

Productivity as the Key to Economic Growth and Development

Young Eun Kim, Norman Loayza, and Claudia Meza-Cuadra

Without improvements in productivity, there is no economic growth—either sustained or inclusive. To raise productivity, four components must work together: innovation, education, efficiency, and infrastructure. Each requires contributions from the public and private sectors.

The Central Role of Productivity

One of the most important lessons in economics is that productivity is key to economic growth. Productivity was a main concern of the fathers of modern economics, Adam Smith and David Ricardo, in the eighteenth century, as they considered the advantages of specialization and trade. In the twentieth century, John Hicks and Joseph Schumpeter emphasized productivity in a context in which developed countries were in the “Great Depression” (Hicks 1939; Schumpeter 1942). Recently, productivity has been a focus of economists concerned about developing countries in their search for sustained growth. For example, a study based on a large sample of countries by William Easterly and Ross Levine (2001) shows that economic growth is mainly explained by productivity growth. Our analysis across 132 countries also shows that the growth of GDP per capita at the global level is highly correlated with the growth of productivity over the period 1960–2014 (with a correlation coefficient of 0.86). Moreover, around half the variance of GDP per capita across these countries for the same period is explained by the variance of productivity (full results available upon request).

What is Productivity?

Productivity is defined in economic theory as the ratio of output over input. This translates into how efficiently input resources such as capital and labor are used to produce economic output. Productivity is mainly driven by four components: innovation, including the creation of new technologies;

education to spread these new technologies and develop the capacity of the workforce; efficiency to promote the effective and flexible allocation of resources for production in various sectors; and infrastructure, both physical (transports, energy supply, and telecommunication systems) and intangible (public institutions and macroeconomic environment), to support private activity (figure 1). These four components are interrelated and influence one another.

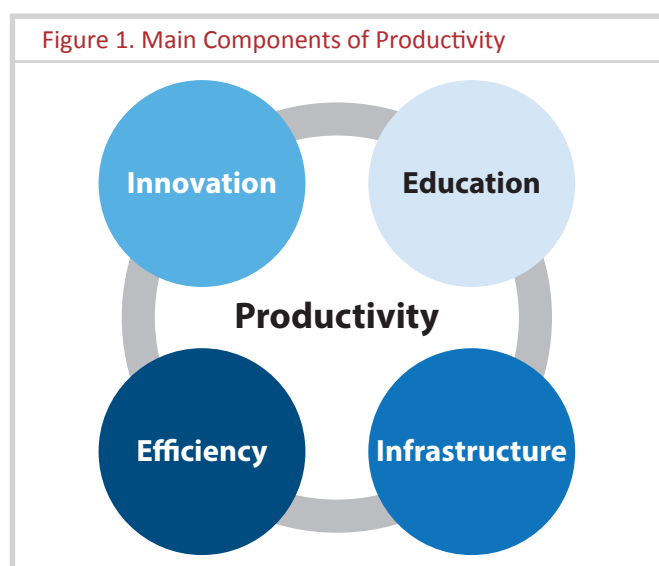
The rest of this Research Policy Brief discusses each component and illustrates them by analyzing six countries in Asia and Latin America: Malaysia, Singapore, and Vietnam, and Chile, Mexico, and Peru. These six countries are members of a free trade agreement recently signed on February 2016, the Trans-Pacific Partnership (TPP).

Component 1: Innovation

Innovation consists of creating new technologies, new products, and new processes, which can potentially lead to the development of high value-added activities. Environments that promote innovation are characterized by sufficient and sustainable investment in research and development by both the private and public sectors, a supply of competent scientists and engineers, high-quality research institutions, companies with the capacity to promote and support innovation, collaboration between academics and industries, and the protection of intellectual property.

A comparison of factors influencing innovation indicates that the countries with the most favorable environment are Singapore and Malaysia (figure 2, panel a). Chile and Mexico rank third and fourth respectively, and the biggest gap between them and the first two countries exists in the level of company investment in research and development and government spending on advanced technology products. Vietnam, which is ranked fifth, has higher government spending on advanced technology products than Chile and Mexico, but scores lower in quality of scientific research institutes and university-industry collaboration in research and development. Peru, ranked last, scores lowest in most factors among the six countries.

