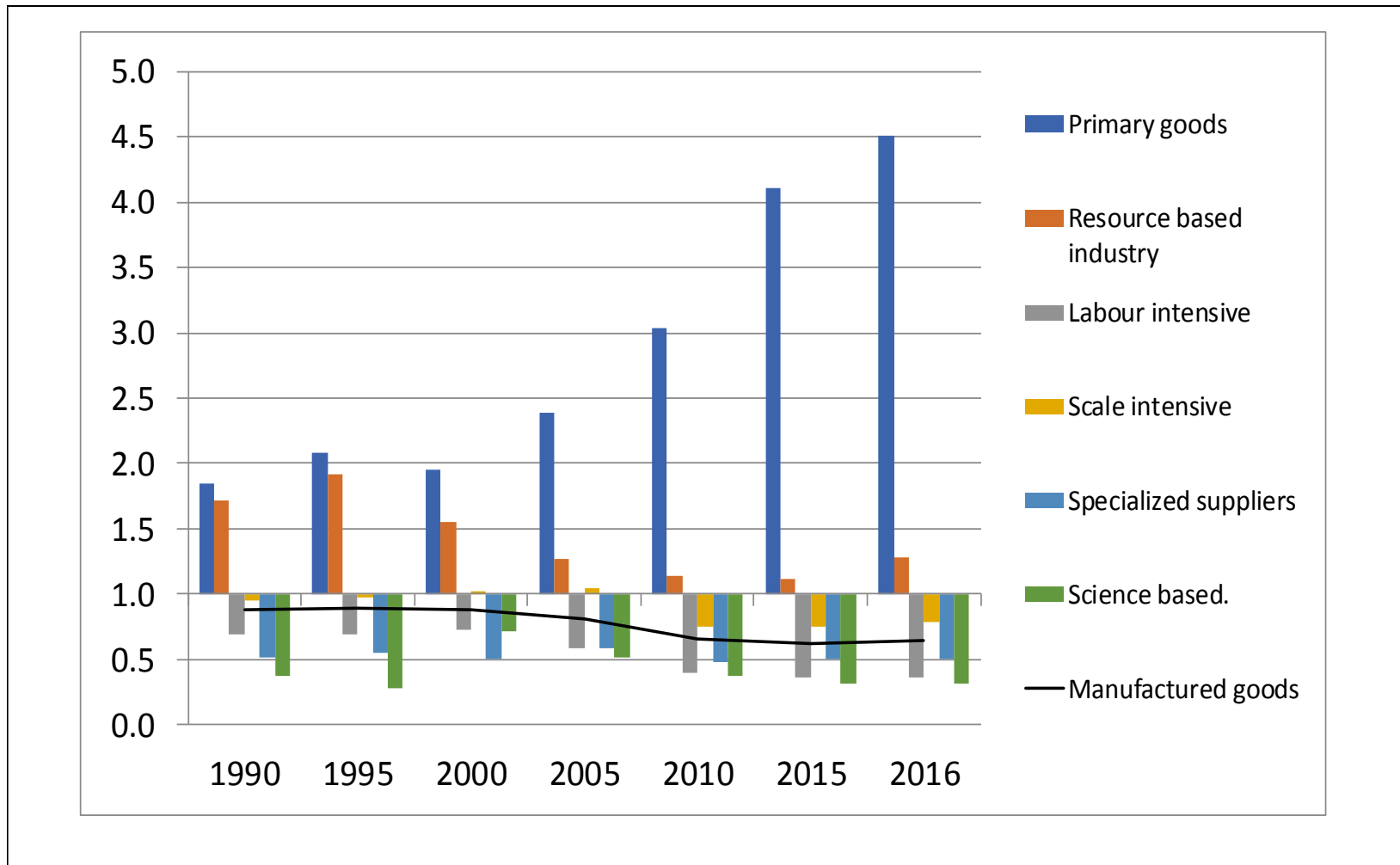
	Primary goods	Resource based industry (1)	Labour intensive (2)	Scale intensive (3)	Specialized suppliers (4)	Science based (5)	n.d	Manufactured goods (1-5)	Total
EXPORTS									
Composition (% of total exports)									
1990-1995	21.1	28.5	12.6	23.0	9.7	4.0	1.0	77.9	100.0
1996-2000	22.4	27.3	10.6	21.1	9.8	7.2	1.6	76.0	100.0
2001-2005	26.4	24.2	9.2	20.4	9.1	8.8	1.8	71.8	100.0
2006-2010	36.8	22.3	6.3	17.2	8.1	7.2	2.2	61.1	100.0
2011-2016	45.1	21.2	4.9	14.5	7.2	5.2	1.9	53.0	100.0
Average Annual Growth (p.y.%)									
1990-1995	5.4	9.7	7.7	8.2	10.7	5.6	10.3		8.2
1996-2000	5.0	(1.9)	2.3	2.3	1.5	29.2	11.4		3.5
2001-2005	23.4	13.9	10.4	18.5	17.7	7.9	15.2		16.5
