Commentary

Xiaodong Zhu

China's growth performance over the past three decades has been remarkable, if not unprecedented. A natural question is whether China's recent pattern of growth is sustainable in the long run. Zheng, Hu, and Bigsten (2009) use a standard growth accounting framework to address this question. They assume that the aggregate production function is Cobb-Douglas:

$$Y_t = A_t K_t^{1-\alpha} L_t^{\alpha},$$

where A_t, K_t, and L_t are total factor productivity (TFP), capital stock, and employment, respectively, and α is the income share of labor. According to their calculation using a labor share of 0.5, the contribution of TFP growth to China's gross domestic product (GDP) growth has declined in recent years. As they reported in their Table 1, the average annual growth rates of GDP and TFP were 10.11 percent and 3.8 percent, respectively, for 1978-95 but 9.25 percent and 1.45 percent, respectively, for 1995-2007. In other words, the contribution of TFP growth to GDP growth declined by 38 percent in the first period and 16 percent in the second period. In contrast, the average growth rate of the capital stock increased from 9.12 percent in the first period to 12.81 percent in the second period. So the contribution of physical capital accumulation increased from 45 percent in the first period to 69 percent in the second period. Based on these calculations, the authors suggest that in recent years China has pursued an *extensive* growth strategy that relies heavily on capital accumulation rather than TFP growth. Because investment as a percentage of GDP has exceeded 40 percent, the authors argue that further increases in the investment rate, which would be needed to maintain a growth rate of capital stock similar to its recent average, is not sustainable and therefore extensive growth cannot be sustained in the long run. They suggest that a switch from *extensive* to *intensive* growth is needed for China to sustain its recent growth performance, thus the emphasis on productivity increases.

The paper addresses an important question, and growth accounting is the right place to start. I am also sympathetic to the authors' arguments, especially their suggestion that TFP growth is crucial for China's growth performance in the long run. However, a few puzzling facts about China's recent growth performance need to be accounted for before we can judge the relative role of capital accumulation and TFP in China's recent growth and make projections about its future growth.

First, given the high investment rates in recent years, low returns to capital might be expected. However, Bai, Hsieh, and Qian (2006) show that this is not the case. They find that China's returns to capital have been around 20 percent in recent years, which is not significantly lower than returns to capital worldwide. If there has been no significant TFP growth, how could China increase its investment rate without lowering the returns to capital?

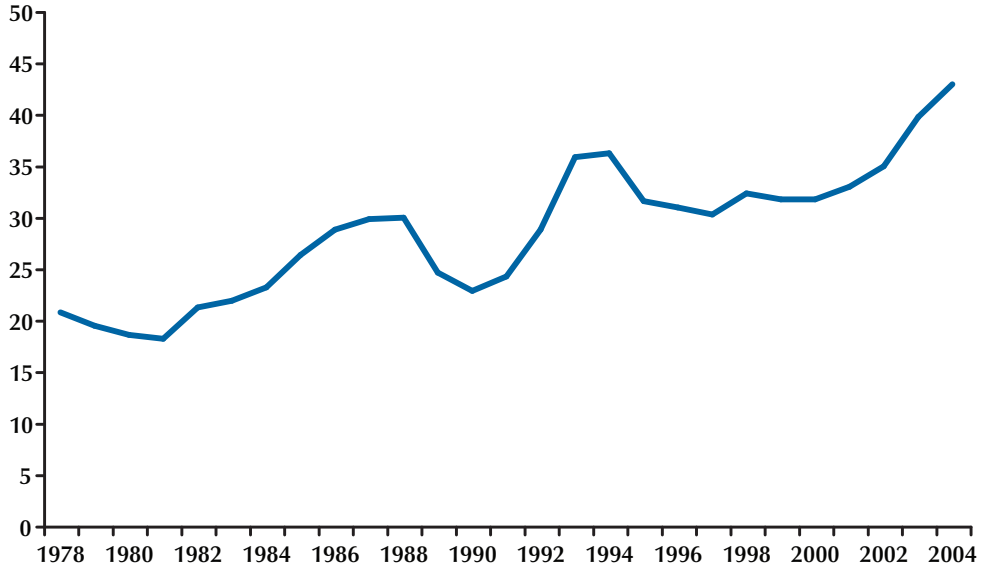
Second, since 1978, when economic reform started in China, TFP has grown substantially.

