



# Economic Letter

## Impact of Chinese Slowdown on U.S. No Longer Negligible

by Alexander Chudik and Arthur Hinojosa

**ABSTRACT:** The impact of the Chinese economy on the U.S. has notably increased over the past two decades. Econometric modeling shows that the U.S. economy is more likely to directly and indirectly (through its trading partners) feel the impact of a negative shock to Chinese output.

China has become a systematically important economy in the world, accounting for about one-sixth of the global economy.<sup>1</sup> It is, therefore, of no surprise that a slowdown of Chinese economic activity impacts many economies globally, including the U.S.

Reliably quantifying these effects is very challenging. Most notably, data quality and availability and changing relationships between economies over time complicate efforts. There are also some technical (but nevertheless important) problems arising from modeling the global economy that features many interdependent individual economies.

Using an econometric technique that examines interdependence of individual economies in the global economy, the Chinese slowdown and its impact on U.S. output growth can be assessed, as well as changes in the relationship since 2000.

Thus, it appears that the impact of slowdown in China on the U.S. economy has increased over time—at the turn of the century, slower growth in China would have had a small effect on the U.S. Today, reducing Chinese output growth by 1 percentage point shaves about 0.2 percentage points from U.S. output growth.

### China's Rise

China began its expansive economic journey under the communist leader

Mao Zedong who founded the People's Republic of China in 1949. China was regarded as highly inefficient and relatively isolated during the pre-1978 communist period. From 1953 to 1978, China nonetheless achieved respectable growth. Its real (inflation-adjusted) gross domestic product (GDP), a broad measure of economic output, expanded at a 5.6 percent average annual rate.

However, it wasn't until the post-1978 economic and political reforms took effect that output growth reached the high levels economists have since come to expect of China. Driven by a dramatic increase in manufacturing productivity, the economy has expanded at a 9.4 percent average annual rate since 1978, doubling in real terms approximately every eight years.<sup>2</sup>

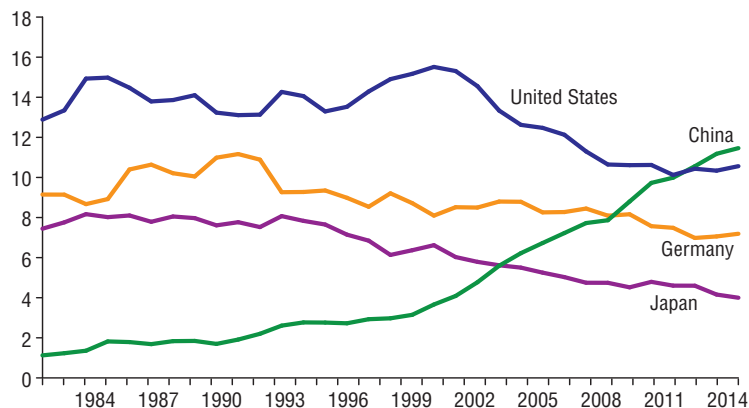
China has subsequently emerged as one of the world's largest economies in the last decade, exceeding that of the U.S. by some measures. China's share of global GDP on a purchasing power parity basis—reflecting what the value of China's goods and services would be were they sold in the U.S.—rose from 2.4 percent in 1980 to 17.2 percent in 2015. Meanwhile, the U.S. share of global GDP fell from 22 percent in 1980 to 15.9 percent in 2015.<sup>3</sup>

China's increased influence in the global economy is particularly noticeable when considering the evolution of

Chart  
1

## China's Trade Importance Accelerates Since 2000

Percent, share of world trade



NOTE: Chart shows the share of foreign trade in the global trade for four selected countries (U.S., China, Germany and Japan).

SOURCES: International Monetary Fund's Direction of Trade Statistics (IMF DOTs) database; Haver Analytics; authors' calculations.

foreign trade flows. The share of Chinese foreign trade flows in global trade has skyrocketed since the early 2000s, in part reflecting the emergence of China as the world's largest manufacturer (*Chart 1*).

