merics
Mercator Institute
for China Studies

China Monitor

No. 29 | 18. November 2015

Is excessive domestic investment hurting China?

by Carsten A. HOLZ

EXECUTIVE SUMMARY

- Investment is a key driver of economic growth in China both in the short and the long run. Capital accumulation plays a much larger role for economic growth in China than it does in Germany.
- The volume of investment is in good part the outcome of government macroeconomic policies. Investment is a key channel through which the Chinese government fosters and shapes economic growth in China.
- The trajectory of China's rate of investment fits well with those of other East Asian economies, though China's current annual rate of investment exceeds the peak rates of other East Asian economies.
- Popular opinion holds that the time of government-driven investment and exceedingly high investment rates is coming to an end, and that the efficiency of investment is decreasing over time. As a result, growth will suffer. However, detailed analysis suggests a more nuanced view.
- First, the current high rate of investment could in part be due to measurement problems, with several percentage points likely reflecting consumption.
- Second, while China invests much more than Germany and has a higher capital stock than Germany, the available volume of capital stock per labourer is still only one-quarter of that of Germany. China has much greater scope for upgrading and expansion of physical capital.
- Third, various concerns about investment in China are unfounded. (1) Rising capital-output ratio: the development of China's capital-output ratio (incremental or otherwise) is no different from other East Asian economies or Germany. (2) Debt-financed investment: today, four-fifths of investment in China is financed with retained profits or via other sources outside the fiscal system and the state banking system. (3) Inefficient state investment: today, only one-quarter of economy-wide investment occurs in state-owned units.
- Finally, China's domestic market size allows broad-scale development with continued expansion of investment in many economic sectors.

Between 1978 and 2014, the size of the Chinese economy grew by an annual average of 9.7 per cent in real terms. Much of this economic growth can be accounted for by investment. The ratio of investment to economy-wide output, measured as the share of gross fixed capital formation (GFCF) in aggregate expenditures or, equally, in gross domestic product (GDP), has been rising dramatically in recent years (Figure 1).

Development economics has long stressed the crucial role of investment in order for a country to take off on a self-sustaining growth path, and then to realize structural change as part of a continued growth strategy. In that respect, China follows traditional economic development patterns.

Investment policies have always featured prominently in the economic policies of the People's Republic of China. Today, the Chinese government directly influences the amount of investment by channelling fiscal funds into investment, such as infrastructure projects, or by making available credit for government-supported investment projects. It can also use indirect tools such as interest rate policy and tax policy. The volume of investment in China, thus, is closely linked to the political regime and its macroeconomic policies. This means that further economic growth through investment is to a considerable extent a policy choice.

Creating growth through public investment has worked well for China in the past. Now, as major infrastructure and real estate construction cycles have run their course and the investment rate might be approaching a peak, a crucial questions is: **Will investment be an effective policy tool to manage growth rates in the future? Or will the growth effect of investments decrease sharply, rendering useless one of the government's most powerful economic levers?** If the leadership were to lose investment as an effective growth engine, this would not bode well for China's growth trajectory. **However, there is evidence that declaring the end of "growth by investment" is in fact premature.**

Definitions

GDP: gross domestic product, a measure of the size of the economy.

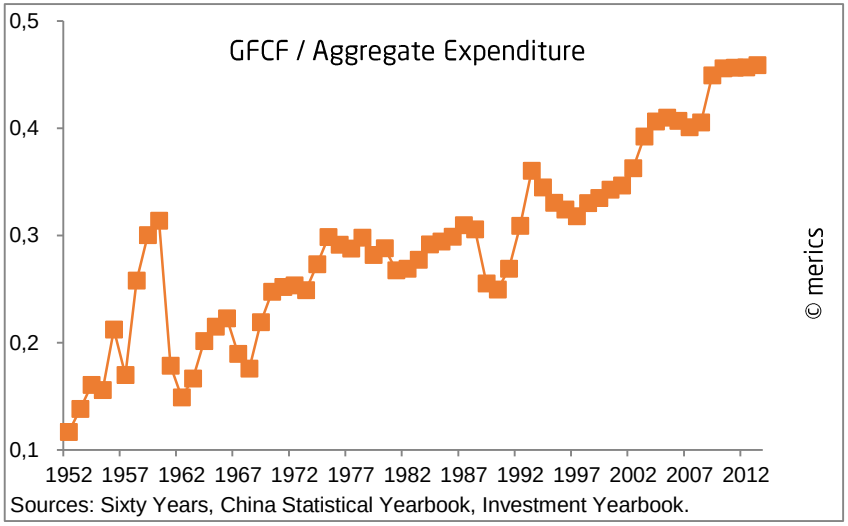
GFCF: gross fixed capital formation, a measure of the value of acquisitions of newly produced fixed assets.