2006-2010	21.6	11.3	1.6	1.9	4.7	3.5	11.6		11.2
2011-2016	(2.3)	(1.3)	(0.7)	0.9	(0.1)	(1.7)	(8.4)		(1.4)
IMPORTS									
Composition (% of total imports)									
1990-1995	20.7	22.5	7.6	14.4	18.8	15.9	0.0	79.3	100.0
1996-2000	12.6	20.5	8.7	16.3	21.8	19.9	0.1	87.2	100.0
2001-2005	15.5	18.5	7.8	14.2	21.3	22.6	0.0	84.5	100.0
2006-2010	14.4	19.3	8.4	17.7	19.0	20.1	1.2	84.4	100.0
2011-2016	11.2	21.0	9.7	19.2	18.7	20.2	0.0	88.7	100.0
Average Annual Growth (p.y.%)									
1990-1995	(1.3)	25.3	33.2	38.2	19.7	19.1	39.0		19.1
1996-2000	(0.6)	(0.9)	(3.7)	(4.9)	2.5	9.0	48.2		0.7
2001-2005	13.1	2.1	5.5	6.5	4.6	5.0	(48.2)		5.7
2006-2010	10.7	22.3	22.9	27.7	19.6	16.2	105.5		19.7
2011-2016	(7.9)	(4.2)	(2.6)	(6.8)	(4.7)	(1.6)	(2.8)		(4.5)

