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"The Rate of Surplus Value, the Composition of Capital, and the Rate of Profit in the Chinese Manufacturing Industry: 1978－2005"

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1. Introduction

In neoclassical economics, the overall level of rate of profit plays a negligible role in the determination of the dynamics of a capitalist economy. essentially, in the long-run the growth rate of a typical capitalist economy is determined by some exogenous factors: in Solow-type models the exogenous technological progress contributes to the most part of the development, and in the so-called new-growth-theory-type models the exogenous parameters which reflect the subjective preferences and the technology to produce some accumulable factors (such as human capital, the diversity of products, the knowledge). (Barro and Sala-i-Martin, 1995; Glyn, 1997[1]) And in the short-run the fluctuations of a capitalist economy are governed by some exogenous technological shocks (The real business models), the demand fall bellow the supply for the subjective of consumers and investors, or simple by the imperfection of the market, such as information imperfection, the monopolistic factors etc. (Lucas,1977; Kydland and Prescott,1982; Mankiw and Romer, 1994).

Contrast to the view of neoclassical tradition, the overall level of rate of profit occupied a central role in the determination of the dynamics of a capitalist economy in the classical economics and especially in Marxian tradition theory. (Glyn, 1997; Howard and King, 1990[2]) Marx wrote that: *'the rate of profit is the compelling power of capitalist production, and only such things are produced as yield a profit.'*[3]The rate of profit influences the dynamic process of the economy through three main routes. Firstly, the rate of profit reflects the capacity of the capitalist class to accumulate capital: if the profit rate is considerably high, the capitalist gain more from the past investment and given the propensity to consume there are more fund to invest in the next period; if the profit rate is relatively low, the capitalist get less from the past investment and given the propensity to consume there are less fund to suffice the investment needs of capitalist in the next period. And according to Marxian theory the capital accumulation is the main shaper of the economic-social dynamics of the capitalist economy.

Secondly, the level of the rate of profit affects the achievement of the firms to the credit. If the level of the profit rate is relatively high, the firm can easily get the credit from the financial system and then have greater potential to expand it. Conversely, if the level of the profit rate is relatively low, it is hard for the firm to get credit from the financial institutions.

Thirdly, share with the same view with Keynesian economics tradition, the rate of profit figures the expectation of the capitalist. If the profit rate is relatively high, the

[1] Barro and Sala-i-Martin, Economic Growth (1[st] edition), ; Glyn, A. , Does Aggregate profitability really matter?, Cambridge Journal of Economics, 1997,21, 593-619.
[2] M. Howard and J. E. King, The 'second slump'- Marxian theories of crisis after 1973, Review of Political Economy, 1990,pp267-91.
[3] Marx, Capital, Vol. 3, pp304.

capitalist will be optimistic and given the surplus draw from the business they will increase the ratio of investment, thus leads to growth; if the profit rate is relatively low, the capitalist will have pessimistic expectation about the future and then reduce the investment on the production, then leads to stagnation.

Thus to Marxian theory, the performance of capitalist economies depends above all else on the overall level of the rate of profit. When the rate of profit is relative high, the capitalist economy is prosperous: business investment is high, unemployment is relatively low, and the living standards of workers generally rise. However, when the rate of profit is low, prosperity turns into stagnation and depression: investment is low or nonexistent, unemployment is high, and living standards decline. (Moseley, 2003)

2. An Overview of Previous Studies

Since the overall level of the rate of profit plays such an important role in the dynamics of the capitalist system, generations of Marxist economists pay a mass of attentions to study the movement of the rate of profit. We can roughly divide those studies into two categories, one is theoretical study and another is empirical ones, although almost each study contains both sides. We will review them successively.

2.1 Theories of the Movement of Rate of Profit

To make our review more traceable, we'd better to review some basic points in the Marxian theory.

i. Value-create and Value-transfer: in the analysis framework of Marxian theory, there are tow kinds of movement of value in the production process, one is the value-transfer process in which the value imbedded in the production means and rare materials is transferred into the new product, and another is value-create process in which the workers create new value through their use of labor power. The new created value is distributed between capitalist and workers, the part distribute to workers is used to recover the used labor power and the part to capitalist is the only source of profit to capitalist as a whole. Thus we can divide the value of the new product into three part: one is to recover the consume of the product means and rare materials and we call this constant capital(we label this part as c, because the value of those materials do not increase and just transferred in the production process), one is to recover the use of labor power and we call this variable capital(we label this part as v, just because the consume of the labor power can bring capitalist more value than he invest on the buy of labor power), and the one which is created by the workers and draw by capitalist as profit is surplus value(we label this part as s). In a more complex capitalist system the surplus value is the source of other kinds of income, such as interest income, corporation tax, and dividend.

ii. The surplus value, thus profit for capitalist can only be created through the capitalist production by labor power. To perform the production, the capitalist must firstly can get the product means, rare material and labor power in the market.

iii. The purpose of capitalist production is to get more and more profit, then after the process of marketing of production means, rare materials and labor power and the process of production, capitalist must sell out those products and get the money. If capitalists can not realize the value (include the surplus value) in the market, not only they can not recover the material used in the production process and pay wages to workers, but also they have no fund to finance their further expand-activities. And because the value is quality-indifferent and only quantity-different, the capitalist who act as the anthropomorphized-capital have to reinvest into the capitalist production.

iv. There are kinds of contradictions contained in the processes described above. Firstly, the capitalist must compete with the workers in the areas of labor market and production process. Secondly, the capitalist must compete with each other in the areas of factor markets and product markets. And thirdly, the capitalist have to compete with the state and international capitalist. All those competitions can affect the production and realization of the surplus value (profit).

