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CHAPTER 19

PRODUCTIVITY AND THE MIDDLE INCOME TRAP: A BRAZILIAN PERSPECTIVE

Fernando Veloso[1]

1 INTRODUCTION

Brazil was one of the fastest-growing economies in the postwar era. However, after becoming a middle-income country, it experienced a growth collapse in the early 1980s, and convergence towards the standard of living of developed countries was interrupted.

The Brazilian growth path is not atypical. In fact, in the postwar period several countries managed to achieve a middle-income status, but only a few were successful in completing the transition towards the group of developed countries. According to World Bank (2012), of 101 middle-income economies in 1960, only thirteen became high-income economies by 2008. The other economies, including Brazil and many Latin-American countries, experienced a sharp growth slowdown and were stuck in the so-called middle-income trap.[2]

The middle-income trap is a controversial concept and has different meanings in the literature.[3] In particular, it is not clear that growth slowdowns are specific to middle-income economies. In fact, the empirical evidence shows that episodes of growth deceleration occur at several stages of development.[4] Even at the middle-income level, Eichengreen *et al*. (2013) show that growth deceleration tends to occur at two levels of per capita income, measured in purchasing power parity: the first around $10,000 - $11,000 and the other at $15,000 - $16,000. Moreover, in the last decades some middle-income countries were successful in becoming high-income economies, such as the Asian Tigers (South Korea, Hong Kong, Taiwan and Singapore).

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1. Researcher at IBRE/FGV.

2. The term "middle-income trap" was apparently used for the first time in Gil and Kharas (2007). Pereira *et al*. (2013) present a comparative analysis of the development experiences of Brazil and China based on the concept of the middle-income trap.

3. Kharas and Kohli (2011) present a summary of the discussion surrounding the concept of the middle-income trap and its policy implications.

4. See Rodrik (1999) and Pritchett (2000).

In any case, there is evidence that the transition from middle to high income is very challenging. In this paper we will use the term "middle-income trap" to denote the difficulties faced by middle-income countries to complete the transition to high-income status.

One possible explanation for the growth slowdown at the middle-income level is as follows. In the initial stages of development, it is possible to obtain significant productivity gains by transferring workers from low-productivity activities, such as traditional agriculture, to high-productivity sectors, such as manufacturing. Since these countries are far from the technological frontier, they can accelerate the process of structural transformation by adopting technologies from the developed countries. During this transitional process, developing countries can compete in international markets exporting labor-intensive goods.

However, when these countries approach the middle-income level, the engines of growth in the initial stages tend to become exhausted. In particular, the stock of underemployed workers in the rural area diminishes and wages start to increase, which reduces the competitiveness of labor-intensive goods. Moreover, the productivity gains associated with the reallocation of resources among sectors and with the adoption of imported technologies tend to decline, and the growth dynamics becomes increasingly dependent on productivity increases within sectors, especially services, which become the main sector in terms of both employment and value added.

According to this interpretation, the episodes of growth slowdown of middle-income economies are associated with the difficulties in making the transition to a new development model that is capable of adapting the economy and its institutions to new challenges and opportunities. Eichengreen *et al.* (2013) show that deceleration episodes are less likely in countries where a large fraction of the population has a high level of education and where goods intensive in technology account for a significant share of exports. Agenor and Canuto (2012) argue that the middle-income trap may be avoided if the country adopts well-designed policies, such as investments in infrastructure, better protection of property rights, labor market flexibility and openness to foreign trade.

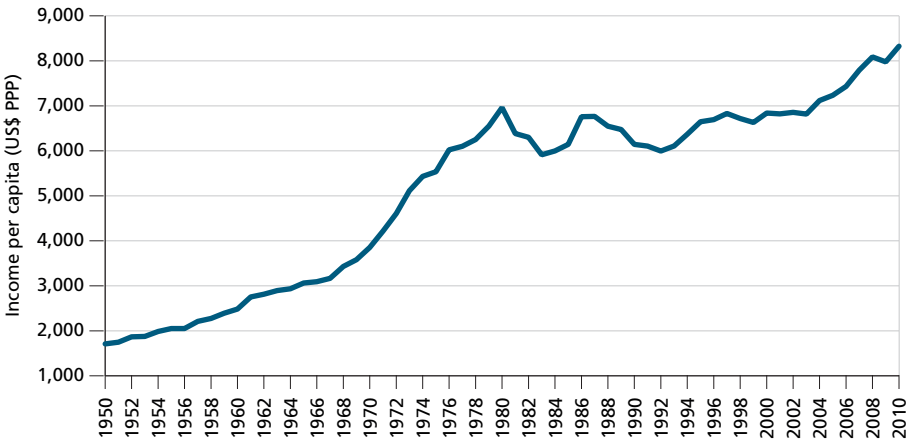
Kharas and Kohli (2011) emphasize that the nature of state intervention in the economy also needs to change. In particular, it should become more decentralized in order to face the task of provision of public services in a more complex economy. The public sector should also implement an efficient regulation of economic activity and engage in partnerships with the private sector.

