

# The Stages of Economic Growth Revisited

## Part II: Catching Up to and Joining the Economic Leader

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### EXECUTIVE SUMMARY

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Rostow (1960) hypothesized that taking off into economic growth was a difficult task for countries in the 19th Century, requiring major changes in institutions. In the 20th Century, however, as the United States and other advanced countries became richer because of improvements in technologies and managerial practices, it became easier for poor countries to take off into rapid growth by adopting some of these improvements.

We hypothesize that, while taking off is now easier, the difficult transition is now from take-off to catch-up, where nations grow closer to the economic leader (now the United States.). Doing so often requires major reforms in policies and institutions. Data suggest that when countries reach the limits imposed by their policies and institutions, their growth slows sharply. Even countries like Japan that have joined the United States in economic leadership in defining best practice in some sectors lag behind in other sectors. Our theory suggests that China is currently reaching its limits to rapid growth.

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\*This paper reports on the results of a larger project that we are conducting jointly with Jose Asturias of the Georgetown University School of Foreign Service in Qatar, Sewon Hur of the University of Pittsburgh, and Kim J. Ruhl of the Stern School, NYU. We are grateful to Edward Prescott for extensive discussions. We also benefited from comments from Jean O'Brien-Kehoe and Kei-Mu Yi. The data set referred to in the text and used to construct the figures is available at <http://www.econ.umn.edu/~tkehoe/>. The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System.

## What drives catch-up growth?

Since the 1960s, economic growth has spread throughout the world. In the first part of this essay (Costa, Kehoe, and Raveendranathan (CKR) (2016)) we calculate that in 2010 there were only seven countries<sup>1</sup> that had never experienced 25 years or more of growth in real GDP per working-age person averaging at least 1.0 percent per year<sup>2</sup> — the sort of growth first experienced by the United Kingdom during the Industrial Revolution — and they contained less than 2 percent of the world’s population. In 1960, in contrast, more than 50 percent of the world’s population lived in countries that had never experienced this sort of sustained growth.

Although taking off into growth has become easier, catching up with the United States has not. In 2010 only 19 percent of world population lived in countries that at some point in the 20th Century had reached 35 percent of the income per person of the United States, a slight decrease from almost 21 percent in 1960. In our earlier paper, we sketch out a theory in which a growing country passes through stages of growth that differ from Rostow’s in his classic 1960 book, The Stages of Economic Growth. We examined how a country moves from the Malthusian trap — where increases in population eat up any increase in income — into a take-off into growth like that experienced by the United Kingdom during the Industrial Revolution.

This sequel paper continues to sketch out the theory, asking: What do developing countries need to do to move into the next two stages, catching up to and joining the economic leader? Should we expect the recent slowdown of growth in China to continue? In recent years, development economists have raised these sorts of questions, asking, for example, what policies a country like China needs to implement to escape what Gill and Kharas (2007) call the middle income trap, where a country reaches the World Bank definition of “middle income” but then stagnates.

We identify a country as *catching up* to the economic leader if it has a period of at least 15 years with more than 35 percent of the income per person of the economic leader. We have chosen the 35 percent cut-off because the data indicate that reaching this level requires massive immigration from rural areas to urban areas and a sharp reduction in agriculture as a fraction of

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<sup>1</sup>Afghanistan, the Central African Republic, Haiti, Madagascar, Niger, Senegal, and Somalia.

<sup>2</sup>As do Costa, Kehoe, and Raveendranathan (2015), we refer to real GDP (gross domestic product) per working age person (15 to 64 years) as income per person. We take real GDP data from the Maddison Project and working-age population data from the World Bank’s *World Development Indicators* and from National Statistics, Republic of China (Taiwan) for Taiwan for 1960–2010.

total output. During the 20th Century and early 21st Century, when the United States has been the economic leader, catching up also requires long periods during which growth in income per person exceeds 2.0 percent per year. We identify a country as *joining* the economic leader if it has a period of at least 15 years with more than 65 percent of the income per person of the economic leader.

