

Can the Development of Total Factor Productivity Help Middle-income Countries to Overcome the Middle-Income Trap?

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Abstract. Falling into the middle-income trap is a common phenomenon experienced by most middle-income countries. The key characteristics of countries fallen into the middle-income trap is that their GDP per capita, instead of rising, is constant throughout the years. A dominant explanation to this problem is that middle-income countries' total factor productivity is slowing, leading to slow technological development and application. This caused reduced international competitiveness of the developing countries in a sense that neither can they compete against low-income countries or other newly emerged middle-income countries over low level manufacturing as their workers' wages had risen, nor can they compete against other developed economies over research and development as these middle-income countries lacked the TFP for improvements. Another school of thought asserted that middle-income countries struggling in the middle-income trap is mainly due to the extractive institutions and the misallocation of resources that result in an inefficient growth of TFPs. This study aims to utilize the historic researches and country-specific cases to examine how countries can escape such trap as well as policy implications to boost TFP and reform institutions. The findings of this research suggests that on one hand, middle-income countries should improve their education and research and development. However, TFP growths cannot be fully achieved without improvements in institution. So, on the other hand, they should allocate more resources to the domestic industries to achieve maximum TFP growths and to reduce reliance on multinational enterprises and foreign high-income countries to minimum the effect of extractive institutions.

Keywords: Total factor productivity, middle-income trap, middle-income countries, globalization, developmental economics.

1. Introduction

Historical research, such as the Solow growth model, had suggested that the growth of total factor productivity (TFP), any factors of production aside from labor and capital, would account for greater economic growth per capita beyond the steady state: a point where depreciation would offset capital accumulation due to the diminishing marginal returns of capital. Many developing countries, on the other hand, had encountered a middle-income trap (MIT) where their GDP per capita, instead of steadily increasing, are fluctuating along a constant value throughout the years. Since 1960, only 15 countries had managed to escape the MIT [1]. Escaping the MIT is the most crucial component should a country wish to transform from a developing country to a developed country. Hence, a question emerges: will the growths in TFP help these developing economies to overcome the MIT? This study seeks to investigate the contributors of TFP and economic growths and the association between TFP and MIT; It will be divided into 3 parts: part I will focus on the association between TFP and MIT; Part II will concentrate on the effect of institutions on TFP development; and eventually Part III will lead to practical implications to policy design for developing countries to overcome the MIT.

2. Tfp Growths Would Have A Positive Impact On Economic Growths And Overcoming The Tfp

2.1 Overview

Historic research suggests that the role of TFP is crucial to overcome the MIT. MIT occurred as a developing economy had lost its competitiveness, as it is unable to compete with low-income, low-wage economies in manufacturing exports and unable to compete with advanced economies in high-

skilled innovations [2], resulting in the GDP per capita to be maintained to a constant level throughout. Kim and Park argue that a slowdown in economic growth due the increase in occurrence of the above problem is likely to appear when a country's income reached \$15000-\$16000 [3]. Hu and Zhou further added to this definition that an economy's progression in technological innovation is important maintain competitiveness with developed economies in the export market, avoiding the MIT [4]. This implies that policies that concentrates on improving TFP would help to overcome the MIT. In Hu and Zhou (2020)'s research, an economic growth model was introduced. Here, an economy's progression from a low-income country (LIC) to a high-income country (HIC) can be divided into 3 phases [4]. In the first phase, there is an "economic take-off," involving high factor input, high consumption of natural resources, and low value-added trade. The second phase, the middle-income transitional phase, involves a growth to 3 possibilities, the constant growth as the economy transitioned to MIT, increasing growth to the HIC level, and the decreasing growth. Here, the TFP growth determines the middle-income transitional phase, as whether or not TFP can undergo sustained growth can reflect the efficiency of resource allocation and the degree of contribution of innovation to economic growth. In the empirical study of economic growth, TFP can generally be bifurcated into technical efficiency and technological progress. Technological progress refers to the improvement of technology. Technical efficiency refers to efficiency in allocating input factors under given technological conditions and can be considered an outcome of market mechanisms. This perspective can be further highlighted by the Solow-Swan (1956) model; it suggests that TFP growth is the engine for long-run economic growths. Here, we will introduce the Solow model to see the effect of TFP growth in the long run economy. Note that although both models are quantitative in nature, this paper will attempt to use minimal mathematics to explain the phenomena. In the traditional Solow model, the predicted long-run growth per capita is assumed to be zero. As capital accumulation tends to yield in diminishing marginal returns, meaning an increase in investments (savings) will increase the capital, but it will also increase the rate of depreciation of the capital, as the levels of depreciation is directly related to the levels of capital, hence investments will increase the capital less by less. Eventually, the growth of capital is being offset by the rate of depreciation, resorting the economy in a steady-state: zero long run growth, assuming everything else are equal (including TFP). This is point of MIT, where the GDP per capita growth tend to be constant. Here, long-run growth will only happen if TFP had increased, as a growth in TFP represents an increase in the technical efficiency and progression in capital accumulation and the investments will increase, leading to a greater steady state. The Solow growth model suggests similar theoretical implication as per Hu and Zhou [4], only the development of TFP is able to result in economic growth beyond the MIT, and development through solely FDI and investments may not be enough.