This paper is organized as follows. Section 2 analyses the evolution of Brazilian productivity in the last decades. Section 3 presents the recent evolution of productivity and Section 4 discusses some of its determinants. Finally, in Section 5 we propose some changes in the Brazilian development model in order for the country to converge to the standard of living of developed economies in the next decades.

2 EVOLUTION OF PRODUCTIVITY IN BRAZIL IN THE LAST DECADES[5]

Brazilian income per capita increased considerably in the postwar period. As shown in graph 1, income per capita increased almost five times between 1950 and 2010. However, most of income growth took place between 1950 and 1980. In this period, income per capita increased four times, expanding at an average growth rate of 4.8% per year. In 1980, however, there was a sharp growth deceleration, and in the next thirty years income per capita increased only 0.6% per year.

GRAPH 1
Evolution of income per capita – Brazil (1950-2010)



Source: Penn World table 7.1.

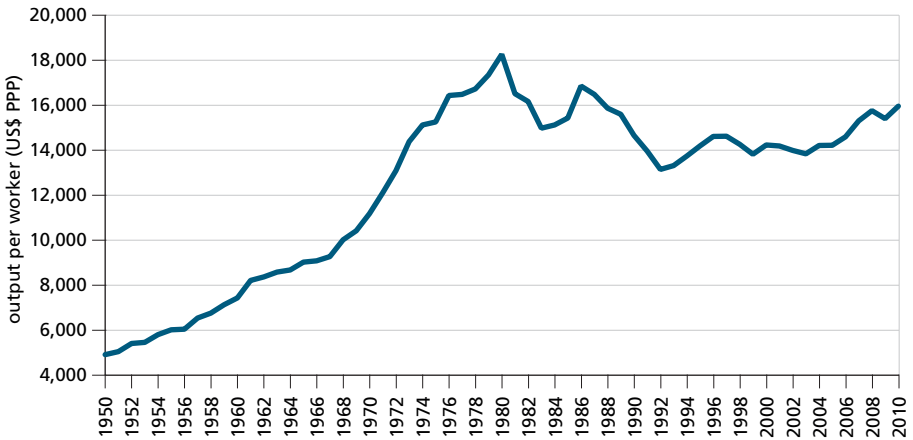
There are, however, important variations within each period. During the 1950s, per capita income increased 3.8% per year, but the growth dynamism ran out of steam in the first half of the 1960s. In the sub-period 1968-1973, per capita income increased 8.3% per year, characterizing the so-called Brazilian economic miracle. Between 1973 and 1980, the growth pace decelerated but remained high at 4.5% per year.

5. See Veloso *et al*. (2013) for an analysis of the Brazilian development experience in the postwar period.

The growth trajectory between 1980 and 2010 was also uneven. Between 1980 and 1992, income per capita fluctuated considerably, and at the end of the period it was 14% below its initial value, which corresponds to an average annual decline of 1.2%. This process was reversed between 1992 and 2003, when there was an average annual expansion of 1.1%. In 2003, however, income per capita was still 2% below its level in 1980. Between 2003 and 2010, there was an acceleration of income per capita growth to 2.9% per year, which represented an accumulated increase of 22% throughout this sub-period.

As shown in graph 2, the trajectory of output per worker was similar to income per capita. Between 1950 and 1980, labor productivity increased 4.5% per year. Between 1980 and the early 1990s, productivity declined, followed by stability until the beginning of the 2000s. Between 2003 and 2010, there was a 2% acceleration growth in productivity per year.

