

Research Digest

In this issue, Research Digest summarizes recent work by

- **Ellen McGrattan**
on economic growth and openness to foreign investment
- **Morris Kleiner and his colleagues**
on the importance—or lack thereof—of “organizational forgetting”
- **Timothy Kehoe and Kim Ruhl**
on divergent growth patterns in China and Mexico

Opening Up

Ellen McGrattan explores the relationship between economic growth and openness to foreign investors.

Economic theory predicts that a country will experience increased economic growth by opening its markets to foreign direct investment (FDI). Foreign investors could provide capital that is often sorely lacking. Of particular need: “*technology capital*”—things like research and development, proprietary brands, patents and organizational capital—ideas or methods that firms develop internally and then use in as many locations as they choose, both at home and abroad.

Combined with local labor and the right legal and regulatory institutions, capital from abroad can spur growth in advanced as well as emerging markets. Yet, with few exceptions, empirical research has not been able to substantiate that



PHOTOGRAPH BY STEVE NIEDORF

prediction, a situation that has perplexed economists for decades.¹

In a recent staff report, Minneapolis Fed mone-

¹Critics of globalization have used this lack of evidence on FDI benefits to buttress their case, though their concerns are often focused on potential volatility in short-term debt markets rather than FDI per se, which is inherently medium-term or longer.

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McGrattan suggests that the inability of prior studies to find a robust positive relationship between FDI openness and growth doesn't necessarily mean that such effects don't exist. Rather, she demonstrates, the benefits may appear to be insignificant or even negative only during the transition period itself. After open markets mature and the policies that support them evolve, the benefits become large and obvious.

tary adviser Ellen McGrattan, also at the University of Minnesota, offers an explanation. "I show that these inconclusive findings do not contradict theory, but in fact are to be expected when countries are in transition to capital market openness."

In "Transition to FDI Openness: Reconciling Theory and Evidence" (Staff Report 454, online at minneapolisfed.org), McGrattan suggests that the inability of prior studies to find a robust positive relationship between FDI openness and growth doesn't necessarily mean that such effects don't exist. Rather, she demonstrates, the benefits may appear to be insignificant or even negative *only during the transition period* itself. After open markets mature and the policies that support them evolve, the benefits become large and obvious. Notably, this effect is most pronounced for smaller countries.

To explore the relationship between FDI openness and growth, McGrattan's paper moves through three stages. The first step is to look at what happens in a hypothetical world with just two countries, a small country (in

terms of population and technology level) that unilaterally opens up to FDI from its large neighbor. She finds that *initially*, per capita GDP and employment drop below historical trends. This reverses only after restrictions reach a critical point of relaxation.

The second step is to build a more realistic multicountry model with policies that generate capital flows like those observed in data from 104 countries between 1980 and 2005. In this model, matched to actual data with realistic FDI flows, McGrattan finds that there is no systematic relationship between economic performance and FDI levels. In other words, she replicates the results of most other empirical research on the question.

The final step is, in a sense, a blend of the first two. For each country in her sample of 104, she estimates the growth impact and welfare gains of unilateral relaxation of capital market restrictions. With the model developed for step two, with its realistic parameters, she thus performs a country-by-country experiment. What will happen to growth and welfare in

each if it eases its constraints on FDI and borrowing/lending?

The model's predictions for GDP growth when countries are close to completely open are revealing. McGrattan finds an inverse relationship between a host country's relative size and its growth following capital market liberalization—larger countries experience smaller growth benefits. But in almost all cases, the boost in growth following FDI liberalization is substantial, with the highest estimates around 7 percentage points annually. "[T]he benefits in terms of higher GDP growth and welfare ... can be huge," writes McGrattan, "especially for small countries."

There are two reasons that GDP and employment measures initially decline after FDI openness is implemented, according to McGrattan. First, when relaxation of restrictions is expected, households increase consumption and leisure in anticipation of higher permanent income, which in turn reduces domestic investment and labor.

The second factor behind apparent GDP declines is actually a

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measurement issue. Part of the increased FDI will typically be booked as “expensed intangible investment” by the corporation and therefore not counted as part of corporate profits. As such, it will not be captured in measured GDP. As McGrattan points out, theory predicts that intangible investments are abnormally high while barriers to FDI are being removed, resulting in a negative correlation between FDI investment and host country GDP during the transition period.