2.2 South Korea had overcome the MIT because she addresses main sources and determinants of TFP

Combing the ideas proposed by Hulten and Kim and Park [5], we can say that strengthening innovative abilities and building innovative capacity through solely R&D developments may not be enough as they suggest that the main contributors to TFP growths are education (the average years of primary secondary, and tertiary education); innovative activities and outcomes (patent applications, and utility models); and openness and financial developments (FDIs, capital accumulation). MICs should instead use a holistic approach in raising efficiencies such as creating an opened financial system (a market-based rather than bank-based financial system, for example) to ensure a greater flow of funds both domestically and internationally, improved health and safety to ensure greater participation rates amongst workers, and regulated curriculum in education (all primary, secondary, and tertiary education) to enhance productivity alongside the traditional improvement in innovation and technology. Now, let us dive through the case of South Korea!

South Korea was devastated by the Korean war which ended in 1953. In 1960, Korea only had an average income per capita of \$80. However, in just over 3 decades, under seven 5-year plans, Korea had reached the threshold of HIC in 1995, making it one of the countries that quickly escaped the

MIT [6]. Here, for the sake of succinctness, the exact details of the 5-year plans will not be discussed, only key policies and effects will be shown to provide practical implications for future policy design.

2.2.1 South Korea increased its R&D capabilities.

In 1961, the Korean government introduced an intellectual property regime (IPR) that protects both conventional and minor innovations. Lee suggests that unlike the traditional IPR that protects regular innovation patents, the Korean IPR allows for exploration of utility models [7]. In a country that was dependent on imported technology, the IPR was critical to facilitate learning. This regulation shows that improvement in technical efficiency and technological progress can be facilitated which caused the development of TFP. Moreover, in 1980s, Korea had encountered a change in policies for R&D, it changed its policy to invest and to improve its R&D capabilities from introducing foreign ideas [6]. This had resulted in a TFP led growths from 9% in 1970-1982 to 44% in 1982-1995 [8].

Korea also seized learning opportunities and joined global value chains (GVCs). In this way, Korea avoided being stuck in performing low value-added activities without value upgrading. Here, in-out-in-again strategy was implemented by Korea. At the initial stage, the participation in GVCs was to learn from outside, then a reduction in participation creates space for an increase of domestic value-added and finally a reintegration was promoted after this development of Korea's own chain [7]. The path of Korea reforms demonstrates that participating in GVCs is able to improve the general competitiveness of domestic industries. Another perspective to joining GVCs and increasing R&Ds is that it would create employment opportunities leading to a growing size of middle-class. The creation of domestically made consumer good would also boost consumer demand. This idea aligned with Ozturk' who stated that middle class, productivity, and R&D are major aspects of TFP [9].

It's not applicable to current MICs.