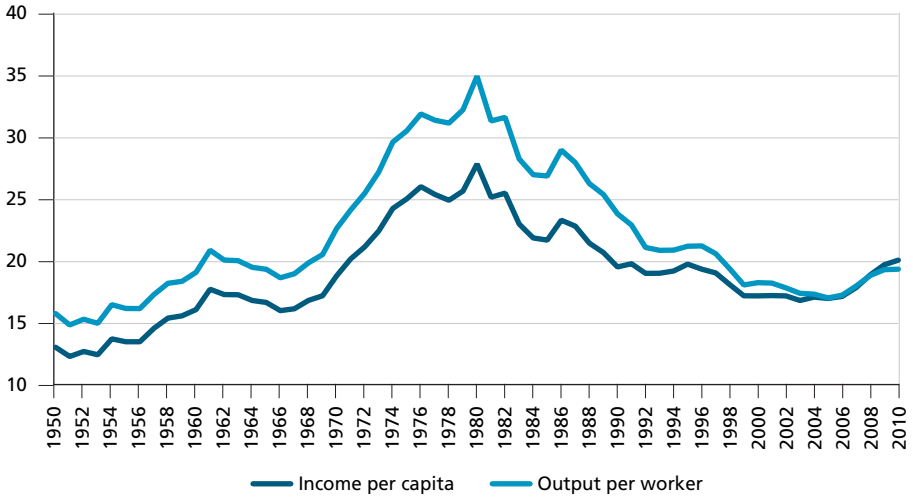
GRAPH 2
Evolution of labor productivity – Brazil (1950-2010)



Source: Penn World table 7.1.

When we compare the performance of the Brazilian economy with the United States, we observe a period of convergence before 1980, followed by divergence (graph 3). Specifically, between 1950 and 1980 Brazilian income per capita increased from 13% to 28% of the United States, whereas labor productivity increased from 16% to 35%. Due to the slowdown of the Brazilian economy, both income per capita and labor productivity declined in relative terms in the following decades, stabilizing around 20% in the second half of the 2000s, which corresponds to the relative levels in the beginning of the 1960s.

GRAPH 3
Evolution of income per capita and labor productivity of Brazil relative to the United States (1950-2010)
(In %)



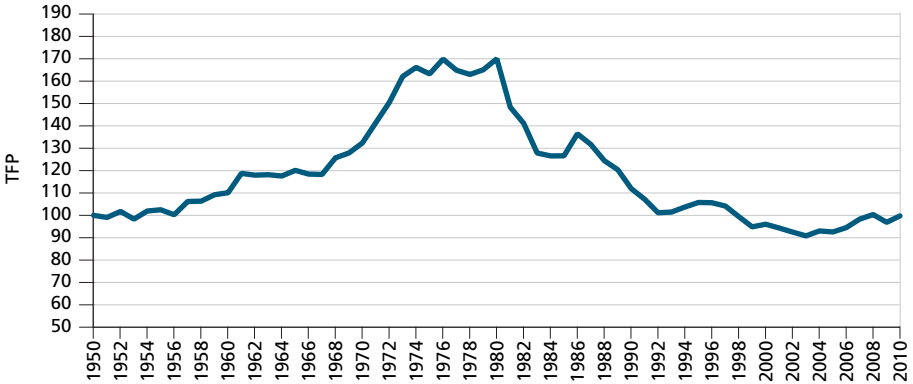
Source: Penn World table 7.1.

Labor productivity growth depends on the accumulation of physical capital (machines, equipment and construction), human capital (education) and the increase of total factor productivity (TFP). TFP is a measure of aggregate efficiency that includes technology and the efficiency of factor allocation among firms.

Graph 4 shows that the evolution of TFP in Brazil is similar to the one observed for labor productivity.[6] Between 1950 and 1980, TFP increased 1.8% per year. During the "economic miracle", between 1968 and 1973, TFP growth jumped to 5.2% per year. Between 1973 and 1980, TFP remained stagnant, despite the growth in labor productivity. In the early 1980s there was a collapse in TFP, which fell at a rate of 4.2% per year between 1980 and 1992. In the period 1992-2003, there was a reduction in the rate of TFP decline (-1.0% per year). Since 2003, there was a reversion in the trajectory of TFP, and it increased 1.4% per year until 2010.

6. For more details about the methodology used to compute TFP, see Ferreira *et al*. (2008) and Ferreira *et al*. (2013).

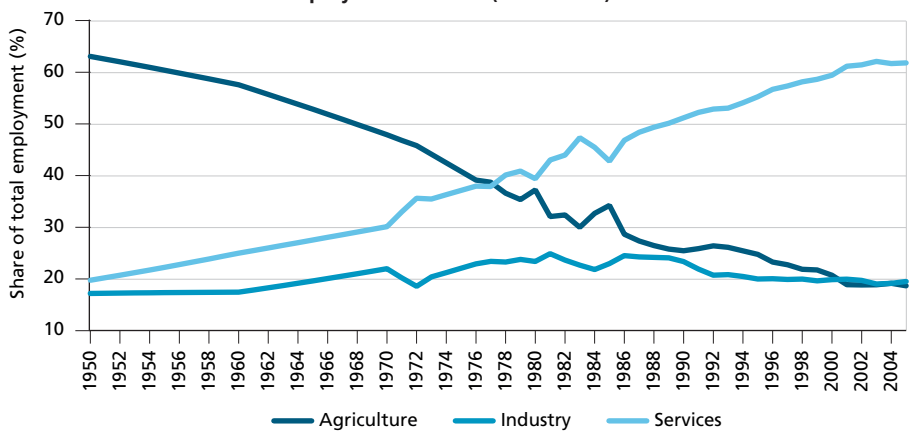
GRAPH 4
Evolution of TFP – Brazil (1950-2010)



Source: author calculations based on Penn World table 7.1 and Barro and Lee (2010).
Obs.: 1950=100.

