Fixed Capital and Wage-Profit Curves à la von Neumann-Leontief: China’s Economy 1987-2000*†

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Abstract

This article aims at making clear growth and distribution of China’s economy 1987-2000 with fixed capital on the input-output table basis. Since fixed capital data are not sufficiently available, one has to estimate fixed capital coefficients. In the outset, this article outlines the Sraffa-Fujimori method, which simulates the maximum growth path and estimate the marginal fixed capital coefficients on that path. In the second place, the marginal fixed capital coefficients of China’s economy are estimated. In the third place, the wage-profit curves of China’s economy will be drawn, and we discuss some further features obtained by our observations.

1 Introduction

In this article, we aim at investigating growth and distribution of China’s economy on the basis of the input-output tables. The tentative goal is to draw the wage-profit curves of China’s economy, and obtain an overview of the position of the actual situation of growth and distribution of China’s economy. We carry out this investigation focussing on fixed capital. Since the available data on fixed capital are very limitted, it is necessary to start the task from estimating the fixed capital coefficients.

On the basis of the standard system of Sraffa(1960), Fujimori(1992) developed a novel and original method to estimate the marginal fixed capital coefficient by employing the Japan’s gross investment matrix data of fixed capital. The first part of this paper will be spent for an outline of the Sraffa-Fujimori method. That is to say, the method employed

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in this paper reallocate all of consumption items of the final demand to investment items proportionally and calculated the marginal fixed capital coefficient in a state of the zero consumption, so it can be said that it is the calculation with the standard system of Sraffa. In addition, from the angle of computation, to evaluate the state in which zero consumption is observed can be said either to look for the standard system of the original system concerned, or to evaluate just the potential greatest growth rate. We adhere fundamentally to Fujimori(1992), with minor corrections and improvements, though.

Second, we apply this method to input-output tables of China’s economy, and estimate the marginal fixed capital input coefficient for 1987-2000.

Third, we draw the wage-profit curves of China’s economy in a von Neumann-Leontief framework, by applying fixed capital coefficients estimated as above. 1 2

Fourth, we discuss the short- and long-run features of China’s economy of the period by comparing the short- and long-run wage-profit curves, where the short run indicates the case in which fixed capital is ignored.

2 Estimation of Fixed Capital Coefficients

2.1 Basic framework

Okishio-Nakatani (1975) reduced a joint production system à la Marx-Sraffa 3 with aged fixed capital alone as joint-products to a Leontief production system that consisted of only the brand-new goods. Let $A, K, F, L$ stand for input coefficient matrix, fixed capital input coefficient matrix, bundle of wage goods, labor input vector, and let $p$ and $r$ be the production price vector of only brand-new goods, and uniform profit rate, respectively.

\[
\begin{align*}
    p &= pM(r), \\
    M(r) &= (\psi(r) + rl)K + (1 + r)(A + FL).
\end{align*}
\]

1 As for Sraffa’s joint-production system with fixed capital and the Leontief system with brand-new fixed capital, see Fujimori(1982) and Li-Fujimori(2013).

2 The analysis frameworks on linear programming of the von Neumann, Marx, Leontief models are pioneered by Morishima(1964, 1973), Fujimoto(1975), Steedman(1976) and Fujimori(1982, 1992). Especially, on a premise to define the depreciation rate by the pension method, Fujimori(1992) expanded the joint production model of Morishima(1964) and Fujimoto(1975), and made an abridgement of the linear programming model only consisting of brand-new goods by a kind of rational operation. In addition, for the other empirical contributions, refer to e.g. Han and Schefold(2006).

3 In a linear multisector framework with equilibrium production prices and activity levels (or quantities) including fixed capital, it is like Marx in a meaning to analyze the establishment of the uniform profit rate on a premise of the wage payment in advance, and it is like Sraffa in a meaning to analyze them in a joint production system including aged fixed capital. So we can call this framework as the Marx-Sraffa model in a narrow sense. For a specific joint production system, see e.g. Schefold(1989, Part II, B, §12), and for more general joint production systems à la Marx-Sraffa, see Li and Fujimori(2013).
$\hat{\psi}(r)$ is a diagonal matrix with the rate of depreciation $\psi_i(r)$ in the diagonal, where for durability $\tau_i$ of fixed capital $i$,

$$
\psi_i(r) = \left( \sum_{h=0}^{\tau_i-1} (1 + r)^h \right)^{-1}.
$$

Remark that in the above formulation, one should assume physical durability of fixed capital with constant efficiency.\(^4\)

If non-productive consumption is disregarded, a Marx-Sraffa activity level system can be similar to the Leontief output system with extra brand-new fixed capital. The equilibrium output system corresponding to the equilibrium production price system (1) is given by the following:\(^5\)

$$
q = M(g)q,
$$

where $q$ and $g$ are an output vector of only brand-new goods and the uniform growth rate, respectively, with $g = r$.