On the other hand, the historic strategies may be no longer applicable in present. In the 1950s - 1970s, the Asian Tigers took advantage of the growing electronics market; however, in present stages, the high-end manufacturing sector, such as the semi-conductor and computer chips industry are being monopolized by HICs; and to prevent competition, a high barrier of entry is being put in place. This makes participation in GVCs difficult for the majority of MICs, especially ex-soviet or ex-socialist states whose trade markets are largely segregated from the international market in the last few decades. Hence, for current MICs, the only mean of participation of GVC is through low-level manufacturing for MNEs where they carryout R&Ds at home. Hence, large-boost in TFP is increasingly difficult in the present than in the past.

2.2.2 South Korea improved its education.

The increasing focus of higher education had resulted in high growths in human capital that boosts productivity. Acevedo suggests that the levels of education contributed to 18.7% of the output growth [9]. Here, in the last 25 years, the Korean economy exhibits a positive return to scale of investments of capital and labour.

Table 1. Contribution to GDP Growth in South Korea, 1980-2004

TFP	Human Capital	Capital	Labor
24.1%	18.7%	39.6%	17.6%

Such a dramatic increase in the proportion of human capital in just a short period of time also implies that the Korean education emphasizes a lot on competition, where students, in order to pass the general higher-education entrance exam (equivalent to Chinese Gaokao or British GCE A-levels), had to devote 16 hours a day at school. Such high social pressure, therefore, created an innovative and productive workforce [10].

Some alternations are required to fit modern socio-economic conditions of most MICs.

In a critique perspective, however, the competitive education system that emphasized on examinations may be effective in the short-run where a country is enjoying a demographic dividend, it's effectiveness may be decreasing when a country is experiencing an aging population structure. In

Korea and China, for example, under such a competitive environment, students tend to focus more on obtaining an undergraduate Bachelor's degrees, but they normally would neglect the technical associate's degree for better future career prospects [11]. This would result in an excess of university graduates with overemployment in domestic industries for their respective field. Moreover, there tends to be less workers, focusing on technical aspects such as workers for manufacturing, due to both shortages of technical students and aging population. In this case, the rates of underemployment and unemployment tends to be high in these countries.

Hence, instead of emphasizing on the levels of competition for undergraduate degrees, countries should emphasize more on the levels of flexibility of the curriculum and to reduce the levels of competition. In this way, students are able to specialize (whether in academic subjects or technical aspects) in their preferred field in an early stage and the general TFP and economic growth can be boosted, both in terms of future consumption (research, the generation of ideas) and current consumption (manufacturing to realize ideas) as suggested by the Romer (1986) model.

2.2.3 Conclusions.

Table 2. Decomposition of South Korean Growth

Year	Average Growth of	% Contribution of
	GDP	TFP
1970-1975	7.3	31.8
1975-1980	6.7	24.7
1980-1985	7.5	51.6
1985-1990	9.2	49.2
1990-1995	7.5	41.4
1995-2000	4.3	43.4
2000-2004	4.5	25.5
1970-2004 (Average)	6.8	39.0

This form suggests that, in general, the TFP growths in South Korea is directly correlated with the GDP per capita growths. The TFP is an essential constituent of growths throughout 1970-2004.

From South Korea's example, it can be inferred that Hulten's as well as Kim and Park's research were mostly correct that not only TFP constitutes the growths that would help countries to escape the middle-income trap, but also education and R&D were the most important constituents of TFP in the case of South Korea.

Please note that this is not a "South-Korean Model fits all" scenario, rather series policies inspired from the South-Korean 5-years plans that had a positive effect on TFP [12]. These policies are worth exploring for current MICs to seek to overcome the MIT.

3. Alternative Views On Institutions

From the above analysis of mainstream literatures regarding the topic of TFP and MIT, we can see a clear positive correlation between them: improvement in TFP would most certainly result in long-run economic growth that would lead MICs to escape the MIT. However, another school of thoughts suggests that although TFP is important, the improvement in institutions-the ability to foster capital and labor-to enhance TFP. The aspects of institution encountered by most MICs that would have most impact to TFP are the rule of law, misallocation, and political stability. In this part, we shall begin to investigate some of the contributors to stagnant TFP growths in MICs by combing case studies and literatures and attempt to provide possible solutions.

