
Dimitris Paitaridis*

ABSTRACT: The purpose of this paper is to bring evidence on the behavior of Japanese economy for the period 1973-2006 and shed some light on the causes that triggered the 90’s recession. Our analysis is based on the estimation of crucial Marxian categories, expressed in value and market price terms, by using the distinction between productive and unproductive labor. We discuss methodological issues involved in the empirical estimations whilst we attempt to derive general conclusions about the trends of Marxian variables, whether are expressed in value or market price terms.

JEL Classification: B5, E1, O40

Keywords: Marxian categories, Values, Market Prices, Unproductive Labor, Japanese Economy

* Department of Economics, University of Macedonia, 156 Egnatia Street, PO Box 1592 540 06 Thessaloniki, Greece, office: 30 2310 891-781, email: paitard@uom.gr
1. Introduction

This paper attempts to map the National Account of the Japanese economy to respective Marxian categories. Such efforts, concerning the US economy, had started in Shaikh’s pioneering work already in the 1970s (e.g., Shaikh, 1978) and culminated in his (joint with Tonak) book (1994).¹ We consider that deriving Marxian categories is essential to understand the evolution and dynamics of Japanese economy from the burst of global crisis at 1973, till recent 2006.

Another issue that we are dealt with is the relation between value and money rate of surplus value. More specifically, we examine if the money rate of surplus value is a good approximation on the value one and how significant are the price - value deviations. At the past, to our concern, such efforts had been accomplished by Wolff (1987) and Khanjian (1988) for the US economy and Kalmans (1997) for the US and Japanese economy. Due to availability of more data we are able to examine the relation of those two different rates of surplus value at sequent time.

The remainder of the paper is organized as follows: Section 2 presents the Marxian theory of productive labor. Section 3 presents the methodology of converting National Accounts into Marxian. Section 4 presents our empirical estimates of Marxian Categories in price terms. Section 5 presents a comparative analysis between money and value rate of surplus value. Finally section 6 summaries and concludes.

2. The Distinction between Productive and Unproductive Labor

The scope of the paper is not any extensive theoretical elaboration of the distinction between productive and unproductive labor but to shed some light on macroeconomic performance of the Japanese economy under Marxian perspective. Nevertheless, we are confined to the basic aspects of the Marxian theory in order to set the theoretical framework that is used to convert National Accounts into Marxian ones. A more detailed analysis of the notion could be found on other studies, for example Gough (1972) and Savran and Tonak (1999). On the other hand, criticism on the particular discrimination could be found on Duménil and Lévy (2004) and Cockshott and Zachariah (2006). Finally, it is interesting the debate about the importance of the distinction, between Mohun (2002) from the one side and Houston (1997) and Laibman (1999), from the other.

¹ The earlier systematic efforts were by Gillman (1958) and Mage (1962).
Karl Marx presented at the Results of immediate Process of Production (1867) but mainly on the Theories of Surplus Value (1969), a detailed, rigorous and positive analysis on the definition of productive labor. Marx has set two necessary properties to define a kind of labor activity as productive. The first property premises that productive labor is waged labor or in other words capitalistically employed labor. The second property is that labor has to create or transform use values. So, according to those two properties, for Marx productive is the labor, which is activated in the sphere of production, where capital hires labor and non-labor inputs in order to produce more value than the value of inputs. The increase in value is attributed to the labor input which has the capacity to create more value than that required for its own reproduction. As for the non labor inputs, they are transferred either wholly in the final product, as in the case of raw materials, or bit-by-bit through depreciation, as in the case of fixed capital. In economic activity, productive labor is usually traced in agriculture, forestry, fishing, mining, manufacturing, construction, transportation, communication and utilities, personal services and social services.

By contrast, in the sphere of distribution, there is no creation of new (use) values, but those that have been already created in the sphere of production change possession or ownership. Similarly, the labor and non-labor inputs employed in the sphere of social maintenance are engaged in the preservation of the existing status quo. In sum, unproductive is the labor which, rather than expanding production and wealth of society, is simply consuming wealth that has been already produced in order to distribute or protect (maintain) the wealth created in the sphere of production. Unproductive labor is usually located in trade, real estate and rental, finance, insurance, public administration, security services, household services and business services such as advertisement, accounting and legal services. Whilst, almost, the whole number of labor in the sphere of distribution and maintenance of social order is unproductive, this is not the case with the sphere of distribution.

2 Even though Marx’s definition on productive labor has been based on classical economists, especially Smith, he criticized them for their failure to establish the definition on the grounds of capitalistic relations of production. Marx, notes: «Only the narrow-minded bourgeois, who regards the capitalist form of production as its absolute form, hence as the sole natural form of production, can confuse the question of what are productive labor and productive workers from the standpoint of capital with the question of what productive labor is in general, and can therefore be satisfied with the tautological answer that all that labor is productive which produces, which results in a product, or any kind of use value, which has any result at all» (1867, p. 1039).