GCF: gross capital formation, the sum of GFCF and inventory investment (net additions to inventories during the period).

TFP: total factor productivity, a measure of the contribution to output of all factors other than labour and capital.

ICOR: incremental capital-output ratio, the ratio of the absolute change in capital stock to the absolute change in output.

Figure 1. **Investment Share in Aggregate Expenditure (GDP)**



Sources: Sixty Years, China Statistical Yearbook, Investment Yearbook.

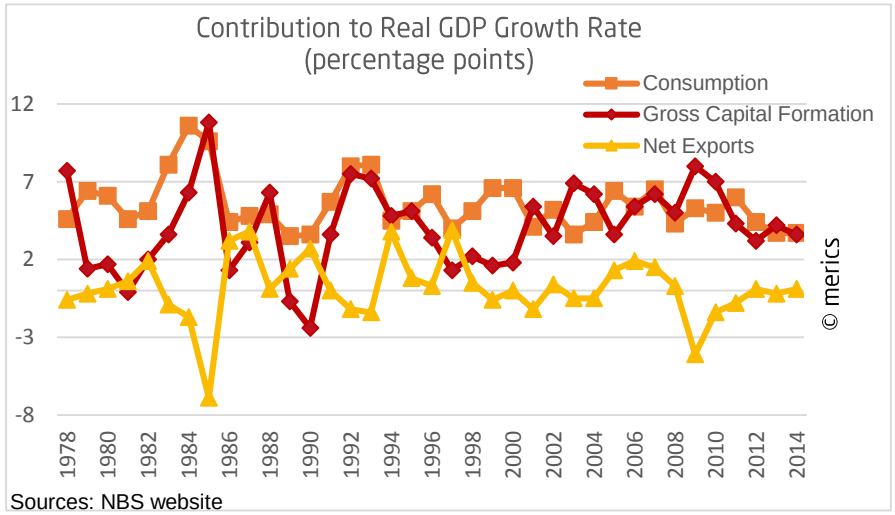
1. How investment drives economic growth in China

Demand-side analysis allows the identification of what drives economic growth in the short run. Supply-side analysis reveals the long-run drivers of economic growth. In both cases, investment is crucial.

In the short run, from the point of view of aggre-gate demand, any additional expenditure on investment goods implies additional production and thereby economic growth.

Annual real growth in aggregate expenditures can be divided into the growth of its three components: consumption, investment, and net exports. Figure 2 shows the relatively stable contribution of consumption to economic growth in China, averaging 5.5 percentage points per year from 1979 to 2014. The contribution of net exports fluctuates tremendously, with a long-run average of 0.2 percentage points per year. The national income accounts measure of investment, gross capital formation (GCF), comprises newly created investment in fixed assets and a typically very small volume of inventory investment.

Figure 2. **Annual Contributions to the Real GDP Growth Rate**



Sources: NBS website

Its contribution to the overall growth of aggregate expenditures was 4.0 percentage points over the period 1979 to 2014.

Although consumption's average annual contribution to growth is larger than that of GCF, **since the early 2000s GCF has been as important as consumption in generating annual economic growth in China**. Given that annual investment fluctuates more than consumption, stable annual economic growth is dependent on a continuously growing stream of investment.