### **The power of productivity and institutions**

Growth in the United States has been the result of increases in productivity and that capital is accumulated to keep the ratio of capital to output roughly constant.<sup>3</sup> Given this empirical evidence, we model the growth of the United States and other advanced countries — those in the stage of joining the economic leader — as a balanced growth path in which output and capital grow at the same, constant rate.<sup>4</sup> Why the balanced growth path of the United States, the economic leader in the 20th Century, had a growth rate close to 2 percent per person per year, while that in the United Kingdom, the economic leader in the 19th Century, was closer to 1 percent is an important question. Our theory simply takes these trend growth rates as given, however, and asks how less developed countries react to it. Trend growth could still accelerate to 3 percent per year in the 21st Century, although it shows no sign of doing so.

What forces have driven the near-constant growth in productivity in the United States? William Lewis (2004), a management consultant, views productivity increases as improvements in “best practice,” the result of improvements both in technology and in managerial practices. Lewis’s view of improvements in best practice and their adoption by firms in less developed countries complements the theory of follow-the leader growth developed by Parente and Prescott (1994, 2002): While best practices in the United States are constantly improving, countries that are behind can grow at the same rate as the economic leader by adopting these best practices, perhaps with a lag. If a country eliminates barriers to adopting best practices, it goes through a period of rapid growth during which capital and labor adjust to the improved productivity.

Japan provides an instructive example of a country moving from one balanced growth path to another. Figure 1 compares the economic growth in Japan 1900–2010 with that in the United States. After the Meiji Restoration in 1868 abolished feudal institutions and opened

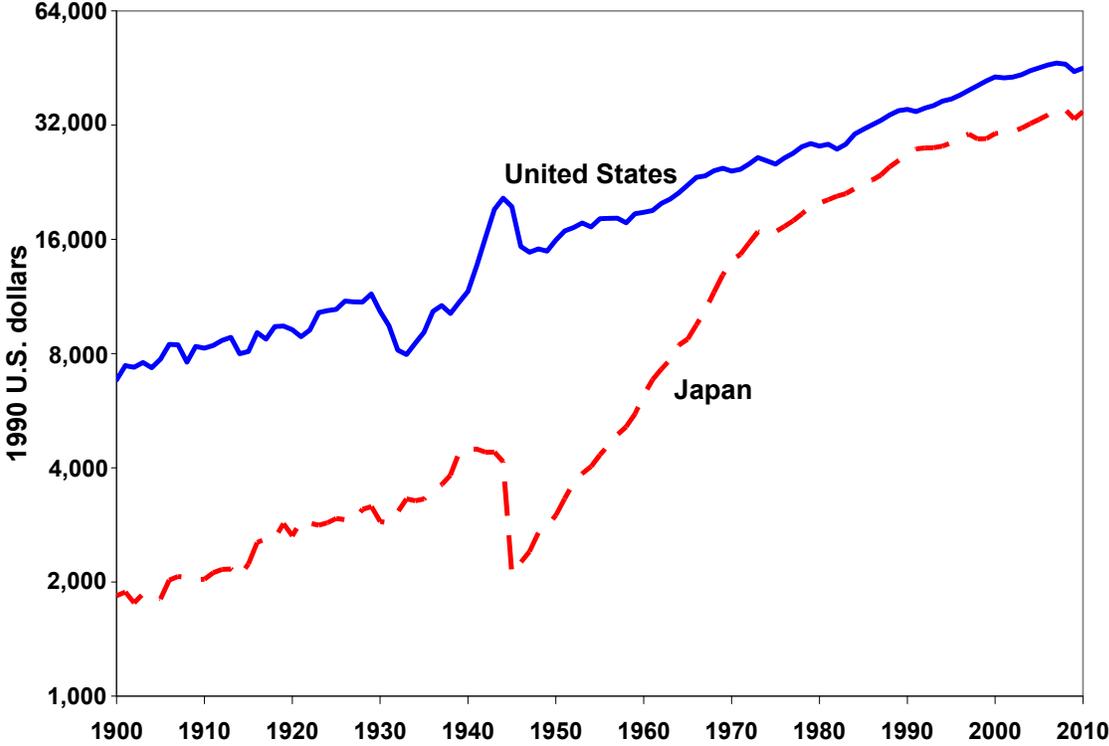
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<sup>3</sup> Solow (1956, 1957), Swan (1956), and Kaldor (1961).

<sup>4</sup> In this, we follow Solow (1956, 1957) and Swan (1956).

