

The Role of Industrial Policy in the BRIC Economies: A Case Study of India, Brazil and China

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ABSTRACT

After the very heated debate on industrial policy from the late 1970's to the mid-1980's prompted by the success of the East Asian industrial policy practices, the debate collapsed into three decades of neglect. Unexpectedly, however, industrial policy is back on the economic policy agenda and starting to be conceived through a systematic approach that extends beyond market failures. This article contributes to the discussion as it attempts to navigate through the industrial policy debate whilst acknowledging its contribution to the development of emerging market economies, more specifically, India, China and Brazil of the BRIC. All of the BRIC economies, at some stage of their industrialisation have engaged with inward looking policies, more specifically, import substitution policies. This paper, whilst following a critical review format, studies these cases and seeks to identify the implications that the debate, modified in the light of its recent comeback, could have on them.

Introduction

Since the 18th century, the debate surrounding industrial policy has been one of the most important in the political economy of development. Most economies, developed and developing have engaged with industrial policy at some stage of development. And whilst this has in many cases resulted in successful industrial upgrading (for example – the East Asian tigers), there have additionally also been multiple examples where industrial policy was inefficient in yielding any gains.

Industrial policy has been defined most famously by Pack and Saggi (2006: 2) as “basically any type of selective intervention or government policy that attempts to alter the sectoral structure of production toward sectors that are expected to offer better prospects for economic growth than would occur in the absence of such intervention.” Simply put, industrial policy is characterized as a strategic effort steered by the state to encourage economic transformation.

Whilst discussing the success of state intervention, Benhassine and Rallaband (2009) suggest that industrial policy is most required in economies with a low-income and an undiversified industrial base. Amidst the discussion of ‘new’ industrial policy arises the implication of ‘soft’ industrial policy, in which the state and private sector “collaborate on interventions to increase productivity.” Harrison and Rodriguez-Clare (2010) suggest that there is an important role for this in the developing debate on industrial policy. Justin Lin (2012) suggests that the state could provide a facilitating role in identifying and help develop industries around comparative advantage along with markets and firms leading the technological innovation. Stiglitz and Greenwald (2014) argue that the major difference between developed and developing countries is their gap in knowledge, which can only be diminished by an industrial policy that “encourages learning and creates a learning society.” Pack and Saggi (2006) argue that the real reason why industrial has failed at some implications is that there are less counterfactuals that it works. “Consider the argument that Japan’s industrial policy was crucial for its success. Since we do not know how Japan would have fared under *laissez-faire* policies, it is difficult to attribute its success to its industrial policy. Maybe it would have done still better in the absence of industrial policy or maybe it would have done much worse.” (Pack and Saggi, 2006: 2).

Cherif and Hasanov (2019) claim that whilst this debate has taken place over the years, most countries, whether intentionally or not, have engaged with some sort of industrial policy. Ha-Joon Chang has argued that policies favour certain industries by choosing to build a certain type of infrastructure or encouraging a certain way of education. Many countries have been trying to explicitly promote certain industries - tourism, finance and logistics, even if these policies aren't called industrial policies, they are rather industrial in nature.

Those sceptical of industrial policy argue of the multiple government failures faced in the past pursuits of industrial policy, important information irregularities and a potential inability to overcome them and in identifying targets and tools to achieve goals determined by the state.

Before the COVID-19 pandemic itself, an industrial policy 'rejuvenation' (Stiglitz et al., 2013) or 'renaissance' (Mazzucato et al., 2015) was apparent.

The reasons for this, as stated by Ferrannini (2021) are firstly, a recognition that industrialisation processes are essential for the transformation of an economy, and a growing recognition of the relevance of proactive industrial policies to encourage the desired structural changes by upgrading economies beyond simply freeing up markets.

Another reason for this is posed by the economic downturns after the financial crisis and the great recession, that have partially pushed back the free-market approach to industrialization.

Looking at industrial policy academically, as clearly stated by Chang and Andreoni (2020: 2) - "most economists are at best, sceptical and at worst hostile toward industrial policy." They go further on to say that whilst many neoclassical economists have sided in favour of industrial policy, they do not deviate from the neoclassical framework, hence often end up distancing themselves from the traditional industrial policies, with an emphasis on tariff protection.

Looking at it globally, industrial policy has been very widely discussed and implemented, (this will be shown later in the paper) including and primarily in the US, several OECD countries and EU member states, as well as in the Asian tigers and BRIC economies (Brazil, Russia, India, and China), whose recent comparative success has given credence to the role of the government in economic development.

From 1960 to 2014, less than 10% of economies have reached high income status. In contrast to the Asian miracles, the others that made it either discovered large quantities of oil or benefitted from joining the European union (Cherif and Hasanov, 2019).

Another element of industrialisation in developing economies, going hand-in-hand with industrial policy, is innovation. It is widely acknowledged that a major source of cross country income variations are differences in productivity levels and that technological change is a major driver of productivity growth. Fu et al., (2010) uses this to justify that technological innovation is a key element of industrialisation and catching up in developing countries.

Looking at the main subjects of this critical literature review – Brazil, India and China, the three countries together account for 40% of world total population, 13% of world total income (2007), and their incomes are rising at a speed similar to that of Japan and Korea's during their take off periods (World bank, 2007). The emergence of these economies have important implications in terms of not only economic impact, but also in terms of their experiences in guiding and promoting the growth process. These countries have opened up to international trade and investment to different degrees and with different speeds and strategies, while at the same time they've all put an increasing emphasis on indigenous knowledge creation and innovation, again to different lengths and through varying sources. Experiences from these emerging economies may provide valuable lessons for other developing nations with regards to industrial, technological and trade policies (Fu et al., 2010).

Degaut and Meachan (2015), Di Maio (2015), and Dominguez Lacasa et al. (2019) discuss China's dominance in the group dynamic, and how it poses major challenges to the BRIC integration. In a decade, China's contribution in manufacturing value added rose from about 10% (2005) to about a quarter of the world total in 2017. The shares of the rest of the BRIC are either growing less rapidly (India) or are stagnant (Russia and Brazil). India's share in both GDP and manufacturing value added has overtaken that of Brazil and Russia (Santiago, 2020).