Xiaodong Zhu is a professor of economics at the University of Toronto and a special term professor at Tsinghua University in Beijing.

Federal Reserve Bank of St. Louis *Review*, July/August 2009, *91*(4), pp. 343-47.
© 2009, The Federal Reserve Bank of St. Louis. The views expressed in this article are those of the author(s) and do not necessarily reflect the views of the Federal Reserve System, the Board of Governors, or the regional Federal Reserve Banks. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

Figure 1

China's Investment-to-GDP Ratio



SOURCE: Brandt and Zhu (2009).

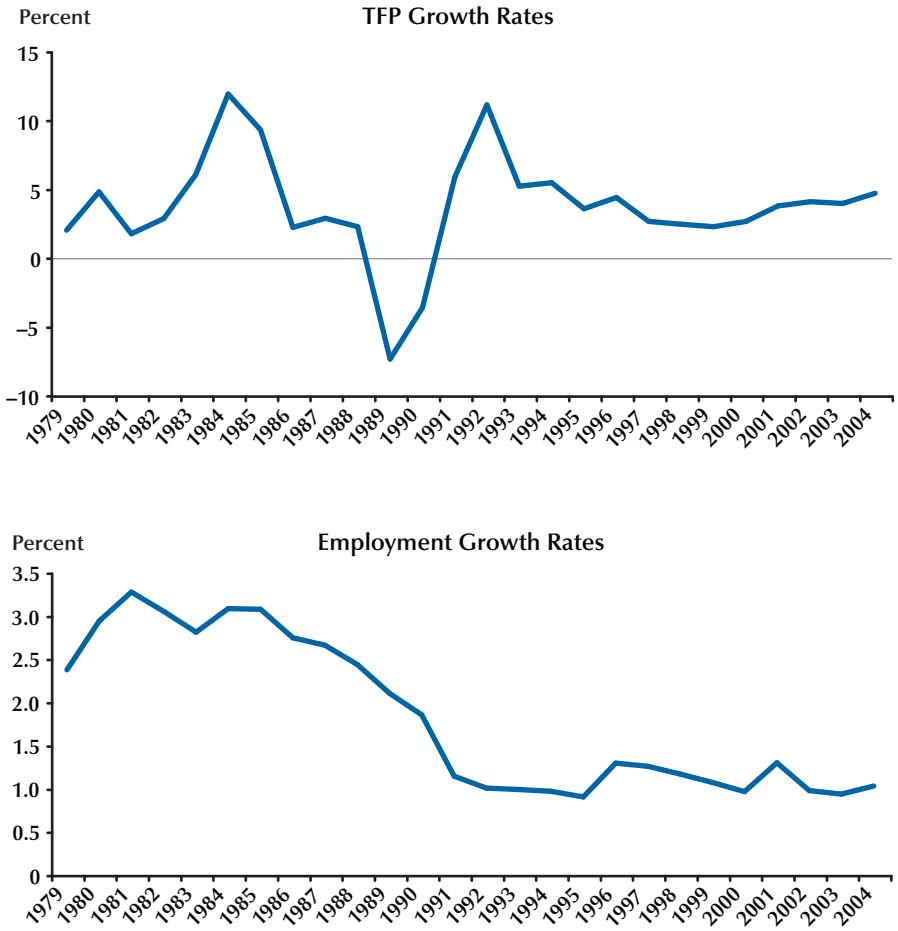
According to a standard neoclassical growth model, an increase in the TFP growth rate would result in a sharp and immediate increase in the investment rate followed by a gradual decline. The actual investment rate in China, however, behaves quite differently. Figure 1 shows that it has increased gradually over time. Arguably, this gradual increase in the investment rate may have been due to a gradual increase in the growth rate of TFP or the labor input. Figure 2 shows the growth rates of TFP and employment in China and neither has had an upward trend. Why, then, didn't the investment rate grow more rapidly?