3 Sometimes, there is a misleading perception that productive labor is the one that incorporates itself exclusively on material use values. This confusion is arisen by the fact that production and consumption of services is realized at the same time and cannot be resold like goods. According to Marx, this is not the case: «...A singer who sells her song for her own account is an unproductive labourer. But the same singer commissioned by an entrepreneur to sing in order to make money for him is a productive labourer; for she produces capital». (1969, p. 401)
production. A percentage of labor that is employed in productive sectors is involved with administrative tasks such as managers and directors, clericals, salesmen, accountants etc. These employees are part of total unproductive employment.

From the empirical perspective, Shaikh and Tonak (1994) have taken the painstaking task of showing the consistency of classical and especially Marx’s theory of what is and what is not productive labor, and of operationalizing these concepts by mapping the orthodox national income and product accounts (NIPA) into classical Marxian accounts. In short, the mapping is not just for the devising of another accounting system, among the many that appeared in the long and turbulent history of these accounts (see Studenski, 1958, *inter alia*), but rather for the demonstration that this alternative accounting system reveals a characteristically different overall picture of the determinants of the alternate stages of growth and stagnation. This research has inspired many other studies in a number of countries, for example Mohun (2001) for Australia; Yu and Feng (2007) for China; Tsouﬁdis (1989) and Maniatis (2008) for Greece; Marina and Moseley (2000) for Mexico; Seongjin (2007) for S. Korea; Cokshott, *et al.* (1995) for the UK, Cronin (2001) for New Zealand and Paitaridis and Tsouﬁdis (2010) for the US. The general guidelines to convert National Accounts to Marxian, are presented at the following section.

3. Deriving Marxian Categories from National Accounts

The Marxian notion of productive and unproductive labor is fundamentally different than the orthodox one. This difference is depicted on the System of National Accounts (SNA) so a rearrangement of the Japanese National Accounts expressing the Marxian theory is compulsory in order to estimate variables such as Marxian Value Added (MVA), Money Rate of Surplus Value (RSV) and General Rate of Profit (R). A complete mapping of the classification of Japanese industries into productive and unproductive is cited in Appendix B.

The transformation of National Accounts into Marxian is a complicated hypothesis and suitable data are required to do so. As already told, Shaikh & Tonak (1994) have elaborated a functional framework and it is the one that we use for our estimations. At first we have to estimate the Marxian Value Added from which a part incorporates the conventional value added ($VA_p$) of total productive industries, net of depreciation. Furthermore, production of goods and services realizes its value only when sold. So, between the producer and the

---

4 According to mainstream economic theory and accounting system, all labor regardless of the sphere of social reproduction that is activated; to the extent that is being paid is treated as “productive”.

5 For the source of data that we use for our estimations, see appendix A.
buyer, trade activity is intermediated in order to circulate the goods and services. In the Japan Industrial Productivity Database 2006 (JIP 2006) that is being used for our analysis, trade activity encompasses Wholesale & Retail Trade, Real Estate and Rental of office equipment and goods\(^6\). In a Marxian point of view the materials, wages and profits that are used for the circulating process are funded by the surplus value that have been created at the productive sector. Consequently the Gross Output of the Trade Sector (GO\(_{t}\)) is a part of the Marxian value added. Other transfers that the productive industries do are towards the royalty sector. These transfers receive the form of ground rent\(^7\), patents, net interest, finance charges and legal fees in order to secure access to land, technical process, money and finally law assistance. According to JIP 2006 the royalty sector encompasses Finance, Insurance, Advertising, Other Services for Businesses, Social insurance and social welfare (non-profit) and Activities not elsewhere classified. The derivation of royalties (RY\(_p\)) is accomplished by summing the inputs of productive sector from the royalties sectors\(^8\).

Concluding the Marxian value added can be expressed as the sum of (1) net value added of the productive sector (2) gross output of the trade sector (3) transfers from productive sector to the royalty sector:

\[
\text{MVA} = \text{VA}_p + \text{GO}_t + \text{RY}_p
\]  

(1)

As we will see, derivation of Marxian Value Added\(^9\) is the basis for the estimation of Marxian categories.

---

\(^6\) The difference between Wholesale & Retail Trade and Real Estate and Rental of office equipment and goods as well is that in the first case we have lump sum sale of production whereas on the second case we have piecemeal sale. Whilst the treatment of Wholesale & Retail Trade is quite straightforward this is not the case with Real Estate and Rental of office equipment and goods. A great part of it consists of “Owner Occupied Housing” which a part is real and another part is completely fictitious. The real part is the intermediate inputs which are not used at the circulation process but rather for personal consumption. The fictitious part is imputed rent and is comprised at the value added of Real Estate Industry. Both measures are extracted from the Gross Output of Real Estate Industry. For further details see Shaikh & Tonak (1994, p. 51 and pp. 253 - 254).

\(^7\) The ground rent is part of the Real Estate and Rental sector. Thought it should be treated as a royalty and not as a trade activity, lack of relative data compelled us to include it with the trade sector. This biases upwards the gross output of the trade sector (GO\(_t\)) without significantly affecting our estimations.