In 2017, the BRIC represented 23.3% of global GDP, a threefold increase from 1990 (7.9%). Similarly, they contributed a third of total global manufacturing value added in 2017. China mainly drives the dynamics in terms of both total GDP and manufacturing value added.

The BRIC economies have achieved drastic structural change and poverty reduction over the last 30 years, albeit to different degrees. Observing them through their developmental stages offer valuable insight to low and middle-income countries desiring structural and economical change, including the growth of ‘dynamic’ sectors, such as manufacturing or market services (Haraguchi et al., 2015).

“China is expected to overtake the USA as the largest economy in the next two or three decades—if not sooner. India is expected to move to the third position by 2050. Brazil is expected to have a larger economy than Germany by 2036 and to be the world’s fifth largest economy by 2050 (Wilson and Purushothaman 2003).” (Haraguchi et al., 2015). Combined, the economic size of these three countries currently exceeds US\$4.7 trillion in nominal GDP terms, and US\$20.7 trillion in 1990 PPP adjusted GDP. Taken together, therefore, the BRIC is in economic terms already larger than the USA and the European Union.

In the following section, I will proceed to discuss some of the central debates on industrial policy, entailing references to their use and impact on developmental models. Following this, the third section will be a case study of the BRIC industrialisation models, centred around India and Brazil. This will entail a case by case comparison between all four countries, however will somewhat deemphasize Russia due to unavailability of data. The last section of this paper will be the Conclusion, which will summarize the paper and emphasize the earlier mentioned, more important takeaways.

Practical and Theoretical Debates on Industrial Policy

Since the 2008 financial crisis, many leading economies have taken measures to value and strengthen their industrial policies (Chang and Andreoni, 2020). The USA and Germany are a couple of the most prominent examples. After the China-driven commodity boom, developing countries that had dismantled their industrial policies during the 1980’s and 1990’s are realising that they need industrial policy in order to upgrade their economies. Many middle-income countries of Asia and some of Latin America now discuss industrial policy as a tool to overcome the ‘middle income trap’. The oil economies of the gulf region talk about industrial policy as a tool to achieve economic diversification. The African economies also discuss it as a tool to surmount their poverty.

Looking back at some of industrial policy’s greatest successes, there was no general ‘East Asian model’ for successful industrial upgrading, each country had a different model and pursued different paths and different strategies. The contrast between the success of industrial policy in the tigers and its failures elsewhere suggests that there is no justification for the general Washington consensus case against interventions. Lall (2004) suggests that it shows instead that the outcome depends not on whether governments intervene but how they do so.

In the next few subsections, we will discuss some of the theoretical debates in industrial policy whilst showcasing their significance and uses through development models.

Neo-liberalism

Around the late 1970’s, a new implication was made to the industrial policy debate: neo-liberalism. This promotes a free market, laissez-faire economy that captured global thinking.

For Nobel laureate Gary Becker (1985), “the best industrial policy is none at all”. For Lawrence Summers, former chief economist of the World Bank, Treasury Secretary of the United States, presently professor of economics at Harvard, government “is a crappy VC [venture capitalist]” (quoted in Nocera 2011). For The Economist magazine, “the government has a terrible record of picking winners” (2011). “The choral force says that ‘industrial policy’ is

‘government picking winners’; and everyone knows that governments cannot pick winners.” Wade (2015) summarises.

The recent ‘rejuvenation’ of industrial policy that has taken place is a departure from the neo-liberal industrialisation model that has become a standard policy for economic reforms since the late 1970’s (Ferrannini, 2021). Chang and Andreoni (2018) point out, that since the 2000’s, justifications of industrial policy arguments are simply “rather clumsy translations of old ideas by non-neoclassical schools into the Neoclassical language”, having led to many drawbacks and limitations in the mainstream debate.

“Neoliberal economists accept that there is a role for the state, essentially to provide basic public goods. They also now accept that it has a role in providing non-selective or functional support for education, health and infrastructure.” (Lall, 2004: 10). Selectivity here is, simply put, the support of particular firms or technologies; crudely put, it is ‘picking winners’, which became the mainstream area of interest for the industrial policy debate in the 1990’s.

Lall (2004) claims “The reason that neoliberalism finds it difficult to analyse industrial development lies mainly in its treatment of technology.” Developing countries are thought not to undertake significant technological activity since they do not innovate at the frontier. The neoclassical approach assumes that there are no additional costs, risks or other constraints to using technologies. Thus, it does not raise any policy issues, by assumption there can be no significant market or institutional failure.

The mid-90’s neoliberalists claimed that it was due to free trade and other non-interventionalist policies that made the East Asian economies successful. It was noted that the success of the East Asian industrializers had been very interventionalist in trade, FDI, technology transfer and domestic resource allocation, which, hence, subjected the economists to harsh criticism.

Hong Kong was nearest to the neo-liberal idea of combining free-trade with an open-door policy to Foreign Direct Investment (FDI) (Lall, 2004). As inherited capabilities were used up, the absence of industrial policy began to show, as the growth of manufacturing became constrained. Progress in terms of product quality and diversification continued, but that in terms of technological or industrial advancement was stagnant. As a result of its free trade policies, Hong Kong de-industrialised as costs rose. Manufacturing now accounts for less than 5% of GDP compared to over 25% at its peak (Lall, 2004). Its manufacturers moved to other countries which made its exports go into decline in the 1990’s. Currently, the economy of Hong Kong is growing slower than that of the other tigers, and it seems to be getting worse as its main comparative advantage falls under severe threat. (Bianchi, 2008)

Import substitution vs Export orientation

“The lack of export orientation leads to a lack of productivity improvements, innovation, and dynamism while ISI policies are also usually accompanied by distortions and perverse incentives.” (Cherif and Hasanov, 2019: 57). India led an infamously ambitious Import Substitution policy in the wake of its independence in 1947, where the state, as suggested by Cherif and Hasanov (2019) took upon the role of a micro-manager. The main objective of India’s ISI policy was to produce a high proportion of its consumption of most manufactured goods domestically. As these goals were being achieved to a considerable extent by the late 1970’s, the downfall of ISI policies began as India began suffering regularly from hard currency shortages, and its growth rate remained anaemic despite its huge domestic market and relatively fast growth in terms of manufacturing output. This policy framework represents the policies pursued by most developing countries around the 1960’s and 1970’s.