This is quite different from Germany, where the average annual contribution of GCF to economic growth in the period 1992-2014 was exactly zero.[1] The average annual real GDP growth rate of 1.3 per cent was driven by consumption (0.9 percentage points) and net exports (0.3 percentage points, with a 0.1 percentage point discrepancy to annual real GDP growth due to rounding).

From a supply-side point of view, annual investment adds to an existing physical capital stock. GDP is produced using the services provided by accumulated physical capital, la-bour, and a third factor which represents everything that is not captured by capital or labour inputs and that is typically labelled "total factor productivity" (TFP).

In the long-run analysis covering 1979-2013,[2] labour growth contributed only 0.9 percentage points to the average annual 9.8 per cent GDP growth in this period, TFP growth contributed 5.0 percentage points, and capital growth 4.0 percentage points. While in the early years of reform growth in labour contributed up to two percentage points to annual real GDP growth, the contribution of labour had virtually vanished by 2013. Growth in China's labour force is about to turn negative, i.e. all future growth will have to come from capital accumulation and TFP growth. From a supply-side point of view, while TFP growth made major contributions to GDP growth in the early years of reform and then again in the mid-2000s, **since 2008 growth in capital has become the most important factor for GDP growth**.

2. China invests a lot for good reason

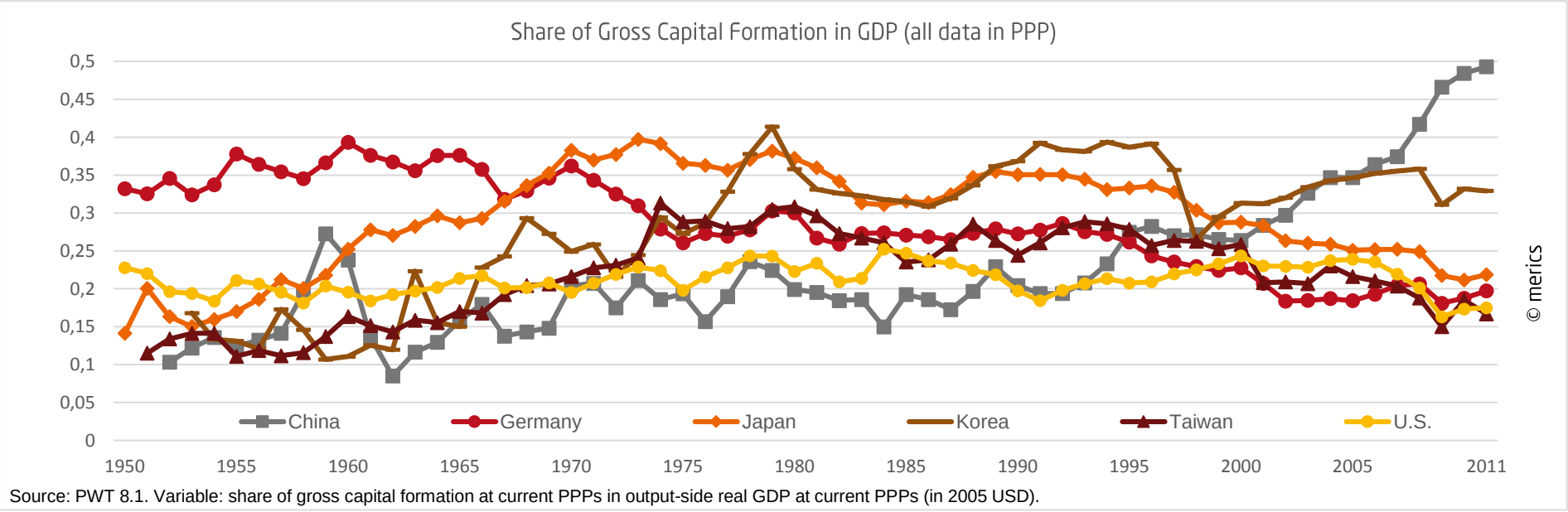
China re-invests approximately half of its GDP every year. At first sight, this appears to be an exorbitantly high share. However, in cross-country comparisons China's investment behaviour comes as little surprise.