\(^8\) The derivation of transfers from the productive sectors to the royalties sector is possible only through the use of input - output tables.

\(^9\) To avoid double counting, we have excluded from Marxian value added, public administration (including, hospitals, education, social insurance etc.) since these expenditures are mainly funded by taxation on wages, incomes and profits which are already part of value added. In a similar fashion we have excluded imputed rents because it is a completely fictitious measure. As we will see on section 5, this is not the case with intermediate inputs used by the owners of houses.
4. Empirical Estimates of Marxian Macroeconomic Categories in Prices

Marx and the classical economists predicted that the unproductive activities in the economy would grow over time. Either believed that the tremendous expansion of unproductive activities would undermine accumulation process and economic growth. Smith for instance was very concerned about the possible expansion of unproductive activities and labor. In similar fashion, Marx notes:

The extraordinary productiveness of modern industry [...] allows of the unproductive employment of a larger and larger part of the working class, and consequent reproduction, on a constantly extending scale, of the ancient domestic slaves, under the name of a servant class, including men servants, lackeys, etc. [...] (Marx, Capital, v.I, p.487)

The growth of unproductive activities and labor is of course not without consequences. We expect that past a point the expansion of unproductive activities is not sustainable for it interferes with the normal process of capital accumulation and leads the economy to even more severe crises. The growth of unproductive activities is induced by the intensification of competition which forces capital to spend increasingly more resources in sales promotion, administration and supervision in the effort to ascertain order within the corporation and maintain and, if possible, expand its market share at the expense of competitors. Furthermore, social cohesion requires increasingly more resources to be devoted in the provision by the government of social security benefits for the unemployed. Finally, international competition for sources of raw materials as well as for markets exerts a permanent pressure on governments to increase their military expenditures.

The rise in unproductive activities has also attracted the attention of some neoclassical economists. For instance, Baumol’s (1967) idea of the increasing share of services in the GDP in the US and other advanced economies is rather an indirect and certainly non-provoking way to raise the issue of productive-unproductive labor and activities in modern service economies, where the process of deindustrialization started already in the 1960s. Services, it has been argued, are of low productivity and so their expansion drags down the economy’s average productivity. In similar fashion, Bacon and Eltis (1976) in the UK have introduced the idea of marketed versus non-marketed activities, which are characterized by a higher growth rate and are associated with the services provided by governments. In the same vain one may see the status of the famous Wagner law that predicts the inevitable long run growth of the public sector.
This trend in capitalist economy that Marx described holds for the Japanese economy as well, though the increase in unproductive activities is not as strong as that of the US economy\textsuperscript{10}. Figure 1 below reveals this trend for the Japanese economy over the period 1973 - 2006 where the ratio of unproductive employment to total employment (L_u/L) increases by 0.96 per cent per year. Correspondingly we observe a rising trend\textsuperscript{11} on the share of unproductive activities\textsuperscript{12} to total Marxian value added (UA/MVA), especially from the mid 1980’s to the mid 1990’s. The average annual rate of growth for the whole period is 0.54 per cent.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{UA_MVA}
\caption{The share of unproductive employment and unproductive activities}
\end{figure}

In the next figure we display\textsuperscript{13} the total surplus value (S) produced which is derived by subtracting from MVA the variable capital (V), that is, the wages of the productive workers. At the same figure we display its crucial component, that is, the operating surplus (OS)\textsuperscript{14}, which is, the share of surplus value that can be spent productively and enhance the growth potential of the economy. Except for operating surplus, surplus value contains net indirect

\begin{itemize}
\item \textsuperscript{10} See Moseley (1997), Mohun (2005, 2006) and Paitaridis and Tsoulfidis (2010). For a comparative analysis between the US and Japanese economy concerning the expansion of unproductive activities, see Kalmans (1997)
\item \textsuperscript{11} Due to lack of relative data we assumed a uniform wage per industry between productive and unproductive workers though this might not be the case. Usually managerial and supervisee work is paid higher than other specialties. So the ratio of unproductive activities to Marxian value added is lightly biased downwards.
\item \textsuperscript{12} The unproductive activities contain the gross output of trade sector, the royalties paid by the productive sectors to the royalty sector and the wages of unproductive labor employed in the productive sector.
\item \textsuperscript{13} For the purposes of our analysis, surplus value and operating surplus are deflated.
\item \textsuperscript{14} A more accurate measure that determines net profits is operating surplus after corporate taxes. Due to lack of relative data we use operating surplus, instead.
\end{itemize}
taxes, materials and depreciation of unproductive sectors in the economy and non-productive wages. As the figure 2 depicts, unproductive growth is persistently grows up till early 1990s when the deviation between surplus value and operating surplus is stabilized.