Around the late 1970’s, however, as we see in India’s case as well, import substitution policies began to lose their popularity. The biggest element to factor into this departure from the typical ISI was the acknowledgment of export orientation policies as a critical ingredient of the east Asian tigers’ industrial policy.

Singapore, for example, one of the larger Asian Tigers, used highly interventionalist policies. More specifically, export-orientation, showing how industrial policy can take other forms apart from import substitution. It started with a base of capabilities in entrepot trading, ship servicing and petroleum refining and after a ‘brief spell’ of import substitution, moved into export-oriented industrialisation. This, alongside heavy reliance on Foreign Direct Investment

(FDI) reduced the initial need for local technological effort for Singapore. Overtime, however, to establish R&D and increase learning, the government mounted its efforts to induce TNCs (Wong, 2003). Due to this strategy working so well, Singapore now has the third largest ratio in the developing world of enterprise financed R&D in GDP, after Korea and Taiwan (UNIDO, 2002).

In comparison with Hong Kong, which followed a neo-liberal industrialisation model, even with half the population, higher wages, and a thriving service sector, Singapore did not suffer the ‘hollowing out’ of manufacturing that Hong Kong did. (Bianchi, 2008). Unlike Hong Kong, Singapore aggressively sought and used Foreign Direct Investment as the tool to achieve its objectives (Wong, 2003). Its industrial sector, with strong policy support that deepened steadily overtime, allowed it to attain rapid industrial growth.

Looking at more examples, the Republic of Korea and the Taiwan Province of China, the two larger tigers adopted policies similar to those of Singapore’s. They insisted on promoting and deepening indigenous enterprises and capabilities, however assigned FDI a secondary role to technology import in other forms (Lall, 2004). To acquire technologies, Korea relied primarily on capital goods imports and technology licensing and used ‘reverse engineering’, (taking apart and producing imported products) to build upon these arms-length technologies and imports and eventually developed its own capabilities. One of the important assets of the Korean strategy and one that marks it and Japan apart from the other tigers was its creation of large private conglomerates, the *chaebols*. These were hand-picked family-run firms from successful exporters that were given various subsidies and privileges. This was undertaken as a costly and high-risk strategy for Korea; the risks were contained by the strict discipline imposed by the government. The industrial policy in Taiwan resembled that of Korea’s as it largely encompassed export promotion, however, of course, there were key differences. Taiwan province of China did not promote giant private conglomerates, industry in Taiwan largely entailed Small and Medium Enterprises (SME’s), it built a large manufacturing public sector to set up facilities where private firms were unable to do so.

An informative example showcasing the contrast between ISI and export-orientation is presented by Cherif and Hasanov (2019) using the different paths followed by Korea’s Hyundai and Malaysia’s Proton. “While Hyundai became a highly successful and innovative car maker, Proton is a less integrated automaker relying on critically important inputs with insignificant exports and a domestic market.” (Cherif and Hasanov, 2019: 60). Strong state intervention led to new capabilities in the 1970’s in the automotive industry for both countries. Licensing agreements with Japanese and US car makers alongside a mix of subsidies, tariffs, and joint ventures helped establish the first car makers in both countries. However, because of the foreign markets that Korean conglomerates aggressively targeted, (following a strategy described as ‘move first, then learn and adjust’,) it experienced a strong push for exports and competition that Proton never experienced in Malaysia. Hyundai, leaning towards its outward looking policies, built its own network of car dealerships and advertisements in the US early on. Proton, however, remained inward-oriented with a modest production capacity compared to the global players, due to this, and its reliance on local dealerships, Proton was unable to build a strong brand whilst trying to export to the US market. In terms of local content, Proton still relies on Mitsubishi to produce its engines while Hyundai ‘leapfrogged’ technologically in the 1980’s, designing its own engine (Cherif and Hasanov, 2019).

Infant Industry Protection:

One of the oldest arguments for trade protection and said to be the only one that does not get dismissed immediately by trade economists is the Infant Industry argument.

It is an understood fact that production costs for newly established domestic industries in a country will be initially higher than those of well-established foreign competitors due to greater experience. Overtime, these industries will experience cost reductions through ‘learning by doing’ and hence will attain the production efficiency of their foreign rivals. Pack and Saggi (2006) argue that, due to the initial absence of experience, unless domestic industries are protected from foreign competitors, they will not take off.

It is for this reason that Japan had to protect its car industry with high tariffs for nearly four decades before it could become competitive in the world market. And for the same reason that Nokia group had to be cross subsidised by its sister companies for 17 years before it made any profit.

Political scientists Alice Amsden and Robert Wade argued that the success of South Korea and Taiwan, respectively, was the result of cleverly designed industrial policies and selective protection. The Korean and the Taiwanese states actively manipulated trade and exchange rates and heavily protected the domestic markets against foreign competition while their industries were developing.

Lall (2004) reiterates that infant industry protection is only a part of industrial policy and by itself can be “harmful and ineffective.” He claims that by cushioning the costs of capability building, protection removes the incentive for undertaking it. “One of the reasons why industrial policy failed in most developing countries is precisely that they failed to overcome this dilemma..” he claims (Lall, 2004: 13). It is only possible to do so, he elaborates, by strengthening domestic competition, setting performance targets and, most effectively, by forcing firms into export markets where they have to compete with best practice.

Comparative Advantage conforming vs Comparative Advantage defying:

Ha-Joon Chang claims that the concept of comparative advantage is one of the few concepts in economics that is beyond just common sense (Chang and Lin, 2009). The beauty of this concept, he claims, is that it shows how even a country with absolutely no international cost advantage in any industry may benefit from international trade by specializing in industries at which they are the least bad.