Japan to the rest of the world, Japan grew rapidly, reaching a balanced growth path with income per person about 27 percent of the U.S. level during 1900–1930. Following the devastation of World War II, Japan needed until the late 1950s to build up the capital necessary to recover to its previous balanced growth path. The American occupation of Japan 1945–1952 and its aftermath brought a new set of institutions, however, which allowed the Japanese economy to adopt best practices more rapidly and widely than before the war. The Japanese economy continued to grow rapidly until its income per person reached 80 percent of the U.S. level in 1991, and many predicted that it would pass the U.S. level. Following a decade of recession in the 1990s, however, Japan has settled down to a new balanced growth path in 2000 with about 77 percent of the U.S. income per person.

**Figure 1: Real GDP per working-age person in Japan and the United States**



We follow North (1991) in viewing institutional changes as moving countries from one stage of economic growth to another. We view the institutional changes of the Meiji Restoration as generating the rapid growth 1870–1900 that moved Japan from the Malthusian trap to the take-off into growth. Similarly, we view the institutional changes associated with the American

occupation as generating the rapid growth 1945–1991 that moved Japan to catch up to and to join the economic leader.

We have chosen the 65 percent cut-off for joining the economic leader because it picks up countries like Japan that share some of the economic leadership with the United States. Lewis (2004) argues that Japan, led by Toyota, has been the leader in setting best practice in automobile production, and heavy manufacturing more generally, since the 1970s. He suggests that the gap of more than 20 percent in income per person between Japan and the United States is due to Japan lagging significantly behind best practice in such other sectors as retailing, food processing, housing construction, and health care provision.

Our theory views the institutions that lead to these deviations from best practice as putting the brakes on Japanese economic growth in the 1990s and keeping Japan more than 20 percent below the U.S. level. Eichengreen, Park, and Shin (2011), following the hypothesis in Kehoe and Ruhl (2010), confirm that, following periods of rapid growth, countries tend to converge to growth paths of 2 percent per person per year, as does Japan in figure 1.

## **Barriers to growth**

Most countries have not experienced the growth that Japan has had, moving from taking off to catching up to and to joining the economic leader, and we hypothesize that the lack of institutional and policy change is the primary barrier to growth for these nations. Just as institutional changes can lead to growth, the absence of such changes can lead to stagnation. Parente and Prescott (1994, 2002) and Lewis (2004) view inefficient institutions and policies as imposing barriers to the adoption of best practice. A vivid example of a barrier to growth is provided by North (1968), who argues that most of the six-fold increase in productivity in ocean shipping from 1600 to 1850 was due to the suppression of piracy, which allowed shippers to develop larger ships with smaller crews that could make voyages independently rather than in convoys. Between 1600 and 1850 there were improvements in technology such as the development of the chronometer for navigation, but North argues that none of the major improvements in best practice in shipping was due to technology. He cites as evidence that by 1600 the Dutch had developed a ship design, the flute, that had most of the crucial technological advantages of early 19th Century ships but had only limited use in Baltic bulk trade and English

coal trade because of its vulnerability to pirate attacks and the prevalence of piracy on major ocean trade routes in the 17th and 18th Centuries.

Some barriers to growth are imposed by forces outside a country, like North's sea pirates or a colonial power that suppresses domestic institutions so that it can exploit a country's resources. Most often, however, the pirates who are holding back adoption of best practice are elites or special interest groups within a country. In some countries, these groups operate directly within the government. In others, they manipulate government institutions. Table 1 reports survey measures of perceptions of corruption constructed by Transparency International and the impact of government regulations on the ease of doing business for small and medium size firms constructed by the World Bank's Doing Business project. Countries are ranked from the lowest perception of corruption to the highest and from the highest ease of doing business to the lowest. Asturias *et al.* (2015a) use cross-country, firm-level data to argue that the ease of entry for new firms is crucial for generating the sort of rapid growth that allows a country to move from one stage to another.