We can summaries those points in the framework of the diagram of capital circulation:

$$M \underbrace{——}_{\text{buy}} \begin{cases} P \\ L \end{cases} \underbrace{\cdots\cdots}_{\substack{\text{production}\\ \text{process}}} Q \underbrace{——}_{\text{sale}} M'(= M + \Delta M)$$

Stage 1: Prepare for the capitalist production

Stage 2: Produce the new product and at the same time transfer and create new value

Stage 3: Realization of value of product

To draw profit from the capitalist production system, capitalist must guarantee the capital get through the three stages successively and fluently. And further this kinds of circulation must not be fulfilled once but be done time after time. Any thing can influence one or more stages of those processes can influence the rate of profit. Actually different theories on the movement of the rate of profit just emphasizes different influent factor which affect different stage in the capital circulate process.

2.1.1 Rising Organic Composition of Capital as the Main Cause of Falling Rate of Profit

In the Vol. III of Capital, Marx discusses the general movement tendency of the rate of profit in a typical capitalist economy. This tendency was termed by Marx as the 'the law of the tendency of the rate of profit to fall'.[4] To Marx himself this law may be ···*in every respect the most important law of the modern political economy and the most essential one for understanding the most complicated relationship. It is the most important law from the historical standpoint.* ···[5] Marx focus his argument on the second stage of the circulation of capital, that is the production stage. This is consistent with Marx's method that the production plays a crucial role in a social system.

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[4] Marx, Capital, Vol. III, Part III

[5] Marx, Grundrisse, http://www.marxists.org/archive/marx/works/download/pdf.htm

Marx's arguments follow: in the capitalist system, the most essential relationship is the relationship between capitalist class and working class and this relationship is essentially antagonistic. This antagonistic relationship roots deep into the capitalist production process: the use of workers' labor power is the only source of the new created value, and what the capitalist get is just what the workers create and exceeds the value of the labor power. That is the relationship between them is exploit relation. In the term of modern game theory, the relationship between them in the problem of dividing-new-created-value is zero-sum game. To be dominating in the process of dividing the new created value, the capitalist must control the production process. And this effort leads to a progressive mechanization of the process of production.[6] In the term of Marxian theory this process is called the rising organic composition of capital. And this leads to the rate of profit to fall: if we define the rate of profit as the ratio of the surplus value to the advanced value of the capitalist in the first stage,

$$r = \frac{s}{c+v}$$

All variables are measured in real unit. After some algebraic arrangement, we will get a new formula

$$r = \frac{(s/v)}{1+(c/v)}$$

The term (s/v) is the rate of surplus value, and (c/v) is the measure of the organic composition of capital. Given the rate of surplus value, a rise in the organic composition of capital leads the rate of profit to decrease. Derivate both sides of above formula with time, we get

$$\dot{r} = (\dot{s/v}) - (\dot{c/v})$$

This means that the movement of the rate of profit is governed by the relative movement of the rate of surplus value and the organic composition of capital. Even the rate of surplus value increases with the process of mechanization, the rate of profit will decline if the ratio of the organic composition of capital increases is larger than that of the rate of surplus value.[7]

Marx himself also enumerates six factors which act as the contracting causes to the falling tendency of the rate of profit, such as cheapening of the elements of the constant capital, raising the intensity of exploitation, depression of wages below their value, reserve army of the labor power, foreign trade and the increases of stock capital. Even though those factors can counteract the influence of the rising organic composition of capital on the rate of capital, this influence will eventually overcome them and leads the rate of profit to fall.

So we can classify Marx's argument which emphasizes the rising organic composition of capital as the one which focus the structure change in the process of the second stage of the circulation of capital.[8]

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[6] In *Communist Manifesto (1848)*, Marx wrote:" *the bourgeoisie cannot exist without constantly revolutionizing the instruments of the production, and thereby the relations of production and with them the whole relation of society*". And in *Capital* he deepens this insight.

[7] Shaikh (1978) provide another argument: the rate of profit, $r = (s)/(c+v)$, definitely have a upper limit $r_{\max} = s_{\max}/c$. If c increases infinitely, then $r_{\max}$ will fall. And then we can expect the rate of profit will trend to fall. This argument was criticized by Van Parijs (1980) who insisted that the upper limit trend to fall needs not contradict with a rising tendency of the real rate of profit(this rate is quite different with $r_{\max}$).

[8] Like Marx's other famous arguments, the theory of rising organic composition of capital bears a lots of criticisms. One of the most important criticisms is termed as the Okishio theorem (Roemer, 1979; Bowles, 1981). The

2.1.2 Profit-Squeeze as the Main Cause of Falling Rate of Profit

The argument of theories of profit-squeeze shifts its focus from the second stage of the circulation of capital to the first stage of the circulation, i.e. from the area of production to the area of distribution. [9]The logic of those theories is essentially simple.

We can redefine the rate of profit as the ratio of the total revenue of the capitalist to the rate of the value of the advanced capital. And further we assume that the value of the workers' labor power is recovered after the value of the production have realized, i.e. the advanced capital is not include variable capital. So we can write the rate of profit as

$$r = \frac{R}{K}$$

in which the variables R and K denote to the total profit and total constant capital (advanced capital to buy machine and rare materials). After some algebraic arrangement, we get a new formula

$$r = \frac{R}{Y}\cdot\frac{Y}{K} = \left(\frac{Y-W}{Y}\right)\cdot\frac{Y}{K} = \left(1-\frac{W}{Y}\right)\cdot\frac{Y}{K}$$

in which the variables W and Y denote the total income of the workers and the total new added-value in the process of production. Thus $\frac{W}{Y}$ is the share of the working class in the national distribution. And $\frac{Y}{K}$ can be interpreted as the productivity of the capital and similar to the term of organic composition of capital. It is clear that the rate of profit is in inverse proportion to the variable $\frac{W}{Y}$ and in proportion to $\frac{Y}{K}$.

And among the two variables, $\frac{W}{Y}$ and $\frac{Y}{K}$, which can affect the rate of profit, the theories of profit-squeeze believe that the raising $\frac{W}{Y}$ is the main cause of the falling of the rate of profit. And this raising $\frac{W}{Y}$ is rooted in the relative increase strength of the working class. This relative increase in the strength of working class roots in the change of the social-economic structure of the capitalist system.