In the early stages of development, it is possible to obtain significant productivity gains by transferring workers from low-productivity sectors, such as traditional agriculture, to high-productivity activities, such as manufacturing. Graph 5 documents this structural transformation in Brazil. In 1950, the share of workers in agriculture corresponded to 63% of total employment, whereas the industry and service shares were 17% and 20%, respectively. Over time, the labor force moved from agriculture to industry and services. In 1980, the labor share in services had increased to 39%, whereas industry's was 23%. The process of structural transformation continued after 1980, and in 2005 the labor share in the service sector corresponded to 62% of the labor force, in comparison to little more than 18% in agriculture and 19% in industry.

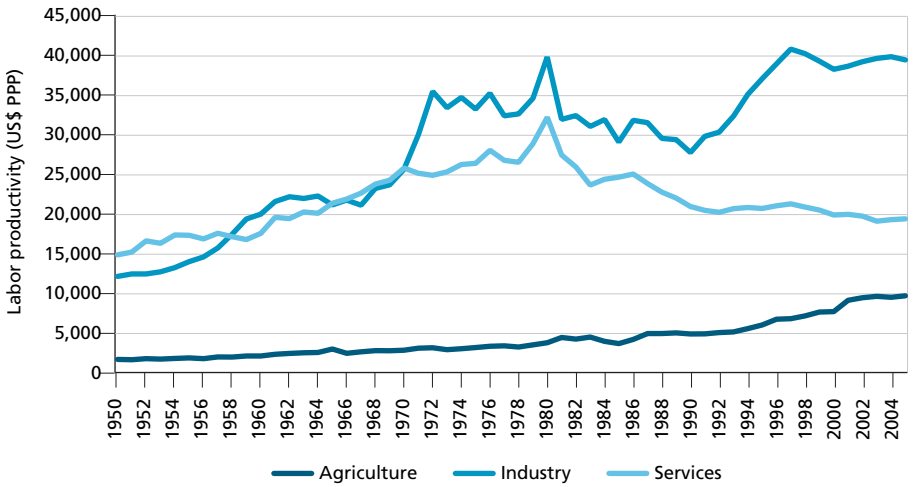
GRAPH 5
Evolution of sectoral employment – Brazil (1950-2005)



Source: author calculations based on Timmer and de Vries (2009).

Graph 6 shows that there were also significant changes in sectoral productivity between 1950 and 2005. Throughout the period, labor productivity in agriculture was always below productivity in industry and services. For instance, in 1950 productivity in agriculture corresponded to 15% and 12% of industry and services productivity, respectively. Between 1950 and 1980, productivity growth was high in the three sectors. However, in the 1980s there was a sharp decline in services productivity, followed by stability in the 1990s. Industry productivity also fell in the 1980s, but it increased significantly in the 1990s. Between the end of the 1990s and 2005 it was stable.

GRAPH 6
Evolution of sectoral productivity – Brazil (1950-2005)

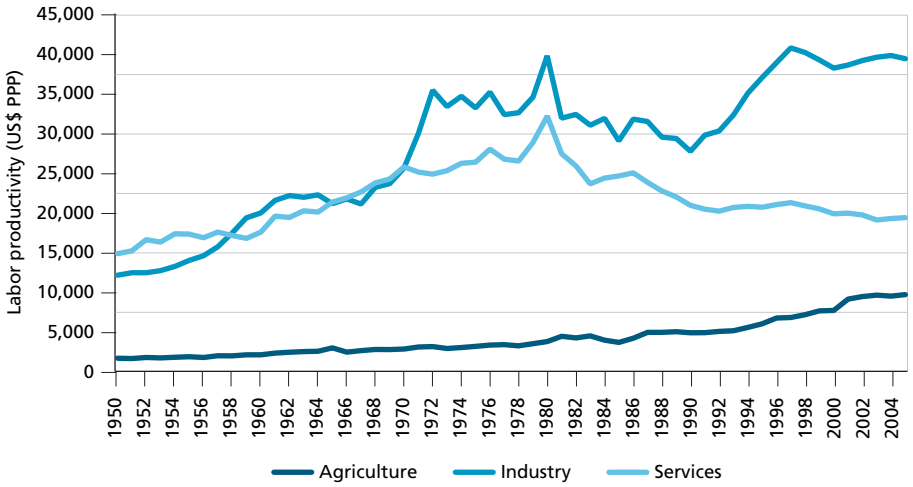


Source: author calculations based on Timmer and de Vries (2009).
Obs.: the data on sectoral productivity from Timmer and de Vries (2009) are expressed in national currency at constant prices and were converted to purchasing power parity dollars.