### China's Future Output Growth

China has experienced a decrease in its pace of output growth since 2010, a deceleration that accompanied slowing in other advanced and emerging economies (*Chart 2*). Despite the slowdown, the Chinese economy still expanded 6.8 percent from fourth quarter 2014 to fourth quarter 2015. This rather impres-

sive growth, coupled with the size of the Chinese economy, made China the largest contributor to global output growth, accounting for approximately 40 percent of overall global growth in 2015 (*Chart 3*).

China's output growth is expected to slow down even more, albeit relatively gradually. The survey of professional forecasters conducted by Consensus Economics in March estimates real output growth of 6.4 percent for 2016. Individual forecasts for the year range from 5.8 percent to 6.7 percent. Such a narrow band does not necessarily imply forecast accuracy. Historically, the size of

one-year-ahead forecast errors (defined as the forecast minus the actual data) in the case of China averages about 1.7 percentage points; the largest since 1995 equaled almost 6 percentage points.

Although it's possible that Chinese growth will fall outside the prediction range, it nevertheless appears likely Chinese growth will gradually decline. The presumed drop begs the question how it will impact U.S. growth.

### Growth Slowdown Impact

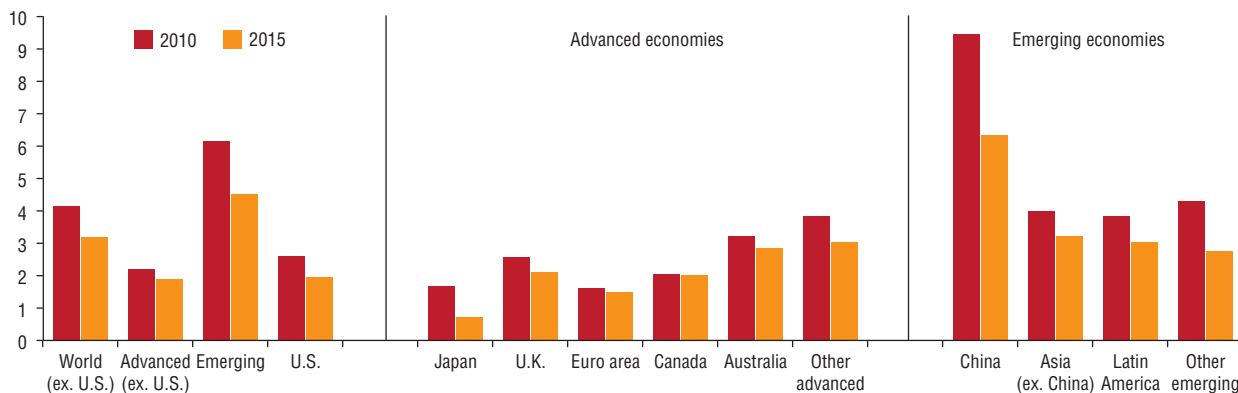
A Chinese output slowdown would affect the U.S. and other economies through several channels. Natural resources such as crude oil, gas and other commodities are traded globally, and global supply and demand affect their prices. Due to its sheer size, a Chinese slowdown (or expectations of it) can have considerable ramifications for the global demand of commodities.

Declining commodity prices can affect individual economies, with exporters generally sustaining ill effects. Another important channel, through which the Chinese economy affects the U.S. and the rest of the world, is direct and indirect foreign trade in goods and services. Regardless of the direct trade exposure of the U.S. economy to China, a Chinese slowdown negatively affects U.S. foreign trade partners, which will eventually spill over to lower U.S. output growth. Such indirect (or "third country")