Not like the neoclassical economics, the wage share in the national income is not merely determined by the exogenous given preference and technology in the framework of Marxian theory. Rather the its determination is a social-economic process, many social factors can influence it, such as: (1). the reserve army of labor, if there exist abundant of unemployed workers, the relative strength, thus relative wage

theorem said that it to be impossible for a cost-reducing innovation to lower the rate of profit without simultaneously increasing the real wage. To defense Marx's argument, the orthodox Marxist economists extent the theorem and made it clear that under some condition (such as the joint production and the existence of reserve army of labor) the profit rate will fall with the development of technology. (Shaikh ,1978; Salvadori,1981; Lipietz, 1986)

[9] Profit-squeeze explanation of falling rate of profit rise mainly in the late of 1970s. See Glyn and Sutcliffe (1972) Boddy and Crotty (1975) and Weisskopf (1979).

share in the national income is low; (2). the solidarity of the working class, if the working class unites firmly, the relative strength, thus relative wage share in the national income is high. (3). the cost of lost job,[10] the larger the cost, the relative weaker strength of the working class, and the relative low share of wage in the national income. With the raising strength of working class, the working class makes the distribution move along their favorable direction. And if the growth of the share of wage bill in the national income overcomes the growth rate of the productivity of the capital, the rate of profit will inevitably fall.

2.1.3 Realization Problem as the Main Cause of the Falling Rate of Profit

The third effort to explain the movement of the rate of profit focuses on the third stage of the circulation of capital, i.e. the realization of the created value. As we have mentioned above it will cause very serious consequences that the product cannot sale out on the market: on the one hand, the value transferred from the used rare materials and depreciated machines and the advanced wage bills can not be recovered, on the other hand, the new created surplus value contained in the products can not realized and this leads the income of the capitalist to fall and so do the rate of profit. We can prove this argument as follows:

Let us redefine the rate of profit as the rate of realized surplus value to the total advanced capital:

$$r = \frac{\theta \cdot S}{C + V}$$

in which θ is the proportion of product that have been soled. It is clear that the rate of profit increase with the raising of θ .

This kind of argument have to explain why θ will fall below 1. We can divide those explanations into two categories. One is termed as the underconsumptionist theory and the other is termed as the coordination failure theory. Both of them can trace directly back to Marx himself.

(1). Underconsumptionist explanation: Marx writes

Always remains the poverty and restricted consumption of the masses as compared to the tendency of capitalist production to develop the productive force in such a way, that only the absolute power of consumption of the entire society would be their limit. (Capital, Vol. III)

To make the effective demand equal to the ever-grows production, the growth rate of them must be same. But in the capitalist system the individual capitalist always trends to low the growth of the wage bill and thus limits the growth of the workers, and this inevitably leads to the effective demand of the society fall below the aggregate demand.[11]

(2). Coordination failure explanation: in the volume two of *Capital*, Marx constructs a simple two-sector reproduction scheme to illustrate the conditions that must be fulfilled so as to guarantee the operation of the capitalist system. And since the character of a typical capitalist system is that individual capitalist bears no authority

[10] Schor (1985). This factor is a measure of the dependence of worker on capitalist. And it is a function of many factors, such as unemployment rate, the probability to find another job after quit from the old, the benefit from the government and insurance company for unemployment, etc.

[11] Sweezy (1942) is the main supporter of underconsumption theory. According to him, the tendency of under-consumption will become more acute when the capitalist system transfers from competitive to monopolistic. Marxian brand of underconsumption theory which emphasizes the effect of the class structure on the effective demand differs from the Keynesian one which emphasizes the effect of subjective propensity of the general consumers on the effective demand.

but the law of the value. This suggests that there is not mechanisms to guarantee those conditions are being achieved automatically. And for the capitalist production has the internal impulse to expand itself, and this leads to the output of some sectors can not satisfy the need of other sector and can not realize the value embodied in their products. And this further leads those sectors to decrease their demand on machines, rare materials and labor powers, and eventually cause the fall of rate of profit.[12]

2.1.4 The Increasing Use of Unproductive Labors as the Main Cause of the Falling Rate of Profit

This kind of explanation of the movement of the rate of profit focus mainly on structure of the circulation of capital as a whole. The concepts of productive labor and unproductive labor are based on the labor theory of value of Marxian economics. [13] According to Marx, only those labor which are involved in the capitalist production is the productive labor, and “capitalist production” refers to those activities which produce, transport or store commodities. In the framework of Marxian theory, only productive labor can transfers the value embedded in the production materials and creates new value (include surplus value). And the unproductive labor involves circulating activities and supervising activities and this kind of activities do not transfer old value or create new value. The even the value of those materials and the labor power involved in those activities must be recovered by the surplus value transfer from the productive sectors.

To simplify the analysis we assume that the only factor needed by unproductive activities is labor power and the wage bills are paid after the value of the commodities have been realized. Thus we redefine the rate of profit as

$$r = \frac{R}{C} = \frac{S - U}{C}$$

in which R denotes the conventional profit received by capitalist class as a whole, and it is equal to the total surplus value created by productive labor (S) minus the value to recover the consumed labor power (U). Dividing numerator and denominator by the variable capital in the productive sectors (V), then we get

$$r = \frac{(S/V) - (U/V)}{(C/V)}$$

It is clear that given the rate of surplus value and organic composition of capital, the rate of profit declining with the rising ratio of unproductive labor to productive labor. Generally, the works of Moseley (1992; 2003), Shaikh and Tonak (1994), and Mohun (2005) do not concern more details why the ratio of unproductive labor to productive labor has to rise in a capitalist economy. But we can give this argument a reasonable explanation in the framework of Marxian theory:

(1). since essentially the production relation between capitalist and workers is antagonistic, to exploit more surplus value from the production process, capitalist tries to control those process through more and more detail divisions of labor in the factory system in two directions: in landscape orientation they divide the whole production process into a system of successive pieces of tasks; in longitudinal direction they try to construct a bureaucratic-ladder.[14] And this inevitably leads the supervision cost and

[12] This kind of argument receives little support after the world war two.