Obviously, for an $r \geq 0$, $M(r)$ is a non-negative matrix, so it has the Perron-Frobenius eigenvalue $1$, and the left (right) eigenvector corresponding to $1$.

Now, the data of $K$ is not available. Only the data of the gross investment matrix may be available as fixed capital data in the actual input-output tables. Therefore, the next subsection will illustrate how the fixed capital input coefficient matrix $K$ in the above-mentioned theoretical model is estimated from the gross investment data of fixed capital.

### 2.2 Sraffa-Fujimori Method

The intermediate input $X_{ij}$, final demand $Y_i$, and total output $X_i$ of an input-output table fulfill the following relations.

$$
X_i = \sum_{j=1}^{n} X_{ij} + Y_i.
$$

The input coefficient matrix $A = (a_{ij})$ is given by

$$
a_{ij} = \frac{X_{ij}}{X_j}.
$$

\(^4\) We can see the same definition of rate of depreciation in Fujimori (1982, p.39). In fact, Eq. (3) that shows the rate of depreciation is the same as Fujimori (1992, Eq. 5, p.44) and Sraffa (1960, p.65). Namely, the following expression of relation is satisfied.

$$
\psi_i(r) = \left( \sum_{h=0}^{\tau_i-1} (1 + r)^h \right)^{-1} = \frac{r}{(1 + r)^{\tau_i} - 1},
$$

where $\tau_i$ stands for the durability of the type $i$ of fixed capital. Eq.(3) is the definition of depreciation rate of brand-new (zero-age) fixed capital.

\(^5\) For a detailed discussion, which includes fixed capital, see Fujimori(1982), Schefold(1989, Part II), Kurz-Salvadori(1995, Ch.7).
Let $x$, $I$ and $C$ stand for the output-, the investment- and the consumption-vector, respectively, and

$$x = Ax + I + C$$

will be obtained from the input-output table. Investment $I$ is the sum total of inventory investment and the gross investment of fixed capital.

Hereafter, we try to find the growth rate of Sraffa’s standard system obtained by the following simulation, in which $C$ is equally assigned to $I$ in the final-demand item. It is necessary to consider investment of nondurable capital goods and that of fixed capital.

Since inventory investment can be regarded as the accumulation of nondurable goods, it is set to $gAx$, where $g$ denotes the uniform growth rate.

On the other hand, since the gross investment of fixed capital is divided into net investment and depreciation (replacement investment), the amount of net investment is $gKx$ and the depreciated part is set to $\hat{\Psi}(g)Kx$. We try to estimate $K$ from the angle of the marginal ratio.

Let $\Delta K$ denote the net investment matrix, and $\Delta X$, the incremental vector of output. The marginal capital coefficient $k_{ij}^*$ will be defined by:

$$k_{ij}^* = \frac{\Delta K_{ij}}{\Delta X_j}.$$  

Assume that $k_{ij} = k_{ij}^*$. Further, we can consider the incremental output as $\Delta X = gX$.

Since the ratio $\gamma_i$ of the net investment to gross investment can be defined as follows,

$$\gamma_i = 1 - \frac{1}{(1 + g)\gamma_i},$$

we can consider the net investment matrix as $\hat{\gamma}_S$, where $S$ is the gross investment matrix of fixed capital, and $\hat{\gamma}$ is the diagonal matrix with $\gamma_i$ in the diagonal.  

From this, we can set the marginal capital coefficient $k_{ij}^*$ as follows.

$$k_{ij}^* = \frac{\gamma_i S_{ij}}{gX_j}.$$ 

In this computation, $k_{ij}^*$ is dependent on the uniform growth rate $g$.

(5) is rewritten as (9) with $K^*(g) = (k_{ij}^*)$.

$$x = M(g)x,$$

$$M(g) = (\hat{\Psi}(g) + gI)K^*(g) + (1 + g)A.$$  

If $\lambda_{M(g)} = 1$, $g$ at that point gives the maximum growth rate $g^*$.