Figure 3 shows the share of GCF in GDP for China in comparison to select other countries. For comparability, all data are taken from the Penn World Tables, which cover the years 1950 (or later) to 2011. The data in the Penn World Tables are in purchasing power parity (PPP) terms, i.e. adjusted for price differences between countries.

China's share of GCF in GDP rose from 10 per cent in the early 1950s to 20 per cent by the late 1970s, hovered around 20 per cent until the early 1990s, and then gradually rose to the current level of 50 per cent. By comparison, in Germany the ratio of GCF to GDP rose to a high of just short of 40 per cent in 1960 before gradually falling back over the next 50 years to 20 per cent; the ratio was near or above 35 per cent for a total of 12 years from the mid-1950s to the mid-1960s.

In Japan, the ratio peaked at the 40 per cent mark in 1973, then gradually fell back to just above 20 per cent in 2011. Around its peak, the ratio stayed at a high level of approximately 35 per cent for more than two decades. In South Korea, the ratio peaked repeatedly around the 40 and 35 per cent levels between the late 1970s and the mid-1990s, with nearly uninterrupted high ratios from the mid-1970s until today. In Taiwan, the ratio peaked at just above 30 per cent in the 1970s and stayed around 25 per cent until 2000.

Figure 3. **Investment Share in GDP, Selected Countries**



Source: PWT 8.1. Variable: share of gross capital formation at current PPPs in output-side real GDP at current PPPs (in 2005 USD).

There appears to be a pattern whereby developing economies experience a period of rising levels of investment relative to GDP. Invariably, the ratio of investment to GDP peaks and falls back, but the turn-around can be prolonged (measured in decades). In the chart, only the U.S. does not match the pattern, likely because it experienced a war-related investment boom prior to the period covered by the Penn World Tables.

China thus is no different from other economies in take-off, except that its investment boom may be more pronounced. If the patterns of the other East Asian economies are anything to go by, China's investment rate will remain at a relatively high level for many years to come.

The high investment rates inevitably lead to suspicions that they could be exaggerated. While conclusive evidence is unavailable, some researchers suspect that **perhaps up to ten percentage points of the investment share do not actually reflect investment, but rather consumption**.[3]

China's investment volume has been increasing more rapidly than that of Germany (in comparable prices), rising from approximate equivalence in 1978 to a ten- times greater investment value by 2011. In the same period, China's accumulated capital stock—using the Penn World Tables' definition—rose from a value half that of Germany to one four times that of Germany. However, the amount of capital *per labourer* in China is still far below that in Germany, rising from 4 per cent of Germany's value in 1978 to 23 per cent in 2011. With output per worker intricately linked to the capital stock available to each worker, China thus has much further to go in increasing output by increasing the capital stock.

3. Potential issues: declining capital-output ratio, debt-financed investment, and state-directed investment

A number of concerns about investment in China have been raised: it takes an increasing amount of new capital to produce an extra unit of output (making future growth more expensive), much of Chinese investment is debt-financed (and not sustainable due to the interest burden on debt), and investment is state driven (and therefore not efficient). To a large extent, these concerns are unfounded.