Justin Lin states that, in theory, poor countries should be able to take advantage of their ‘backwardness’ by importing technologies and institutions developed elsewhere (Chang and Lin, 2009). Some countries have done this well, meanwhile others haven’t been as successful at industrial upgrading and subsequently, at poverty reduction. Lin argues that industrial upgrading and technological advancements are best promoted by what he calls ‘a facilitating state.’ This is a state that facilitates the private sector’s ability to “exploit the country’s ideas of comparative advantage.” He claims that the key is to make use of the country’s comparative advantage in the factors of production that it has currently or at the time instead of factors of production that it may have someday.

The role of the facilitating state in this dilemma is to encourage the emergence of firms, industries and sectors that, once launched, make effective use of the country’s current comparative advantage. In poorer countries, this will mean focusing on labour or resource intensive types of production activities and services. Considering the increased international capital flows of recent decades, low-cost capital remains relatively scarce, whereas labour and resources are relatively abundant and less costly.

Taking the examples of China and South Korea, while they took proactive steps to accelerate industrial upgrading, their success was spurred by a state that made possible the effective exploitation of comparative advantage at each step of development.

Whereas Lin believes that state intervention, while important, should be basically about facilitating the exploitation of a country’s comparative advantage, Chang believes that comparative advantage is a base line, and that a country needs to defy it, in order to upgrade its industry.

It is agreed upon by both authors that too much deviation from one’s comparative advantage does not work in favour of the country. The more you deviate from your comparative advantage, the more you pay in order to acquire capabilities in new industries.

However, Chang claims that this does not mean that a country should conform to its comparative advantage. The nature of the process of factor accumulation and technological capability building makes it simply impossible for a backward economy to accumulate capabilities in new industries without defying comparative advantage and really entering the industry before it has the ‘right’ factor endowments. Neoclassical economists (such as Lin) would argue that a country should do cost benefit analysis before entering a new industry, weighing the cost of technological upgrading against the expected future returns. This is a logical, but ultimately misleading way of looking at the process

because it is extremely difficult to predict how long the acquisition of the necessary technological capabilities will take and how much return it will bring. To conclude – unless you enter an industry and develop it, it is impossible to know how long it will take for the country to acquire the necessary technological capabilities to become internationally competitive.

Agglomeration economies:

Pack and Saggi (2006) discuss the desirability of “fostering learning and obtaining benefits” from agglomeration economies offered by industrial clusters in discussions of ‘new’ industrial policy. These clusters have benefits when software writers and chip manufacturers interact, as this can be productivity enhancing. It attracts workers with relevant skills and leads to reduced transportation costs.

Notable examples of this have occurred in the ‘research triangle’ in North Carolina centred on Duke University, the University of North Carolina, and North Carolina State University. The presence of well-known research universities and innovative and entrepreneurial PhD students have generated other clusters such as Silicon Valley (Pack and Saggi, 2006).

The difficulty of replicating an industrial cluster such as Silicon Valley is paralleled by the absence of major success stories in developing countries, state Pack and Saggi (2006). Taking for example, the rapid development of the software sector in Bangalore and other cities in India, which look to be the outcome of the existence of a large group of well-educated students and the entrepreneurial abilities of a small group of residents combined with the awareness of their existence on the part of the large Indian expatriate community, particularly in Silicon Valley. The initiating sources were private and there was little to no government participation here, with a communications satellite financed by Hewlett-Packard. Positive government efforts followed only after the ‘take-off’ of the sector (Pack and Saggi, 2006).

In foreign economies, taking China and Taiwan as examples, the establishment of special economic zones (for attracting FDI) or science parks were due to a government stimulus. A critical input for success in both examples was foreign participation. None of which was received by India in the establishing of its software sector.

Looking more closely into the development of the software sector in Bangalore, India: in 1977, pressures to increase domestically controlled computer production led the Indian government to demand that the International Business Machine allow Indians to hold 60% of its equity if it wished to continue its operations in India. As a response, they shut down their operations in the country within 6 months. Now this turned out to be a positive development for the Indian computer software industry. Without being constrained to operating systems used in the IBM computers, software engineers turned to the cheaper platforms for programming, especially UNIX. When US firms decided to move to UNIX-based client server systems in the 80’s, Indian programmers’ familiarity with it compared to their western counterparts made them extremely sought after. This left Indian programmers better prepared for many applications than programmers in other developing countries that may have had similar wage structures (Pack and Saggi, 2006).

How does this experience of a very successful sector compare with the many strands of new industrial policy? All of it was privately initiated, with governments only getting involved after the success of the industry was evident. The industry expanded on the basis of comparative advantage and needed no protection. A symbiosis of foreign and domestic firms was critical. Though there was a clear agglomeration of firms in Bangalore, this was the effect of the presence of graduates of the local education system. “Foreign contracts rather than government subsidies provided the basis for international exploration of markets.” (Pack and Saggi, 2006)

Selective and functional interventions played vital roles in the industrial and technological development of the Asian tigers. Each country mixed selective and functional policies in each area of intervention. “The extent of technological deepening in the tigers is directly related to their selective interventions in industry.” (Lall, 2004). He rightfully also points out that “those who argue that intervention was irrelevant to their industrial success show a lack of understanding of the real capability building processes underlying industrialization.”

Lall (2004) concludes that a few of the major conclusions and lessons from the Asian miracles come from the governments of Asian tiger economies showing the ability to devise and implement complex interventions effectively.

For example, South Korea and Taiwan, these economies used trade interventions and export orientation and imposed a strict discipline on both industry and governments. Government capabilities improved overtime in both countries with growing levels of skill and remuneration.

Another factor that added to the same was how FDI was treated differently by each country and played a varying role in technology development. Those that wanted to promote indigenous technological deepening had to intervene to restrict foreign entry and to guide their activities and maximize spill-overs.

The next section will constitute of a comparative case study centred around the economies of India, China and Brazil of the BRIC.

