

FUNCTIONAL INCOME DISTRIBUTION, ECONOMIC GROWTH AND TRANSFORMATION IN CHINA

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Abstract

Based on the Bhaduri-Marglin model, this paper establishes an economic model concerning surplus labor supply and credit constraints in Chinese economy to analyze the relationship between the change of the functional income, the economic growth and the transformation in China. Credit constraints have a significant effect on the relationship of the functional income distribution and economic growth. When an economy grows with credit constraints, such as China, it could change from a wage-led growth regime in classical Bhaduri-Marglin models to a profit-led growth regime in our model, and vice versa. Empirical estimation shows that if labor share improves by 1 percent, private consumption will improve by 0.59 percent and it does not have negative effect on China's economic growth. As a result, if the government could control the opportunity and strength of the economic reform policies which concern functional income distribution, private consumption and investment effectively, China's economy could transfer to a consumption-led growth path smoothly.

Key words: functional income distribution, economic transformation, consumption-led growth, labor share

JEL Code: O11, O47, O53

Introduction

During the past 30 years, China's economy has kept a growth rate of 9.9% annually, which creates a "Chinese Economic Miracle". However, the "Only GDP" growth mode and "Heavy Industry Oriented" development policy lead to the decreasing of the labor share in functional income distribution since the mid-1990s under current income distribution system. And the labor share has dropped to 47% by 2011, which is significantly lower than the average level of world major economies during the same period. The deterioration of the functional distribution would not only affect the economic growth in the long period, but also intensify the gap between the rich and poor. So it's important to explore the effect of increasing the labor share in functional income distribution on economic growth and transformation,

especially for policy makers who want to lead Chinese economic growth to a consumption-led path.

Most recent research on the relation between functional income distribution and economic growth is based Bhaduri-Marglin model which is proposed in 1990. In this model the increase of labor share will expand private consumption as a result of the marginal propensity to consume of wage being higher than that of the profit, which will also has a negative effect on investment and net export demand via decreasing the international competitiveness of domestic products. As a result, the influence of the change of the labor in functional income distribution on total demand could be attributed to an empirical problem. For example, Hein & Vogel (2008), Stockhammer et al. (2009), Onaran et al. (2011), Bowles (2013) etc., have studied the economic growth mode empirically. If the increasing of labor share has a positive effect on total demand, then the economic growth is wage-led, otherwise, it's profit-led.

Based on the Bhaduri-Marglin model, this paper establishes an economic model concerning surplus labor supply and credit constraints in Chinese economy to analyze the relationship between the change of the functional income, the economic growth and the transformation in China. Our model could explain the problem of the labor share doesn't have significant effect on investment, which also enriches the connotation of the growth mode in Bhaduri-Marglin model. On this basis, we analyze how the change of labor share would affect Chinese economy's short-term growth and transformation and offer some suggestions for building a long-term private consumption growth mechanism in China.

1 The Theoretical Model

The total domestic demand (y) consists of private consumption (c), government consumption (g), investment (i), export (x) and imported (m),

$$y = c + g + i + (x - m) \quad (1)$$

Suppose the tax rate is τ , the labor share in functional income distribution is Ω , and then private consumption could be treated as a function of wage income Ωy and profit income $(1 - \Omega)y$. The marginal propensity to consume (MPC) of them are β_w and β_π , $0 < \beta_\pi < \beta_w < 1$. So the private consumption could be written as

$$c = \beta_w(1 - \tau)\Omega y + \beta_\pi(1 - \tau)(1 - \Omega)y = [\beta_w\Omega + \beta_\pi(1 - \Omega)](1 - \tau)y \quad (2)$$

The MPC of government is β_g , so

$$g = \beta_g(1 - \tau)y \quad (3)$$

Assume the import function is a linear function of the total output with a marginal propensity to import ζ , so

$$m = \zeta y \quad (4)$$

Put (2) (3) and (4) into (1), we can get

$$y = \frac{i + x}{1 - (1 - \tau)[\beta_w\Omega + \beta_\pi(1 - \Omega)] - \beta_g(1 - \tau) + \zeta} = \frac{i + x}{u} \quad (5)$$

