

Improving productivity through innovation policy in Brazil

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Introduction

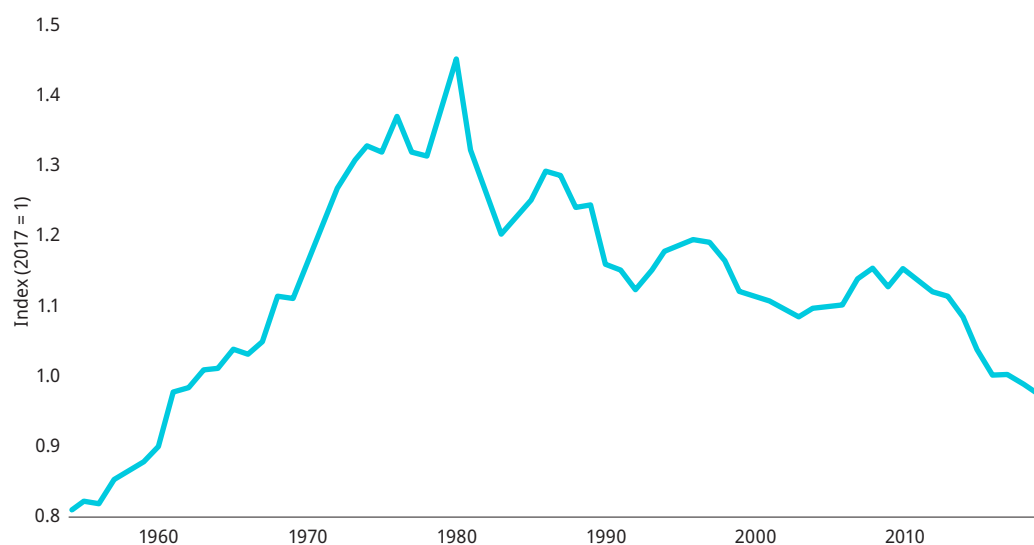
Analyzing the present situation and identifying productivity as a decisive competitive factor requires a concerted effort from governments, policymakers and entrepreneurs. This is the only way to foster a sustainable business environment that can withstand the challenges of the modern world. Society, too, must also take an active role in this process, by committing to become more competitive through innovation.

The case of Brazil

Like other major economies, Brazil is finding it difficult to increase economic productivity, which has gradually declined since 1980 (Figure 8.1). In the case of Brazil there are specific socioeconomic factors in play, mainly the prevalence of informal activities and a high share of unproductive small and medium-sized enterprises (SMEs), which historically have created a structurally heterogeneous economy in terms of productivity.

Previously, Brazil's productivity benefited from having a productive-age population larger than its non-productive one. This demographic bonus has now been exhausted, and productivity growth is dependent on increased worker efficiency. This poses the question of how the aggregate productivity of the economy can be improved in a post-COVID-19 pandemic scenario, with its countless uncertainties about the real economic possibilities of frontier technologies.

Figure 8.1 Total factor productivity in Brazil, 1954–2019



Note: Constant national prices; index, 2017 = 1.

Source: FRED Database, 2022.¹

There is a long-standing persistence in the deterioration of Brazil's productivity. Economic dynamics have changed substantially, especially for large companies. For example, today's factory floor is different from 10 years ago. The flexible specialization that started in the mid-1970s has given way to the Fourth Industrial Revolution's intense autonomous interconnection of materials, equipment and products. The very concept of industry is shifting as borders between sectors have become more fluid. Leading analysts are already talking about a "Second Machine Age."²

There is a consensus that entry into this new era will evolve seamlessly. However, for countries to realize expected gains in productivity, it will be necessary to act proactively to adopt and diffuse new techniques and technologies throughout the economy. This is as true for developed countries as it is for Brazil.

The set of new technologies promising to revolutionize productivity – for example, artificial intelligence (AI) – still needs to go through a series of final developments which depend on the diffusion of numerous complementary assets, for instance, comprehensive 5G communication technology coverage. Thus, the transition from technology hype to tangible productivity impact will depend on the choices made by society. In this respect, it is worth bearing in mind that even revolutionary technologies can fail.

To the extent that there are essential differences in productivity levels between countries, the choices made will also diverge. While the socioeconomic specificities of most developed countries will require the constant adoption of frontier and high-tech innovations, in Brazil, due to current levels of productivity, incremental and already known innovations still have great potential to transform economic activity.

In the search for increased productivity, modern environmental requirements and the preservation of local ecosystems – and the planet itself – are factors that cannot be ignored. Increases in efficiency must be environmentally sustainable. Environmental preservation must be integral to Brazil's growth strategies.