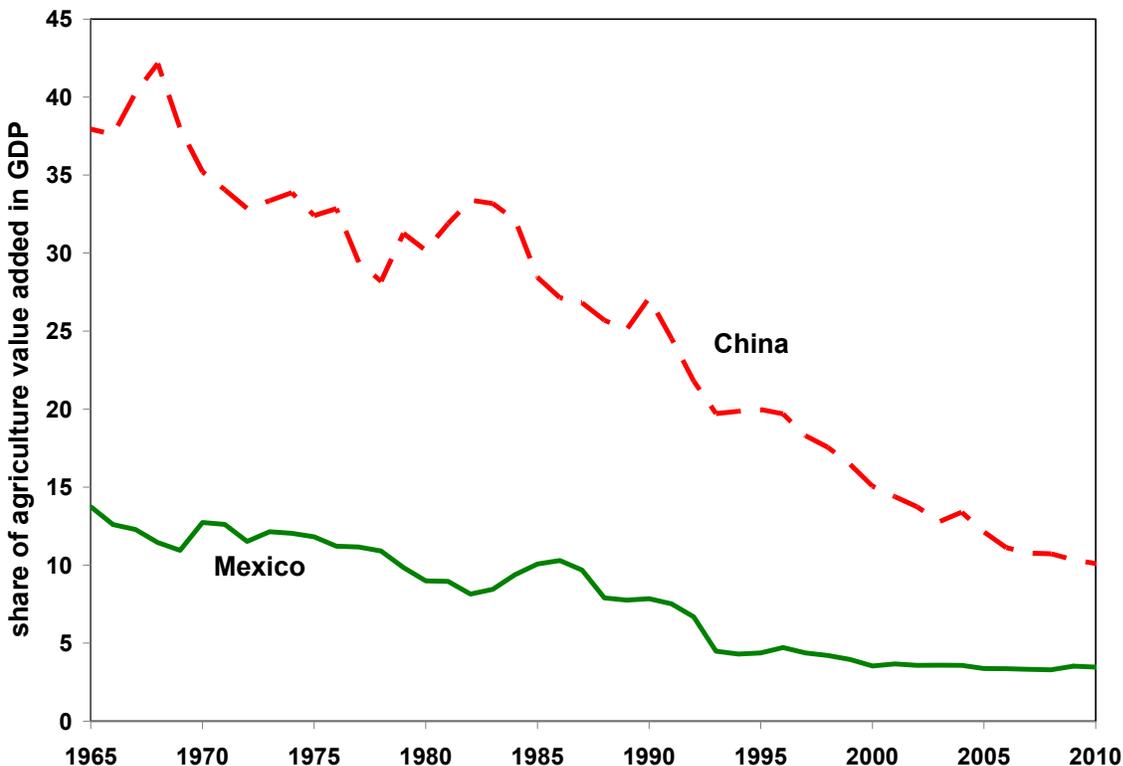
**Table 1: Perceived Corruption and Ease of Doing Business in Countries organized by Growth Stages, 2010**

Growth Stage	Corruption perceptions	Ease of doing business
stage 3 (joining)	21.7	16.7
stage 3 failure	111.6	128.9
stage 2 (catching up)	49.2	53.3
stage 2 failure	100.3	68.5
stage 1 (taking off)	95.6	108.2
stage 1 failure	116.4	121.5
stage 0 (Malthusian trap)	143.8	156.7
Population-weighted, average ranks. Lower number means less perceived corruption and greater ease of doing business. The Transparency International ranking runs from 1 to 177. <a href="http://www.transparency.org/">www.transparency.org/</a> The Doing Business ranking runs from 1 to 182. <a href="http://www.doingbusiness.org">www.doingbusiness.org</a>		

## China versus Mexico

Over the past two decades, China has experienced very rapid economic growth. We argue that, unless it undergoes major institutional change, China has reached (or soon will) the limit of its rapid growth, as did Japan in 1991 and Mexico in 1981. China is still in the take-off stage because its income per person is only 24 percent of that of the United States. China is still benefiting from massive migration of population from rural to urban areas and movement of workers from agriculture into industry. As seen in figure 2, China is still significantly behind Mexico in this process.<sup>5</sup> We should point out that Asturias *et al.* (2015b) argue, following Kehoe and Meza (2011), that China has had an advantage over Mexico because it opened to international trade and investment earlier in its industrialization process, building up an industrial structure better able to cope with international competition.

**Figure 2: Share of agriculture in GDP**



<sup>5</sup> Determining where exactly China stands compared to Mexico in income per person depends on what data source we use. Comparing income levels across such different countries is an inherently difficult task. The Maddison Project has China only 11 percent behind Mexico in 2010, the latest year for which data are available, which would imply that China is currently slightly ahead. The World Bank's World Development Indicators have China 47 percent behind Mexico in 2010 and the Penn World Tables have China 44 percent behind, however, and both would imply that China is still significantly behind.