3 RECENT EVOLUTION OF PRODUCTIVITY

Graph 7 presents the recent evolution of labor productivity in Brazil. After a period of stagnation between 1993 and 2003, productivity increased significantly until 2008. Due to the international financial crisis, it declined in 2009, but increased significantly in 2010. Since then, however, it has only had a modest increase.

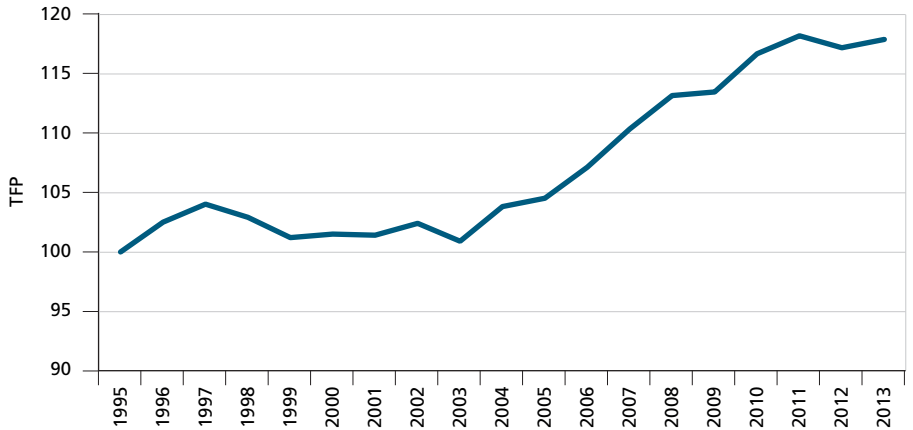
GRAPH 7
Recent evolution of labor productivity – Brazil (1995-2013)



Source: Barbosa Filho and Pessôa (2013).
Obs.: 1995=100.

Graph 8 shows the recent evolution of TFP in Brazil. Between 1995 and 2003, TFP was relatively stable. Between 2003 and 2008, there was a significant acceleration, followed by stability in 2009 and an increase in 2010. Since 2011, however, TFP stagnated.

GRAPH 8
Recent evolution of TFP – Brazil (1995-2013)



Source: Barbosa Filho and Pessôa (2013).
Obs.: 1995=100.

As displayed in table 1, the growth rate of labor productivity increased from 0.2% per year in 1995-2003 to 1.3% per year in 2003-2009. However, the variation of productivity growth was not homogeneous among sectors. Agriculture was the fastest growing sector throughout the whole period, but it decelerated from 5.4% per year to 3.4% between the two sub-periods. Manufacturing productivity had a modest increase in 1995-2003 and declined 1.8% per year in 2003-2009.

On the other hand, Financial Intermediation had a strong acceleration, from 0.3% per year to 7.9% per year. Retail productivity, which had declined at a rate of 2.3% per year in 1995-2003, increased 2.7% per year in 2003-2009. Construction productivity fell 2.1% per year in the first sub-period and was stable in the second.

Summing up, there was a significant acceleration in labor productivity growth in sectors related to credit, such as financial intermediation, retail and construction. The increase in productivity growth in other services should also be mentioned, however, the average growth rate of services productivity is still low. This is an important bottleneck for the improvement of aggregate productivity growth, since the bulk of the labor force is employed in the service sector.

TABLE 1
Sectoral productivity growth in Brazil

Sectors	1995-2003 (%)	2003-2009 (%)
Agriculture	5.4	3.4
Extractive industry	4.6	0.9
Manufacturing	0.2	-1.8
Construction	-2.1	0.0
Public utilities	2.1	1.7
Retail	-2.3	2.7
Financial intermediation	0.3	7.9
Public administration, health and education	-0.1	-0.8
Other services	-0.6	0.7
Total	**0.2**	**1.3**

Source: National Accounts.

To conclude this section, we present in table 2 a comparison of TFP relative to the United States for Brazil and selected countries. Brazilian TFP corresponds to only 50% of US TFP, which is higher than China (39%) and India (42%), similar to Russia (52%) and a little smaller than South Africa (56%). Relative TFP is higher in Chile (63%) and Mexico (65%), even though it is still far from the technological frontier. Despite its extraordinary growth in the last decades, South Korea´s TFP has not yet converged to the US.