[13] This kind of argument receives more and more attention since 1990s with the works of Moseley (1992; 2003), Shaikh and Tonak (1994), and Mohun (2005), concerned with theoretical analysis and empirical estimations.

[14] Marglin (1974) and Edwards (1979) are the best references in the field.

management cost to increase.
(2). since the capitalist system characterized by a automatically self-regulation system in the most period of its development, as mentioned above, realizing the produced value and financing the further investment become more and more important to capitalist, so more and more resources are invest into the circulating activities and financial service.

2.2 Marxian Empirical Investigations into the Movement of the Rate of Profit

Although the movement of the rate of profit plays a very central role in the determination of the dynamics of a typical capitalist economy in the Marxian economics, the Marxian economists do not study its actual movement and causes empirically until 1970s when the post-war prosperity came to an end suddenly.[15] This section's aim is two folded: Firstly, we seek to review the main difficulties in the empirical estimation of Marxian categories; secondly, we try to review the main empirical conclusion draw from the previous studies.

2.2.1 The Difficulties to Put Marxian Law Testable

When the Marxian economists try to use available official data to investigate the movement of the rate of profit and its causes, we face several difficulties:[16]
(1). *Labor time or Money:* it is not problematic when we restrict ourselves in the area of theoretical discussions. In Marxian theoretical literatures all variables are measured in the value unit which is determined by the standard labor time.[17] But actually in the national accounting system every variable is measured in money unit. It is unrealistic to transfer those money-measured variables into labor-time-measured ones. And actually all empirical studies define Marxian categories in money unit.
(2). *Only capitalist production or all production*: it is also not problematic when we restrict ourselves in the area of theoretical discussions. What Marxian economics concerned is the dynamics of a capitalist system. But there is no pure capitalist economy at all. There are non-capitalist production (including government production, household production and simple commodity production) as well as capitalist one. Should we account that non-capitalist production when we measure corresponding variables? Actually there is no general accepted method especially when it is concerned government production and simple commodity production. It will cause more difficulties when we measure corresponding categories of developing countries (such as China).
(3). *Should we distinguish unproductive activities from productive activities*: this involves with how to define the magnitude of surplus value, profit, variable and constant capital. To our purpose the main problem is whether the wage bill of workers of unproductive sector is considered as variable capital or as a part of surplus value. As same as the problem (2), different scholars have different methods in empirical studies and this leads to quite different conclusions.
(4). *How to define variable capital*: it is not as simple as it looks like to define

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[15] May be Joseph M. Gillman's monograph, *The Falling Rate of Profit-Marx's Law and Its Significance to Twentieth Century Capitalism*,(London, Dennis Dobson, 1957) is a excellent exception, in which he use the official data of U.S. to test the trend and causes of the Marxian rate of profit
[16] Here, we will only treat of several main problems briefly. To those who wants to know more details concern about this problem, Moseley (1992), Shaikh and Tonak (1994), are good references.
[17] The term "standard" refers to that the commodity is produced under socially average technology and average labor intensity. See Marx, *Capital*, Vol. I.

variable capital. Should the government tax on the workers be considered as a part of variable capital? Should the government subsidies to worker be counted as a part of variable capital? Fortunately the taxes and subsidies are all relative small and only have insignificant effect on the empirical outcomes.

2.2.2 Some Important Empirical Estimations

Most of empirical studies have concentrated on the experiences of advanced capitalist economy and further most of them concerned with the post-war period. We do not attempt to review all those literatures but to cover some representative studies.

(1). *What those studies share*

All of those studies share follow findings and maybe we can call them the styled-facts in Marxian theory about the dynamics of capitalist:

i. All of those studies agree that the dynamics of the capitalist economy is determined by the overall level of the rate of profit. When the rate of profit is relatively high, the growth rate of the capitalist economy is high; when the rate of profit is relatively low, the growth rate of it is also low.
ii. All of those studies agree that the stagnation and depression of capitalist world after 1970s is not as sudden as it looks like, just as what the neoclassical theories alleged that it was the consequence of some sudden shocks, such as the oil supply shock, the mistakes of monetary authority. But it was the consequence of the long-run decline of the overall level of rate of profit. Recently the relative resurgence of advanced capitalist economy is also stimulated by the relative recovery of the rate of profit at the cost of the benefit of working class.
iii. To those studies which tempt to explain the Great Depression, it was also the long-term decline of rate of profit that caused the economic tragedy.

Those findings give Marxian theory strongly empirical supports.

(2). *The divarication under the common consensus*

As we have described above there are several different theories to explain why the profit rate would eventually decline. Each of them received some empirical supports.

i. Lipietz (1986), Dumenil and Levy (1993, 2002) may be the main contributions which emphasized the rising organic composition of capital (the decline of productivity of capital) contribute mainly the post-war falling of rate of profit. And Michl (1988) thought that the decline of profit rate in the period of 1972-1986 mainly caused by the decline of productivity of capital.
ii. James Devine (1983) explained the Great Depression by the declining share of profit which leads the rate of profit to fall. Glyn and Sutcliffe (1972), Weisskopf (1979), Bowles, Gordon , and Weisskopf (1986), Weisskopf , Bowles , and Gordon (1983) and Weisskopf (1992) are the main works which consider the decline of the share of profit in national income is the main cause of the post-war dynamics of advanced capitalist economy. To make their argument more reasonable those scholars constructed a theory that is termed as the theory of social structure of accumulation. And to explain recent resurgence of capitalist world the scholars in this theoretical tradition, such as Kotz (2003) and Wolfson (2003), consider the main cause is the resurgence of

the power of capitalist class which makes the share of profit increasing.