Case Study Exploration for the BRIC Economies

The recent industrial performance in all of the BRIC economies have involved continuous policy reforms underpinning economic and political transformation, as well as processes of capability accumulation and improvement. Since the end of the second World War, several, if not all of these policy domains have been integral for each of the BRICs industrial policy models (Santiago, 2020). BRIC has actively used trade policies in the early stages of industrialisation. Whilst studying this, Andreff (2015) documents that unlike Brazil and India, where outward FDI mainly responded to economic purposes, China and Russia also targeted foreign policy, diplomacy and even ideology goals.

The heterogeneity within the BRICs is illustrated well through its export performance over the period 2005-2015 (Santiago, 2020). China reports the largest and fastest growing share of manufacturing in total exports. In Brazil, a steady increase in the share of exports of agricultural mining products and to a more minor extend, also services. In Russia, manufacturing exports are giving way to mining and services, while they account for 44% of Indian exports. Mbele (2018) qualifies BRIC growth trajectories as categorizing them into distinctive groups. He predicts that China will continue to upgrade its position in Global Supply Chains, becoming a major global manufacturing centre whilst boosting its share in manufacturing exports within the BRICs and later in the world. Russia and Brazil should consolidate as exporters or natural resource-based products while India goes further in manufacturing and the predominantly service-based sectors.

Fu et al. (2010) demonstrates how the rise of these emerging economies is changing the landscape of the world economy: The average annual GDP growth rate of China in the past 30 years, has been as high as 9.8%, more than three times of the average annual world economy GDP growth of 3.0%. In 2007, the annual GDP growth rate was 13.0% in China, 9.1% in India, and 5.4% in Brazil. All of the above growth rates were again, higher than that of the world average growth rate in 2007 of 3.8%. in 2008, in spite of the financial crisis, these economies continued to grow much faster than the world 1.7% average: 9.0% in China, 6.1% in India, and 5.1% in Brazil. By 2007, China was ranked among the four largest economies in the world in terms of GDP. The pace and duration of these economies resembles Korea and Japan's performances during the three decades after 1960. The combination of this fast growth with the large size of these economies makes them a significant economic development experience with a global impact (Freeman, 2005).

India

"If the 1940s in India are best thought of as the decade in which India marked the transition from colonialism to sovereign democratic republic, the Nehru era (post-independence 1950-64) that followed is usefully viewed as the crucible of modern India: it is during this era that a stable democracy took root and a statist model of economic development emerged hegemonic." stated Kohli (2004: 259).

In simpler words, similar to the other BRICs, India's industrialisation began with import-substitution, adopted by the newly independent country in the early 1950's (Santiago, 2020).

As decided by Indian rulers at the time, upon independence, the state was advanced as an effective agent of political order. This was to become the long-term trend in the coming years in economic development for India, prioritizing political needs over economic ones and thus initiating what would eventually become a substantial gap between the state's capacities and its developmental ambitions.

State intervention for industrial upgrading in India had been extensive. Unlike many other east Asian countries which used state intervention to build stronger private sector industries, India opted for government control over larger industries. To promote these industries, India imposed high taxes on exports, imposed import restrictions, paid the funds to nationalise firms and controlled land use and prices.

Looking at the scenario in industrial terms, when gaining independence from the two-century old British rule, India inherited an economy which was largely agrarian in nature. According to Majumdar (2021), India's embark on industrialisation through an import substitution strategy was greatly influenced by this. Maddison (1971) and Chandra (1979) point out, that though modern industry began developing in India mainly after 1918, it had a very insignificant presence, contributing only 7.5% to India's National Income in 1947 and employing a meagre 2.3% of the country's labour force in 1951. According to Chaudhuri (1979), along with small scale industries and mining, the overall contribution of the Indian industry was 12-14% of Gross Domestic Production (GDP) at the beginning of 1950. Majumdar (2021), hence claims that industry played an insignificant role in the economy at the time.

Agriculture was the dominant form of economic activity, employing over 80% of the Indian workforce. Even the major industries at the time, for example- jute, tea, cotton textiles, were agro-based ones. Large scale modern manufacturing industry was represented by the few steel plants established during the early periods of the 20th century. Chaudhuri (1979) observes that though some amount of consumer goods were produced in the country it was overwhelmingly dependent on imports; Roy (2011) points out that the imports provided a significant market for British industries while India's capability for producing capital goods was almost non-existent.

The thrust of the import substitution strategy was on building up domestic production capabilities through the development of the capital goods industry which in turn would enable the Indian industry to indigenously produce the goods that were earlier internationally imported. Problems arose however, around the implementation of the strategy, as the Indian private sector, at the time of independence and soon after was not at the place to set up a capital goods industry that involved huge investments, application of advanced technology, and long-term gestation lag (Majumdar, 2021). With no alternatives, the government turned toward the public sector units for production of capital goods. Thus, Public Sector Enterprises (PSEs), which was soon to dominate the Indian industrial scene for the next four decades, was initiated.

In the course of these four decades (1950s-1990s), India's industrialisation moved onto a highly protected and regulative environment. Backed by legislations aiming at regulating domestic investments, keeping check on the growth of monopolistic tendencies, controlling foreign domination and providing protection to Indian industries from foreign competition. Through this, the earlier discussed infant industry protection policy was adopted. Jalan (2021) has observed that over these four and a half decades, Indian industry was overwhelmingly dominated by the public sector, with its presence limited, not only to the capital goods sector where it was required, but in close to every other industry as well. Jalan (2021) further pointed out that though the public sector enterprises provided a strong base for Indian industry enabling it to develop across the board production capabilities; the way they functioned for about four decades resulted in serious fallouts which had a deep impact on India's long-term industrial development.

However, despite the Indian industry being dominated by the public sector, private sector presence was noticeable. According to Bagchi (1972) and Ray (1979) Indian private sector essentially constituted a handful of big family run business houses that made their forays in industry after amassing a fortune from trading activities during the colonial era. The activities of these business houses were confined to a few sectors such as fast-moving consumer goods and consumer durables like automobiles (Majumdar, 2021).