Chart  
2

## Chinese Output Growth Slows Along With Other Advanced, Emerging Economies

Percent

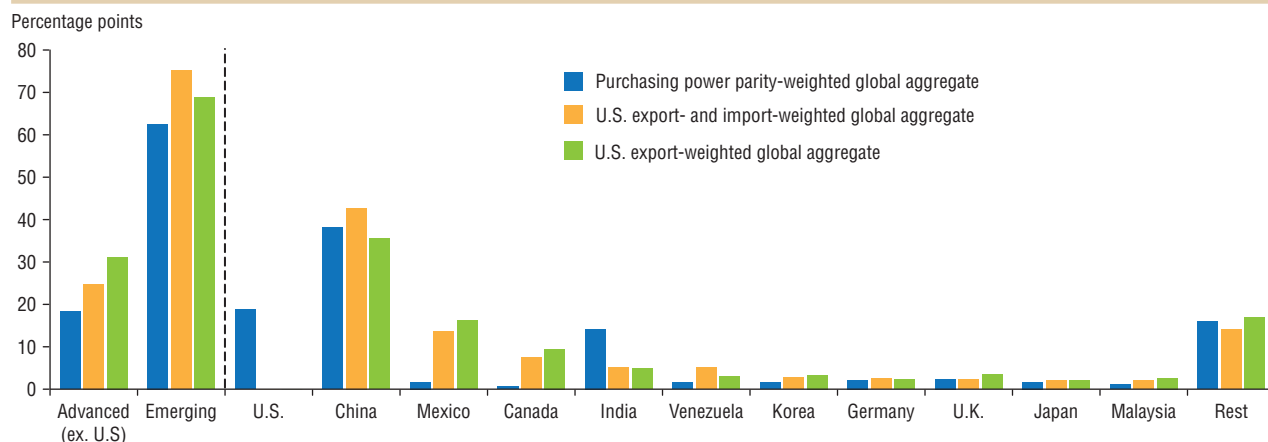


NOTES: Chart depicts real output growth in 2010 and 2015. Data for 2015 are estimated in economies where gross domestic product for the full year is not available. World and advanced economies (both excluding U.S.) and emerging economies are trade-weighted aggregates defined in the Federal Reserve Bank of Dallas' Database of Global Economic Indicators.

SOURCES: International Monetary Fund's World Economic Outlook (IMF WEO) database; Haver Analytics; Dallas Fed.

## Chart 3

### China Remains Major Contributor to Global Output Growth in 2015



NOTES: Chart depicts percentage-point contributions to global growth aggregate. Three definitions of global growth aggregate are considered—all based on 40 countries available in the Federal Reserve Bank of Dallas' Database of Global Economic Indicators.

SOURCES: Dallas Fed; authors' calculations.

effects can be rather important in a globalized world.

Financial interlinkages and confidence effects are also very important channels through which the transmission of economic shocks occur, as turmoil in Chinese stock markets vividly demonstrated.

Accurately measuring so many channels, often simultaneously, can be a Herculean task. Instead, a more direct data-driven, "reduced form" econometric approach is employed to estimate the impact of sudden, negative economic change. Specifically, a global vector

autoregressive (GVAR) model of output growth is used with a dataset featuring quarterly real output growth data for 22 advanced and emerging economies from first quarter 1980 to second quarter 2015, along with data on annual bilateral trade flows covering 1980–2014.

This approach can be briefly described in two steps. In the first step, a country-specific model, featuring domestic variables and country-specific trade-weighted averages of foreign variables, is estimated for all countries. In the second step, the individual country models are stacked and solved in one large, coherent

global interdependent system featuring all variables.<sup>4</sup>

Such GVAR models are increasingly used by policy institutions, including the International Monetary Fund and a number of central banks to analyze spillover effects across countries of various economic scenarios.

### Estimation Findings

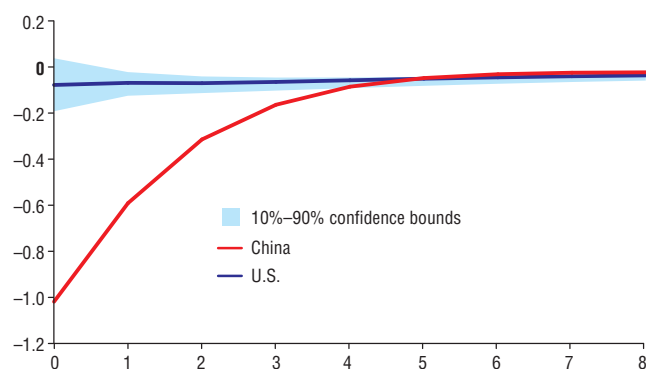
Using the GVAR modeling approach, Chart 4 shows the effects of a Chinese output growth shock that immediately lowers China's GDP growth by 1 percentage point. Chart 4A shows the impact