**Figure 2.** Surplus Value and Operating Surplus (billions of 2000 yen)

The expansion of unproductive activities is a burden for accumulation process since a growing part of social product could have been invested in the sphere of production promoting that way economic growth. On the other hand the expansion of unproductive activities depends on a high rate of productivity, enough so as to compensate, more than fully, for the rise of unproductive activities. Productivity in Marxian terms \((y_m)\) is quite different from the orthodox ones. Particularly for the estimation of “Marxian productivity” we use the ratio of Marxian Value added\(^\text{15}\) to productive employment. On the contrary productivity on neoclassical terms is measured as the ratio of GDP to total employment. Figure 3 portrays the evolution of Marxian productivity in real terms which is nominal Marxian value added, deflated by the GDP deflator (in 2000 prices) to productive employment. Marxian productivity rises up for the whole period by 2.20 per cent per year, despite the retard that is observed from early 90s (see table 1).

---

\(^{15}\)For the derivation of Marxian value added, see section 3.
In figure 3, at the same time with the increase on real productivity we observe a similar trend on real productive wage which is an increase by 1.31 per cent. Those two variables are the basic contents that affect money rate of surplus value (RSV) or in other words the rate of exploitation of productive workers, which is derived by dividing surplus value with variable capital. Real productivity and real wage affect surplus value in an opposite manner. The first one has positive relation with surplus value whilst the second one has negative. These countertendencies are reflected on the following relation:

\[
RSV = \frac{MVA-V}{V} = \frac{(MVA/P_{GDP})/I_{pp}}{(V/P_{CPI})/I_{pp}} \frac{P_{GDP}}{P_{CPI}} - 1 = \frac{y_p}{w_p} \frac{P_{GDP}}{P_{CPI}} - 1 \quad (2)
\]

Figure 4, displays the evolution of rate of surplus value which shows up an increasing trend for the whole period by 0.67 per cent per year. In the beginning of 1990s decade we observe a slowdown on the increasing trend. During the period 1991 - 2006 real productivity presents a higher retard than real wage resulting finally to a retard on the increase of surplus value (see table 1).
Karl Marx considered that capitalism as a system is characterised by an endogenous tendency for mechanization and automatization of production process. This tendency is originated by entrepreneurs’ efforts to increase productivity and thus reducing unit cost of production taking advantage in that way on competition process. In Marxian analysis this tendency is measured by value composition of capital (VCC) which is captured by the ratio of constant capital stock (C) to variable capital (V). The next figure 5 portrays the evolution of VCC which is constantly rising by 1.72 per cent per year.

The value composition of capital shows the degree of mechanization and the state of technology in an economy, while the rate of surplus value shows the distribution of income and also allows us to account for the allocation of surplus value produced in different
spheres of social reproduction, and, therefore, it gives an estimate of the size of the unproductive activities and the limits of their expansion. Furthermore, the value composition of capital in combination with the rate of surplus value determines the general rate of profit (R), defined as the ratio of total surplus value to total capital advanced. As we can observe from relation 3, value composition of capital is negatively related with the R whilst surplus value is related in a positive way:

\[ R = \frac{S}{C} = \frac{S/V}{C/V} \]  

Figure 6 below, displays an unambiguous falling general rate of profit. Though the rate of surplus value increases for the whole period, value composition of capital grows at a higher pace resulting to a falling general rate of profit. Furthermore, the fact that the rate of growth of real wage is lower than real productivity do not support the wage-induced profits squeeze theory of crisis (see table 1). Summing up the principal force that drives the general rate of profit to decline is the increase on value composition of capital.

Figure 6. The Evolution of General (R) and Net (r) Rate of Profit

At the same figure we observe that the net rate of profit presents a falling trend by 1.25 per cent per year though during 1973 - 1991 rises by 0.67 per cent. This is attributed to the fact that operating surplus increases on a higher pace than unproductive activities (see table 1).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1973 - 1991</td>
<td>1.17</td>
<td>0.55</td>
<td>3.68</td>
<td>4.71</td>
<td>3.57</td>
<td>3.06</td>
<td>1.83</td>
<td>1.20</td>
<td>1.68</td>
<td>-0.47</td>
<td>0.67</td>
</tr>
<tr>
<td>1991 - 2006</td>
<td>0.71</td>
<td>0.53</td>
<td>0.93</td>
<td>-1.42</td>
<td>0.41</td>
<td>1.16</td>
<td>0.70</td>
<td>0.04</td>
<td>1.76</td>
<td>-1.72</td>
<td>-3.56</td>
</tr>
<tr>
<td>1973 - 2006</td>
<td>0.96</td>
<td>0.54</td>
<td>2.43</td>
<td>1.93</td>
<td>2.14</td>
<td>2.2</td>
<td>1.31</td>
<td>0.67</td>
<td>1.72</td>
<td>-1.04</td>
<td>-1.25</td>
</tr>
</tbody>
</table>

Table 1. Average Annual Growth Rates (per cent)
5. Calculation of the Rate of Surplus Value in Value Terms: A Comparative Analysis

Though the rate of surplus value expressed in value terms (RSV*) is closer to Marx’s labor theory of value the majority of empirical works estimate surplus value in price terms (RSV). Estimation of the rate of surplus value in value terms demands a great bulk of data, including input - output tables, which are published periodically by National Statistical Services (usually every five years). So, deriving such estimations at sequence time is quite difficult. This is not the case with our estimations that span the whole period 1973 - 2006, contributing that way to a more complete view regarding the relation between money and value rate of surplus value.