The computational procedure of $g^*$ is described below.

(1) Take a sufficiently small initial value $g_0 > 0$, and $M(g)$ in (10) is positive.

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It should be noted here that $\gamma_i(g) = \gamma_i(r)$. In an economy that disregards non-productive consumption, the uniform profit rate $r$ and the uniform growth rate $g$ are equal. For details, see Fujimori (1982).
(2) For $g > 0$, we can confirm the following. From $\frac{d}{dg} M(g) > 0$, $M(g)$ is an increasing function of $g$. Besides, from the Perron-Frobenius theorem, $\lambda_{M(g)}$ is an increasing function of elements of $M(g)$. Hence,

$$g_t < g_{t+1} \Leftrightarrow M(g_t) < M(g_{t+1}) \Leftrightarrow \lambda_{M(g_t)} < \lambda_{M(g_{t+1})}.$$ 

Let $g_{max} = \frac{1}{\lambda_{1}} - 1$. From $|g_t| < g_{max}$, $g_t$ is bounded. 

Now, if $\lambda_{M(g)} < 1$, the value of $g$ should be increased; if $\lambda_{M(g)} > 1$, the value of $g$ will be decreased.

A sequence $\{g_0, g_1, g_2, \cdots \}$ is generated by

$$g_{t+1} = \delta(g_t) = g_t + \beta(1 - \lambda_{M(g_t)}),$$

where $\beta > 0$ represents an arbitrary constant.

If $g_t$ is taken near 0, then $g_{t+1}$ will appear above the 45° line. Since the tangent of $\delta(g)$ is given by

$$\frac{d\delta_{t+1}}{dg_t} = 1 - \beta \frac{d}{dg_t} \lambda_{M(g_t)} < 1,$$

$\delta(g_t)$ will cross the 45° line from the top to the bottom.

The relationship between $g_{t+1}$ and $g_t$ can be expressed as in Fig. 1. In view of the above, $g_{t+1} = \delta(g_t)$ has a fixed point $g_{t+1} = g_t = g^*$. $g_{t+1} = g_t = g^*$ is equivalent to $1 - \lambda_{M(g_t)} = 0$. Moreover, this fixed point is stable from (11). This fixed point can be found by the regula falsi method of numerical computation.

(3) For $g^*$, the marginal fixed capital coefficient matrix can be constructed as follows:

$$K^* = \left( k_{ij}^*(g^*) \right)$$

The procedure described in the above may look like the one to compute the maximum growth rate in the golden rule of the von Neumann model. Some may argue that the maximum growth rate of the von Neumann growth model is conceptually different from the maximum profit rate of Sraffa’s standard system. Nonetheless, they are formally equivalent. In the same manner to estimate the maximum growth rate we evaluate the wage-profit curve in the next section, the concept of which comes from Sraffa(1960).

2.3 Notes on data

In this paper, the gross investment matrix of each year of China is aggregated to the matrix of the same size with similar sectors: the 33-sector input-output tables for 1987, 1990, 1992, 1995 and the 40-sector input-output tables for 1997, 2000 are aggregated to the

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7 For details, see Nikaido (1960, Ch.2).
8 For details of the regula falsi method, see e.g. Traub(1964), Ortega-Rheinboldt(2000).
Figure 1: The convergence of the iteration

24-sector input-output tables. The input-output table data employed were published by the National Bureau of Statistics of China (NBSC), and the investment matrix data were estimated by Lü (2007). The durability data of fixed capital were published by Ministry of Finance of China (1992) and State Council of China (2007). The details of the input-output tables and durability of fixed capital are shown in Table 1.

The data of the total working population are from the NBSC publication, China Statistical Yearbook 2003, and the data on the annual working hours per person are from the International Labor Office (ILO) publication, Yearbook of Labour Statistics 2003.

From the input-output tables, the macro marginal capital-output ratio $\kappa$ of each year can be evaluated by

$$\kappa = \frac{\sum_i \sum_j y_i S_{ij}}{g \sum_j X_j}.$$ 

The Chinese economy’s maximum potential growth rates $g^*$ and the macro marginal capital-output ratios $\kappa$ are shown in Table 2.