iii. The underconsumptionist theory receives nearly little support by Marxian economists except Paul Sweezy (1982). Dumcnil, Glick, and Rangel (1987) thought that the main cause of the Great Depression (1929-1933) is underconsumption of the society which is caused by the rising share of profit limit the consumption capacity of working class.

iv. By the works of Moseley (1992; 2003), Shaikh and Tonak (1994), and Mohun (2005), the conception of productive/ unproductive labor (activities) resumes the important position in Marxian theory. To them, the main contributor to the decline of rate of profit is the increasing ratio of unproductive labor to productive labor since post-war. And the increasing organic composition of capital is also a important cause in explanation the profit rate's decline (Moseley). Recent rising of rate of profit is mainly caused by the increasing rate of surplus rate, but the trend is also offset by the continuous increase of ratio of unproductive labor to productive labor (Moseley, 1997).

v. As mentioned above almost all empirical studies were focus on the experiences of advanced capitalist economy, especially the experience of post-war U.S. economy. There are several studies concentrated on the developing countries or transitional economy.[18] All of them show that the Marxian theory is a powerful tool to understand the experiences of those economies.

3. Empirical Investigation into Chinese Economy (Manufacturing Industry) in the Framework of Marxian Theory

3.1 The Methodological Problems in Applying Marxian Theory to Analyze Chinese Economy

In applying Marxian theory to analyze the dynamics of Chinese economy, we have to face some methodological problems. The main one is that whether we can use those traditional Marxian categories, such as the rate of surplus, the rate of profit, the value of labor power et al, to analyze a Socialist economy, such as China? Our argument is that after nearly 30 years of economic reform since 1978, China has established a market-oriented economic system in which the law of value of course is valid.[19] Secondly, the development experiences of China since 1978 is special. The transition of Chinese economy is two-folded: on the one hand, China has to fulfill the task of industrialization which is characterized by transform from an economy in which the traditional agricultural sector occupied the dominating component to one in which the modern industrial and informational sectors are the main contributor of the economy; on the other hand, China has to transform from traditional central planning system to modern market-oriented economy. Those characters leads that Chinese economy is characterized a dual one in which some important parts is not profit-oriented production, such as most part of agricultural production, the government production et al. So we focus our analysis on the industrial sectors, especially the formal one. Thirdly, as mentioned above, there are several concepts which have special meanings to Marxian analysis, such as the distinctions between productive labor (activities) and

[18] Marina and Moseley (2000) for Mexico economy; Lianos (1992) and Maniatis (2005) for Greece economy; and Izyumov and Alterman (2005) for Russia economy.

[19] Sun YeFang (1979), Shehui zhuyi jinji de ruogan lilun wenti (Some Problems of the Socialist Economy), renmin press.

unproductive labor (activities), but we have to neglect them due to the lack of appropriate statistical data in the manufacturing sector and at the level of economy as a whole..

3.2 The Analytical Framework and Definitions of Corresponding Variables

According the theoretical review at previous section, the dynamics of the economy is mainly determined by the overall level of rate of profit, and the rate of profit is further determined by some underlying variables: the rate of surplus, the organic composition of capital, the share of profit in the new created value. In this section we give those variables a strict definition.

The rate of profit is defined as the ratio of profit to the total capital:

$$r = \frac{\pi}{K} = \frac{\pi}{p_k \cdot k}$$

in which k is the capital stock in manufacturing industry valued in constant price, p_k is the inverse of the price deflator of capital, K is capital stock valued in current price, π is the total profit valued in current price.

The rate of surplus is defined as the ratio of total profit to total worker compensation

$$s = \frac{\pi}{W} = \frac{\pi}{w \cdot l}$$

in which W is the total worker compensation, w is the average labor income for worker, and l is the total employment in manufacturing industry. And we can decompose the rate of surplus into two factors

$$s = \frac{\pi}{W} = \frac{\pi}{V} \cdot \frac{V}{W} = \frac{\pi}{V} \cdot \frac{1}{w} \cdot \frac{V}{l}$$

in which V is the value-added. And the first term is the share of profit in all new created value; the second is the inverse of average worker compensation; the third is a measure of productivity of labor.

The definition of organic composition of capital is more complex. It may be the most disrupted concept among Marxian categories. On the one hand, it is defined as the ratio of constant capital to variable capital, all in value terms, on the other hand it is quite different from the value composition of capital and its movement is determined by the change of technology of production process. We just simply define the ratio of constant capital to variable capital valued in current price as organic composition of capital, and the ratio of constant capital to variable capital valued in constant price as technical composition of capital

$$\eta = \frac{K}{W} = \frac{p_k \cdot k}{w \cdot l} \quad \text{and} \quad \rho = \frac{k}{l}$$

in which η and ρ are organic and technical composition of capital respectively, the organic composition is not only effected by the technical composition of capital, and also is affected by the relative price between constant capital and labor power.

From those definitions we can get one basic equations that can help us understanding the movement of rate pf profit in the Marxian framework

$$r = \frac{l}{k} \cdot \frac{w}{p_k} \cdot s$$

the first term is the inverse of technical composition of capital, the second is the reverse of relative price between capital and labor, the last is rate of surplus.

3.3 The Trend of Rate of Profit, the Growth Rate of Real GDP and Value-added in Manufacturing Industry

(1). *The trend of rate of profit*

The trend of rate of profit is shown in Figure 1.