3.1 Misallocation harms TFP growth and is common amongst MICs

Historic research suggests that the role of allocation of resources is highly important in determining economic growths. Based on the empirical research drawn from the EU KLEMS dataset, Oulton

thinks that capital's role in the growth processes is also directly correlated with the elasticity of output with respect to capital. This associates with the idea of allocation of resources [12]. From Oulton's model it can be inferred that in the free-market, the levels of investments and labor are being allocated to projects that will deliver the most marginal product (reward). In this case, resources may not be devoted to aspects where the MIC needs the most (such as R&D or human capital that will achieve technical progression and technical efficiency which are essential to escape the MIT).

3.1.1 Misallocation in South East Asia (SEA)

Such problem of misallocation of resources are common amongst MICs. Under the revised empirical Hsieh and Klenow (2009) framework (to examine allocative efficiency), Nicola et al realized that MICs in Southeast Asia (SEA) tend to have a resource misallocation within firms in different sectors [13]. Here, domestic private firms that are more productive encounters distortions (taxes) at a higher rate, leading to capital and output absorb resources that would have otherwise been used to expand production. While, foreign firms that are less productive (below average in SEA) tend to face lower distortions (taxes), causing them to grow at a faster pace. This character implies that resources are being allocated towards less productive field, causing slower economic growths. This evidence is being confirmed by Doner and Schneider who believe that, in a general sense, MICs' GDP depends low-level manufacturing for multi-national enterprises (MNEs) that carries their R&D at home [14]. Here, a potential conflict can be seen that it is important allow domestic firms to be positive to result in TFP growths; however, resources are being allocated to foreign firms that have a little impact on the overall technical progression and efficiency of the MIC. Here, such resource misallocation is key to a stagnant TFP developments in MICs. Thus, policymakers in SEAs should provide less distortions to more productive domestic firms to ensure TFP growths. Another method to address such problem is through industrial policy: policy to direct private investors to invest in a certain capital or industry that may have a positive externality but will not be considered in a free market sense.

3.1.2 Industrial policy is a potential solution to misallocation

The industrial policy used by South Korea would help to treat the misallocation of resources, leading to a positive effect on TFP. In the 1970s, due to the underdevelopment of the financial system in South Korea, firms tend to face domestic interest rates. The government introduced an industrial policy that allocates foreign credit; here, the government limits domestic firms' direct transaction with foreign firms and only selected firms are given the opportunity to borrow from abroad, leading to selected firms to borrow at lower rate [15]. Levchenko and Cho's econometric model suggests that a firm receiving the average subsidy between 1973 and 1979 had 919% sale growths between 1982 and 2009, showing that firms under temporary subsidies would have long-run positive welfare increase [15]. In the model, firms under subsidies tend to experience 2 phases. In phase 1, firms are borrowing-constrained. They cannot expand to internalize the dynamic of effects of learning by doing (LBD). The industrial policy aims to relax these constraints therefore increasing the output which in turn increases productivity in phase 2 through LBD. From the example of South Korea, industrial policies are highly effective in achieving long-run productive boosts where focuses on selected industries would surely result in an improvement of productivity that would lead to TFP increase through LBD.

3.2 Extractive institutions, an even bigger hinderance to TFP growth

Kaya and Tsai suggest that inclusive economic institutions contain a set of law and social establishments that protects property rights, and ensure equality of legal rights to economically empower the broader population [16]. In this way, TFP growths tend to be enhanced as inclusive institutions encourages R&D and allows investments to be allocated efficiently throughout an economy.