And $u = 1 - (1 - \tau)[\beta_w\Omega + \beta_\pi(1 - \Omega)] - \beta_g(1 - \tau) + \zeta$, u^{-1} is Keynes output multiplier, which depends on tax rate, labor share and so on. Then both sides for (5) operate total differential and divide y simultaneously, and we get

$$\hat{y} = -\hat{u} + \frac{i}{uy} \hat{i} + \frac{x}{uy} \hat{x} = -\hat{u} + \Psi_i \hat{i} + \Psi_x \hat{x} \quad (6)$$

Here we have $\Psi_i = i/uy$, $\Psi_x = x/uy$. They could be seen as weighted-multipliers adjusted by the proportions of investment and import demand in total demand. From (6), we can find that output growth rate is linear weighted average of investment growth rate and import growth rate. Ψ_i and Ψ_x depend on u and are endogenous variables. Next we try to get expressions of the three variables on the right of (6).

We can get growth rate of u from its expression,

$$\hat{u} = -\frac{(1 - \tau)(\beta_w - \beta_\pi)\Omega}{u} \hat{\Omega} = -\frac{(1 - \tau)(\beta_w - \beta_\pi)\Omega}{u} (\hat{\omega} - \hat{\lambda}) \quad (7)$$

As a result of long term surplus labor supply in China, the real wage growth is little which means $\hat{\omega} \approx 0$. While $\hat{\lambda} > 0$ in actual economy, from (7) we can conclude that $\hat{u} > 0$. It will lead to Ψ_i and Ψ_x becoming smaller.

According to Bhaduri&Marglin(1990), profit share and capacity utilization are main variables in the investment function. Just as in most current study, we assume the investment function is

$$i = ab^{\phi_0} \pi^{\phi_1} y^{\phi_2} \quad (8)$$

Here a is a positive constant and b includes all other factors affecting investment.

However, most part of investment in China is government investment which usually has a close connection with economic growth target and macroeconomic-control target made by

government. It means investment function in China may be different from (8) which are applicable to developed economies. For China we should focus on credit constrains in Chinese commercial bank system and establish a new investment function which is different from that of current research (Gong & Lin, 2007).

Suppose the total amount of loans that can be obtained by government and enterprises are ΔM which is supposed to be exogenous for simplicity. All investment projects may face credit constrains no matter it belongs to government or enterprises while some of them may get rid of credit constrains as a result of their smaller scale. Suppose there are N projects which are arranged in a particular order to make the first n projects are restricted by credit constrains and the last $N-n$ projects are not. As a result, the actual investment of the first n projects is $\Delta M_i (i=1,2,\dots,n)$ which is equal to the upper limit of credit constrains they face; the actual investment of the last $N-n$ projects is $\Delta M_i^* (i=n,n+1,\dots,N)$ which is the optimal investment without credit constrains. The optimal investment depends on market principle and could be seen as a function of profit share and total demand written as $f(\pi, y)$. In summary, the investment function we used here could be written as

$$i = \sum_{i=1}^n \Delta M_i + \sum_{i=n+1}^N \Delta M_i^* = \Delta M' + f(\pi, y) \quad (9)$$

Here $\Delta M' = \sum_{i=1}^n \Delta M_i$, $f(\pi, y) = ab^{\phi_0} \pi^{\phi_1} y^{\phi_2}$. So the growth rate of investment could be written as

$$\hat{i} = \Delta \hat{M}' + \phi_0 \hat{b} + \phi_1 \hat{\pi} + \phi_2 \hat{y} = \Delta \hat{M}' + \phi_0 \hat{b} \phi_1 - (\Omega/\pi) \phi_1 (\hat{\omega} - \hat{\lambda}) + \phi_2 \hat{y} \quad (10)$$