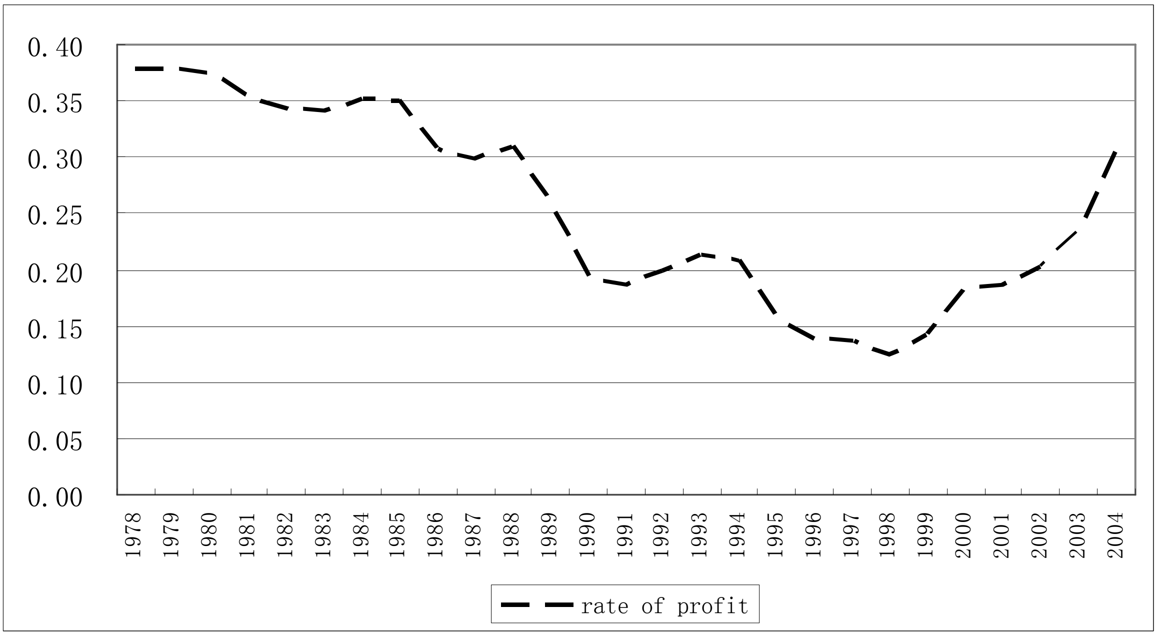

Figure 1 the Trend of Rate of Profit，1978－2004

We can divide the trend of rate of profit into three periods. The first period is from 1978 to 1988. In this period, the rate of profit had a very slight trend to decline. In fact it fluctuated between 38% and 31% in those years. The second period is from 1989 to 1998 in which the rate of profit declined relative sharply. It declined from 26% in 1989 to 13% in 1998. The third period is from 1999 to 2004 in which the rate of profit increased steadily. The rate of profit increased from 19% to 31% which near its peak level in 1978.

(2) *The Trends of Rate of Profit and the Growth Rate of Real GDP*

According to Marxian theory, the dynamics of the economy is mainly determined by the overall level of rate of profit. This argument received many empirical supports from the experiences of advanced capitalist economies, developing capitalist economies and transitional economy. Does it valid in a market-oriented Socialist economy? The trends of rate of profit and the growth rate of real GDP are shown in Figure 2.

Firstly, we can see from Fig.2 that before 1984, in the initial period of reform, the general level of rate of profit had nearly no direct effect on the growth of real GDP. With the deepening of economic reform process, the co-movement between the rate of profit and the growth of real GDP became more and more clear. And the movement of rate of profit keeps ahead of the growth rate of real GDP relatively.

In the period from 1984 to 1990 when the rate of profit declined almost a half, from 35% to 19%, the growth rate of real GDP declined 74%, from 15% in 1984 to 4% in 1990. And in the period from 1993 to 1998 when the rate of profit decreased smoothly

from 21% to 13%, the growth of real GDP declined from 13% to 8% in 1998 and 7% in 1999. When the rate of profit increased slowly in the late of 1990s, the overall growth rate is also recovered steadily.
The louses of rate of profit and growth rate of real GDP show a strong empirical support what we argue for that the Marxian categories can be applied to analyze Chinese economy. And the relationship between them is fairly fit what the theory predicts.

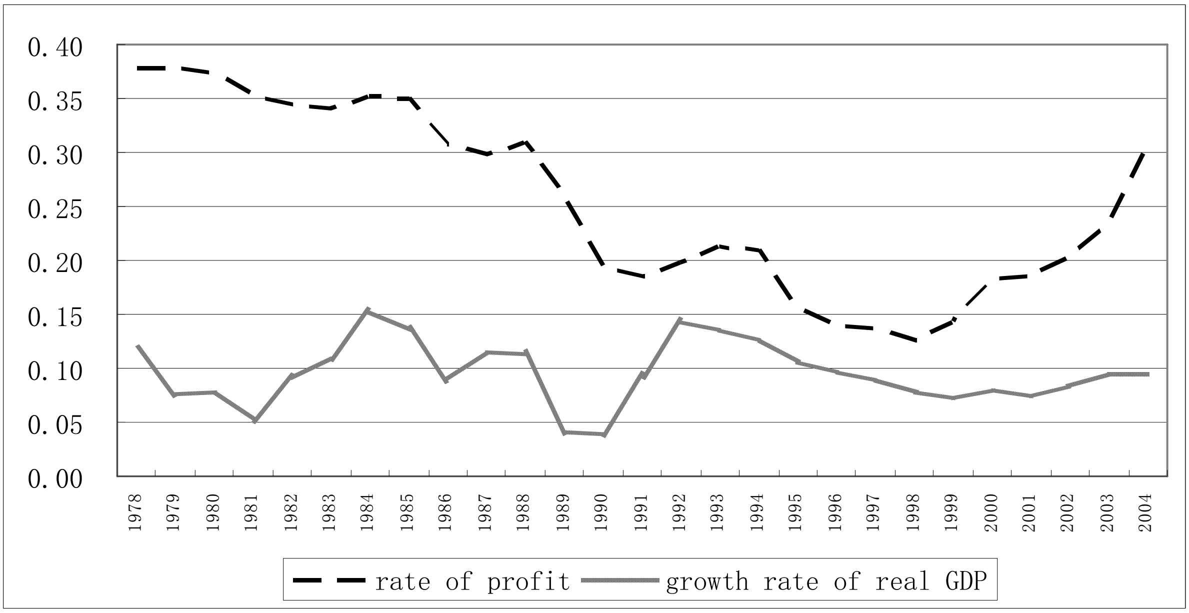

Figure 2 the Trend of Rate of Profit and the Growth Rate of Real GDP

3.4 The Deconstructing the Trend in Rate of Profit

Last section show us the locus of rate of profit and its effect on the fluctuation of the growth rate of real GDP. In this section we will try to explore the underling factors affect the movement of rate of profit in the framework of Marxian theory.