Kohli (2004) points out that from the mid-1960's on, the global economy became more open to manufactured exports from developing countries, and countries as diverse as South Korea and Brazil sought to take advantage of such global shifts. These countries came to be ruled by military dictators who prioritized economic growth and sought export promotion as an additional strategy. By contrast, India, after some brief relations with devaluation in 1966, moved in nearly the opposite direction, becoming more and more consumed by "politics".

The biggest fall out of the import substitution strategy, as pointed out by Majumdar (2021), lay in the emergence of high-level inefficiency. The policy induced protective regime created to facilitate self-sufficiency resulted in public and private sector monopolies where there was very little urge for improvement in efficiency levels. This has its impact on industrial performance and productivity as India's performance on these two fronts was the worst among developing economies realising an annual average growth of just over 6% during the entire period between 1950-82 which fell well short of the projected annual average growth of 8% for the period. By the early 90's, the efficiency associated with the functioning of Indian industry reached its peak, "spilling over the entire economy putting both Indian industry and economy in 'dire straits'." (Bhavani and Bhanumurthy, 2007). Basant (2000) point out that the over regulated and protected industrial structure which did not allow competition to foster was the root cause of the inefficiency in the Indian industry. The solution was to diminish the policy induced barriers to entry, so that foreign domestic competition could breed in Indian industry which would improve its efficiency, making Indian firms globally competitive. Subsequently, by early 1991 a new competition-enhancing industrial policy regime was adopted for the Indian industry.

According to Mohan (2004), signs of change in the industrial regime were visible since the mid 1980's as efforts were made to provide greater autonomy to the public sector while also initiating selective de-regulation of imports. However, it was with the initiation of Industrial Policy Resolution (IPR) 1991, that a paradigm shift occurred in the orientation of India's industrial policy regime from that of restrictions of imports for facilitating the development of indigenous industries toward utilisation of the advantages which India possessed for making Indian industry globally competitive. Based on the pillars of liberalisation, privatisation and globalisation, the government, through the provisions of IPR 1991, tried to implement a policy regime designed to promote competition and enhance the efficiency of Indian industry (Majumdar, 2021). The focus of IPR 1991 was on freeing Indian industry from excessive regulation and bureaucratic control, facilitating growth and expansion of the private sector, limiting the role of the public sector along with lessening their subsidy burden, and facilitating the flow of foreign capital and technology in Indian industry.

Cited from Majumdar (2021:173), "The essence of the policy regime lay in doing away with the idea of public sector domination and developing a private-sector oriented industrialization process where along with domestic private investments, foreign investment would have an important role to play relieving the government from the dual burden of setting up new and sustaining sick public sector enterprises."

Sharma (2014) argues that though India's industrial growth rate in the post 1990's did not reach the 8% mark achieved earlier in the 1950's and 1960's, the average annual growth of 6.7% realized by Indian industry during the post reform period of 1991-92 to 2010-11 was noteworthy because it was achieved by overturning the lowest ever industrial growth rate of 0.6% in 1991-92 and by weathering the global financial crisis of the late 90's.

In the course of the past three decades, there has been a perceptible change in the orientation of Indian industry. It has moved away from a primarily public sector dominated one to one where the private sector has come to increased prominence.

Circling back to the 1990's liberalisation, India's foreign exchange reserves were exhausted by 1991 when a new government came to power. A major economic reform was launched and the government began promoting a competitive economy that would be open to trade and foreign investment.

The dismantling of the import substitution model in the early 1990's granted freedom to the private investors and expanded the scope of partnership with foreign economic agents by reducing controls on foreign direct investments, this allowed foreign majority ownership and facilitated technology transfers.

Irrespective of whether arguments about ‘export pessimism’ or ‘infant industry’ protection were ever technically supportable or not, such attitudes were understandable, according to Kohli (2004), during the Nehru (1950-64) period, given the prevailing political values and popular economic doctrines of the time. By the 1970’s, however, many of these assumptions became globally challenged.

Countries such as South Korea and Brazil, by the 1970’s, were aggressively turning toward export promotion and trying to attract foreign investors. However, due to political constraints, India adapted a strictly anti-western political rhetoric, pushing its economic policies in the opposite direction. As a result, India continued to embrace its import-substitution regime fiercely, hurting economic growth in multiple ways.

Whilst conducting a comparison between the two, Kohli (2004) argues “Both India and Brazil pursued import substitution in the 1950’s within democratic regimes, and yet Brazil’s industry grew faster and more efficiently. Clearly, blaming import-substitution policies per se is not an adequate explanation. Instead, the role of different types of states in the two countries stands out as significant. The Brazilian state in this period was considerably less nationalist and mass-based than that of India, allowing Brazilian leaders to focus more on industrialization, to invite foreigners to lead the way, to cooperate closely with business groups, and to repress labour. All of these political differences were economically consequential, producing more rapid and more efficient import-substitution industrialization in Brazil.” (Kohli, 2004 :287)

Brazil

Elaborating further on the case of Brazil, state efforts were discernible in terms of industrialisation in the 1940’s. The 1940’s and the 1950’s did, however, witness the growth of many industries with the creation of multiple well-known banks and companies that strongly boosted Brazil’s industrial development. Infrastructure was added to provide support for the power and transportation industries on which solicitous attention was focused at the time for expanding Brazil’s installed industrial capacity (Santiago, 2020).

The latter half of the 60’s brought with it the emergence of a military regime to the country along with a series of economic reforms. It was in that period that Brazil went through its so called ‘economic miracle’, characterized by rapid development and record GDP growth of up to 12% per year (Teixeira, 2004). Investment grew in infrastructure, basic and transformation industries, capital and durable goods production, and agribusiness in an effort to transform the country into an emerging power with access to capital markets.

Until the 1970’s, two aspects of Brazil’s industrial policy set it apart from a number of countries in Europe and Asia. Firstly, there was an opening up of the economy to attract foreign investment, in which a number of supply chains added multinational corporations to their managerial capacity. Secondly, the industrialisation based on import-substitution with no strategic plan to export and nationalize its companies.