Informality and the “long tail” of low-productivity companies

In Brazil's case, the solution to the productivity challenge will depend on (i) a reduction in informality (both in the number of informal companies and of informal employment); (ii) an intensification of the digital transformation led by large national information technology (IT) companies; (iii) the widespread deployment of “lean” manufacturing practices, and other incremental innovations; (iv) the utilization of existing networks of technical education institutions; and (v) an improvement in the business environment and of the business support network.

There are two categories of informal companies in Brazil: (i) those not officially registered (sometimes having only a single employee) and (ii) those officially registered, but which employ unregistered workers (informal employment). Informal companies are invisible to the state. They have no access to credit or other forms of public support. The absence of such support makes it difficult to procure new machinery and equipment, or even access new production techniques that could increase productivity. Such companies are therefore unable to reap most of the benefits afforded by new banking services or digital transformation innovations. On the other hand, registered companies that employ informal staff cannot train and qualify them, and do not have adequate instruments for encouraging workers to raise productivity. In both cases, volatile circumstances undermine dynamic competitiveness. As a consequence, these two groups of informal companies remain at the margins of the market, unable to benefit from public support or generate additional benefits from industrial or innovation policies.

In Brazil, it is noteworthy that many companies with a low productivity level do, nevertheless, survive. These companies are SMEs and they coexist with big, very productive companies with a solid international competitiveness level. The historical persistence of this large group of less productive SMEs, which often exploits informality (“long tail”³), has, on the one hand, contributed to a deterioration in the aggregate productivity of the economy.⁴ On the other hand, this set of firms is the most responsive to the introduction of those incremental and organizational

innovations associated with lean manufacturing and digital transformation processes. Putting this productivity paradox to one side, the relevance of technical change and incremental innovations for the smallest companies in the Brazilian economy is undeniable.⁵ In fact, many of the innovations brought about by digital transformation processes have the power to reduce informality in economic activity.

Tackling informality in Brazil is central to the development of strategies for increasing productivity.⁶ Official statistics show that more than 40 percent of the employed are working informally (informal employment), most performing activities on their own account. Due to informality and its consequent lack of state support, this was the group most affected by the pandemic.⁷

Continental countries like Brazil are also affected by a geographical distribution of informality. Fragmentary evidence shows a positive correlation between regions where informality is more prevalent and lower productivity. Furthermore, this correlation also occurs where there is a high concentration of income and a lower level of wealth. In Brazil specifically, the empirical evidence for a relationship between informality and productivity still needs to be carefully studied. A lower percentage of informality is observed in the South, South East and Midwest, with higher rates in the North and North East. The same applies to productivity: higher in the South, South West and Midwest regions; lower in other areas.⁸ Therefore, when addressing low productivity in Brazil, regional differences representing distinct historical processes and sectorial specializations within the country need to be taken into consideration.

The informality prevalent in the service sector, and even more so that prevalent within the transportation industry, is exploited by formal companies, which frequently hire workers with no legal registration. These two sectors are among the least productive in Brazil. Of course, the higher the formalization requirements are, the lower the incentive for firms to comply. Therefore, an adequate business environment without excessive documentation and unnecessary demands for approval is fundamental to securing a reduction in informality. As we will explain, this is a pressing concern for Brazilian society.

Opportunities: Business environment, lean manufacturing and digital transformation

Business environment

There is cause for optimism. Brazil's recent concern with the business environment, the positive results of productivity-increasing programs, a robust indigenous IT industry, the existence of a vast network of institutes specializing in technical education and the recent release of public resources by the National Fund for Scientific and Technological Development (FNDCT) are all positive vectors needing exploration.

In 2021, Brazil passed two important laws: the Business Environment Law (14, 195/21) and the New Legal Framework for Startups (Complementary Law 182/21). In addition, in 2016, after an intense learning process using trial and error, the country's Innovation Law (13, 243/16) was completely reformulated. These regulatory changes extend risk-sharing between the State and companies with respect to R&D projects and transaction costs, while providing greater legal certainty and promoting minor changes designed to facilitate trade.

Of course, changes to legislation are not enough in themselves to address all the challenges companies face in their commercial activities. One such obstacle is the length of time on average it takes to deal with taxes. This is a significant drain on the resources of companies (primarily small ones), making it difficult to operate in the Brazilian market.⁹ Additionally, most econometric impact assessments of public R&D programs show a limited crowding-in effect and, sometimes, even a crowding-out effect.¹⁰ Due to this, currently, there is a weak causality between R&D investment and productivity. Nevertheless, for the first time, the business environment is an important topic on the public innovation agenda, leading to different public actors becoming engaged in the debate and proposing alternatives. In this context, reform to taxation in Brazil is now an item of discussion.

