

THE RATE OF SURPLUS VALUE, THE COMPOSITION OF CAPITAL, THE RATE OF TURNOVER OF CAPITAL, AND THE RATE OF PROFIT IN THE BRAZILIAN MANUFACTURING INDUSTRY: 1949-1985

Adalmir A. Marquetti*

The end of the so called Golden Age in the 1970s drove a series of empirical researches within the Marxian tradition. However, they were done mainly for the developed countries; studies for developing countries are in reduced number. For the Brazilian economy Rosinger (1988) is the only attempt to calculate the rate of surplus value, the organic composition of capital and the profit rate. Yet, the years considered (1970 and 1975) are insufficient to identify any trend behavior in the variables.

This paper investigates the evolution of the Brazilian manufacturing industry in the period 1949-1985 from a Marxian perspective. Initially, it purports to estimate the rate of profit and its basic components, the rate of surplus value, the composition of capital, and the rate of turnover of capital, in the Brazilian manufacturing industry for the years 1949 and 1959 as well as for the period 1970-1985. Furthermore, the markup is calculated. These variables are computed according to Foley (1986) chapters 3 and 6.

Secondly, the Brazilian manufacturing growth is described with reference to the behavior of the categories above referred. The goal is to determine the source of variation in the rate of profit by decomposing such modifications into changes in the rate of surplus value, composition of capital, whose addition gives us the variation in the markup, and the rate of turnover of capital. Behind of such goal is the conception "that the profit rate is crucial to the functioning of ... capitalist economies" (Duménil, Lévy, 1993, p. xi).

This decomposition allows to investigate the conception that the Brazilian crisis in the 1970s was caused by demand problems. This interpretation provided by structuralist economists explains the Brazilian's crisis at that moment due to the disproportionality of growth among the industrial departments and the agricultural sector (Serra, 1982) and "problems of dynamic realization" in the durable consumer good sector (Tavares and Belluzo, 1982, p. 130). This interpretation is confronted with the more traditional Marxian explanation of crisis based on the tendency of the profit rate to fall due to the elevation of the organic composition of capital.

This paper is organized in three sections. In section 1 a very concise description of the manufacturing production is provided. The objectives are to familiarize the reader with the evolution of the Brazilian economy in the period of study and to establish a periodization of the Brazilian manufacturing growth. In section 2 the methodology employed to calculate and the results for each Marxian category are presented. In the last section a link between the evolution of the Brazilian manufacturing and the rate of profit is presented through a long run and a peak-to-peak decomposition. The presentation of the data source and the discussion of the empirical consistence of the estimates are relegated to the Appendix.

* Department of Economics, Graduate Faculty, New School for Social Research, 65 Fifth Avenue, New York, NY, 10003, USA (170226@newschool.edu)

Assistent Professor, Pontifícia Universidade Católica do Rio Grande do Sul, PUC-RS, Faculdade de Ciências Políticas e Econômicas, FCPE, Av. Ipiranga 6681, Porto Alegre, RS, Brazil

The Brazilian Manufacturing Growth: 1949-1985

The Brazilian economy in the 1949-1985 period expanded with a high growth rate trough of a process of import-substitution industrialization (ISI). The Gross Domestic Product (GDP) rose in real terms at an annual compound rate of 6.5 percent. This growth was led by the manufacturing sector whose gross value added expanded at 7.8 percent per year. The manufacturing sector was the major determinant of both the long-run and cyclical evolution of the GDP.

The long-run growth path was characterized by two distinct periods: the golden age of ISI between 1949 and 1973, and the crisis and end of ISI between 1973 and 1985.¹

During the golden age of ISI the real per capita income was tripled, and the labor productivity in the manufacturing industry multiplied by four. As share of value added agriculture fell from 24.1 to 12.6 percent, industry increased from 25.4 to 41.9, and manufacturing from 19.3 to 33 percent.

GDP expanded at constant market price at an annual compound rate of 7.5 percent, and the manufacturing gross value added at 9.9 percent. External trade decreased as share of GDP from 23.4 to 15.3 percent.

The manufacturing cyclical behavior was characterized by three moments. The 1950s were marked by a rapid industrialization with expansion of the consumer durable and capital goods, specially during the "Plano de Metas" (Target Program, 1956-1960). The 1960s were years of stagnation, but with political and institutional changes.² These had their economic apex in the 1968-1973 years. The so-called Economic Miracle, as this period is known, was marked by an impressive annual compound growth rate of 14 percent in the manufacturing sector.

Yet, after 1973 with the international capitalist crisis and the internal limits of the ISI there was a deterioration in the growth performance of the manufacturing industry. Between 1973 and 1985 the manufacturing gross value added expanded at 3.7 per year, real GDP grew at 4.9 percent per year, and labor productivity remained basically constant. In terms of share in the value added there were no significant changes in the participation of agriculture and industry. External trade increased as share of GDP from 15.3 to 22.6 percent.