The answers to these questions are important for understanding the nature of China's growth performance and cannot be easily answered using an aggregate growth accounting framework. I suggest addressing these questions by looking at more disaggregated data. Figure 3 shows the returns-to-capital and capital-to-labor ratios in the state and non-state nonagricultural sectors, respectively, and their significant differences. In the state sector, the capital-to-labor ratio increased steadily before 1997 and dramatically afterward. Correspondingly, returns to capital were roughly constant at 10 percent before 1997 and declined sharply afterward. Such behavior is consistent with what Zheng, Hu, and Bigsten (2009) find at the aggregate level. It suggests that, in the state sector, capital accumulation played a much more important role than TFP growth in recent years. For the non-state sector, however, the story is quite different. The capital-to-labor ratio in this sector actually declined in the early years, which coupled with TFP growth resulted in a sharp increase in returns to capital. In recent years, the non-state sector's capital-to-labor ratio increased, but the returns to capital did not decline. This sector has maintained a relatively high rate of returns to capital (around 60 percent) because of rapid TFP growth (Figure 4).

So, the answer to the question of whether China's recent growth pattern is extensive or intensive depends on which part of the Chinese economy is analyzed. If the focus is on the state sector, then it clearly follows an extensive growth path.

Figure 2

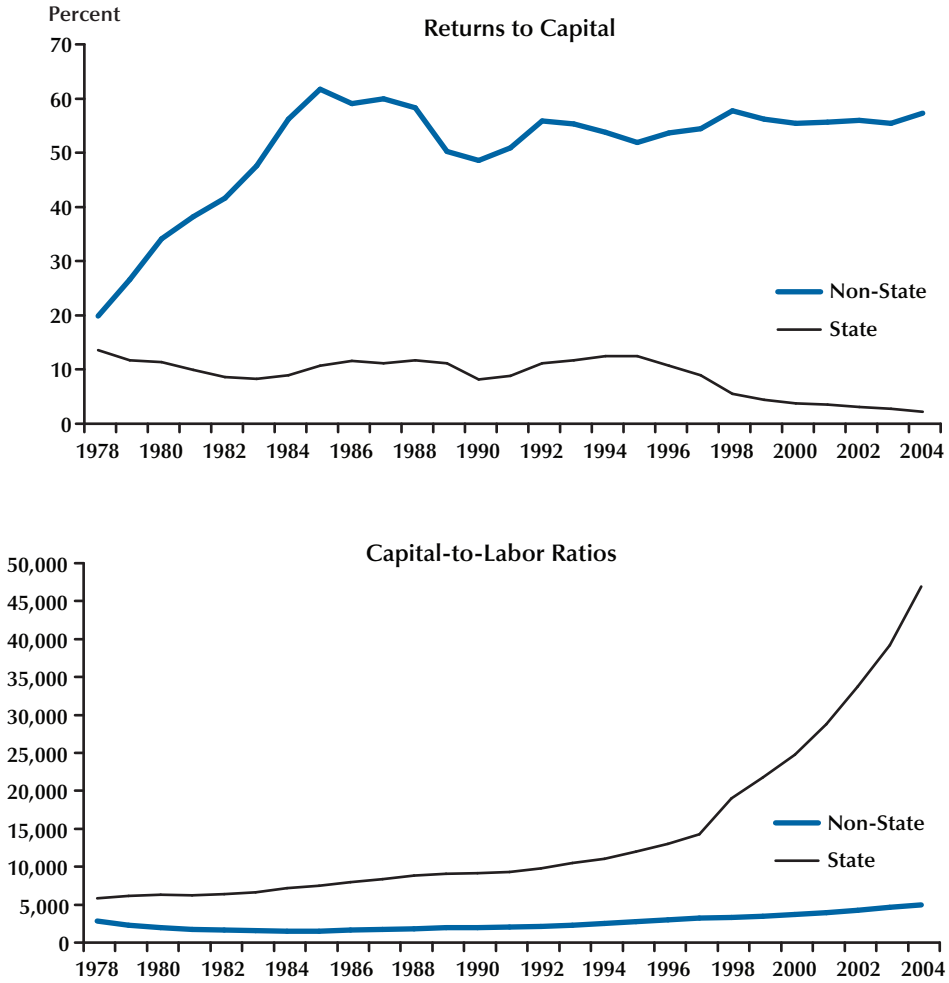
China's TFP and Employment Growth Rates



SOURCE: Brandt and Zhu (2009).