At figure 4, we presented the evolution of the rate of surplus value in money form. Therefore, it is interesting to find out how significant are the price - value deviations between those two measures and how accurately money rate of surplus reflects the movement of the value rate of surplus value. To our concern there is no extensive empirical research on this field. We individualize works of Wolff (1987) and Khanjian (1988) for the US economy and Kalmans (1997) for the US and Japanese economy. We use the approach of Khanjian and Kalmans to derive our estimates.

Marxian Value Added in labor terms (MVA*) is equal to total productive employment on productive sector of the economy \( L_{pp} \). Therefore:

\[
MVA^* = L_{pp} \quad \text{(4)}
\]

the variable capital \( (V^*) \) is estimated as:

\[
V^* = \lambda B \text{ con}_p = \lambda \text{ con}_{pp} \quad \text{(5)}
\]

where \( \lambda \) is a row vector of labor value/producer price ratios and \( \text{con}_{pp} \) is a column vector of the bundle of production outputs consumed by productive workers.

---

16 For data sources, see appendix A.
17 For a criticism on Wolff’s method see Khanlian (chapter 5, 1988) and Shaikh and Tonak (pp. 198 - 201, 1994)
Labor values for each individual sector of input-output table is derived by the solution of the following system\(^{19}\):

\[
\lambda = \alpha + \lambda A
\]  

and the solution is:

\[
\lambda = \alpha (I-A)^{-1}
\]  

where A is a \(n \times n\) technological coefficient matrix and its element \(a_{ij}\) represent the amount of commodity i needed to produce one unit of output j. I is the identity matrix. Finally \(\alpha\) is a row vector of labor coefficient\(^{20}\) that is the ratio of productive labor employed at the productive sector j to the output of that sector.

After the estimation of labor values we are able to proceed with the estimation of variable capital based on relation 5. First we should separate the bundle of total production outputs (\(\text{comp}\)) to those that are consumed by productive workers (\(\text{con}_{pp}\)) from those that are consumed by the unproductive (\(\text{con}_{pu}\)). To derive the separation we multiply \(\text{con}_{pp}\) by \(B\) which is the ratio of variable capital in money prices (V) to total consumption (con) with the assumption that employee’s compensation is directed mainly to consumption.

For the estimation of total consumption and, consequently B, we use “Household Consumption” column from the final demand of the input-output tables. Few adjustments are necessary to obtain the final amount of total consumption. The first adjustment is

---

\(^{19}\) Labor value of a good has two distinct components. The first is present (or living) labor and that means labor that is directly used during the production process. The second is past (or dead) labor which is labor that is transferred indirectly to the labor value of the good through the means of production, which comprise intermediate inputs and the part of fixed capital that is worn out, receiving the form of depreciation. So for the estimation of labor values a depreciation matrix is required, inter alia. Due to lack of relative data, initially we chose the second best solution which is to endogenize depreciation row into the matrix of technological coefficients (A), following Wolff (1986). The results were even worse since we observed a higher deviation between market prices and direct prices whilst this is not the case as has been proved by Chilcote (pp. 163 - 166, 1997). Finally, we did not use any depreciation data underestimating that way labor values.

\(^{20}\) The vector of labor coefficient should be adjusted for skill differentials. But as Kalmans (1997) notes using relative wage coefficients as a proxy for skills is problematic for countries like Japan since workers in agricultural activities, where the lowest wages are traced, are underpaid relative to their skills and many husbandmen are doing supplementary jobs. Furthermore, we believe that idem consumption is high on agricultural industry and should be a part of the wage in order to use it as a skill proxy. We noticed from our data that nominal compensation on the following industries: “Rice and wheat production”, “Miscellaneous crop farming and Livestock” and “Sericulture Farming”, present a decline whilst the fishing industry remains fairly constant for the period 1973 - 2006. This is an outcome that comes in contrast with the rest of the industries. So we decided to not adjust the vector of labor coefficient for skill differentials though the estimated values do not express exactly abstract labor.
related with owner-occupied housing. The associated column of the input-output table consists of two components, a real one and a fictitious. The real component are the intermediate inputs which are nothing else than the expenditures that homeowners do for the maintenance of their houses. These expenditures are not investment but consumption so we shift the column to the Household Consumption column. The fictitious component is value added which is subtracted from the cell that corresponds to the intersection of housing industry with the household consumption expenditures' column.

The second adjustment is related with new residential construction. As Khanjian (1988, p.162) notes, new residential construction should not considered as investment because it does not increase the productive capital stock. Correspondingly, new residential construction should be treated rather as consumption filling the cell that corresponds to the intersection of construction with the household consumption expenditures' column.