In cyclical terms the crisis and the end of ISI were also characterized by three moments. First, between 1973 and 1980 when the intermediate goods experienced a process of import substitution with the "II Plano Nacional de Desenvolvimento" (II National Plan of Development, 1974-1978). This was the answer of the military dictatorship to the first oil crisis. Despite the crisis, the Brazilian manufacturing sector grew at 6.8 percent per year.

Second, between 1980 and 1983 the manufacturing gross value added declined at annual compound rate of 5.6 percent. The beginning of the 1980's marked the end of the ISI. In this moment the Brazilian industrial structure was similar to the advanced capitalist countries. However, with external problems due to the second oil shock, and the increase in the international interest rate as well as internal economic problems the manufacturing sector had its worst recession in the period 1949-1985 at this moment. On the other hand, over 1983-1985 stimulated by the growth of exports the manufacturing sector expanded at 7.2 percent per year. This performance was due to the low level of capacity utilization in the manufacturing sector in 1983.

¹ This paper makes the distinction between long-term or structural crises and business cycle movements existent in the Marxian literature (see for example Lipietz (1985), and Foley (1986)).

² In fact the recession in the 1960s embrace the years from 1962 to 1967. However, due to a compatibility problem in the data all the 1960s were considered as a recessionary period.

Table 1 summarizes the above paragraphs. It is a periodization of the Brazilian manufacturing evolution between 1949 and 1985.

Table 1: Manufacturing Rates of Growth (%), 1949-1985

Period	Annual Average Compound Growth Rates
1949-1973	9.9
1949-1959	11.7
1959-1970	7.3
1970-1973	14.1
1973-1985	3.7
1973-1980	6.8
1980-1983	-5.6
1983-1985	7.2

Source: IBGE (1990) and IBGE (1994)

Estimate of the Brazilian Manufacturing Profitability, 1949-1985

The rate of profit is defined as ratio of the total surplus value to the total capital invested. According to Foley (1986, p. 92) is possible to write the profit rate (r) in terms of the rate of surplus value (e), the composition of capital (k), and the rate of turnover of capital (n).³ He uses the following expression:

$$r = s/K = ekn \quad (1)$$

or, respectively,

$$r = (s/v)[v/(v+c)][(v+c)/K] \quad (2)$$

where, s is surplus value, v the variable capital, c the constant capital, and K the total capital tied up in the production.

Furthermore, the rate of profit can be expressed in terms of the markup on cost (q) and the rate of turnover of capital. Foley (1986, p. 45) states the markup as an identity between the rate of surplus value and the composition of capital:

$$q = s/(c+v) = (s/v)[v/(c+v)] = ek \quad (3)$$

Therefore, the rate of profit is also expressed by

$$r = qn \quad (4)$$

The results for the rate of surplus value, composition of capital, markup on cost, rate of turnover of capital, and profit rate are presented in Table 2.

³ For the definition of the rate of surplus, the composition of capital, and the rate of turnover of capital see Foley (1986, chapters 3 and 6). The composition of capital is a proxy for the organic composition of capital. The former can be converted into the latter by the expression $c/v = (1-k)/k$. Thus, they are negatively correlated. The Marxist theories of crisis are related to the categories above referred. Falling rate of profit theories of crises are associated with the reduction in the markup. This reduction is caused either by a profit squeeze due to the reduction in the rate of surplus value or the fall in the composition of capital. This reduction correspond to an increase in the organic composition of capital. On the other hand, crises in the demand side – disproportionality and underconsumption – are associated with the decline in the rate of turnover of capital (Foley (1986), Weisskopf (1979)).

Table 2: Brazilian Manufacturing Profitability, 1949-1985

year	e	k	q	n	r
1949	2.407	0.155	0.374	n.a.	n.a.
1959	3.713	0.149	0.554	0.617	0.342
1970	3.028	0.143	0.434	0.649	0.281
1971	3.184	0.162	0.517	0.616	0.318
1972	3.637	0.158	0.575	0.602	0.346
1973	4.046	0.135	0.547	0.646	0.353
1974	4.593	0.108	0.498	0.669	0.333
1975	4.456	0.108	0.481	0.663	0.319
1976	4.171	0.117	0.488	0.651	0.318
1977	3.904	0.119	0.467	0.640	0.299
1978	3.732	0.124	0.464	0.638	0.297
1979	3.703	0.127	0.471	0.633	0.298
1980	3.895	0.117	0.457	0.651	0.298
1981	3.917	0.119	0.465	0.618	0.288
1982	3.896	0.120	0.468	0.620	0.290
1983	4.531	0.110	0.499	0.604	0.301
1984	4.867	0.092	0.448	0.641	0.287
1985	4.430	0.104	0.459	0.658	0.302

Note: There is no estimate of capital stock for the Brazilian manufacturing industry in 1949.