Source: Elaborated by the authors based on COMTRADE database.

Source: Nassif and Castilho (2018, forthcoming)

Empirical evidence 1: Regressive specialization

Revealed comparative advantage in commodity goods (primary + resource-based manufactured goods)



Source: Nassif and Castilho (2018, forthcoming)

Empirical evidence 1: Regressive specialization

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Concentration, not diversification of the export basket

Concentration of Brazilian exports, by product group (HH Index, 1990-2016)

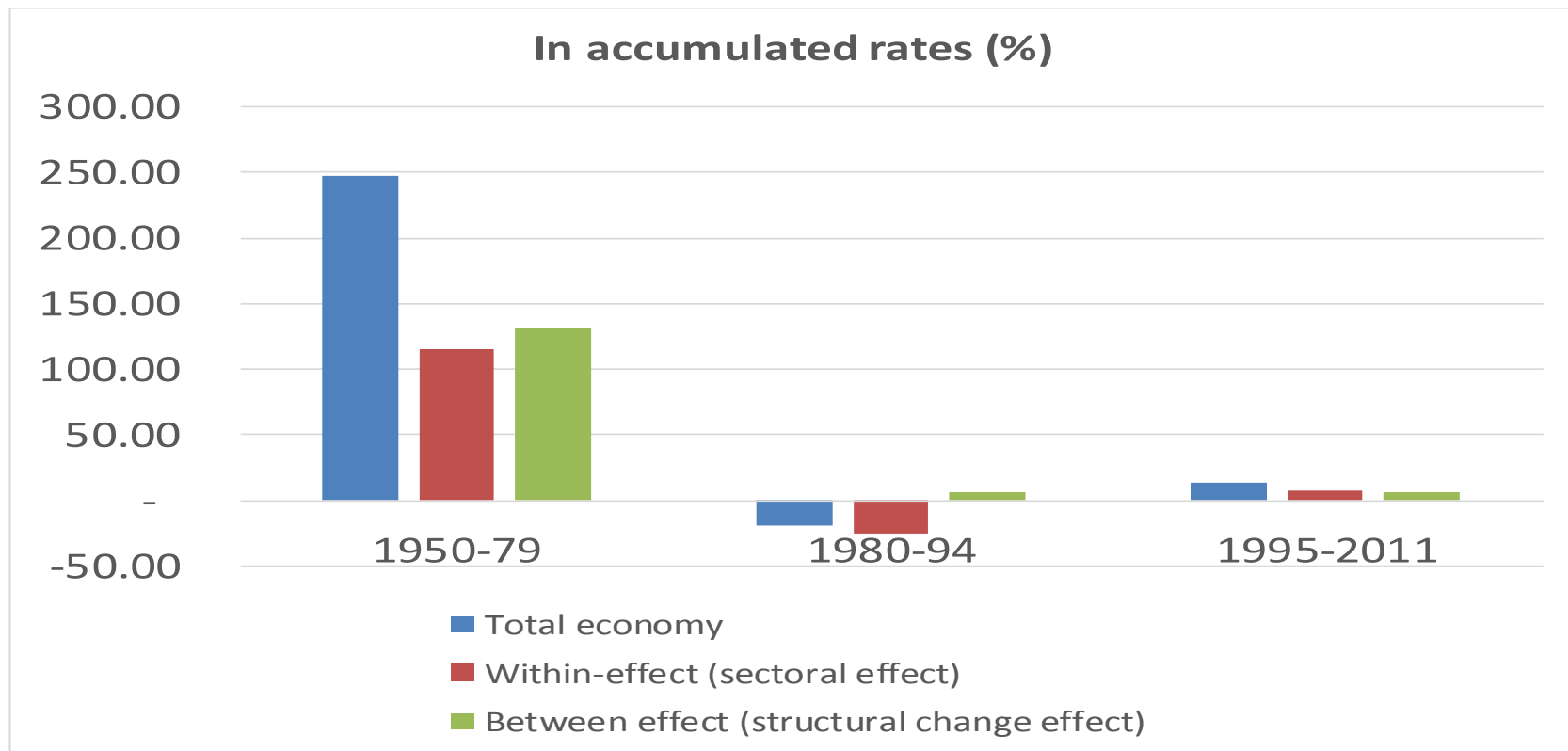
	1990	1995	2000	2005	2010	2016
Primary goods	0.186	0.181	0.156	0.149	0.181	0.149
Resource based industry	0.094	0.077	0.068	0.072	0.122	0.117
Labour intensive	0.126	0.107	0.110	0.097	0.099	0.116
Scale intensive	0.093	0.086	0.089	0.086	0.086	0.084
Specialized suppliers	0.129	0.079	0.087	0.089	0.081	0.086
Science based	0.190	0.090	0.331	0.223	0.192	0.250
TOTAL	0.025	0.021	0.022	0.023	0.044	0.035

Source: Calculated by the authors based on COMTRADE database.

Source: Nassif and Castilho (2018, forthcoming)

Empirical evidence 2 – From structural change to a stagnant labor productivity growth

Break down of the Brazilian labor productivity growth into structural change and within change components
McMillan and Rodrik's (2011) methodology



Source: Nassif et al. (2018, forthcoming)

From 1950-1979: significant labor productivity growth driven by structural change, but also driven by within change;

From 1980-2011: stagnant labor productivity growth and lack of structural change much before the economy has reached “maturity” in Kaldor sense (Kaldor, 1966)

Empirical evidence 3 – What explains Brazil's stagnant labor productivity and the lack of structural change?