In another indicator of innovation, the annual average number of patent applications, Singapore significantly outperformed the other five countries from 2011 to 2012, with 127.0 applications per million people. Malaysia had 11.6 applications per million people, followed by Chile with 7.1, Mexico with 1.9, Peru with 0.3, and Vietnam with 0.2 (World Economic Forum 2015).



Affiliation: Development Research Group, the World Bank.

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Figure 2. Indicators for the Main Components of Productivity in Selected TPP Countries

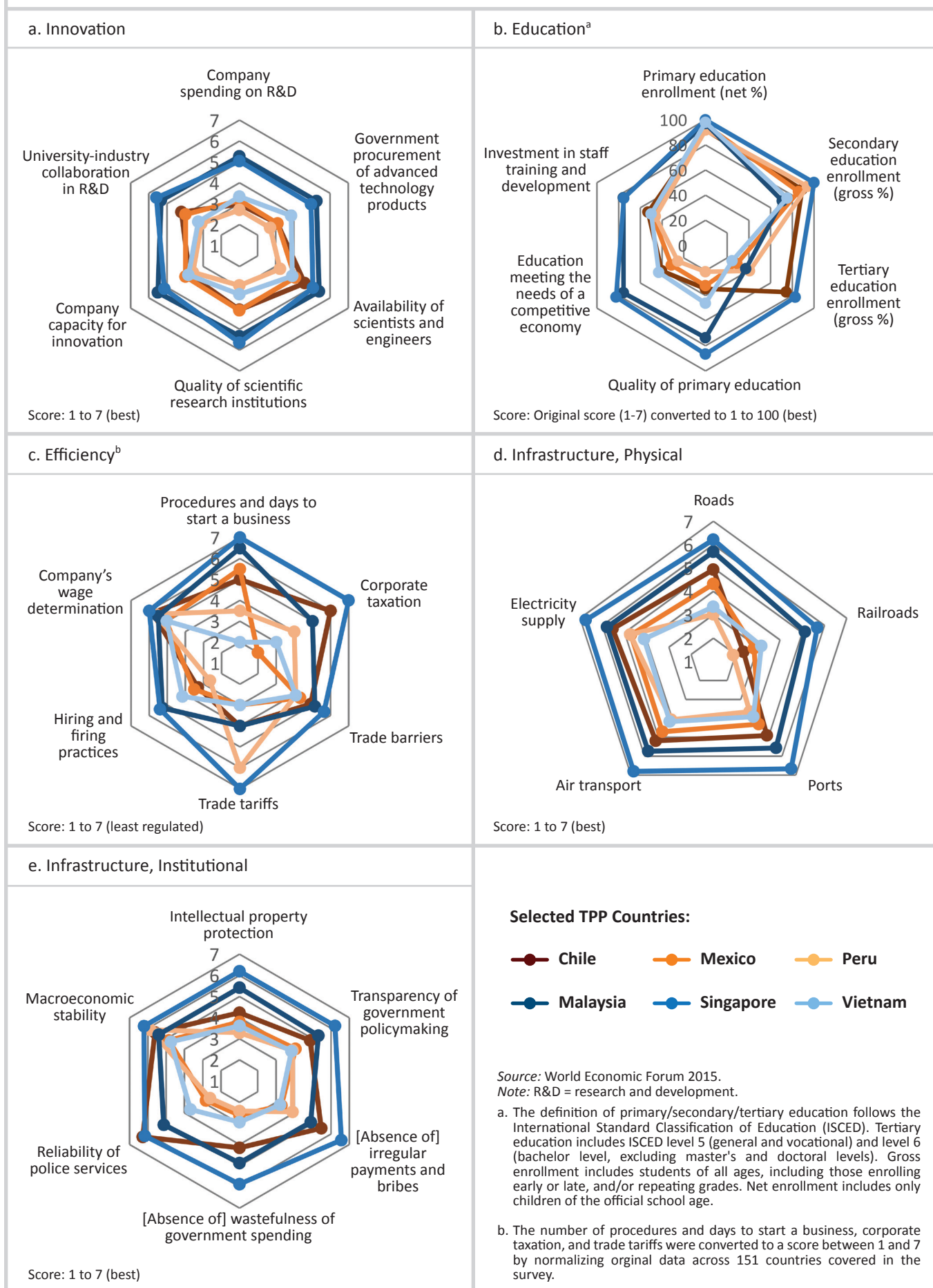
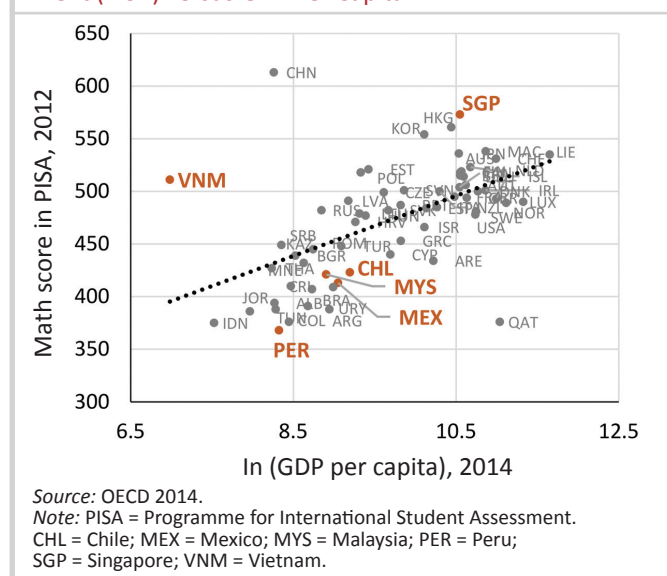