3 Wage-Profit Curves à la von Neumann-Leontief

3.1 Basic concept

In the normal production process, many factors are employed, such as raw material and fixed capital with various durabilities and ages. Brand-new fixed capital and aged fixed capital are considered as distinctly different items. Moreover, plural types of commodities are jointly produced by processes. In a von Neumann system, the equilibrium price
Table 1: Codes and durabilities of 24 sectors

<table>
<thead>
<tr>
<th>Code</th>
<th>Sectors</th>
<th>Durabilities (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agriculture</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>Mining</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Foods and tabacco</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Textiles</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pulp and papers</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Electricity, steam and hot water</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Petroleum and coal</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Coal gas and coal product</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Chemicals</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Nonmetallic mineral products</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Metals smelting and prossing</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Metal products</td>
<td>12</td>
</tr>
<tr>
<td>13</td>
<td>General machinery</td>
<td>17</td>
</tr>
<tr>
<td>14</td>
<td>Transportation machinery</td>
<td>9</td>
</tr>
<tr>
<td>15</td>
<td>Electric machinery</td>
<td>17</td>
</tr>
<tr>
<td>16</td>
<td>Precise machinery</td>
<td>15</td>
</tr>
<tr>
<td>17</td>
<td>Other manufactured products</td>
<td>12</td>
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<tr>
<td>18</td>
<td>Construction</td>
<td>40</td>
</tr>
<tr>
<td>19</td>
<td>Transportation</td>
<td>13</td>
</tr>
<tr>
<td>20</td>
<td>Commercial</td>
<td>10</td>
</tr>
<tr>
<td>21</td>
<td>Services</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Finance, insurance and real estate</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Education, health and scientific research</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Public administration</td>
<td></td>
</tr>
</tbody>
</table>

Note: Blanks in the durability column indicate that goods concerned are non-durable.

Table 2: Basic macro parameters (1987-2000)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>maximum potential growth rate $g^*$ (%)</td>
<td>40.3</td>
<td>35.5</td>
<td>31.9</td>
<td>30.3</td>
<td>30.5</td>
<td>26.6</td>
</tr>
<tr>
<td>macro marginal capital-output ratio $\kappa$</td>
<td>0.873</td>
<td>1.003</td>
<td>1.420</td>
<td>1.587</td>
<td>1.397</td>
<td>2.195</td>
</tr>
</tbody>
</table>
problem of such an economy can be described as follows:  

\[ \text{max} \left\{ pF \left| \frac{1}{1+r} pB \leq pA + L, \ p \geq \Phi \right. \right\}, \]

where \( A, B, F, L, r, \) and \( p \) represent tentatively a rectangular input matrix, a rectangular output matrix, a bundle of wage goods, a labor input vector, the uniform profit rate, and the production price vector, respectively. This is a linear programming problem in which the wage rate \( w = pF \) is maximized.  

Let \( x \) stand for the activity level; the dual problem of (13) is expressed as follows; assuming a uniform growth rate \( g = r \):

\[ \text{min} \left\{ Lx \left| \frac{1}{1+r} Bx \geq Ax + F, \ x \geq 0 \right. \right\}. \]

This dual problem minimizes the labor input in the economy.

If the above general joint-production system is looked at as a joint production system, in which aged fixed capital alone is jointly produced, then by applying the same procedure of reduction applied by Sraffa-Okishio-Nakatani, we can obtain systems of inequailitities similar to (1)-(4), which will be called the \textit{von Neumann-Leontief} system.  

In short, in a von Neumann-Leontief-type economy, the standard maximum problem (13) is expressed as follows.

\[ \text{max} \left\{ pF \left| \frac{1}{1+r} pB \leq pA + L + p \left( \frac{r}{1+r} I + \frac{1}{1+r} \hat{\psi}(r) \right) K, \ p \geq \Phi_m \right. \right\}, \]

where notations are the ones introduced in Section 2.

The relationship between profits and real wages can be expressed as that between the profit rate and the number of units of the bundle of wage goods. Hence, the wage-profit curves should be expressed as a curve composed of points \((\frac{1}{pF}, r)\).

Similarly, the dual problem of linear programming problem (15) is expressed as follows, assuming \( g = r, i.e. \) with the capitalist non-consumption premise:

\[ \text{min} \left\{ Lq \left| \frac{1}{1+r} q \geq Aq + F + \left( \frac{r}{1+r} I + \frac{1}{1+r} \hat{\psi}(r) \right) Kq, \ q \geq \Phi_n \right. \right\}. \]

where \( q \) represents the output vector.