Suppose the export demand is a decreasing function of unit labor cost which is equal to labor share Ω and an increasing function of total external demand D_f . Then the export function could be written as

$$x = a_e D_f^{\varepsilon_0} \left(\frac{\Omega}{\Omega_f}\right)^{-\varepsilon_1} \quad (11)$$

For simplicity, we assume $\varepsilon_0=1, \Omega_f=1$ just as Naastepad(2006) and the export function could be written as

$$\hat{x} = \hat{D}_f - \varepsilon_1 \hat{\Omega} = \hat{D}_f - \varepsilon_1 (\hat{\omega} - \hat{\lambda}) \quad (12)$$

Put (7) (10) (12) into (6), we can get the growth rate of the total output

$$\hat{y} = \frac{\Psi_i \phi_0 \hat{b} + \Psi_x \hat{D}_f}{1 - \Psi_i \phi_2} + \frac{(1 - \tau)(\beta_w - \beta_\pi) \Omega u^{-1} - \Psi_x \varepsilon_1 - \frac{\Omega}{1 - \Omega} \Psi_i \phi_1}{1 - \Psi_i \phi_2} (\hat{\omega} - \hat{\lambda}) + \frac{\Delta \hat{M}_i'}{1 - \Psi_i \phi_2} \quad (13)$$

From (13) we can find there are three factors affecting economic growth in our theoretical framework. The first one is the nature growth rate of investment and external demand (\hat{b} and \hat{D}_f). According to classical economic theory, they have a positive connection, which means $1 - \Psi_i \phi_2 > 0$. The second one is the relative growth rate of real wages and labor productivity which decides whether the change of labor share is positive or negative. The third one is the growth rate of total constrained investment operated by government and entrepreneur. If the economic growth is overheating and the government want it to slow down, then the constrained investment increases, which means $\Delta \hat{M}_i' < 0$; if the economic growth slows down fast (much lower than the target made by the government) and the government want to stimulus the economic growth, then the constrained investment decreases, which means $\Delta \hat{M}_i' > 0$. Suppose $\hat{\omega} - \hat{\lambda} > 0$, if $\Delta \hat{M}_i' > 0$ and

$$(1 - \tau)(\beta_w - \beta_\pi) \Omega u^{-1} - \Psi_x \varepsilon_1 - \frac{\Omega}{1 - \Omega} \Psi_i \phi_1 > 0 \quad (14)$$

That means $\beta_w - \beta_\pi > \frac{1}{1 - \tau} \left(\frac{x \varepsilon_1}{\Omega y} + \frac{i \phi_1}{(1 - \Omega) y} \right)$, and then the increase of the labor share could improve the economic growth rate. If $\Delta \hat{M}_i' < 0$ and $\beta_w - \beta_\pi < \frac{1}{1 - \tau} \left(\frac{x \varepsilon_1}{\Omega y} + \frac{i \phi_1}{(1 - \Omega) y} \right)$, the increase of the labor share would have a negative effect on economic growth. It's not sure how the change of the labor share would affect the economic growth under other circumstances. The conclusion is different from current research when considering credit constrains in commercial bank system of China, which indicates that a wage-led growth economy could behave like a profit-led one, and vice versa. Table 1 shows the details of our conclusion.

Tab. 1: Judgement on economic growth mode

Judgement Condition	$\Delta \hat{M}_i' > 0$	$\Delta \hat{M}_i' < 0$
$\beta_w - \beta_\pi > \frac{1}{1 - \tau} \left(\frac{x \varepsilon_1}{\Omega y} + \frac{i \phi_1}{(1 - \Omega) y} \right)$	Wage-led Growth	Can't Judge

$\beta_w - \beta_\pi < \frac{1}{1-\tau} \left(\frac{x\varepsilon_1}{\Omega y} + \frac{i\phi_1}{(1-\Omega)y} \right)$	Can't Judge	Profit-led Growth
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The enormous credit target made by the government has a significant effect on the relationship between labor share and economic growth in an economy like China whose investment is mainly decided by the government plan. As a result, compared with developed market economies, we could not only depend on empirical evidence, but also the government's administrative instructions when we judge whether Chinese economic growth is wage-led or profit-led.