Figure 3. Mathematics Score in an International Assessment (PISA) versus GDP Per Capita



Component 2: Education

Education develops human capacity by teaching knowledge and skills required for economic activities, disseminating and promoting existing technologies and processes that could lead to higher productivity in industries, and providing an environment where new ideas are generated and developed into innovative technologies and processes (Nelson and Phelps 1966; Gintis 1971). To increase productivity, countries need a strong education system to provide primary and secondary education to everyone and promote higher education and continuous training in university and industry.

The comparison of indicators of education systems shows that Singapore scores the highest in all relevant factors including school enrollment, quality of primary education, adaptability of higher education to economic needs, and company investment in staff training and development (figure 2, panel b). Malaysia, ranked second, has a good primary education system, a satisfactory level of adaptability of higher education to economic needs, and a high level of company investment in staff development; however, it has low secondary and tertiary school enrollment rates. Chile, the third ranked country, has a high enrollment rate for primary, secondary, and tertiary education; however, it lags behind in terms of the quality of primary education, adaptability of higher education to economic needs, and company investment in staff training. Vietnam, Mexico, and Peru have high to moderate primary and secondary education enrollment; however, the quality of the primary and higher education system appears to be unsatisfactory and company investment in staff training to be insufficient.

The equity in access to educational opportunities is another important measure of the quality of education systems. A report by the Organisation for Economic Co-operation and Development (OECD) indicates that the equity in the allocation of educational resources between socioeconomically advantaged and disadvantaged schools is the highest in Singapore, followed by Malaysia, Vietnam, Chile, Mexico, and Peru (OECD 2014).

In an indicator of the performance of education systems, scores on the recent PISA (Programme for International Student Assessment) test, Singapore had the highest math score of the six countries, Vietnam scored the second highest, followed by Chile, Malaysia, Mexico, and Peru (figure 3).

Component 3: Efficiency

Efficiency is defined as the effectiveness and timeliness with which capital and labor are allocated through the constant renewal of businesses across sectors. The key to efficiency is sectoral and corporate renewal and the flexible allocation and use of resources (Caballero and Hammour 1996; Hsieh and Klenow 2009). Structural transformation toward high value-added sectors from agriculture to industry and services has occurred in developed countries and is ongoing in developing countries (Divanbeigi, Paustian, and Loayza 2016). Corporate renewal involves the death of inefficient companies, but also the growth of productive companies and the emergence of new efficient ones. For this renewal to occur, flexibility of resource allocation and use is critical; however, regulatory rigidity has been an obstacle in many developing countries, impeding the adoption of new technologies and processes, the emergence of new enterprises, and the transition of companies from informal to formal sectors.