Figure 3

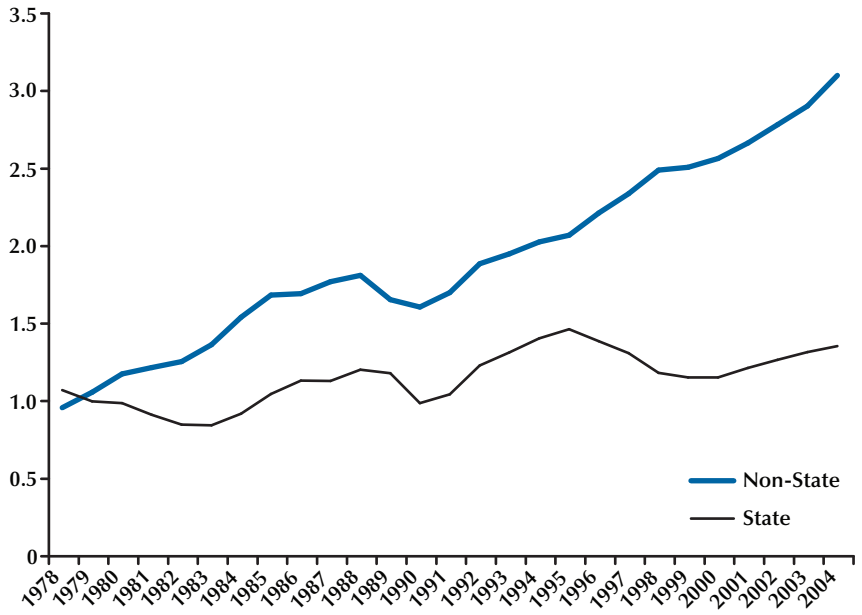
China's Returns to Capital and Capital-to-Labor Ratios



SOURCE: Brandt and Zhu (2009).

Figure 4

China's TFP



SOURCE: Brandt and Zhu (2009).

The non-state sector, on the other hand, follows an intensive growth path that relies much more on TFP growth than capital accumulation. As Zheng, Hu, and Bigsten argue in their paper, intensive growth is more likely to be sustainable than extensive growth. The sustainability of China's recent growth performance, then, will depend on the relative importance of the two sectors. Measured by the share of employment, the non-state sector's importance has increased over time. According to Brandt and Zhu's (2009) estimates, the non-state sector's share of nonagricultural employment increased from 48 percent in 1978 to 87 percent in 2004. Measured by the share of investment, however, the picture of the non-state sector is not as rosy.

Despite its lackluster TFP growth performance and declining employment share, the state sector's share of investment has always stayed above 60 percent. Given the high TFP growth in the non-state sector and the high investment rate in the state sector, China can increase both the aggregate efficiency of the economy and the GDP growth rate without increasing the aggregate investment rate, by shifting investment from the state sector to the non-state sector.

REFERENCES

Bai, Chong-En; Hsieh, Chang-Tai and Qian, Yingyi. "The Return to Capital in China." *Brookings Paper on Economic Activity*, 2006, Issue 2, pp. 61-88.

Brandt, Loren and Zhu, Xiaodong. "Explaining China's Growth." Working paper, University of Toronto, 2009.

Zheng, Jinghai; Hu, Angang and Bigsten, Arne. "Potential Output in a Rapidly Developing Economy: A Comparison of China with the United States and the European Union." Federal Reserve Bank of St. Louis *Review*, July/August 2009, *91*(4), pp. 317-42.