TABLE 2
TFP relative to the United States (2010)
(In %)

	TFP relative to the United States
Brazil	50
China	39
India	42
Russia	52
South Africa	56
Chile	63
Mexico	65
South Korea	70

Source: author calculations based on Penn World table 7.1 and Barro and Lee (2010).

This evidence indicates that TFP growth should be a central element of Brazil's growth strategy in the next years. However, in order to design effective policies, it is necessary to understand the reasons for the low productivity of the Brazilian economy.

Recent research has shown that inefficiencies in the allocation of production factors among firms have a strong impact on aggregate TFP. Hsieh and Klenow (2009) show that manufacturing TFP in China could be increased by 115% if factors were allocated efficiently among firms. In India, the potential increase in TFP is 128%.

Inefficiency in factor allocation can also explain a significant portion of low TFP in Latin America. According to Pagés (2010), a reallocation of capital and labor from less productive firms to more productive firms may increase manufacturing TFP in the region by 60%. The magnitude of productivity increase varies among countries. Whereas in Chile TFP may increase by 50%, the potential productivity growth in Mexico is 100%.

One of the main symptoms of inefficiency in Latin America is a proliferation of small firms with very low productivity, especially in the service sector. Pagés (2010) argues that the potential increase in TFP in the service sector is even higher than in manufacturing. For instance, a better allocation of factors among firms could increase retail productivity in Mexico by 260%.

In the case of Brazil, Ferraz and Monteiro (2009) show that the elimination of inefficiency in factor allocation among firms could increase TFP in manufacturing by 49%. This calculation underestimates the potential increase in productivity, since in Brazil there is only available data for firms with at least thirty employees. The studies for other Latin American countries discussed in Pagés (2010) use data

for firms with ten or more employees, which allows for the inclusion of small firms with very low productivity. In the service sector, there is an even greater potential for TFP increase. According to de Vries (2009), the potential growth of TFP in the Brazilian retail sector is greater than 200%.

The next step is to understand why the factor allocation among firms is so inefficient in developing countries and, in particular, in Brazil. Loayza and Servén (2010) argue that excessive regulation of the business environment is an important determinant of inefficient factor allocation. This happens because excessive regulation creates barriers for entry of more productive firms in the market, making it more difficult for low productivity firms to exit.

Hence, policies that reduce excessive business regulation may contribute to increase TFP. With this goal in mind, the next section analyses the business environment in Brazil.

4 BUSINESS ENVIRONMENT IN BRAZIL

The Global Competitiveness Report 2013-2014 of the World Economic Forum presents competitiveness indicators for 148 countries. The competitiveness of a country is defined as the set of institutions, policies and factors that determine its productivity level.

Table 3 presents the relative position of Brazil and selected countries according to the Global Competitiveness Index. Brazil is in an intermediary position (56), a little worse than Mexico (55) and South Africa (53). According to this indicator, Brazil is more competitive than India (60) and Russia (64), but is less competitive than China (29) and Chile (34). South Korea has high competitiveness (25), which is consistent with its successful development experience in the last decades.

TABLE 3
Global competitiveness ranking (2013-2014)

Brazil	56
China	29
India	60
Russia	64
South Africa	53
Chile	34
Mexico	55
South Korea	25
United States	5

Source: World Economic Forum (2013).

There is great heterogeneity among the different components of the Global Competitiveness Index. In relative terms, the worst performance for Brazil is in the Basic Requirements category, in which the country is in 79th place (table 4). In this category, Brazilian competitiveness is particularly low in the Health and Primary Education pillar (89).

TABLE 4
Global competitiveness ranking – basic requirements (2013-2014)

	Basic requirements	Institutions	Infrastructure	Macroeconomic environment	Health and primary education
Brazil	79	80	71	75	89
China	31	47	48	10	40
India	96	72	85	110	102
Russia	47	121	45	19	71
South Africa	95	41	66	95	135
Chile	30	28	46	17	74
Mexico	63	96	64	49	73
South Korea	20	74	11	9	18
United States	36	35	15	117	34

Source: World Economic Forum (2013).

Tables 5 and 6 present the relative position of Brazil and selected countries in the Efficiency Enhancers category. Brazil's relative position (44) is better in this category, but it is not uniform among its components. For instance, even though the competitiveness derived from the size of the market is high (9), efficiency of the goods market is very low (123).