Taking into consideration above analysis we can proceed with the estimation of surplus value ($S^*$) expressed in value terms. From relations 4 and 5, we derive:

$$S^* = L_{pp} - V^*$$  \hspace{1cm} (8)

and finally rate of surplus value in value terms:

$$RSV^* = \frac{S^*}{V^*}$$  \hspace{1cm} (9)

Figure 7, portrays the evolution of value and money rate of surplus value. We observe that both variables share the same trend except for the years 1977, 1989, 1998 and
marginally for the years 2000 and 2005. Furthermore, the deviation between those two variables is practically minimal\(^\text{21}\). It is peculiar the fact that for the year 1973, and the period 1975 - 1985, money rate of surplus value is higher than the value rate. Our results come in contrast with those of Khanjian (1988) and Kalmans (1997) that derive higher value rate of surplus value than money rate. Khanjian and Shaikh and Tonak (1994) attribute the deviation to the fact that input - output tables are constructed in producer prices which mean that intermediate inputs and consequently output of each sector does not contain trade - margins. So when we estimate value rate of surplus value we exclude trade margins which are nothing else than the gross output of wholesale and retail trade industries. But as we can ascertain from relation 1 this is not the case with money rate of surplus value. Money surplus value is a mix of consumer, investment, net export, and government purchases. On the other hand, variable capital consists exclusively by consumer expenditures. Since consumer goods pass through both wholesale and retail channels, have higher overall trade margins than those goods purchased for investment or government. Consequently, money rate of surplus value is biased downwards related to the value rate.

Summing up both rates of surplus value share the same trend and the deviations between them are not rather significant. The fact that for some years, money rate of surplus value is higher than the value rate comes in contrast with other empirical works and a further research is required.

6. Summary and Conclusions

In this paper we stress the importance of the distinction between productive and unproductive labor to describe the evolution of Japanese economy from the onset of economic crisis in 1973, till recent years. We believe that this distinction is not just an issue of consistency with Marxian theory but is tightly related with growth potential of economies.

At the beginning of economic crisis in 1973, Japanese economy was one of the most powerful economies in the world, enjoying during 1951 - 1973, an average annual growth rate of 9.2 per cent\(^22\). The onset of economic crisis could not leave Japanese economy unaffected especially due to increase on real wages and the price of primary products from abroad. Despite the shock, Japanese economy recovered instantly and productivity kept

\(^{21}\) For the whole period, the mean absolute deviation of RSV from RSV* is 6.47 per cent whilst standard deviation is 7.17 per cent. The minimum deviation is observed for 1985 and it is about 0.15 per cent whereas maximum deviation is observed for 1985 and it is about 16.44 per cent

\(^{22}\) Itoh (p.1, 2000)
rising vigorously till the early 1990s. This is attributed mainly to the substitution of inefficient and high-energy consuming old lines and plants by introducing microelectronic automation systems. Another reason is the gradual dismantle of labor market and weakening of trade unions. As we can observe from figure 3 and table 1, for the whole period, the growth rate of real wages was lower than productivity’s, especially for 1973-1991.

From the above analysis, an increase of surplus value is prospective, whether it is measured in money or value terms. At the same time an increase of unproductive activities is expected and indeed this is the case as we can see on figure 2 and table 1 (measured in 2005, constant prices. On the other hand, in contrast with the US economy, when the expansion of unproductive activities is measured as a ratio of Marxian Value Added we observe stability for the whole period. This should be attributed to the fact that at the decades of 1970s and 1980s, Japanese economy remained a manufacturing oriented economy using at the same time more advanced and labor-saving economy. For instance in 1975-1980, labor productivity in Japanese manufacturing increased annually at a rate of 9.2 per cent which is higher even than that in 1960-1965. We believe that high productivity in combination with the reduce of discount rate from 5 percent at the end of 1985 to 2.5 percent in February 1987, expansion of consumer credit and a better mobilization of money due to new technologies promoted domestic demand and investment resulting to a great increase on real operating surplus by 4.71 per cent. So, Japanese economy was well armored to confront the crash on Tokyo Stock Exchange when the Nikkei average dropped by 14.9 per cent. Despite worries for depression, the Nikkei average reached its historic high of 38.195 yen at the end of 1989.

From early 1990s the structure of Japanese economy is dramatically changing. The burst of the bubble mainly due to bad loans in combination with rapid appreciation of yen against dollar forced many manufacturers to transfer their factories to other countries, especially Asian. From 1993 is observed a decrease on the absolute number of workers in manufacturing whilst employment on less competitive Japanese tertiary (including unproductive industries) sector, kept rising. This change resulted to a strong decrease on the growth of real productivity from annual average of 3.06 per cent, for the period 1973-1991 to an annual average of 1.16 for 1991-2006 (see table 1). The outcome of this decrease was

---

23 As Itoh (p.17, 2000) refers, in 1986, 60 per cent of all robots in the world were used in Japan. For the year 1988, the number of robots deployed in Japan was about 175.000 and that means more than five times that of the USA, and nearly ten times that of Germany.

