China's Economic Growth to 2020:An Outlook
(Resume)
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Yoshihide　Ishiyama

(1) Forecast methodology

I choose a medium-term forecast horizon of about 10 years. The year 2011 is the first year of the 12th Five-Year Plan, which aims at building a moderately well-off society by 2020.

The Plan emphasizes domestic demand orientation, the quality of life, more equitable income distribution, more adequate social security, etc.

What is the appropriate forecast methodology when the horizon is 10 years, 2011 to 2020?

My approach is to consider both the supply side and the demand side, And somehow integrate the two. (I do not discuss structural changes and leave out financial factors.)

In my calculation, numerical outcomes from the supply side and the demand side differ slightly.

Demand growth will be represented by personal consumption. Supply Growth will be conventionally by the growths of labor and capital, and TFP growth.

A novel element in my approach is the adoption of a simple optimal consumption model, from which saving(investment) can also be derived. In this sense, there is a linkage between demand and supply.

(2) The traditional supply side approach(growth accounting)

This approach is usually adopted for the medium run and the long run. It is useful, but not completely satisfactory.

Perkins and Rawski(2008) adopt this approach for 2005-2025. Labor growth and capital growth are assumed(exogenously given). The TFP growth is an adjustment factor. They arrive at 6 to 8 percent for 2006-2015 and 5 to 7 percent for 2016-2025.

Aside from arbitrary TFP adjustment, its flaw lies in giving the value of capital growth exogenously. (Same as in the past?)

They neglect demand (almost) completely. The reason given is that demand becomes less and less important as the forecast horizon lengthens. This is not correct.

I claim that in the medium run the demand factor cannot be ignored. People derive utility from consumption of goods and services. They divide income between consumption and saving in a forward-looking manner. Saving is a source of capital investment, so that consumption and investment are not independent, Capital growth cannot be given without considering optimal consumption(i. e. demand).

(3) A study by Zhang(2008), Development Research Center

Paper No. 3 of Zhang(2008) adopts the supply side approach basically. To produce a forecast it makes assumptions about labor growth, capital growth and TFP growth.

Its forecast is as follows.

(%)

Period	2011-15	2016-20	2021-25	2026-30
Real GDP	7.9	7.0	6.6	5.9
Growth rates				
Labor	0.5(0.2)	0.0(0.0)	0.0(0.0)	- 0.3(-0.1)
Capital	9.4(5.7)	8.4(5.0)	7.8(4.7)	6.7(4.0)
TFP	2.0	2.0	1.9	2.0

(Note) Figures in parentheses are percentage point contributions.

(4) My own supply growth calculation---TFP and labor

TFP growth is provisionally set at 2.0 percent a year. Because it is a residual, there is not much sense in trying to make the estimate rigorous.

Labor growth---I also follow Zhang, who borrows from the UN medium term forecast. From ths study we have a forecast of the size of productive population(age 15-64) for five year intervals up to 2035. A labor force participation rate has to be assumed. The result is 0.5% for 2010-15 and 0.0% for 2016-20.

The elasticity of real GDP with respect to labor seems to be 0.6. Thus, the percentage point contribution of labor growth is 0.3 for 2011-15 and zero for 2016-20. The contribution of labor growth is very small.

(5) Capital growth and optimal consumption(saving)

For the forecast period Zhang uses the value of capital growth slightly lower than 10 %.

I derive the value exceeding that of Zhang. It seems to be 11 to 12 % for 2011-20. This value cannot be derived until we derive the likely optimal saving growth, as follows.

Consider the representative worker, who maximizes

$$\sum_1^T b^t \frac{c^{1-a}}{1-a} t$$

ct is consumption in period t, a ia the coefficient of relative risk aversion and b is the discount factor(1 divided by 1+p) where p is the rate of time preference.

Assume the Cobb-Douglas production function with the rate of technical progress h.

I do not explain the whole derivation. It can be shown that:

---Optimal consumption growth is the return on capital mius the rate of time preference divided by the coefficient of relative risk aversion, and in case this coefficient is unity it is just the excess of the rate of return over the time preference rate

---The optimal level of consumption is the sum of physical capital and human capital(i.e. wealth) multiplied by the rate of time preference

---From the income level optimal saving can be calculated by subtracting the optimal consumption level.

These are the behavior of the individual. His/her optimal consumption growth rate can be translated into the macro optimal consumption growth rate by adding the growth rate of the number of workers, if any.

In my calculation, the gross rate of return on capital is (about) 17 %. The rate of depreciation is (about) 5 %. The net return on capital is 12%
It seems reasonable to assume that the time preference rate in China is low, 1 or 2 %. Thus the individual's optimal consumption growth rate is 10 or 11% for the period 2011-20. This is an important conclusion.

The growth rate of (optimal)gross saving is assumed to be equal to the actual growth rate of gross fixed capital formation. I am assuming that

the wish of the worker-consumer is realized.

In practice there is government(public) consumption. Its growth rate is Determined by government policy. I gather from the literature that the Chinese government is aiming at 10% growth.

(6) The forecasts obtained

(a) Case of time preference rate of 1%

Period	2011-15	2016-20
Real GDP	10.9	10.4
Growth rates		
Personal consump	11.5(4.04)	11.0(3.86)
Gov't consump	10.0(1.29)	10.0(1.29)
Gross investment	12.3(5.61)	11.5(5.22)

(b) Case of time preference rate of 2%

Period	2011-15	2016-20
Real GDP	10.5	10.0
Growth rates		
Personal consump	10.5(3.69)	10.0(3.51)
Gov't consump	10.0(1.29)	10.0(1.29)
Gross investment	12.2(5.54)	11.4(5.18)

(Note) Figures in the parentheses are percentage point contributions.

It is apparent that the value of time preference rate exerts only a miniscule influence on the overall GDP growth rate.

Net exports do not appear because it is assumed that they remain very small as a share in GDP.

A question---I have assumed the growth rate of real labor income to be 12.6% when calculating the value of human capital. It may be too high. It comes from nominal growth of 14.5% and CPI growth of 1.9% in the 2000s.

(7) Integration of supply growth and demand growth?

The estimate of capital growth is very high in our approach. The growth rate of 11-12% of gross fixed capital formation may look reasonable, but when translated into the growth rate of capital it implies about 15% growth. This is much higher than Zhang. The reason is that gross investment now accounts for nearly 50 % of GDP. (The lack of capital stock data is unfortunate. I did my own calculation.)

On the other hand, the elasticity of real GDP with respect to capital is about 0.4. 15% times 0.4 is 6%.

I also calculated TFP growth rate to be 2.7%. With labor's contribution of about zero, the supply side approach will predict 9% growth for 2011-15 and 8.7% growth for 2016-20.

Here is a big issue. There is a substantial discrepancy between the demand approach (my table) and the supply approach.

I have not come to a definitive resolution, but in view of the recent strength in gross investment the demand approach seems to dominate the supply approach. Food for thought.

References

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