With regard to manufacturing, the success of the More Productive Brazil Program stands out, the outcomes of which show incremental changes of a low technological complexity to have a great potential for efficiency gains (Table 8.1).¹¹

Table 8.1 Average impacts of the More Productive Brazil Program, 2018

Average productivity increase (%)	Average work movement reduction (%)	Average re-work reduction (%)	Time for return of investment (months)	Return on investment (ratio)
Production capacity increased by reducing waste and/or increasing efficiency in the productive processes in which the tool was applied	Reduction of unnecessary displacements through reorganization of processes and payouts, prioritizing activities that add value	Indexes of reduction in rejected and discarded materials resulting from processing failures during the manufacturing process	Average estimated time in which the total investment for the service (R\$ 18,000) is recovered by the company, derived from improvements implemented	Average annual gain estimated per company, on total investment (R\$ 18,000) in the consultancy service due to improvements implemented
55.12	60.60	64.82	5.05	11.11

Source: CEPAL *et al.* (2018).

Note: R\$ = Brazilian Real (BRL).

Lean manufacturing

Brasil Mais Produtivo (More Productive Brazil Program) was a federal program focused on SMEs designed to support productivity. Its objective was to apply low-complexity techniques associated with lean manufacturing at production factories, thus, very distant from current discussions on the Fourth Industrial Revolution or other similar topics discussed widely in developed countries.¹² As noted by an official evaluation, the program's impact went beyond an increase in labor productivity to affect total factor productivity. This example demonstrates that it is still possible to implement efficiency-enhancing strategies without the need for high technology, or even the absorption of frontier technologies from abroad.

Digital transformation

Digital transformation has the power to reduce informality or semi-formality and, at the same time, boost production efficiency in Brazil's economy as a whole. Brazil has built a robust "industry" of IT services that today consists of a number of important global players that stimulate productivity growth in other sectors. Together with a group of leading companies in manufacturing, they form the dynamic core of Brazil's economy.

The intense digital transformation processes underway in Brazil have been conducted by the country's global IT companies with encouraging results, including having reduced informality in specific cases and introduced many novel processes and technologies into the banking system. An example of this is TOTVS, the biggest information technology company in Brazil. Throughout its journey, TOTVS has always believed in supporting SMEs through its products and services. TOTVS views this approach as providing the driving force for developing new opportunities, and for safeguarding a plan that defines its national aspiration for Brazil to have a business-friendly environment (work, taxes, education and legislation) and a clear path to productivity.

Services provided by large IT companies like TOTVS have the power to disseminate methods, techniques, software and artifacts that increase productivity for the economic activities that utilize them. These companies provide the general-purpose technologies most relevant to Brazil's economy. Therefore, public support for IT companies is fundamental to growing the productivity of many small and micro-enterprises. Given that they involve new management models, connectivity, novel processes, and even data analytics, digital transformation processes are by no means trivial and require a substantial change in a firm's behavior, especially when that firm is small and disconnected from international technological flows. Such processes are highly impactful in increasing the efficiency of an operation. However, such a change is far harder to implement either within informal firms or those with informal employees.

An influential MIT study has already demonstrated the comparative advantages for firms starting this process, whose relevance has intensified with the pandemic and the consequent need for social distancing.¹³ Many small businesses in Brazil survived this period solely due to an urgent digital transformation. Brazil's long-standing banking competence, which emerged after the lessons learnt from past hyperinflation, combined with an innovation network based on federal and state public universities, has led to the creation of one of the most potent startup ecosystems currently exploiting the global financial market. More than 770 FinTechs existed in Brazil in 2017. Of these, 35 percent had been created in that same year. GovTech (small technology-based companies that exploit the government procurement and public services market) also stand out in this ecosystem. The rapid and pervasive diffusion of internet banking and FinTechs in Brazil has altered the banking paradigm, by introducing thousands of customers into the system and reducing banks' physical presence to a minimum.¹⁴

The transformative power of startups likewise positively impacts the agro-industrial sector, offering numerous complex solutions to improving already highly productive Brazilian agriculture. A majority of the 300 AgTechs identified in 2018 worked in the area of the internet of things (IoT) and hardware. This has led to the emergence in Brazil of the concept of precision agriculture, which aims for productivity gains at very detailed production levels. The agro-industrial sector has also benefited from significant productivity gains. In this sector, digital transformation has occurred mainly through the introduction of management tools for the end-to-end control of agricultural production. Thus, even this most traditional of activities now depends on the introduction of incremental IT innovations to sustain productivity.