However, many MICs are experiencing an extractive institution created by high inequalities and, most occasions, MNEs, causing resources not being devoted to domestic economic growths, leading

to slow TFP growths. Schrecker et al defines extractions as physical and economic activities and as social relations characterized by “power asymmetries” that resulted in constraint resource development in MICs [17]. Extractive injustice is commonplace amongst MICs; this is resulted as a result of globalization where multinational enterprises (MNEs) tend to base in developing countries for low-level primary or secondary works and then, in turn, sell their products in developed countries.

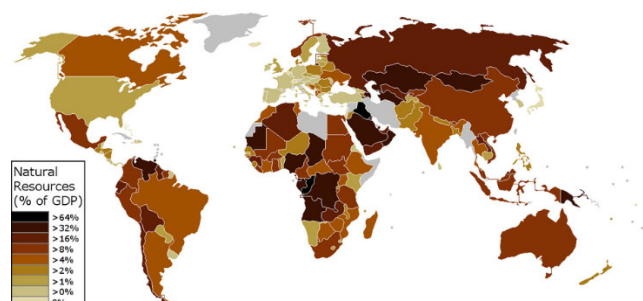


Fig. 1 countries where natural resources exports as percentage of GDP [17]

This figure suggests a positive correlation between MICs and LICs and resource dependency. HICs such as those in western Europe and North America tend to rely less on resources; however, countries such as BRIC and MINT that fell into the MIT are those that are heavily dependent on resources on an average of greater than 32% of GDP depends on natural resources.

3.2.1 What harm did extractive institutions pose on MICs

Shrecker et al had identified 4 main extractive institutions in MICs and LICs that made economic development difficult [18], 3 cases that I find important are:

Mining (in Latin America)

Mining is the largest global source of health and social injustice [19]. Latin America is the top destination for mining-related FDIs. Both established MNEs and junior exploration firms that belong to the GVC tend to scout locales that generate long-run environmental damage. Further, since mining firms operate outside of environmental regulations and scope of royalty agreements, they are not accountable for any environmental damages. Hence, in Latin America, environmental damages that result in health consequences and displaced populations are largely caused by mining.

Oil and gas (in the Gulf of Guinea region)

Oil and gas accounts for half of the world energy consumption. In the Gulf of Guinea, the major oil MNEs in the region formed a partnership with local state-owned oil company to create extractive institutions, where oil and gas are being exported at a cheap price to the home countries of the MNEs. Yet, the constant oil spill overs had made Niger Delta one of the world most polluted locales, destroying farming, exacerbating poverty, and exposing people to water contamination. The combined effect of environmental damage and resource depletions means that domestic capital accumulation and income generation for local MICs and LICs can be very difficult.

Land and water grabs (in majority developed countries)

Since 2007-2008, due to the food price crises, foreign investors (from HICs) are rapidly acquiring productive agricultural land from MICs and LICs. From the graph, it can be inferred that the subjects are generally BRIC and MINT nations- those who fall into the MIT.

The target countries are often those that lies in the MIT, such as the BRIC and MINT. Whereas investors are often HICs in western Europe and North America.

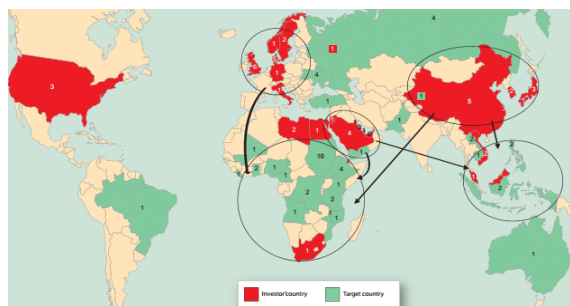


Fig. 2. Investor and target regions and countries in overseas land investment for agricultural production, 2006-2009 [20]

3.2.2 Such problem is difficult to treat as short-run economic developments of MICs depends on MNEs and in turn created such extractive institutions