From 1965 to 2014, a common feature among the six countries was the decreasing share of total value added represented by the agriculture sector and the increasing share of service sectors (World Bank 2016). Nevertheless, the trajectory of the share of the industry sector varies across countries over the same period. The share increased in Mexico, Peru, Malaysia, and Vietnam; remained stable in Chile; and decreased in Singapore, particularly since the mid-1980s.

Indicators of the level of regulations on market, trade, and labor show that Singapore has the lowest regulatory burden (figure 2, panel c). Malaysia is the second least regulated country, yet it imposes higher corporate taxation and trade tariffs than Singapore. Chile ranks third; it has higher regulatory burdens to start a business and more centralized regulatory control over companies' hiring and firing practices than Singapore and Malaysia. Peru ranks fourth, lagging behind mainly due to high regulatory burden on starting a business, high corporate taxation, and highly centralized control over companies' hiring and firing practices. Mexico, which ranks fifth, imposes particularly high corporate taxation and trade barriers. Vietnam is the most regulated country, with the highest burden on starting a business and trade and high corporate taxation and trade tariffs.

Regulatory burden and rigidity can have a negative impact on goods and labor markets. Especially in developing countries that lack transparent and effective governance, they may result in high levels of informality because companies are discouraged from operating in formal sectors and instead run their business outside a legal framework. Using as proxy for formal employment the fraction of the labor force that contributes to a retirement pension fund, the share of informal employment in the labor force as of 2010 was less than 50 percent in Chile, Malaysia, and Singapore and more than 75 percent in Mexico, Peru, and Vietnam.

Component 4: Infrastructure

Infrastructure, both physical and intangible, is the fourth component promoting productivity (Aschauer 1989; Fischer 1993; Rivera-Batiz 2002). Physical infrastructure includes transport, telecommunications, and energy supply systems; intangible aspects include public institutions and the macroeconomic environment. Good public institutions are those that protect the intellectual property of individuals and companies, make their policy decision making transparent, do not squander their budgets, provide reliable public security to citizens and organizations, and maintain a stable macroeconomic environment. In turn, a stable macroeconomic environment is characterized by a sustainable government budget balance, sufficient national savings, debts at a manageable level, and a stable inflation rate with neither high inflation nor deflation.

The comparison of the quality of physical infrastructure in terms of transportation and electricity supply shows that Singapore and Malaysia have the first and second strongest infrastructure of the six countries, respectively (figure 2, panel d). Chile and Mexico lag behind these two mainly due to a low quality of railroads. The physical infrastructure in Vietnam and Peru is generally weak in all relevant indicators.

In a comparison of performance indicators of public institutions—in terms of intellectual property protection, transparent policymaking, efficient government spending, reliable police services, and macroeconomic stability—Singapore and Malaysia again rank first and second, respectively, out of the six countries (figure 2, panel e). Chile, the third ranked country, has highly reliable police services and a relatively low level of irregular payments and bribes, but

lags behind the first two in intellectual property protection and efficient government spending. Vietnam, in fourth place, scores lower in all indicators when compared to the first three countries. Peru, ranked fifth, has a highly stable macroeconomic environment, similar to the level of Singapore, but scores low in other indicators. Mexico, ranked last, has a similar level of performance to Vietnam in general, but with a lower level of reliability of police services.

Conclusion

Productivity is key for economic development, and is driven by four interrelated components: innovation; education; efficiency in allocation and use of resources; and physical and institutional infrastructure.

The investment needs and level of urgency for reform in the four main components of productivity vary by country, generally depending on the stage of economic development. Developed countries—because they are forerunners in technology and tend to have slower economic growth—generally need to prioritize promoting innovation, while also alleviating the regulatory burden. Developing countries typically need to prioritize strengthening physical and institutional infrastructure and primary and secondary education systems. As the analysis of the six countries featured in this Research Policy Brief exemplifies, every country is in a different stage of development and has its own strengths and weaknesses in terms of the drivers of productivity. Governments may use this information to set their priorities and design policies and programs to target these drivers, especially where productivity gains depend on collective action and public goods.

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