Activating the technical education system

An expansion of digital transformation processes and the startup ecosystem will be dependent on a robust professional qualification policy in which the workforce is trained to incorporate innovations in the value chain on a consistent basis. In this context, labor-enhancing technologies should be prioritized. The professional qualification policy should be redesigned in such a way as to stimulate innovative professional learning (including teaching methods) that is directly responsive to sectoral demands. It will also need to ensure that workers can migrate from informal to more highly productive formal employment. This needs to be accompanied by a revitalization of manufacturing and an intensification of IT services.

Brazil already has a vast network of public and civil society technical education institutions that can be quickly activated by well-calibrated public policies. Brazil today has more than 60 federal technical education institutes alone. An additional 580 fixed units operate under the National Service of Industrial Learning (SENAI). Together, these institutions go beyond professional training to work in carrying out metrological tests and R&D on-demand, as well as extension activities to support management. A modern and bold training policy is essential in facilitating the adoption of incremental innovations, whether associated with lean manufacturing practices or digital transformation, and enhancing the quality of a company's management. The effects of professional qualification tend to be greatest in small, low-productivity enterprises.

Thanks to a trial and error process, Brazil has a broad mix of policies directed at both the demand and supply sides of the economy administered through modern public policy instruments with guaranteed funding from the National Fund for Scientific and Technological Development (FNDCT). Historically, FNDCT resources have been employed in support of scientific and academic activity. However, over a decade ago, these same resources began to be put into entrepreneurial innovation activities. Therefore, with the substantial increase in FNDCT's capacity, it will be essential that funding for scientific activities guided by curiosity is maintained and also support expanded for those activities that increase a firm's productivity.

These resources can, in part, be used to enable a network of technical qualification institutions to share facilities in order to support innovation generation and value addition in micro, small and medium-sized enterprises (MSMEs). In this respect, strategies related to basic industrial technologies will be essential, especially for smaller manufacturing companies with low traceability of inputs and a lack of information about the quality of their products.

Finally, it is necessary to ensure an adequate business environment, but, above all, that there are incentives and support for a better quality of management for companies. Brazil needs to encourage its business support institutions to promote a delicate balance between competition and cooperation. Firms that comprise the “long tail” of low productivity need an environment that stimulates rather than inhibits. There needs to be a concatenation of efforts so that different policies act in favor of such firms. To achieve this, Brazil has strong institutions in place, such as the National Bank for Economic and Social Development (BNDES), the Brazilian Innovation Agency (FINEP), the Brazilian Industrial Research and Innovation Company (EMBRAPPII), the National Institute of Metrology, Quality and Technology (INMETRO), in addition to the entire Civil System (SISTEMA S). These institutions need to be organized and stimulated in order for them together to reverse the slowdown in productivity growth. Hence, access to credit, ease of tax payment, contractual security, connection with technological developments, economic infrastructure and environmental preservation are all systemic elements to be considered in any policy tailored to increasing productivity in Brazil.

Enhancing productivity in Brazil: prioritizing SMEs with low productivity

Considering that all these inputs and opportunities are already present, it should be possible for Brazil to begin the process of disseminating and implementing mature technologies. This needs to be sufficient to give an initial impetus to greater productivity, especially in SMEs and the large group of informal companies.

Of course, increasing productivity in Brazil will not be a simple task. It will require a joint effort and precise coordination between environmental, technological and professional qualifications, and digital transformation policies. They must be designed to support sophisticated economic activities and formalize a large part of the informal economy (informal companies and informal employment).

At the same time, policies should take into consideration regional disparities across the country, as well as the factors limiting the productivity of small companies, mainly with regard to obtaining credit, the qualification of the workforce and the management techniques employed.

Thus, through the diffusion of incremental innovations, it ought to be possible to grow the aggregate productivity of the economy. For this strategy to work, it will be necessary to prioritize support to those small firms operating very close to informality (informal companies and informal employment in formal companies) and which at present constitute a long tail of low-productivity companies.

Notes

- 1 Federal Reserve Economic Data, 2022.
- 2 Brynjolfsson and McAfee, 2014.
- 3 A graphical representation of the distribution of productivity by numbers of firms. It refers to a large number of companies with low productivity.
- 4 Barbosa Filho and Correa, 2017; Bonelli *et al.*, 2017.
- 5 Brynjolfsson *et al.*, 2019.
- 6 Rodrik, 2014.
- 7 Belandi, 2022.
- 8 FGV IBRE, 2017.
- 9 Russi, 2020.
- 10 De Negri and Rauen, 2018.
- 11 CEPAL *et al.*, 2018.
- 12 CEPAL *et al.*, 2018.
- 13 Capgemini Consulting, 2017.
- 14 McAfee and Brynjolfsson, 2017.

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