By taking account of a transition period, McGrattan reconciles economic theory predicting that openness to FDI will lead to higher growth and welfare for host countries with the lack of robust empirical evidence for such benefits. In McGrattan’s model, benefits to FDI openness are large, but only once a certain threshold of openness is attained.

Nonetheless, McGrattan’s findings leave economists with two challenges. The first involves defining the characteristics of the openness threshold. A better-defined threshold could allow for more accurate economic modeling, predictions and policy corrections. The second, and more significant, challenge, according to McGrattan, is to abandon the standard method for analyzing the effects of FDI openness. Her model is a critical first step.

—Lester Picker



Morris Kleiner

PHOTOGRAPH BY STEVE MEDORF

Is forgetting a problem?

A new study suggests that organizational forgetting is a less significant drain on productivity than previously thought.

A long tradition in economic research suggests that learning through on-the-job experience has a substantial impact on productivity. Kenneth Arrow’s seminal 1962 paper on learning and productivity observed that “learning is the product of experience ... [and] that learning associated with repetition of essentially the same problem is subject to sharply diminishing returns.”

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However, a recent article ... argues that the importance of organizational forgetting has been overstated and that empirically documented productivity declines attributed by past researchers to forgetting can instead be accounted for by other, simpler explanations.

Research inspired by Arrow's has looked at how on-the-job experience occurs at, and affects, both individual workers and companies as a whole.

A more recent stream of research has suggested that workers and organizations also likely suffer a degree of *depreciation* in learning—that is, forgetting. Individual workers obviously can forget things essential to their job (exhibit A: computer passwords).

But how significant is forgetting by the *organization* as a whole? Some economists believe the impact is substantial at the company level and for the broader macroeconomy. If a firm's institutional memory fades due to production slowdown during a recession, for example, organizational forgetting could negatively impact productivity well beyond the recession itself.

However, a recent article by Minneapolis Fed visiting scholar Morris Kleiner of the University of Minnesota, Jerry Nickelsburg at UCLA and Adam M. Pilarski of AVITAS Inc., argues that the importance of organizational forgetting has been overstated and that

empirically documented productivity declines attributed by past researchers to forgetting can instead be accounted for by other, simpler explanations.

"We show that previous outcomes of organizational forgetting analysis may be called into question," write Kleiner et al. in "Organizational and Individual Learning and Forgetting," forthcoming in *Industrial and Labor Relations Review*, "through a more thorough modeling of the production function ... and through the addition of more detailed data."

Producing a plane

The economists focus on aircraft manufacturing. This, too, has a long tradition: Arrow cites a 1936 article, "Factors Affecting the Cost of Airplanes." But there are several other reasons for looking at airplane companies: (1) An influential piece of research documenting the importance of organizational forgetting studied Lockheed's aircraft production, (2) many countries consider aircraft manufacturing a strategic industry deserving restrained antitrust policy, (3) mar-

ginal costs of airplane production do not always decrease over time, as learning theory predicts and (4) in the 1980s, Nickelsburg and Pilarski were economists at McDonnell Douglas where they worked on cost analysis of MD-80 aircraft.

The last fact provided them a clear picture of the actual manufacturing process. In particular, it clarified what really happens on the aircraft assembly line to both workers and management when production slows down: Do they forget, or do other disruptive factors explain productivity trends?

The economists first look at actual cost-of-production data for MD-80 airplanes and Lockheed's L-1011 in the months before and after a labor strike. During strikes, workers forget—*individual* forgetting—but supervisors and management remain active as they replace workers on the production line. "If management has knowledge of production," the economists write, "[organizational] forgetting is diminished."

At both companies, costs increased slightly right before and

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Leaving out important variables may lead to false explanations. “A more fully specified model that takes into account previously omitted variables finds a much smaller role of forgetting.”

after the strike, but then quickly resumed their typical levels. “In neither of the plane production lines is there evidence of organizational forgetting,” they write. “The small amount of increased costs associated with the previous three strikes is consistent with individual forgetting ... leaving little room for the large organizational forgetting found by [others].”

Forgotten variables

The economists then build a mathematical model of the production process, with deliberate inclusion of factors neglected by previous studies. Specifically, they include variables for parts shortages, labor strikes and existing aircraft grounded for maintenance (which can affect production because airlines may demand that replacement parts be pulled from unfinished planes).