3.1 Capital-output ratio: no long-term rise and no cross-country anomaly

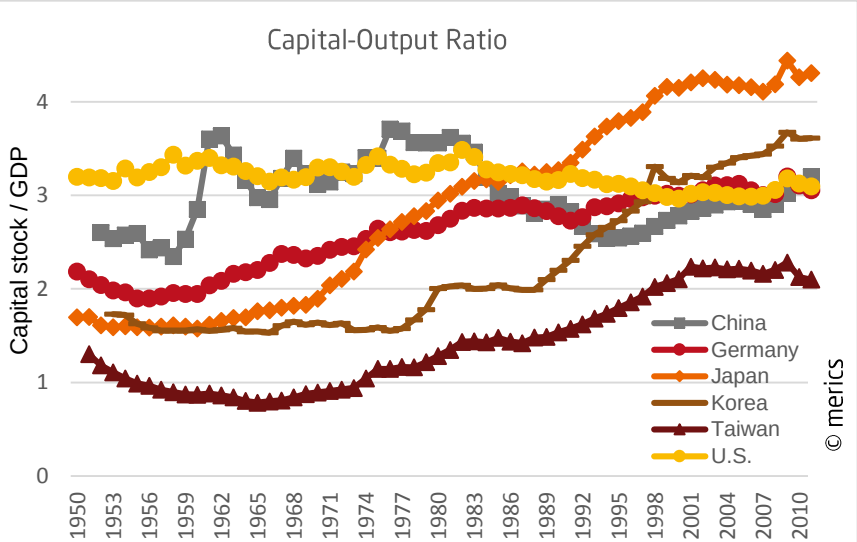
A standard issue in development economics is the rising capital-output ratio or, in its marginal form, the rising *incremental* capital-output ratio: to produce an additional unit of output requires more additional capital than the previous unit of output did. But this widely known truism is not as straightforward as it appears.

Capital-output ratios may well exhibit an upward trend over time, but this trend is not uniform and can even reverse (Figure 4). The most striking changes occurred in Japan and South Korea, which in 2011 had capital-output ratios of double those of the early 1950s. In contrast, the capital-output ratio of the U.S. has remained rather stable over time. **China's capital-output ratio shows some variation but at the end of the period is not much above the level at the beginning.** Capital-output ratios also vary drastically across countries: in 2011, Japan's ratio was twice that of Taiwan, and about a third higher than those of China and the U.S.

The *incremental* capital-output ratio is more difficult to interpret. When annual changes in output are close to zero, the incremental capital-output ratio can assume values that go into the thousands. Removing outliers and taking three-year differences does create an upward trend for the incremental capital-output ratio over time (except for the U.S.). Among the selected countries (except for the U.S.), China's incremental capital-output ratio increases the least from year to year.

What these data suggest is that a quick look at an aggregate capital-output ratio, incremental or otherwise, conveys very little long-run information: capital-output ratios can go up or down over time (in this sample more up than down)

Figure 4. **Capital-Output Ratio**



Source: PWT 8.1. Variable: capital stock at constant 2005 national prices (in 2005 USD) divided by real GDP at constant 2005 national prices (in 2005 USD). Values are for 1950-2011 as available.

If one focuses one's attention on recent years, it will be apparent that China's capital-output ratio has been gradually increasing since the mid-1990s. But seen in perspective, both Japan and Korea's capital-output ratios are higher than China's and have been rising faster. Is that a sign that growth in China will slow, as it did in Japan and Korea? There is no easy answer. **Over the fifteen years to 2010, China's gradually rising capital-output ratio came with invariably high growth rates; since 2010, this hasn't been the case.**

The relationship between capital-output ratios and economic growth is simply not that straightforward. Capital-output measures do not consider structural change: as an economy moves from heavy industry into services, an additional unit of output is likely produced with less additional capital than the previous unit of output. The capital-output ratio may rise only within narrow industrial sectors, or in the course of structural change into capital-intensive sectors. Further, the change in capital has no particular meaning with respect to output, its value depending on such measures as the depreciation rate, which in turn depends on factors such as climate, tax regulations, and obsolescence.[4] If one were to use current-period GFCF instead of capital, some of these difficulties could be avoided, but it is far from clear if the effects of this year's GFCF should be seen in output changes this year, next year, or, say, the five years starting two years from now.

3.2 Investment does not lead to unsustainable debt levels

Another common concern is that investment in China is the cause of severe and unsustainable levels of indebtedness. A comprehensive treatment of debt in China is beyond this article. Suffice to say that the share of state budget appropriations in investment in fixed asset financing in China has fallen from 28 per cent in 1981 to 5 per cent in 2014. The share of investment financed through credit rose from 13 per cent in 1981 to a high of 27 per cent in 1992 before falling back to 12 per cent in 2014, while the share of foreign funds rose from 4 per cent in 1981 to a high of 12 per cent in 1996 and then fell to 1 per cent in 2014. The residual is made up of "own" funds (largely retained earnings) and "other" (unspecified) funding. **By 2014, only 12 per cent of investment was financed through credit**, against 70 per cent through own funds (and 13 per cent through "other" funds), which, overall, hardly indicates a heavily debt-financed investment scenario.