Around the end of the economic miracle, which coincided with the first international oil crisis in 1973, came a global recession and high interest rates. The supply of credit contracted and Brazil’s foreign debt became a critical issue, while industrial development fell off considerably.

The return to democracy in Brazil brought with it a number of economic plans aimed at doing away with inflation and creating favourable conditions to sustainable development. With the opening up of Brazil’s economy during the 1990’s came sharp reductions in import tariff rates and economic deregulation. A number of recent changes were made, with the intention to bring the country in line with the realities of a new global economy. Market regulation, fewer restrictions on hiring and an end to government monopolies in industries such as oil, power, steelmaking, telecommunications and transportations were adopted along with other changes to ease the transition. A significant victory in this process was the control of inflation. Industry nevertheless was still buffered by international competition and many felt the need for public policies designed to encourage domestic manufacturers (Teixeira, 2004).

In comparison with India, in its first decade post-independence, Brazil became one of the fastest developers in the world with a democracy with a strict import-substitution policy regime – which industrialised at a rate of nearly 10% per annum – identical to that of India’s – which industrialised at a rate of 7% per annum.

This somewhat ‘superior performance’ of Brazil also reflected underlying political and policy differences. The rate of investments in both countries were somewhat comparable, thus, the real difference was in the capital-output ratio, or in the relative efficiency with which capital was invested in the two countries. “The roots of this difference, in turn, can be traced back to the fact that Brazilian democracy was considerably less nationalist and mass-based than that of India. Brazilian leaders thus worried less than India’s leaders about legitimacy issues of nationalism or redistribution. The clearest manifestations of this greater political room for maneuver in Brazil were the closer cooperation between the state and business and the heavy dependence on foreign investment to facilitate import-substitution industrialization. While this strategy was not without its own problems, the advanced technology and management bought by foreign investors to Brazil was an important reason for Brazil’s more rapid industrial growth in this early phase.” (Kohli, 2004: 270)

China

In China, the approach towards industrialisation was characterized by long term planning and experimentation to accompany the gradual shift of the economy to a capitalist model, it is today framed within the ‘harmonious society’ vision (Ferrannini, 2020).

China’s economic reforms began during the 70’s. China has supported structural change transformation towards market-driven economies, combined with heavily selective support, including through FDI and compulsory technology transfer. Investment in large infrastructure projects is noticeable.

Massive R&D investments evidence China’s stronger commitment to the building of productive and particularly technological capabilities in comparison to the other BRICs. In 2011, China became the world’s second largest investor in R&D in terms of volume, second to the United States (Santiago, 2020). While in GDP terms, China still ranks behind most developed countries, it tends to out-perform the other BRICs.

According to Santiago (2020), there are three dimensions to structural change – technological, industrial and organizational. Liu (2017) argues that building innovation capabilities is a precondition to overcoming what may be the most significant binding constraint for middle income economies.

Countries achieve productive and technological upgrading by balancing different framework conditions to support capabilities. They use different kinds of knowledge to change, sustain catching up and eventually leapfrog. Two kinds of capital accumulation processes are possible.

First, production capabilities, which refers to the accumulation of advances in physical capital and associated human capital required to run productive facilities at given levels of efficiency.

Second, innovation capabilities assist economies’ agents to master and change the technology they already use, eventually allowing them to create new technology. They also help latecomers close the gap on the technological frontier and help them assume leadership in furthering the technological frontier. By using emerging market opportunities, through exports, for example, latecomers may reduce dependence on global value chains, capturing market shares and increasing domestic value addition.

Capability building, however, is path dependent, which may constrain the ability to identify emerging window opportunities and may limit the flexibility to accommodate changes in technological and productive trajectories. Globalization and international conventions around Intellectual Property Rights also restrict the scope of technology transfer and limit the possibilities of imitating and reproducing technologies through R&D. Latecomers should focus on developing small yet incremental innovations while avoiding confrontations with incumbents and their IPRs.

Dominguez Lacasa (2019) argues that innovation is at the core of technological upgrading. While improvements in infrastructure and the institutional environments have generally enhanced innovation in the BRICs,

particularly in China, performance remains modest compared to developed-country standards. Innovation corroborates the very distinct development paths followed individually by the BRICs.

The BRICs have increased their innovation capabilities while reducing dependence on foreign actors and external knowledge transfer in order to catch up. They have progressively developed the ability to carry out technological activities with the sole exception of Russia.

As a result, the structure of technological knowledge has increased across other countries. China and Russia are the only economies that have augmented or kept constant the intensity of behind-the-frontier technological activities. China, in this regard, has rapidly enhanced innovation capabilities, diversified technology knowledge bases and entered into a dynamic frontier. The country is fostering structural changes and global interactions towards technological frontier-expanding activities, a process which, according to Dominguez Lacasa et al. (2019) emulates Korea or Taiwan during earlier periods of technological upgrading and catching up.

The BRIC economies aspire to foster innovation-driven economies, away from commodities and traditional industrial products and toward increasingly higher value-added sectors. China particularly is steadily moving towards industrial development strategies that seek to capitalize on its increasing ability to reproduce and produce new technologies (Li, 2017).

Technological capabilities in these emerging economies have also grown significantly, and in some industries, they are catching up with those of industrialised economies. Since 2000, China and India have experienced a rapid surge of patent applications. China's export market share of R&D intensive products increased from 3% to 13% over the period 2000-08 moving close to the 15% and 19% market share held by the US and the EU as a whole. This illustrates the rapid structural change and industrial upgrading which is currently taking place in China.

Aside from the common features such as their large size, these emerging economies are very diverse in their factor endowments, economic structure and development history, and strategy.

All these countries have opened up to international trade and investment. While Brazil mostly relied on its large domestic market (trade/GDP ratio was 27% in 2007), India relied much more on the international economy with a trade/GDP ratio of 46% in 2007, and China experienced a dramatic export-led growth path with a trade/GDP ratio as high as 76% in 2007.

All of these countries have also significantly reduced tariff barriers and opened up to imports or foreign goods. Over the 1990-2006 period, the average weighted tariff rate was reduced from 27% to 7% in Brazil, from 41% to 5% in China, and from 83% to 14% in India.