Their model tracks actual cost data on MD-80 aircraft with remarkable consistency, suggesting that these factors do an excellent job of explaining productivity trends, particularly during a period of higher costs as output ramps up in response to increased orders. “The

concept of ‘organizational forgetting’ as the explanation of this cost increase is therefore not supported.”

They use the same model to study L-1011 production, substituting a proxy variable for parts shortages because data from Lockheed weren’t available. They again find that including variables for labor and part shortages diminishes the likely importance of organizational forgetting. In other words, leaving out important variables may lead to false explanations.

“A more fully specified model that takes into account previously omitted variables finds a much smaller role of forgetting,” the economists conclude. “That is, organizational forgetting, while important and interesting, is most likely not as influential as suggested by previous work.”

—*Douglas Clement*

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Kim Ruhl and Timothy Kehoe

Obstacles to growth

Diverging trends in Mexico and China suggest that, absent significant institutional reforms, China's rapid progress will slow.

Many of the institutional factors said to impede growth in Mexico—labor market rigidities, inefficient financial institutions and deficiencies in the rule of law—are also present in China. In *Why Have Economic Reforms in Mexico Not Generated Growth?* (Staff Report 453, online at minneapolisfed.org), Timothy Kehoe and Kim Ruhl examine whether standard economic theory can explain why China has grown so much more rapidly than Mexico in the past two decades.

Both countries have opened themselves to trade and foreign direct investment; Mexico implemented additional market-oriented changes, such as fiscal reforms and privatization of govern-

ment-operated firms. “In spite of these reforms, Mexico’s economic growth since 1985 has been modest, at best,” write Kehoe and Ruhl. “This growth is especially disappointing if we compare it with that of China.” Real GDP per working-age person grew by 510 percent in China from 1985 to 2008, but only 10 percent in Mexico. “In this paper, we ask why Mexico’s reforms did not result in higher rates of economic growth.”

To answer that question, the authors develop a theoretical framework in which countries far behind the “industrial leader”—the United States over the past century—can grow rapidly for a limited period without major reforms to either labor markets or legal and financial systems. By adopting the stock of knowledge created by industrial leaders, they hypothesize, poorer countries can increase total factor productivity and experience a period of rapid “catch-up” growth.

At some point, however, institutional constraints bind, and growth in GDP per working-age person will level off at a trend rate of about 2 percent per year. Only by enacting significant reforms can countries experience growth rates that exceed the trend rate, but “the possibilities for such catch-up growth depend on the distance of the

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“Our theory suggests that the factors that currently impede growth in Mexico, such as inefficient financial institutions, and insufficient rule of law, and rigidities in the labor market, do not yet do so in China because China has not yet reached a sufficient level of economic development.” These factors will become more important as China grows further.

developing economy from the (industrial leader) frontier.”

Mexico experienced a period of this catch-up growth from 1953 to 1981, enjoying 3.8 percent annual growth in real GDP per working-age person. Thus, despite its rapid recent growth, China was still substantially poorer than Mexico in 2008, with a GDP per working-age person of \$7,986 compared with Mexico’s \$20,755.

The authors point out that a small part of the perceived “growth gap” between China and Mexico is apparent rather than real. They calculate that changes in China’s terms of trade may be causing Chinese consumers to benefit less from growth than real GDP measures would indicate. Real GDP is invariant with respect to changes in the terms of trade. In contrast, real gross domestic *income* (GDI) adjusts the trade balance using the import price deflator: Exports are valued in terms of the amount of imports they could purchase. Using World Bank data to estimate the effect of China’s terms of trade on GDI suggests that Chinese real

GDP overstates the growth in real GDI by almost 8 percentage points over the decade considered. The economists also adjust for the welfare benefits of consuming a greater *variety* of goods. These measurements seem to indicate that Mexico has reaped substantial benefits from trade liberalization despite its relatively slow GDP growth.

But such measurement issues are a small part of the overall conundrum. Increases in productivity drive economic growth, argue the economists, and so an explanation of why Mexico stagnated while China grew rapidly must focus on productivity trends in both countries and reasons for those trends. “Our theory suggests that the factors that currently impede growth in Mexico, such as inefficient financial institutions, and insufficient rule of law, and rigidities in the labor market, do not yet do so in China because China has not yet reached a sufficient level of economic development,” they write.

These factors will become more important as China grows further, Kehoe and Ruhl predict, and

observers should expect sharp deceleration in China’s growth if it fails to significantly reform its economic and legal institutions.

—Linda Gorman