(1). *the technical and organic composition of capital*

Despite Marx himself mentioned many factors which can have effect on the rate of profit, he did emphasize the organic composition of capital plays a central role in the determination of the profitability. As showed in the last equation in section 3.2, the rate of profit will decrease with the increase of organic composition of capital. As shown in Figure 3, the organic composition only has a very slight trend to decline from 1978 to 2004. Especially in the period between 1990 and 2002, the organic composition of capital fluctuated around 3 in a very small range. So the factor of organic composition of capital contributed little to the fluctuation in rate of profit from 1978 and 2004.
The organic composition of capital is determined by to underlying factors, the technical composition of capital and the ratio of relative price between labor and capital, in our definition. And from 1978 to 2004, the level of industrialization of China increased dramatically. This can be clearly found in Figure 3. The locus of technical composition of capital increased steadily in this period, except the last two years. But the effect of increasing technical composition of capital is offset by

increasing ratio of average worker compensation to inverse of deflator of capital. This leads us to focus on the trend of rate of surplus value.

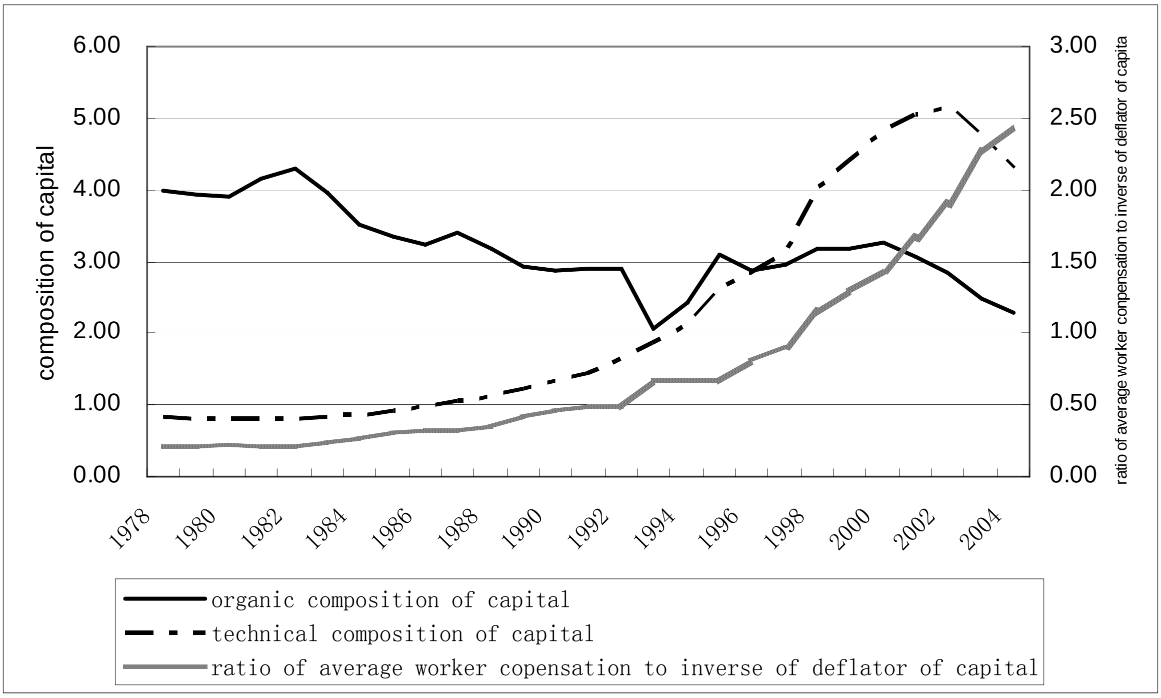

Figure 3 the Trend of Organic and Technical Composition of Capital, and the Relative Price, 1978-2004

(2) *The Rate of Surplus value and its decomposition*

The trend of rate of surplus value is shown in Figure 4.