2 Empirical Results

Next we use single equation estimation method to estimate how the change of labor share would affect Chinese economic growth and transformation. All data come from China Statistical Yearbook. Variables are all deflated by GDP deflator and come into estimation equation by log-form. Considering the time series data is too short for unit root test and China's economy has changed profoundly during this period, we use ADL models in differential form.

2.1 Consumption

We estimate consumption function using the following forms

$$\ln c = 1.235^{***} + 0.691^{***} \ln W^A + 0.072 \ln \pi + 0.332^{**} L2. \ln c - 0.219^{**} L3. \ln c \quad (I)$$

$(R^2 = 0.999, D.W. = 1.507)$

$$D. \ln c = -0.0314^{**} + 0.800^{***} D. \ln W^A + 0.200^* D. \ln \pi + 0.145^* LD. \ln c \quad (II)$$

$(R^2 = 0.933, D.W. = 1.945)$

$$D. \ln c = -0.033^{***} + 0.776^{***} D. \ln W^A + 0.197^* D. \ln \pi + 0.180^{**} LD. \ln c \quad (III)$$

$(R^2 = 0.957, D.W. = 1.704)$

Estimation (I) is OLS in log form adding lagged dependent variables to eliminate autocorrelation in the residuals. Estimation (II) adopts first order difference of variables to eliminatenon-stationary and multicollinearity. Estimation (III) uses the same form with (II) but takes PW-FGLS estimation. The profit income doesn't have a significant effect on consumption in estimation (I). Maybe it's because the existing of multicollinearity. Considering estimation result of (II) and (III) are similar and the DW statistic of (II) is superior to that of (III), so we adopt the result of estimation (II).

We can find that when wages and profits increase by 1%, private consumption will increase by 0.80% and 0.20% respectively, and the total effect is approximately equal to 1%. As the MPC of wages is significantly higher than that of profits, when wages increase private will also increase. In order to calculate the direct partial effects of a change in the labor share on the GDP growth contribution of consumption, the elasticity estimated above are converted using average values over the whole period and the value in 2011 for c/W and c/π respectively. It shows that a one-percentage-point rise in the labor share, according to our results, increases private consumption by 0.57% during the whole period and by 0.59% at the end of the period. It indicates improving the labor share could release private consumption effectively and provide a stable domestic demand for economic transformation.

2.2 Investment

We still use the traditional form as Bhaduri&Marglin (1990) to estimate the investment function which takes it as a function output and profits. Considering the interest rate r may influence the investment, so it's also taken into the estimation. All estimations show that neither the government investment nor the private investment has a significant connection with the change of profits. So we take money and quasi money supply (M2) by the central bank into estimation which represents the government's intent on economic control. And the GDP deflator reflecting the degree of inflation is also considered. The detailed estimation results are showed as follows

$$D.\ln i = 0.156^{***} - 0.376LD.\ln \pi + 0.458^* LD.\ln y + 0.432^{***} LD.\ln r \quad (I)$$

$(R^2 = 0.750, D.W. = 1.684)$

$$D.\ln i = -0.042 - 0.232LD.\ln \pi + 0.958^* D.\ln y + 0.286D.\ln r - 1.259^* D.\ln def$$

$+ 0.891D.\ln M2, (R^2 = 0.698, D.W. = 1.792)$ (II)

$$D.\ln i = -0.068 + 0.412^* D.\ln y + 0.319^{***} D.\ln r - 1.034^* D.\ln def + 1.235^{***}$$

$D.\ln M2, (R^2 = 0.730, D.W. = 1.916)$ (III)

$$D.\ln i = -0.067 + 0.407D.\ln y + 0.312^{**} D.\ln r - 1.017^* D.\ln def + 1.234^{***}$$

$D.\ln M2, (R^2 = 0.725, D.W. = 1.984)$ (IV)

Estimation (I) (II) and (III) adopt OLS and (IV) adopts PW-FGLS. Specifically, the coefficients of profits in (I) and (II) are not significant and are negative which is contradictory with theoretical expectation. We drop profits in (III) and (IV), as a result, all coefficients become statistically significant. We adopt (IV) to analyze where GDP and M2 all have positive effect on investment and deflation has a negative effect, which is consistent with

theoretical expectation. The negative coefficient of interest rate may be related with the uncompleted market-oriented interest rate in China. The interest rate may reflect government's intent more than market price. As a result, we can conclude that the change of profit share doesn't have a significant effect on investment in China.