What might give rise to a different concern is the low share of foreign funds in investment financing

in China, at just one per cent today, down from a peak of 12 per cent in 1996. Even if this foreign investment were all in crucial industries, the volume of foreign-funded investment is still so small that it is hard not to conclude that **China's growth story today is predominantly a domestic one**.

3.3 Investment is not just state-driven

The final concern is that investment in fixed assets is driven by the state, and that because state ownership is less efficient than private ownership, this investment is not as productive as it could be if it were in private hands. Again, the data tell a different story. Investment by state-owned units, which accounted for 82 per cent of all investment in 1980, accounted for only 25 per cent of all investment in 2013. Investment by individuals/privately owned units accounted for 30 per cent of all investment in 2013, and investment by shareholding units for another 32 per cent (with the remainder undertaken by units in collective, foreign, Hong Kong/Macau/Taiwan, "joint," and "other" ownership). **That is three-quarters of investment occurs outside the state sector.**

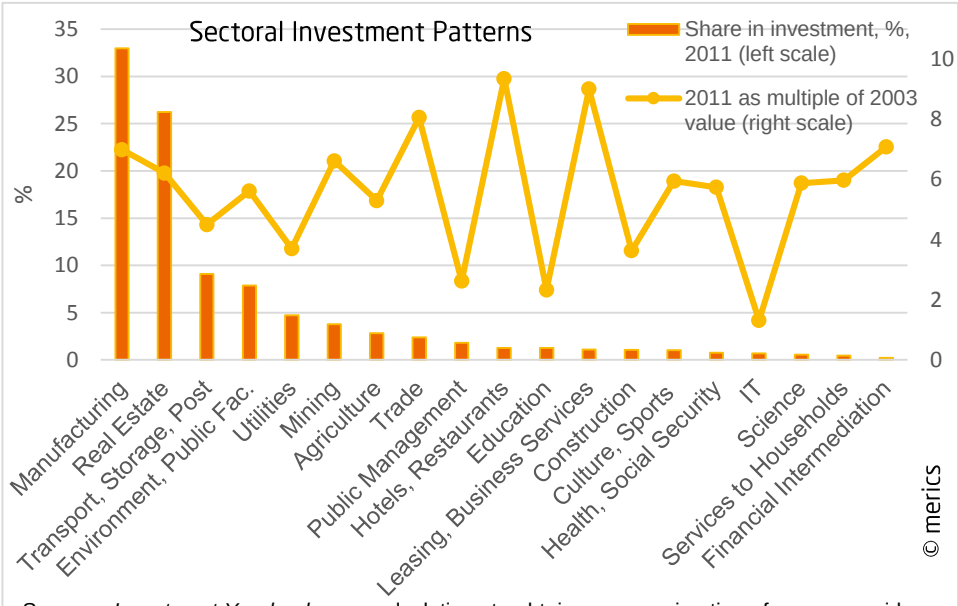
One caveat is that shareholding units may well include state-controlled listed stock companies, i.e., the state may have a hand in more than just the investment by outright "state units".

There is a temptation to equate state investment with inefficiency. But that is too simplistic. State-controlled listed stock companies may not differ much in their behaviour from private companies. Private companies could well be quasi state-controlled/-influenced via Party cell or other mechanisms. While some state investment could indeed be wasteful, some seemingly inefficient state investment may have positive externalities (for example, supporting growth in other enterprises, including private enterprises), whereas private investment tends to internalise all benefits. That means, from an economy-wide, social perspective, even seemingly inefficient state investment may contribute to economic growth.

