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Total Factor Productivity

How can economies do more with less?

Robert Zymek

WHETHER WE REALIZE IT OR NOT, we think about productivity all the time. Can I take on another project at work without sacrificing my weekend? Can I save commuting time by working from home? Will this course help me do my job better?

Self-help books on productivity regularly top the sales charts, with recent bestsellers in the United States promising potential readers advice on how to “get more done in less time,” “accomplish your goals without stress,” or “reclaim your time in a world that demands more.”

Macroeconomists think about productivity just as much, and in much the same way. Their focus is the productivity of the whole economy. They refer to this as total factor productivity (TFP).

It’s a measure of an economy’s ability to generate income from inputs—to do more with less. The inputs in question are the economy’s factors of production, primarily the labor supplied by its people (“labor” for short) and its land,

machinery, and infrastructure (“capital”). If an economy increases its total income without using more inputs, or if the economy maintains its income level while using fewer inputs, it is said to enjoy higher TFP.

According to the Penn World Tables, the economies with some of the world’s highest TFP—countries such as The Netherlands, Norway, Switzerland, and the US—are also among its richest. Considering this association between productive efficiency and economic prosperity, recent trends are worrisome. Recent IMF research shows that TFP growth has slowed around the world since the global financial crisis. In low-income developing countries, it has come to a virtual standstill in recent years.

Living standards

TFP is an important macroeconomic statistic for two reasons. First, improvements in living standards must come from growth in TFP over the long run.

This is because living standards are measured as income *per person*—so an economy cannot raise them simply by adding more and more people to its workforce.

Meanwhile, economists have amassed lots of evidence that investments in capital have diminishing returns. This leaves TFP advancement as the only possible source of sustained growth in income per person, as Robert Solow, the late Nobel laureate, first showed in a 1957 paper.

TFP growth is also the answer to those who say that continued economic growth will one day exhaust our planet’s finite resources. When TFP improves, it allows us to maintain or increase living standards while conserving resources, including natural resources such as the climate and our biosphere.

The second reason for the importance of TFP in economics is closely related to the first. Large differences in living standards persist across countries. Controlling for differences in national prices, the average person’s income in South Sudan, one of the world’s poorest countries, was estimated to be less than 1 percent of the average person’s in the United States, one of the world’s richest, in 2023.

Differences in people’s hours worked or their access to capital can explain only a fraction of these cross-country income disparities. The bulk of the disparities—more than 66 percent by one recent estimate—is explained by large cross-country differences in TFP.

This makes it a key concern for policymakers everywhere. For policymakers

in emerging market and developing economies, the central question is how to close the TFP gap with richer countries. Only by doing so will they be able to provide better jobs and a higher standard of living for their people—most critically in Africa’s economies that are set to experience strong population growth in the coming decades.

For policymakers in advanced economies, igniting TFP growth is about charting new frontiers of productivity. This is required to make growth sustainable, in the face of both environmental concerns and aging societies. With a shrinking share of working-age adults, which can be only partly offset by immigration, TFP has a vital role to play in maintaining living standards.

Measure of ignorance

How can a country grow more with fewer inputs? There is no straightforward answer to this trillion-dollar economic question. Statistically, TFP is measured as a residual—the part of a country’s income that cannot be attributed to factor inputs such as labor and capital, which are easier to quantify. As such it represents a “measure of our ignorance” about what makes some countries rich and others poor.

Over time, economists have chipped away at this residual by identifying at least three variables that are closely related to higher TFP.

First, workforce productivity. TFP is higher in countries where the average worker has more years of schooling, the quality of education and training is better, and the workforce is healthier. These advantages enable the average hour of work to generate more economic value added—in addition to improving the quality of life more broadly.

Second, resource allocation. Even within narrowly defined economic activities, some firms are much more productive than others. It thus matters to an economy’s overall productivity if the most productive firms in any given sector are able to attract the bulk of labor and capital. When this is the case, an economy is described as “allocatively efficient.” If instead a lot of labor and capital is stuck in rel-

atively unproductive firms, the economy is “allocatively inefficient.” This will drag down its TFP.

Third, international trade. Trade incentivizes countries to specialize in industries in which they enjoy a comparative advantage, allowing them to deploy their resources more productively. Access to the global market also offers firms the opportunity to exploit economies of scale, and international competition tends to promote productive firms over their unproductive counterparts.

These three variables suggest a partial blueprint for TFP catch-up by developing economies, where workforces

tend to lack access to education and health care, resource misallocation is more prevalent, and barriers to international trade are often higher.

It requires mobilizing financing to improve the public provision of human services, removing taxes and subsidies that distort markets, and lowering barriers to fair competition between firms, as well as opening up to international trade.

Economic studies suggest that this could close some of the TFP gap between rich and poor countries. Yet a large part of this gap continues to elude explanation.

Power of innovation

Moreover, these measures are unlikely to provide much additional TFP growth in advanced economies. They already operate close to the frontier of workforce productivity, allocative efficiency, and trade openness. In these economies, the most likely source of sustained TFP growth is innovation in technology, production processes, and product variety, but there is mounting evidence that the impact of such innovation has slowed in recent decades.

So what can advanced economies do? First, they should “do no harm,” by avoiding policy mistakes, such as permitting a decline in market competition, with powerful firms using their monopoly positions to stifle entry and innovation, or reverting to costly trade protectionism. Beyond this, policymakers should craft regulations that tap the possible productivity benefits of recent innovations in green technology, information and communications technology, and artificial intelligence. They should also tackle remaining barriers restricting the opportunity for women and minorities to bring their talents and innovative potential to all sectors of the economy.

The ins and outs of TFP may seem remote from everyday life. But if decades from now humanity suffers less stress and enjoys longer weekends, TFP growth—not self-help books—will likely deserve most of the credit. **F&D**

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ROBERT ZYMEK is an economist in the IMF’s Research Department.