Kehoe and Ruhl (2010) argue that Mexico has had poor growth performance since the 1980s because of problems with its financial system, immobility in labor markets, and lack of rule of law. They point that these sorts of barriers to growth are also present in China, and are perhaps even worse there. Transparency International, for example, ranks China 78 in 2010 and Mexico 98, while Doing Business ranks China 89 and Mexico 51. Our theory suggests that the barriers that slowed growth in Mexico have not yet slowed China because China has not reached the catching up stage of growth. Perhaps these barriers are starting to bind on China. If not, we hypothesize that they will soon.

### **Who will overtake the United States?**

Starting in the 1870s, the United States began to grow at a consistently higher rate than that of the United Kingdom and in 1901 overtook the United Kingdom to become the economic leader. Is some country currently overtaking the United States? As we have seen, Japan reached 80 percent of the U.S. level in 1991. That is a closest a major economy has come in recent decades. Hong Kong, Norway, and Singapore were approaching the U.S. level in 2010, and may soon pass it, but these are very small countries who do what they do very well but are never going to be the leaders in a significant number of economic sectors. It is conceivable that South Korea, which has had high growth in recent decades, will eventually pass the United States, but, as of 2010, South Korea had a level of income per person only 64 percent of the U.S. level and still had not entered the stage of joining the economic leader. Currently, there is no major country that is the obvious candidate for the next world economic leader.

## References

- Asturias, Jose, Sewon Hur, Timothy J. Kehoe, and Kim J. Ruhl. 2015a. "Firm entry and exit and aggregate growth," Federal Reserve Bank of Minneapolis.
- Asturias, Jose, Sewon Hur, Timothy J. Kehoe, and Kim J. Ruhl. 2015b. "The interaction and sequencing of policy reforms," Staff Report 521, Federal Reserve Bank of Minneapolis.
- Costa, Daniela, Timothy J. Kehoe, and Gajendran Raveendranathan. 2016. "The stages of economic growth revisited, I: General framework and taking off into growth," Federal Reserve Bank of Minneapolis.
- Eichengreen, Barry, Donghyun Park, and Kwanho Shin. 2011. "When fast growing economies slow down: International evidence and implications for China," NBER Working Paper 6919.
- Gill, Indermit and Homi Kharas. 2007. *An East Asian Renaissance: Ideas for Economic Growth*. World Bank.
- Kaldor, Nicholas. 1961. "Capital accumulation and economic growth," in F. A. Lutz and D. C. Hague (eds.), *The Theory of Capital*. St. Martin's Press, 177–222.
- Kehoe, Timothy J. and Felipe Meza. 2011. "Catch-up growth followed by stagnation: Mexico, 1950–2010." *Latin American Journal of Economics*, 48, 227–268.
- Kehoe, Timothy J. and Edward C. Prescott. 2002. "Great Depressions of the 20th Century," *Review of Economic Dynamics*, 5, 1–18.
- Kehoe, Timothy J. and Edward C. Prescott. 2007. *Great Depressions of the Twentieth Century*. Federal Reserve Bank of Minneapolis.
- Kehoe, Timothy J. and Kim J. Ruhl. 2010. "Why have economic reforms in Mexico not generated growth?" *Journal of Economic Literature*, 48, 1005–1027.
- Lewis, William W. 2004. *The Power of Productivity: Wealth, Poverty, and the Threat to Global Stability*. University of Chicago Press.
- North, Douglass C. 1968. "Sources of productivity change in ocean shipping, 1660–1850," *Journal of Political Economy*, 76, 953–970.
- North, Douglass C. 1991. "Institutions," *Journal of Economic Perspectives*, 5, 97–112.
- Parente, Stephen L. and Edward C. Prescott. 1994. "Barriers to Technology Adoption and Development." *Journal of Political Economy*, 102, 298–321.
- Parente, Stephen L. and Edward C. Prescott. 2002. *Barriers to Riches*. MIT Press.
- Rostow, Walt W. 1960. *The Stages of Economic Growth: A Non-Communist Manifesto*. Cambridge University Press.
- Solow, Robert M. 1956. "A contribution to the theory of economic growth," *Quarterly Journal of Economics*, 70, 65–94.
- Solow, Robert M. 1957. "Technical Progress and the Aggregate Production Function," *Review of Economics and Statistics*, 39, 312–320.
- Swan, Thomas. 1956. "Economic growth and capital accumulation," *Economic Record*, 32, 334–361.