TABLE 5
Global competitiveness ranking – efficiency enhancers (I) (2013-2014)

	Efficiency enhancers	Higher education and training	Goods market efficiency	Labor market efficiency
Brazil	44	72	123	92
China	31	70	61	34
India	42	91	85	99
Russia	51	47	126	72
South Africa	34	89	28	116
Chile	29	38	36	45
Mexico	55	85	83	113
South Korea	23	19	33	78
United States	1	7	20	4

Source: World Economic Forum (2013).

TABLE 6
Global competitiveness ranking – efficiency enhancers (II) (2013-2014)

	Efficiency enhancers	Financial market development	Technological readiness	Market size
Brazil	44	50	55	9
China	31	54	85	2
India	42	19	98	3
Russia	51	121	59	7
South Africa	34	3	62	25
Chile	29	20	42	42
Mexico	55	59	74	11
South Korea	23	81	22	12
United States	1	10	15	1

Source: World Economic Forum (2013).

Table 7 shows that the relative position of Brazil in the Innovation and Sophistication Factors category (46) is similar to the one in Efficiency. The main deficiency is the lack of engineers and scientists, which may be an important obstacle for innovation efforts.

TABLE 7
Global competitiveness ranking – innovation and sophistication factors (2013-2014)

	Innovation and sophistication factors	Business sophistication	Innovation
Brazil	46	39	55
China	34	45	32
India	41	42	41
Russia	99	107	78
South Africa	37	35	39
Chile	45	54	43
Mexico	55	55	61
South Korea	20	24	17
United States	6	6	7

Source: World Economic Forum (2013).

The Doing Business project of the World Bank measures several dimensions of the business environment. *Doing Business* 2014 presents indicators for 189 countries.[7] Table 8 shows that Brazil does not have a favorable business environment (116th position in the global ranking).

7. World Bank (2013).

TABLE 8
Doing business ranking (2014)

Brazil	116
China	96
India	134
Russia	92
South Africa	41
Chile	34
Mexico	53
South Korea	7
United States	4

Source: World Bank (2013).

The ten components of Doing Business can be classified in two groups: Complexity and Cost of Regulatory Processes; and Quality of Legal Institutions, which are presented in tables 9 and 10. These indicators show that the business environment in Brazil is characterized by high bureaucracy and institutional shortcomings in legal protection of market transactions. In particular, the indicators of starting a business and insolvency resolution show that there are significant barriers to the entry and exit of Brazilian firms in the market. Our relative position is particularly low in the paying taxes indicator (159), which measures the complexity and burden of the tax system.

TABLE 9
Doing business ranking – complexity and cost of regulatory processes (2014)

	Starting a business	Dealing with construction permits	Getting electricity	Registering property	Paying taxes	Trading across borders
Brazil	123	130	14	107	159	124
China	158	185	119	48	120	74
India	179	182	111	92	158	132
Russia	88	178	117	17	56	157
South Africa	64	26	150	99	24	106
Chile	22	101	43	55	38	40
Mexico	48	40	133	150	118	59
South Korea	34	18	2	75	25	3
United States	20	34	13	25	64	22

Source: World Bank (2013).

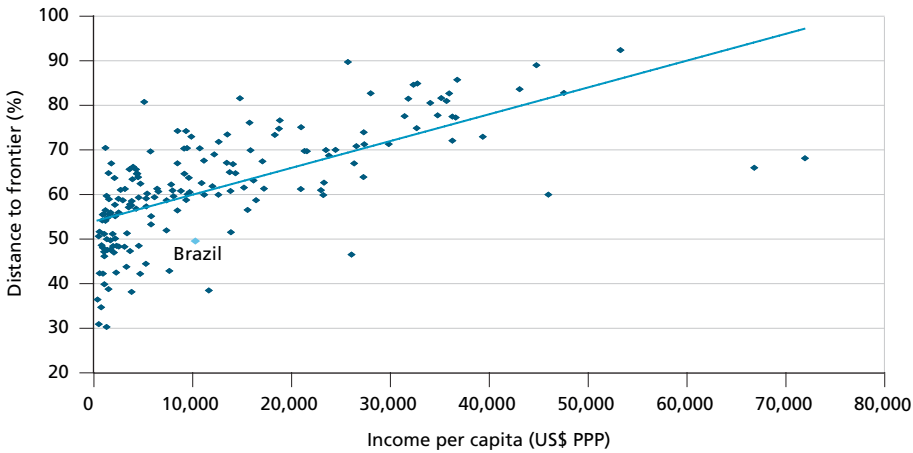
TABLE 10
Doing business ranking – quality of legal institutions (2014)

	Getting credit	Protecting investors	Enforcing contracts	Resolving insolvency
Brazil	109	80	121	135
China	73	98	19	78
India	28	34	186	121
Russia	109	115	10	55
South Africa	28	10	80	82
Chile	55	34	64	102
Mexico	42	68	71	26
South Korea	13	52	2	15
United States	3	6	11	17

Source: World Bank (2013).