A linear programming problem of this kind should be considered from both short- and long-run perspectives. While the replacement and the net investment of fixed capital are

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9 See von Neumann(1945/46[1937]) for details of original von Neumann Model.
10 See Fujimoto (1975).
11 Refer to Fujimori(1992) for the detailed procedure of the abridgement. Fujimori(1992)’s method is re-
related to Sraffa in two ways: in the way to deal with fixed capital, and in other way in the similarity
between estimating the marginal fixed capital coefficient and drawing the wage-profit curves. Fuji-
 mori(1992) was strongly conscious of Sraffa’s system. Incidentally, Pasinetti(1977, Ch.VI) and espe-
cially Schefold(1980) mentioned the conceptual differene of von Neumann model, linear programming
and Sraffa system, and indeed the concept of the wage-profit curve is closer to Sraffa than to von Neu-
mann.
generally carried out in the long run, these can be ignored in the short-run. Therefore, the short-run version of the linear programming problem (15) can be expressed as follows.

\[
\text{(17) } \max \left\{ pF \left| \frac{1}{1+r} p \leq pA + L, \ p \geq \Xi \right. \right\}.
\]

When , the dual problem in the short run will be expressed as follows:

\[
\text{(18) } \min \left\{ Lq \left| \frac{1}{1+r} q \geq Aq + F, \ q \geq 0 \right. \right\}.
\]

This corresponds to the uniform growth equilibrium with \( g = r \).

### 3.2 Computation procedure with respect to input-output data

1. Calculate the bundle of wage goods \( F \) and the labor input vector \( L \).

   The product of the annual total working population \( N_0 \) and annual working hours \( h \) per person gives the total working hours in a year; that is,

   \[
   H = N_0 h.
   \]

   The bundle of wage goods per person is the consumption divided by the total working population. In other words, this is equal to \( \frac{C_i}{N_0} \). As for wage goods per unit of labor, one may write

   \[
   f_i = \frac{C_i}{H}.
   \]

   The bundle of wage goods is then given by \( F = (f_i) \).

   Further, the total added value \( V_0 \) is expressed by

   \[
   V_0 = \sum_{j=1}^{n} W_j + \sum_{j=1}^{n} V_j + \sum_{j=1}^{n} T_j,
   \]

   where \( W_j, V_j \) and \( T_j \) stand for wages, profits and taxes of an input-output table respectively. The working hours per unit of value is evaluated by \( \frac{H}{V_0} \), and the working hours in sector \( j \) is given by \( (W_j + V_j + T_j) \frac{H}{V_0} \). Hence, the labor input necessary for producing one unit of goods becomes

   \[
   l_j = \frac{H(W_j + V_j + T_j)}{V_0 X_j}.
   \]

   The labor input vector is represented by \( L = (l_j) \).
(2) Find the optimum solution for the long-run linear programming problem, and draw the wage-profit curve.

For each $r$ in the range $0 \leq r \leq g^*$, solve the long-run standard maximum problem (15), and find the optimum solution $p^*$.

The long-run wage-profit curve can be represented by a curve composed of points $(\frac{1}{p^*F}, r)$.

(3) Find the optimum solution for the short-run linear programming problem, and draw the wage-profit curve.

Repeat the same procedure of the long run as in the above with respect to (17).

Similarly, the short-run wage-profit curve is given by a curve composed of points $(\frac{1}{p^*F}, r)$.

(4) Estimate the coordinates of the position of the actual Chinese economy.

(i) Since the National Bureau of Statistics of China (NBSC) publishes $GDP$, total wage amount $\Theta^*$, and the total amount of capital formation $S^*$, the amount of total profit can be evaluated by

$$\Pi^* = GDP - \Theta^*,$$

and the accumulation rate is computed by

$$\alpha^* = \frac{S^*}{\Pi^*}.$$

(ii) For the economy containing fixed capital, the profit rate is estimated as

$$r^* = \frac{g^*}{\alpha^*}$$

from $\alpha^*$ evaluated in (i), and the growth rate $g^*$ published by NBSC.

(iii) From $r^*$, the optimal solutions for the above-mentioned LP problem (15) and (17) can be calculated, and points $(\frac{1}{p^*F}, r^*)$ and $(\frac{1}{p^*F}, r^*)$ on the wage-profit curve can be identified.