4. What does China invest in?

Investment in China is heavily concentrated in one-third of the 19 economic sectors which China uses as the first level of classification for its economy: six sectors together account for more than four-fifths of total investment (Figure 5). Manufacturing alone accounts for 33 per cent of total investment, followed by real estate at 26 per cent (keeping in mind that much real estate investment may reflect trading in existing fixed assets rather than investment in new fixed assets). The next four sectors are transport, storage and post (9 per cent), environment and public facilities (8 per cent), utilities (5 per cent), and mining (4 per cent). China's sectoral concentration of investment is not unusual—the pattern for Germany is similar.

Figure 5. **Sectoral Investment Patterns**



Sources: *Investment Yearbook*; own calculations to obtain an approximation of economy-wide values by sector (covering both urban and rural investment).

On average, sectoral investment increased 5.6-fold between 2003 and 2011, with some variation across those sectors that receive only a small amount of investment (Figure 5). The growth rate of investment in IT (information transmission, computer services and software), as well as the share of investment in this sector in 2011, is astonishingly low and could indicate that some investment in IT might not be captured by the sector "IT".

Detailed sectoral investment data covering 1182 sectors are available for urban areas and allow identification of the sectors in which investment grew fastest between 2003 and 2010. [5]
Among the 30 fastest-growth sectors, a relatively small number were in manufacturing—manufacturing accounts for only 8 of the 30 fastest-growing sectors but comprises half of all sectors—and a relatively large number in retail trade. The list of fastest-growth sectors comprises a range of diverse sectors, from magnesium dressing to notary services. The 30 fastest-growing sectors together account for only 1.7 per cent of total investment in 2010, where one would expect 3 per cent (30 out of approximately 1000 relevant sectors). Therefore, the fastest-growing sectors tend to be relatively small sectors to begin with and grow quickly from a small base. This suggests that **fast-growing investment in a particular sector primarily serves to develop previously underdeveloped sectors**.

Investment data since 2012 follow a new sectoral classification and so far only the 2012 data have been released. It therefore remains to be seen when, to what extent, and how structural change happens in China.

At an intermediate level of sectoral breakdown, with approximately 100 sectors, investment per labourer in 2010 was relatively small.[6] **Investment per labourer is high only in traditionally capital-intensive sectors** such as the extraction of petroleum and natural gas, production and distribution of electric power and heat power, railway transport, the real estate sector, and management of public facilities.

China's size is a new phenomenon in the study of developing economies. South Korea tried to develop a broad industrial base but soon began to specialise. Taiwan quickly abandoned plans for broad-based economic growth and focused on developing areas of comparative advantage, in many instances serving niche markets around the world. However, for China there are as yet no signs of significant specialisation.

Across virtually all industries in China, the optimal firm size—the firm size with lowest per-unit production costs—is below market demand. That is, there is sufficient market demand in every sector of the economy for several firms to co-exist and compete. **The prospect of a historically unprecedented domestic market size may yet lead to the development of new optimal firm sizes at lower per-unit production costs than hitherto experienced around the world.**

Viewed from an international perspective, focusing on comparative advantage makes little sense for China: world demand may simply not be big enough to support any substantial degree of specialisation in China. For example, for some electronics products China may already be the dominant world supplier without, however, the electronics manufacturing industry dominating the Chinese manufacturing sector. In this case, world demand has driven specialisation in China, except that in the Chinese economy the resulting degree of specialisation is barely noticeable.

As a result, **one can expect to see ongoing investment across virtually every sector of the Chinese economy**. The size of the Chinese economy allows for balanced economy-wide development.

5. Conclusions

We have seen that investment has been an important driver of economic growth in China both in the short and in the long run, that a relatively large

volume of further investment is needed to catch up with developed economies, and that China's high investment rate is quite in line with the experience of other East Asian economies. Various concerns about the level of investment are unfounded. China is investing across all sectors of the economy, leading to broad-based economic development rather than specialisation.