Doing Business 2014 also presents a measure of the distance of each country to the frontier of best regulatory practices. The shortcomings of the Brazilian business environment become evident when we analyze the relation between the distance to the frontier and income per capita. As shown in graph 9, the relative distance of Brazil (50% of the frontier) is considerably larger than the one expected for countries with a similar per capita income.

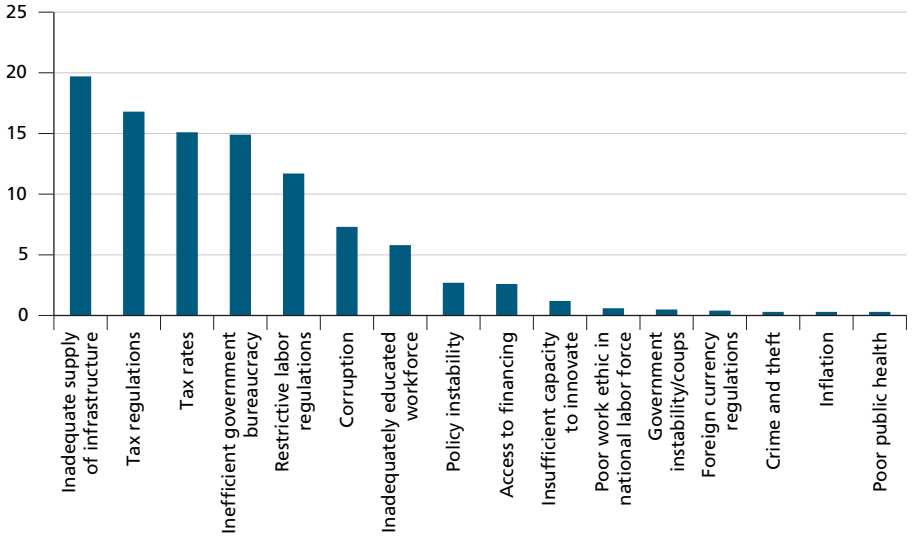
GRAPH 9
Relation between distance to frontier and income per capita (2013)



Source: Doing Business 2013 and World Development Indicators – World Bank.

These objective information about the quality of the doing business environment in Brazil are confirmed by qualitative surveys. The results of a survey with business leaders presented in the Global Competitiveness Report 2013-2014 show that the three main obstacles to doing business in Brazil are inadequate infrastructure, excessive tax regulation and high tax burden (graph 10).

GRAPH 10
Main obstacles to doing business in Brazil – global competitiveness report (2013-2014)
(In %)



Source: World Economic Forum (2013).

5 CONCLUSION

In the postwar period several countries were able to achieve a middle-income status, but few succeeded in becoming developed countries, and were stuck at the so-called middle-income trap. The growth decelerations at the middle-income level are associated with the difficulty in making the transition to a new development model that adapts its economy and institutions to the new challenges and opportunities.

Brazil made significant progress in the last two decades, but the transition to a new development model is still incomplete in several dimensions. In particular, the Brazilian economy has limited capacity to generate innovations, the degree of openness to foreign trade is low, and the infrastructure is deficient. Despite important progress in indicators of quantity of education, the quality of education is still very low. Moreover, as shown in this note, the business environment in Brazil is very unfavorable, despite several reforms. The bureaucratic procedures

are cumbersome, and the tax system is complex and imposes a high burden on firms. There are also shortcomings in the functioning of judicial institutions, which result in insecurity of property rights.

The main challenge for the Brazilian economy in the next decades is to complete the transition to a new development model in the context of important technological and demographic changes. In particular, the new information technologies are intensive in high-skill labor. The use of these technologies has contributed to an increase in inequality in developed countries. To the extent that growth acceleration in Brazil will depend on the adoption of these technologies, the decline in inequality that was observed in the 2000s may be reversed unless adequate education and job training policies are implemented.

Another important factor that will affect policy choices in Brazil is related to the demographic changes that are already in motion, and that will be intensified in the next decades. The decline in the growth rate of working-age population will reduce the expansion of the labor force, which will create difficulties for the growth of gross domestic product and the financing of social security. Moreover, the increasing fraction of old-age individuals in the population will imply a raise in social security expenditures.

Brazilian policymakers will have to design a coherent growth strategy and implement it in a persistent and flexible way in order to deal with these challenges and be able to put the Brazilian economy in a path of convergence to the standard of living of developed countries.

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