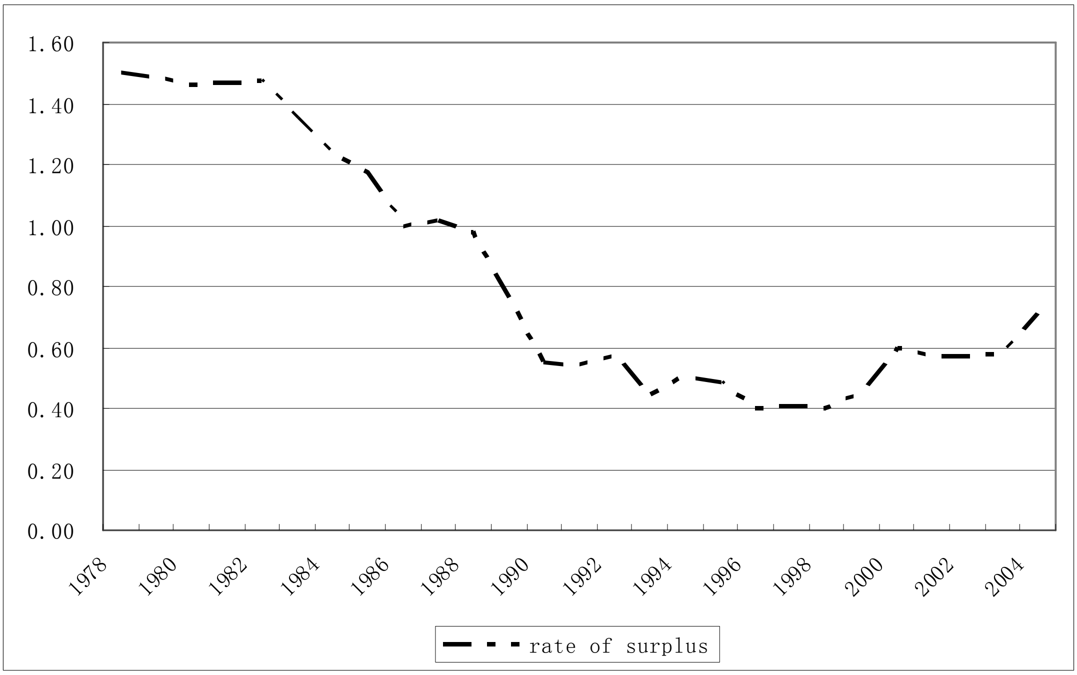

Figure 4 the Rate of Surplus from 1978-2004

It is shown that we can divide the period from 1978 to 2004 into two sub-periods. In the first sub-periods, from 1978 to 1998. At the initial year of the first sub-period, the rate of surplus value is relatively steady, and after that time, it declined quickly from 1.35 in 1983 to 0.4 in 1998. And its decline attributed mainly to the decline in rate of profit in this period. After 1998 the rate of surplus value increased gradually and this cause the rate of profit rising correspondingly.

Since the fluctuations in rate of profit attributed mainly to the up and down of rate of surplus value, how itself was affected by the underlying factors? The analytical framework constructed above shows that the rate of surplus value is determined by three underlying factors: the share of profit in value-added (+), the average worker compensation (-), and the productivity of labor (+). The symbols in blankets refer to the direction of effect of those factors on the rate of surplus. Their trends in this period are shown in Figure 5.

Figure 5 the Share of Profit, the Average Worker Compensation and the Productivity of Labor, 1978-2004

The productivity of labor and average worker compensation both increased steadily, but the divergence between them became more and more great. The change of share of profit can be divided into three parts: from 1978 to 1983, it nearly did not change; and then in the sequential period, it declined from 57% in 1983 to 28% in 1998, nearly decreased 30%; and from 1998 to now, the share of profit increased lowly, from 28% to 41% in 2004, recover nearly a half of previous decline.

Then how do those factors affect the change of rate of surplus value? From 1978 to the middle of 1990s, since the divergence between the productivity of labor and the average worker compensation is neglectable, the change in the rate of surplus value attributed mainly to the decline in the share of profit. And in the sequential period, the rise of surplus value attributed to two factors: firstly, in this period the declining trend of share of profit was inversed and this contributed a great part of the recovery of rate of surplus value, hence the rate of profit; and the divergence between productivity and compensation of labor also contributed a large part of the rise of rate of surplus value, from 1998 to 2004 the productivity increased nearly 187%, however the average worker compensation increased only 134%.

IV. Conclusion

The movement of overall level of rate of profit determine the up and down of a economy. And in the framework of Marxian theory, the movement of profit rate attributes mainly to three classes of factors: the first is the technical factors, such as the technical composition of capital, the productivity of labor; the second is distributional and price factors, such as the share of profit, the average worker compensation; the last is the structural factors, such as the ratio of productive labor to unproductive labor, the demand constraint. Different theory argues for different factor as the most essential one that contributes mainly to the movement of profitability.

In this paper we use the data of Chinese manufacturing industry from 1978 to 2004 to test the movement of rate of profit and its underlying determinants. Our main finds are following:

(1). the rate of profit in manufacturing industry is a fairly good indicator for the growth rate of real GDP. We argue that this rate of profit is a fairly good substitutor for the overall level of rate of profit which can not be estimated accurately for lack of appropriate data in macroeconomic level.

(2). in the period from 1978 to 1998, the rate of profit declined from 38% to 13%. And in the sequential period, it resurged gradually.

(3). the organic composition of capital which had no systematical up or down trend in the period contributed little to the fluctuation of the rate of profit. Despite the technical composition of capital increased sharply, the relative decline of capital price offset its effect.

(4). the decline and sequential resurgence of rate of profit attributed to the change in the rate of surplus value.

(5). the decline of rate of surplus value, hence the rate of profit from 1978 to 1998 attributed mainly to the decline in the share of profit. But its resurgence from 1998 to 2004 affected by two main factors: firstly, the increasing in the share of profit remain played an important role in this process; secondly, in this period the increase of productivity of labor overcame the inverse-direction effect of rising worker compensation on the rate of surplus.

The empirical investigation support the Marxian argument that the performance of capitalist economies depends above all else on the overall level of the rate of profit. But not support other arguments of Marx himself, such as the decline of rate of profit, and the rising organic composition of capital as a main cause of this decline. On the contrary, the organic composition had no systematical trend and the fluctuation in rate of profit attributed mainly to the change in rate of surplus value.

Of course our estimation also has some limitations. Maybe the most serious one is that we limit our estimation in manufacturing industry only. The second is that we do not consider the different between unproductive labor and productive labor which is very important to estimate the Marxian categories. The last one is that we do not estimate the effect of effective demand on the rate of profit. It is affirmative that we include those factors into our analysis and this is also the aim of our further studies.

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Appendix

In this appendix we give the explicit definition of some critical variables. Because of lack of systematical dada for the whole economy and the whole manufacturing industry, we have to use the data of those enterprises with independent accounting system (before 1998, and above formal level after 1999). All data are available from the official website of Bureau of Chinese Statistic.

Constant Capital: we define constant capital as the overall net value of fixed asset.

Variable Capital: we define the variable capital as the overall worker compensation, including all wage bills and other fringe income from work. For lack of appropriate data, we have to estimate this variable by value-added minus the total profit.

Profit: we define it as the sum of sales tax and extra charges, total profits and value added tax payable. In fact we should include the interest payment of the enterprises, but there has no systematical corresponding data available from official data base.

Value Added: it refers to the final results of industrial production of the industrial trade in money term during the reference period.

Profit Rate: we define it as the ratio of Profit to constant capital.