(iv) From consumption $C_i^*$ (with government consumption included), the wage goods per unit of labor is computed as

$$f_i^* = \frac{C_i^*}{H},$$

where $F^* = (f_i^*)$. The coordinates of the actual economy are estimated as $(\frac{1}{p^*F}, r^*)$. 

10
Table 3: The long-run wage-profit relationships (1987-2000)

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>1.790</td>
<td>1.849</td>
<td>1.935</td>
<td>1.904</td>
<td>1.958</td>
<td>1.889</td>
</tr>
<tr>
<td>0.02</td>
<td>1.701</td>
<td>1.752</td>
<td>1.815</td>
<td>1.781</td>
<td>1.836</td>
<td>1.754</td>
</tr>
<tr>
<td>0.04</td>
<td>1.613</td>
<td>1.656</td>
<td>1.695</td>
<td>1.658</td>
<td>1.715</td>
<td>1.619</td>
</tr>
<tr>
<td>0.06</td>
<td>1.526</td>
<td>1.561</td>
<td>1.577</td>
<td>1.535</td>
<td>1.593</td>
<td>1.482</td>
</tr>
<tr>
<td>0.08</td>
<td>1.441</td>
<td>1.466</td>
<td>1.459</td>
<td>1.413</td>
<td>1.472</td>
<td>1.345</td>
</tr>
<tr>
<td>0.10</td>
<td>1.356</td>
<td>1.372</td>
<td>1.341</td>
<td>1.291</td>
<td>1.351</td>
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</tr>
<tr>
<td>0.12</td>
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<td>1.169</td>
<td>1.230</td>
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<tr>
<td>0.14</td>
<td>1.188</td>
<td>1.184</td>
<td>1.107</td>
<td>1.047</td>
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</tr>
<tr>
<td>0.16</td>
<td>1.105</td>
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<td>0.925</td>
<td>0.985</td>
<td>0.788</td>
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<td>0.18</td>
<td>1.022</td>
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3.3 Computation results

The coordinates data of long- and short-run wage-profit curves à la von Neumann-Leontief are shown in Table 3 and Table 4, respectively. The wage-profit curves from 1987 to 2000 based on the above-mentioned tables are drawn as in Figures 2-7.

The short-run curve is shown for comparison.

Remark that, for computational reasons, some of the maximum profit rate cannot be numerically computed.

The estimated profit rate and real wage rate of the Chinese economy are shown in Table 5.

The coordinates of the estimated position of the actual Chinese economy are indicated with “⊕” in the figures of the wage-profit curves.

4 Concluding Remarks

In this article, we estimated China’s marginal fixed capital coefficient by means of the Sraffa-Fujimori method and computed the economy’s wage-profit curves in a von Neumann-Leontief system.
Table 4: The short-run wage-profit relationships (1987-2000)

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$g_{max}$: 0.820 0.668 0.602 0.582 0.583 0.539

Table 5: The profit rate and real wage rate in Chinese economy (1987–2000)

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<td>1.116</td>
<td>0.160</td>
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12
Figure 2: The wage-profit curve à la von Neumann-Leontief (1987)

Figure 3: The wage-profit curve à la von Neumann-Leontief (1990)
Figure 4: The wage-profit curve à la von Neumann-Leontief (1992)

Figure 5: The wage-profit curve à la von Neumann-Leontief (1995)
Figure 6: The wage-profit curve à la von Neumann-Leontief (1997)

Figure 7: The wage-profit curve à la von Neumann-Leontief (2000)
The following points concerning the Chinese economy are clearly seen from the 1980s through the 2000s from our computation of theoretical parameters.

(1) The short-run maximum profit rate and the long-run maximum potential growth rate tends to decrease over the period.

(2) The maximum real wage rate increased over the period, both short- and long-run, although slight fluctuations are observed.

(3) As the rate of profit increases, the long-run wage-profit curves tend to sink faster than the case of short run in each year.

(4) The marginal capital-output ratio has increased.

In this article, various theoretical restrictions, such as physical durabilities of fixed capital with constant efficiency etc., exist. However, estimating theoretical values by using actual data, and further making simulations revealed significance of fixed capital data for better understanding of the performance of the actual economy.

In view of Government’s policy to raise wages during period concerned, it is expected that the real wages have been increasing monotonically. However, Table 5 shows only the rising tendency. This should be investigated further in near future.

References