24 See Itoh (p.11, 2000)

---
the rate of surplus value to be swamped whereas the robust increase of real operating surplus to be followed by a decline of 1.42 per cent. At the same time intensification of global competition especially after rapid appreciation of yen against dollar at the middle of 1990s compelled the Japanese capitalists to increase mechanization and automatization of production process. This resulted to a constant increase of value composition of capital and combined with the swamp of the rate of surplus value, general rate of profit declines after a long period of stability. The turn of millennium till recent 2006 reveals a dismal picture of Japanese economy having entered into a prolonged period of depression.
Appendix A: Data Sources

i) Input - Output Tables: The empirical estimations of the Marxian macroeconomic categories are carried out by using 108x108, input - output tables. From the 108 sectors we have excluded: Education (public), Research (public), Medical (public), Hygiene (public), Social insurance and social welfare (public), Public administration and Housing in order to avoid double counting and imputed measures (see reference 8). The yearly input - output tables are derived from Japan Industrial Productivity Database 2009 (JIP 2009) which is published by Research Institute of Economy, Trade & Industry (RIETI).

ii) Total and Productive Employment: We use data on Number of Workers by Sector which include self employed. Data on employment are provided by Research Institute of Economy, Trade & Industry (RIETI). To separate productive employment from unproductive we used data on share of workers by occupation. Productive workers are considered those that are occupied as “Professional and Technical Workers”, “Service Workers”, “Production Process Workers and Laborers”, and last “Others” (farmers, fishermen, etc.). Data on occupation are published by RIETI but only for the period 1980 - 2005. For the year 2006 we derived our estimations by extrapolating with data from 2005. For the years 1973 - 1979 we used occupation data from International Labor Organization (ILO). The data that ILO publish are only for the years 1970, 1975, 1978 and 1979 and are classified to one digit level according to International System of Industry Classification - 2 (ISIC - 2). To complete the between gaps we tried linear interpolations. Then we matched ILO occupation data with RIETI data on employment for the years 1973 - 1980 and finally we differentiated backwards the results from 1980, when we use more suitable data, to 1973.

iii) Total Wages and Variable Capital: We use data on Nominal Costs by Sector which are published by Research Institute of Economy, Trade & Industry. The specific data are already adjusted for wage equivalent of self - employed. Unfortunately no data that distinct individual wage of productive worker from the wage of unproductive worker, within the same industry, were available. So, we assume a uniform wage for productive and unproductive employee per industry.

iv) Data on New Residential Construction: These data are derived from “Estimate of Construction Investments” which is included on the “Current Survey on Construction Statistics”. That survey is published by Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT).
### Appendix B: Industry Classification into Productive and Unproductive