2.3 Net Exports

The growth rate of net export is much higher than that of GDP, which lead to the estimation for net export function being very sensitive to the empirical form we adopt. We take the net export as a function of domestic demand y , external demand y^f , exchange rate E and labor share, which means $NX = f(y, y^f, E, \Omega)$. We used the GDP of the 40 main economies as the proxy variable of Y^f . The details show as follows

$$\begin{aligned} D.\ln nx &= -3.084^{***} + 37.800^{***} LD.\ln y + 7.273^{**} D.\ln y^f + 5.943^* D.\ln W^A \\ &- 8.440^{**} LD.\ln W^A - 4.742^* L2D.\ln W^A + 4.855^{**} L3D.\ln W^A + 19.163^{***} D.\ln E \end{aligned} \quad (I)$$

$$R^2 = 0.919, D.W. = 1.907$$

$$\begin{aligned} D.\ln nx &= -3.103^{***} + 38.442^{***} LD.\ln y + 7.448^{**} D.\ln y^f + 5.522^* D.\ln W^A \\ &- 8.803^{**} LD.\ln W^A - 4.850^* L2D.\ln W^A + 5.169^{**} L3D.\ln W^A + 18.884^{***} D.\ln E \end{aligned} \quad (II)$$

$$R^2 = 0.912, D.W. = 1.899$$

$$\begin{aligned} D.\ln nx &= -2.527^{***} + 30.214^{***} LD.\ln y + 9.016^{**} D.\ln y^f + 6.468^* D.\ln W^A \\ &- 8.205^{**} LD.\ln W^A + 16.037^{***} D.\ln E \end{aligned} \quad (III)$$

$$R^2 = 0.792, D.W. = 2.469$$

$$\begin{aligned} D.\ln nx &= -2.744^{***} + 35.551^{***} LD.\ln y + 5.500^* D.\ln y^f + 8.796^{***} D.\ln W^A \\ &- 11.947^{**} LD.\ln W^A + 20.350^{***} D.\ln E \end{aligned} \quad (IV)$$

$$R^2 = 0.919, D.W. = 2.379$$

Estimation (I) (III) adopt OLS and (II) (IV) adopt PW-FGLS. We adopt the estimation of (I) which shows that if the labor increase by 1%, the net export will decrease by 2.38% (=5.94%-8.44%-4.74%+4.86%). Then convert it to direct partial effects which show a one-percentage-point rise in the labor share decreases net export by 0.21% during the whole period and by 0.13% at the end of the period.

2.4 Total Effect

When add up all effect of compositions of total demand, we can get the effect of the change of labor share on economy. In 2011, according to our estimation, a 7- percentage-point rise in the labor share (the highest point during the last 20 years) increases private consumption by 4%

and decreases net export by 0.13%. As a result, the total output increases by 0.46% assuming the investment is not influenced by it.

Conclusion

On conclusion, according to our research, the increase of the labor share in China could increase total output effectively. Although Chinese government has a significant and powerful effect on investment and the net export decrease sharply since 2008 for China, both of them provide a suitable external environment for Chinese economy to transform into a consumption-led growth path. If China could take full advantage of this Golden Period of economic transformation, it would find an equilibrium point between economic growth and transformation based on releasing of private consumption which are two main topics for China in the next 10 years.

The Chinese government should try to build a long-term mechanism to motivate the increase of private consumption. It should improve wages and reduce its control for economic activities, especially in the credit market. Otherwise, the government should co-ordinate the economic reform policies in different fields to create a grace period in order to avoid short-term fluctuations.

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