Where does this lead to? At the macro level, China is continuing the process of economic transition. Under the planned economy, investment and thereby growth were planned in advance and dutifully implemented. In the reform period, state-driven investment became a policy tool and growth became less predictable. In the next step, investment will increasingly become dependent on market forces, with interest rates and industrial policy the main government economic policy tools.

Along with the gradual withdrawal of the state from direct participation in investment decisions will likely come structural change in two respects. First, in terms of the structure of aggregate demand, following East Asian precedents, **China's investment rate will fall. Given that it reached extraordinarily high levels in recent years, it may yet fall significantly in a short period of time.**
But the Asian precedents also suggest that the investment rate will likely stabilise at a high level and then decline gradually over a period of decades. As driver of economic growth, consumption will likely once again be the mainstay. The government's wage policies, including the consistent increases in minimum wages over the past five years, are just one sign suggesting that the Chinese government is giving more weight to consumption while not underestimating the importance of investment in expanding production and implementing technological change.

Second, in terms of the structure of production, **the share of China's GDP accounted for by industry, at close to 40 per cent, is still relatively large. Given typical development patterns, this share is likely to fall**. Since industry has a relatively high ratio of capital to output, this should lower the investment rate and put downward pressure on the capital-output ratio. Within industry, technological upgrading and technological progress are likely to lead to changes in the relative shares of different industrial sectors in industrial value-added. The Chinese government is furthering these developments through its industrial policies, including its promotion of job creation in services and its promotion of specific industries through industrial policies. What one can expect to see in the coming years then is not 'more of the same', i.e. capital accumulation distributed across sectors as before, but an adjustment of investment across sectors towards the most efficient uses of capital.

The drastic drop in the share of foreign funds in total investment funding from 12 to 1 per cent over the past twenty years is **a striking testimony to the development of the Chinese economy, which simply no longer needs foreign funding to sustain an acceptable growth rate.** The current period appears to be one of a transition from foreign firms playing an important role in China's economic development to a period in which China has the capability to sustain significant forward momentum on its own—perhaps the defining criterion of an economic superpower.

Your contact for this issue of China Monitor:
Björn Conrad
bjoern.conrad@merics.de
Editor: Kerstin Lohse-Friedrich

Publisher's details:
Mercator Institute for China Studies
Klosterstraße 64
D-10179 Berlin
Tel: +49 30 3440 999-0
Mail: info@merics.de
www.merics.org

[1] 1992 is the first year for which the German data are available.
[2] 2013 is the most recent year of analysis due to technical requirements in the construction of capital stock data. Throughout this monitor, the maximum possible time series are used starting with the reform period (1978).
[3] ZHANG Jun and ZHU Tian (2013) suspect that the NBS obtains GFCF as residual by subtracting consumption and net exports from GDP. In their view, several forms of household consumption are underestimated, such as tourism, imputed rental value of housing, healthcare, luxury good consumption, car purchases, and household consumption through company accounts. The NBS household survey also under-represents high-income households. While the NBS may not obtain GFCF as residual, car purchases and household consumption through company accounts would appear as GFCF in the national income accounts when, in effect, they constitute consumption.
[4] Another issue is the service life of capital. Capital stock calculations, in particular those constructed for cross-country comparisons, typically assume a uniform depreciation rate across countries. But what if China's capital stock is in heavy industry and depreciates over 50 years, while a comparison country's capital stock is in software and depreciates over 5 years? If one assumes that one unit of investment leads to one additional unit of output, i.e. the two countries perform equally well, then the application of a uniform depreciation rate across countries will show China's capital-output ratio to be many times higher than that of the comparison country. I.e. equally efficient use of investment leads to vastly different capital-output ratios. Yet another consideration is that the Chinese capital stock could be systematically overestimated because in a rapidly developing economy physical assets may experience a much higher rate of (unexpected) obsolescence, not reflected in the depreciation rate, due to fast technological progress.
[5] 2003 and 2010 were chosen as beginning and final years due to statistical breaks in 2002/2003 and in 2010/2011.
[6] The year 2010 was chosen because the decennial population census of 2010 provides employment figures with the necessary detailed sectoral breakdown.