## Chart 4

### Estimated Impact of a Chinese Output Shock Increases Since 2000 (Deviations of real output growth from baseline)

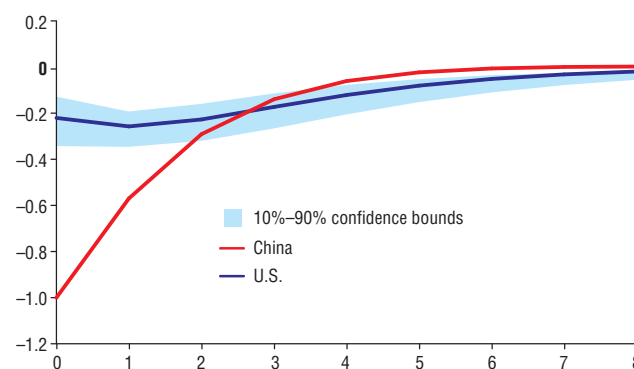
#### A. Year 2000

Percentage points



#### B. Year 2015

Percentage points



NOTES: Charts show the impulse-response functions of a –1 percentage-point shock to China's real output growth. Shaded area shows a 10 percent–90 percent confidence interval in which the result could fall.

SOURCES: Federal Reserve Bank of Dallas' Database of Global Economic Indicators; International Monetary Fund's Direction of Trade Statistics database; authors' calculations.

of such a shock in 2000; by comparison, Chart 4B depicts a shock of the same magnitude in 2015. The red line signifies the effect of the shock on Chinese output growth and is equal to -1 percentage point at the time of the impact (by definition, the impact of the shock).

Eventually, the consequences of this negative shock on the Chinese economy dissipate—the red line converges to zero as the time horizon (shown on the horizontal axis) increases. The blue line shows the impact of the shock on U.S. output growth, while the blue shading depicts the 10–90 percent confidence bounds—the range in which the results could statistically fall. Notably, such a confidence interval implies that there is a 1-in-5 chance that the impact of the negative shock to China's economy would fall outside the depicted bound.

The findings suggest U.S. output growth would have incurred a relatively small decline from a shock in 2000. Since the zero line is included within the confidence bounds, it isn't certain that the effect is statistically different from no effect.

The reaction is more pronounced in 2015, with U.S. output growth declining by about 0.2 percentage points and persisting over several quarters. This estimate is approximately four times larger than the one for 2000.

### Significant Impact

Over the past few decades, China's economy has grown very strongly, similar to Korea and Taiwan previously.

China has evolved into an economic juggernaut in a relatively short time, prompting economists to consider possible future impacts on U.S. and global economies.

While the U.S. economy does not have very large direct trade exposure with China, it is still significantly affected by a slowdown in Chinese output growth. Such an affect is roughly one-fifth the size of the output shock initially observed in China.

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### Notes

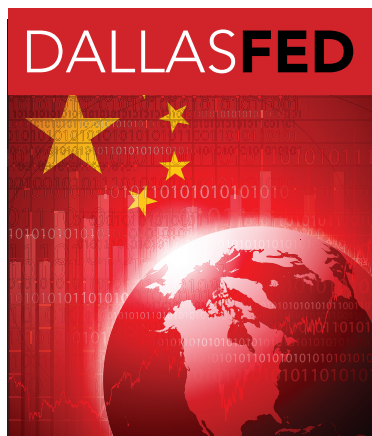
<sup>1</sup> The metric used is China's share of global gross domestic product on a purchasing power parity basis in 2015. These statistics are taken from the International Monetary Fund's World Economic Outlook Database.

<sup>2</sup> See "Long View of China Suggests Inevitable Slowdown," by Anton Cheremukhin, Federal Reserve Bank of Dallas *Economic Letter*, vol. 10, no. 10, 2015, for a broader perspective and additional details about the economic rise of China. The underlying data sources for the Chinese national accounts are the *China Statistical Yearbook* and *60 Years of New China*, both published by the Chinese National Bureau of Statistics.

<sup>3</sup> Statistics are taken from the International Monetary Fund's World Economic Outlook Database.

<sup>4</sup> A detailed description of the methodology is presented in "Theory and Practice of GVAR Modeling," by Alexander Chudik and M. Hashem Pesaran, Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute, Working Paper no. 180, May 2014.

▶ *China has evolved into an economic juggernaut in a relatively short time, prompting economists to consider possible future impacts on U.S. and global economies.*



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