Here, the profit driven MNEs and HICs facilitates an extractive institution in MICs, and HICs, to some extent hinder the formation of institutions in MICs that would allow for rapid economic growths. Resource curse is the phenomena that resource-rich countries tend to underperform relative to others in the aspects of social indicators and growths [21]. Ross states that if a developing country is resource-rich in petroleum, for example [22]. It tends to lead to heightened corruption, authoritarian regimes, and violent conflicts in MICs and LICs. In the case of authoritarian regimes, this is mainly due to that the large financial gains to extract resources from these countries made the international society unwilling to address them. Examples include: the lack of international actions on the emergence of military dictatorship in Nigeria in 1995 which executed anti-Shell Ogoni activists. For corruption, politicians in MICs and LICs tend to obtain illicit financial flows (corruption, illegal exploitation, and tax evasion) from the extractive sector [23]. Here, Schrecker et al suggests that when mineral prices increase, MNEs and HICs tend to lobby for weaker social and environmental standards and for state subsidies through exemptions from taxes and other obligations [15]. This, to some extent, explained the widespread misallocation of resources problem discussed earlier in this part, where distortions (taxes) are encountered more frequently and at a greater magnitude by domestic firms than by foreign firms. Hence, such profit-motive of foreign MNEs facilitated such poor institution which makes traditional economic development such through TFP growths and capital accumulation difficult. Such phenomena also contribute to explain that economies in the present are easier to be trapped in MITs than in the past (due to globalization). Here, we can see a potential conflict, if resource-rich MICs wants to improve the standard of living of its workers, then it requires MNEs' FDI and job opportunities for its people; however, MNEs would in turn influence the politics of MICs, creating extractive institutions and therefore dependent on HICs.

To evaluate, should MICs wish to exit the MIT. They should attempt to achieve economic growths by reducing their economic dependency on MNEs, and instead should target the development of domestic industries to achieve through industrial policy to achieve the desired TFP growth discussed earlier in this part.

4. Conclusions

From Part I, through the cases of South Korea, we are able to conclude that the improvement in education and R&D is able to help MICs to achieve technical progression and technological efficiency that would help MICs to escape the MIT. On the other hand, from Part II, we also see that poor institution effects, most notably misallocation and extractive institutions, made TFP growths difficult and hindered economic developments.

In conclusion, countries trap into the MIT is mainly due the slow growths TFP caused by poor R&D developments, poor education, misallocation and the extractive institutions exploited by MNEs, HICs, and widespread inequalities in MICs. Hence, the ultimate policy suggestions are 2 folds both to boost TFP and to reform the ongoing institutions.

In order to boost TFP, MICs should focus concentrate on aspects of education and research and development. For education, countries should Standardized high-school curriculum that ensures flexibility and allows a division of students into both university bachelor's degree and technical degree to improve productivity. This policy was largely based on the example of South Korea, China, and Hongkong where a standardized high school curriculum is utilized. However, factoring in the recent aging population and the problem of underemployment in majority MICs, flexibility in curriculums that encourages both technical and academic education would contribute to fulfil both the domestic manufacturing and research demand. For the perspectives of research and development, MICs should introduce regulations that better protect property and intellectual rights as well as an encouragement for the exploration of imported utility models, aiming to improve technical efficiency; utilize countries' underlying competitiveness such as demographic dividends to enjoy economies of scale over high-tech goods and join GVCs to encourage firm-level R&Ds, aiming to improve international competitiveness; and encourage start-ups to increase the levels of competitions as well as attempts to curb monopolies to encourage maximum efficiency and R&Ds, combined with export-led policies to improve international competitiveness.

In order to improve institutions, countries should utilize industrial policy, such as subsidies and tax breaks, to better support domestic industries in aspects such as expansion into GVCs or improvement in R&Ds. This can not only create great employment opportunities (boosting middle-income worker demand), but also improve the international competitiveness of domestic industry. Further, such industrial policies targeted towards domestic firms is likely to boost domestic-level R&Ds, pushing the technological advancement further. Meanwhile, MICs (especially resource-rich countries) should also reduce the level of dependency on MNEs, countries should devote energies to help domestic industries and should focus more on an inclusive institution that promote legal rights, rule of law, and democracy (in an institution where the individual policies and politics in MICs will not be influenced by foreign stakeholders).

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