#### a) Table 1: Productive Industries

<table>
<thead>
<tr>
<th>No.</th>
<th>Industry Description</th>
<th>No.</th>
<th>Industry Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rice, wheat production</td>
<td>35</td>
<td>Household electric appliances</td>
</tr>
<tr>
<td>2</td>
<td>Miscellaneous crop farming</td>
<td>36</td>
<td>Electronic data processing machines, digital and analog computer equipment and accessories</td>
</tr>
<tr>
<td>3</td>
<td>Livestock and sericulture farming</td>
<td>37</td>
<td>Communication equipment</td>
</tr>
<tr>
<td>4</td>
<td>Agricultural services</td>
<td>38</td>
<td>Electronic equipment and electric measuring instruments</td>
</tr>
<tr>
<td>5</td>
<td>Forestry</td>
<td>39</td>
<td>Semiconductor devices and integrated circuits</td>
</tr>
<tr>
<td>6</td>
<td>Fisheries</td>
<td>40</td>
<td>Electronic parts</td>
</tr>
<tr>
<td>7</td>
<td>Mining</td>
<td>41</td>
<td>Miscellaneous electrical machinery equipment</td>
</tr>
<tr>
<td>8</td>
<td>Livestock products</td>
<td>42</td>
<td>Motor vehicles</td>
</tr>
<tr>
<td>9</td>
<td>Seafood products</td>
<td>43</td>
<td>Motor vehicle parts and accessories</td>
</tr>
<tr>
<td>10</td>
<td>Flour and grain mill products</td>
<td>44</td>
<td>Other transportation equipment</td>
</tr>
<tr>
<td>11</td>
<td>Miscellaneous foods and related products</td>
<td>45</td>
<td>Precision machinery &amp; equipment</td>
</tr>
<tr>
<td>12</td>
<td>Prepared animal foods and organic fertilizers</td>
<td>46</td>
<td>Plastic products</td>
</tr>
<tr>
<td>13</td>
<td>Beverages</td>
<td>47</td>
<td>Miscellaneous manufacturing industries</td>
</tr>
<tr>
<td>14</td>
<td>Tobacco</td>
<td>48</td>
<td>Construction</td>
</tr>
<tr>
<td>15</td>
<td>Textile products</td>
<td>49</td>
<td>Civil engineering</td>
</tr>
<tr>
<td>16</td>
<td>Lumber and wood products</td>
<td>50</td>
<td>Electricity</td>
</tr>
<tr>
<td>17</td>
<td>Furniture and fixtures</td>
<td>51</td>
<td>Gas, heat supply</td>
</tr>
<tr>
<td>18</td>
<td>Pulp, paper, and coated and glazed paper</td>
<td>52</td>
<td>Waterworks</td>
</tr>
<tr>
<td>19</td>
<td>Paper products</td>
<td>53</td>
<td>Water supply for industrial use</td>
</tr>
<tr>
<td>20</td>
<td>Printing, plate making for printing and bookbinding</td>
<td>54</td>
<td>Waste disposal</td>
</tr>
<tr>
<td>21</td>
<td>Leather and leather products</td>
<td>55</td>
<td>Railway</td>
</tr>
<tr>
<td>22</td>
<td>Rubber products</td>
<td>56</td>
<td>Road transportation</td>
</tr>
<tr>
<td>23</td>
<td>Chemical fertilizers</td>
<td>57</td>
<td>Water transportation</td>
</tr>
<tr>
<td>24</td>
<td>Basic inorganic chemicals</td>
<td>58</td>
<td>Air transportation</td>
</tr>
<tr>
<td>25</td>
<td>Basic organic chemicals</td>
<td>59</td>
<td>Other transportation and packing</td>
</tr>
<tr>
<td>26</td>
<td>Organic chemicals</td>
<td>60</td>
<td>Telegraph and telephone</td>
</tr>
<tr>
<td>27</td>
<td>Chemical fibers</td>
<td>61</td>
<td>Mail</td>
</tr>
<tr>
<td>28</td>
<td>Miscellaneous chemical products</td>
<td>62</td>
<td>Education (private and non-profit)</td>
</tr>
<tr>
<td>29</td>
<td>Pharmaceutical products</td>
<td>63</td>
<td>Research (private)</td>
</tr>
<tr>
<td>30</td>
<td>Petroleum products</td>
<td>64</td>
<td>Medical (private)</td>
</tr>
<tr>
<td>31</td>
<td>Coal products</td>
<td>65</td>
<td>Hygiene (private and non-profit)</td>
</tr>
<tr>
<td>32</td>
<td>Glass and its products</td>
<td>66</td>
<td>Other public services</td>
</tr>
<tr>
<td>33</td>
<td>Cement and its products</td>
<td>67</td>
<td>Automobile maintenance services</td>
</tr>
<tr>
<td>34</td>
<td>Pottery</td>
<td>68</td>
<td>Entertainment</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------------------------------------</td>
<td>------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>69</td>
<td>Miscellaneous ceramic, stone and clay products</td>
<td>81</td>
<td>Broadcasting</td>
</tr>
<tr>
<td>70</td>
<td>Pig iron and crude steel</td>
<td>82</td>
<td>Information services and internet-based services</td>
</tr>
<tr>
<td>71</td>
<td>Miscellaneous iron and steel</td>
<td>83</td>
<td>Publishing</td>
</tr>
<tr>
<td>72</td>
<td>Smelting and refining of non-ferrous metals</td>
<td>84</td>
<td>Video picture, sound information, character information production and distribution</td>
</tr>
<tr>
<td>73</td>
<td>Non-ferrous metal products</td>
<td>85</td>
<td>Eating and drinking places</td>
</tr>
<tr>
<td>74</td>
<td>Fabricated constructional and architectural metal products</td>
<td>86</td>
<td>Accommodation</td>
</tr>
<tr>
<td>75</td>
<td>Miscellaneous fabricated metal products</td>
<td>87</td>
<td>Laundry, beauty and bath services</td>
</tr>
<tr>
<td>76</td>
<td>General industry machinery</td>
<td>88</td>
<td>Other services for individuals</td>
</tr>
<tr>
<td>77</td>
<td>Special industry machinery</td>
<td>89</td>
<td>Medical (non-profit)</td>
</tr>
<tr>
<td>78</td>
<td>Miscellaneous machinery</td>
<td>90</td>
<td>Research (non-profit)</td>
</tr>
<tr>
<td>79</td>
<td>Office and service industry machines</td>
<td>91</td>
<td>Other (non-profit)</td>
</tr>
<tr>
<td>80</td>
<td>Electrical generating, transmission, distribution and industrial apparatus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**b) Unproductive Activities**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wholesale Trade</td>
<td>6</td>
<td>Advertising</td>
</tr>
<tr>
<td>2</td>
<td>Retail Trade</td>
<td>7</td>
<td>Rental of office equipment and goods</td>
</tr>
<tr>
<td>3</td>
<td>Finance</td>
<td>8</td>
<td>Other services for businesses</td>
</tr>
<tr>
<td>4</td>
<td>Insurance</td>
<td>9</td>
<td>Social insurance and social welfare (non-profit)</td>
</tr>
<tr>
<td>5</td>
<td>Real estate</td>
<td>10</td>
<td>Activities not elsewhere classified</td>
</tr>
</tbody>
</table>
References