All of them have also opened up to international direct investment with China and Brazil enjoying an average FDI/GDP ratio of 3.2% and 3.4% over the period 2000-05. While the figures in India were lower than that of China and Brazil at 0.9%, it has been increasing since its liberalization.

These countries have also spent significant and rising shares of GDP on royalty and licensing fees for foreign technology acquisition: from 0.8% (India) to 2.6% (China).

On the other hand, they are also putting in great effort into indigenous capability building. Alongside the United States and the Russian federation, they stand as the top five countries in the world in terms of number of university enrolments in 2007 (Dahlman, 2010). Their expenditure on R&D has also increased exponentially. In 2006, the total R&D expenditure in China was greater than that of Germany, United Kingdom and France and was about a third of that in the EU as a whole. In terms of its gross R&D expenditure to GDP ratio, China is now moving close to the EU average.

Conclusion

After the very heated debate on industrial policy from the late 1970's to the mid-1980's prompted by the success of the East Asian industrial policy practices, the debate collapsed into three decades of neglect. Unexpectedly, however, industrial policy has made a comeback, in academia, as well as the real world. The industrial policy debate was back on the economic policy agenda long before the COVID-19 pandemic, starting to be conceived through a systematic

approach that extends beyond market failures. This pandemic has accelerated the shift in the academic and policy-making discipline on industrial policy, revamping attention on the need for state intervention on production dynamics to tackle economic issues. In this article, we attempt to navigate through the debate whilst acknowledging its contribution to the development of emerging market economies, more specifically, India, China and Brazil of the BRIC.

Whilst tackling the ‘neo-liberal’ side of the debate, we encounter the neo-liberal belief that the East Asian success was due to free trade and non-interventionist policies. This belief has subjected neo-liberal economists to intense criticism because it has been empirically and theoretically proven that the East Asian industrializers were very interventionist in trade, FDI, technology transfer and domestic resource allocation. Drawing examples, Hong Kong is nearest to the neoliberal idea of combining free-trade with an open-door policy to FDI. The absence of selective industrial policy constrained the growth of manufacturing while inherited capabilities were used up. There was some progress in terms of product quality and diversification, but little technological or industrial deepening, in comparison to Singapore, a smaller entrepot economy that pursued strong industrial policy. As a result, Hong Kong de-industrialised as costs rose.

Looking towards one of the two larger Asian tigers, the Republic of Korea adopted the most interventionist strategies, spanning product as well as all factor markets. Korea relied primarily on capital goods imports, technology licensing and OEM agreements to acquire technologies. It used ‘reverse engineering’ adaptation and product development to build upon these arms-length technology and imports and develop its own capabilities. Its R&D expenditures are now highest in the developing world, ahead of all but a few OECD countries. Korea accounts for some 53% of the developing world’s total enterprise-financed R&D.

Another important point mentioned earlier in the paper involved the privately-initiated industrial expansion of the software industry of India. As discussed by Pack and Saggi (2006), the industrial cluster of Bangalore, at the forefront of ‘new’ industrial policy, led India to the rapid development of its outstanding software sector. Its initiating sources were private, with close to no role of the government besides providing a good education system. The industry expanded on the basis of comparative advantage and needed no protection. Foreign contracts rather than government subsidies provided the basis for international exploration of markets.

Delving further into the BRIC economies, each of the BRICs have at some stage of industrialisation, implemented inward looking policies. More specifically, they have practiced import substitution industrialisation. In the case of India, it led an ambitious ISI policy at the wake of its independence with its objective being to produce domestically a high proportion of most manufactured goods it consumes. After having attained these goals by the 1970’s, however, it suffered regularly from hard currency shortages and its growth rate in per capita terms was anaemic. A similar case struck with Brazil. Russia faced difficulties managing its transition toward a market driven economy inspired by the Washington Consensus. As for China, the approach towards industrialisation was characterized by long term planning to accompany the gradual shift of the economy to a capitalist model.

Despite the continued attention the BRIC countries have paid to industrial policy, the outcomes have, ‘as in the case of their political and social transitions, not lived up to expectations’ (Haraguchi et al., 2015). Clearly, the success of industrial policy is not automatic, and it also depends on policy design, state capabilities, social cohesion, external circumstances, and of course, luck.

The ideal case for India and Brazil, specifically, would have been to follow the example of Singapore, which, after a spell of import-substitution, moved into export-oriented industrialisation. This specialization with its heavy reliance on FDI reduced the initial need for local technological effort. However, overtime, the government mounted its efforts to induce TNCs to establish R&D and foster innovation (Wong, 2003). Due to this strategy working so well, Singapore now has the third largest ratio in the developing world of enterprise financed R&D in GDP, after Korea and Taiwan (UNIDO, 2002).

“The most successful countries seem to be those in which industrial policy has helped realize latent comparative advantages, facilitated human capital formation, foreign investment and technology transfer, and where industrial policies were flexibly adapted and modified in light of changing external circumstances.” (Haraguchi et al., 2015)

Advanced and developing economies are worried about the erosion of manufacturing in the face of Chinese competition, many middle-income nations are worried about being stuck in the middle income trap, many lower income countries are worried about being stuck as commodity exporters, while many governments, developed and developing, are trying to target investment in 'green' industries.

At this time, foremost for industrial upgrading in the BRICs is their need to further drive their structural economic transformation through stimulating innovation. When promoting structural economic transformation for poverty reduction, a country's stage of development and the particulars of the sectors involved, need to be considered. As countries develop, entrepreneurship and the role of the private sector seem to become more important.

Industrial policy has for years been a term, either misunderstood, mismanaged or misinterpreted. And after years of facing both, disregard and debate, there is still no promise of its efficiency. In the above article I have demonstrated how I believe industrial policy has, in some cases, hastened and in others, impeded the process of development in developed and developing countries. The BRIC economies have been specifically emphasized to showcase how industrial policy, through state intervention and technological innovation stimulation can help emerging market economies such as these achieve successful industrial upgrading.

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