Notations for the explanatory variables	Explanatory variables	Expected sign
Log share of low-skill labor in total employment	Share of low-skill labor in total employment	-
Log trade openness	Trade openness degree (X+M/GDP)	+/-
Log share of primary exports in total exports	Share of primary exports in total exports	-
Log real interest rates	Real interest rates (nominal policy interest rates deflated by consumer inflation indices)	-
Log REER	Real effective exchange rates	+
Log import tariffs	Average import tariffs	+/-

Source: Nassif et al. (2018, forthcoming)

Empirical evidence 3 – What explains Brazil's stagnant labor productivity and the lack of structural change?

Determinants of the magnitude of the structural change term:

Variable	Model 1: OLS coefficients	Model 2: OLS coefficients	Model 3: OLS coefficients
<i>c</i>	-2.026 [-0.41]	-2.870* [-1.64]	-2.085* [-1.88]
Log share of low-skill labor in total employment	-0.343 [-0.18]		
Log trade openness	0.566* [1.84]	0.598** [2.45]	0.524** [2.56]
Log share of primary exports in total exports	-0.738*** [-3.12]	-0.745*** [-3.36]	-0.725*** [-3.40]
Log real interest rates	-0.160** [-2.08]	-0.161** [-2.20]	-0.163** [-2.31]
Log REER	0.873*** [3.20]	0.853*** [3.59]	0.797*** [3.75]
Log import tariffs	0.192 [0.57]	0.157 [0.59]	

(3rd)
(2nd)
(4th)
(1st)

Source: Nassif et al. (2018, forthcoming)

Empirical evidence 4 – Brazil’s trajectory from catching-up to falling-behind

Don’t let Samba die!

Thirlwall’s law and the falling behind trajectory of the Brazilian economy (1980-2010)			
Period	Income-elasticity of demand for Brazilian exports (ϵ_x)	Income-elasticity of demand for Brazilian imports (π_M)	Thirlwall’s Law $\frac{Y_{Brazil}}{Y_{World}^*} = \frac{\epsilon_x}{\pi_M}$
1980:3 – 2010:2	1.059	1.993	0.531
1980:3 – 1998:4	1.358	1.967	↓ 0.690
1999:1 – 2010:2	1.329	3.361	↓ 0.395

Note: 1, 2, 3 and 4 indicate quarters. Source: Nassif, Feijó and Araújo (2015: 1326)

Source: Nassif and Castilho (2018, forthcoming)

Empirical evidence 4 – Brazil's trajectory from catching-up to falling-behind

BRICS's actual GDP growth, change in exports and Thirlwall's law (1995-2013)

Country (1)	GDP growth, % (2)	Change in exports, % (3)	ε_X / π_M Thirlwall's law Strong version (4)	X / π_M Thirlwall's law Weak version (5)
Brazil	3.17	6.01	0.87	2.99
Russia	3.32	4.17	0.48	1.86
India	6.95	9.56	2.03	7.3
China	9.67	15.91	3.72	10.2
South Africa	3.13	4.23	0.43	2.82

Source: Nassif, Feijó and Araújo (2016)

Only China and India show a catching up trajectory

Conclusion:

- 1) While a country keeps a state of “immaturity” in its productive structure, development must continue to be driven by structural change, in which resources (especially labor) are shifted from agriculture to the manufacturing sector.
- 2) No matter if part of these resources go towards the service sector, but while the country has not caught up, there must be synergies between the higher productivity segments of the service sector and the higher technologically sophisticated segments of the manufacturing sector.
- 3) Development never comes from a mana: it needs industrial policy, but this latter must be permanently coordinated with the macroeconomic regime. This means that labor productivity growth driven by structural change will not be sustained under an economic environment in which real interest rates tend to be at sky-high levels and domestic currency is tendentially appreciated in real terms.
- 4) Brazil is a case of a falling-behind trajectory, and the empirical results suggest that misleading economic policies are the most responsible factors for such underperformance.

THANK YOU!

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