Source: See Appendix

Marx argued that there is a tendency for the rate of surplus value to increase while the composition of capital, mark-up, and profits present a tendency to decrease (see Foley, 1986). Despite having discussed largely the effect of the rate of turnover of capital in the rate of profit, Marx did not present an analysis about the long run evolution of the rate of turnover of capital. As can be observed in the Table above, the evolution of the rate of surplus value, composition of capital, and mark-up in the Brazilian manufacturing industry in the period 1949-1985 correspond to Marx's view about the long run behavior of these variables.

Brazilian Manufacturing Profitability Decomposition: 1949-1985

In this section the evolution of the Brazilian manufacturing industry is related to the rate of profit. The deconstruction analysis has been done according to long run periods and peak-to-peak business cycle.

In growth rate terms equations (1) and (4) are expressed, respectively, as:

$$\dot{r} = \dot{e} + \dot{k} + \dot{n} \quad (5)$$

and

$$\dot{r} = \dot{q} + \dot{n} \quad (6)$$

where, $\dot{q} = \dot{e} + \dot{k}$ (7).⁴

⁴ The growth rate of each variable x was calculated according to the following expression:

$$\dot{x}_t = (\ln x_t - \ln x_{t-1})/1.$$

In other words, the variations in the profit rate can be seen as the sum of the changes in the rate of surplus value, in the composition of capital, and in the rate of turnover of capital. In the same way, the markup growth can be determined as the change in rate of surplus value plus the variation in composition of capital. Table 3 presents the decomposition of the Brazilian manufacturing profitability.

Table 3: Manufacturing Profitability Decomposition, 1949-1985

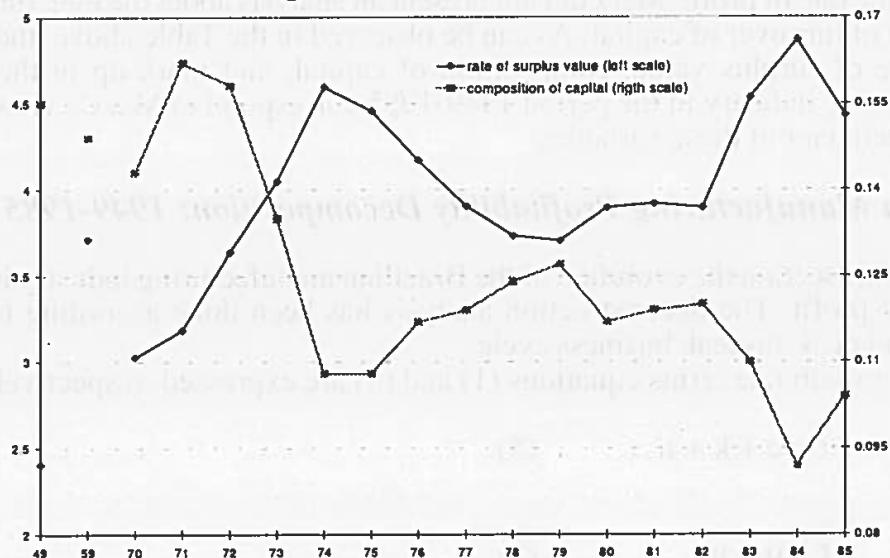
period	e	k	q	n	r
1949-1985	1.70	-1.12	0.57	0.25 ^a	-0.48 ^a
1949-1973	2.17	-0.58	1.59	0.33 ^b	0.23 ^b
1949-1959	4.34	-0.39	3.94	n.a.	n.a.
1959-1970	-1.85	-0.38	-2.23	0.46	-1.77
1970-1973	9.66	-1.92	7.74	-0.16	7.58
1973-1985	0.76	-2.21	-1.46	0.16	-1.30
1973-1980	-0.54	-2.01	-2.56	0.10	-2.45
1980-1983	5.04	-2.14	2.90	-2.46	0.43
1983-1985	-1.12	-3.03	-4.15	4.27	0.12

a – For the period 1959-1985. b – For the period 1959-1973.

Note: All figures are in annual average rate of growth.

Source: Table 2

The markup during the golden age of ISI had an annual rate growth of 1.59 percent. The mark-up increase was determined by the evolution of the rate of surplus value.⁵ This latter showed a strong positive trend and a pro-cyclical behavior, rising at 2.17 percent per year in the period. The composition of capital despite having a negative growth, falling annually 0.58 percent between 1949 and 1973, was roughly stable over 1949-1972 as can be seen in Figure 1.



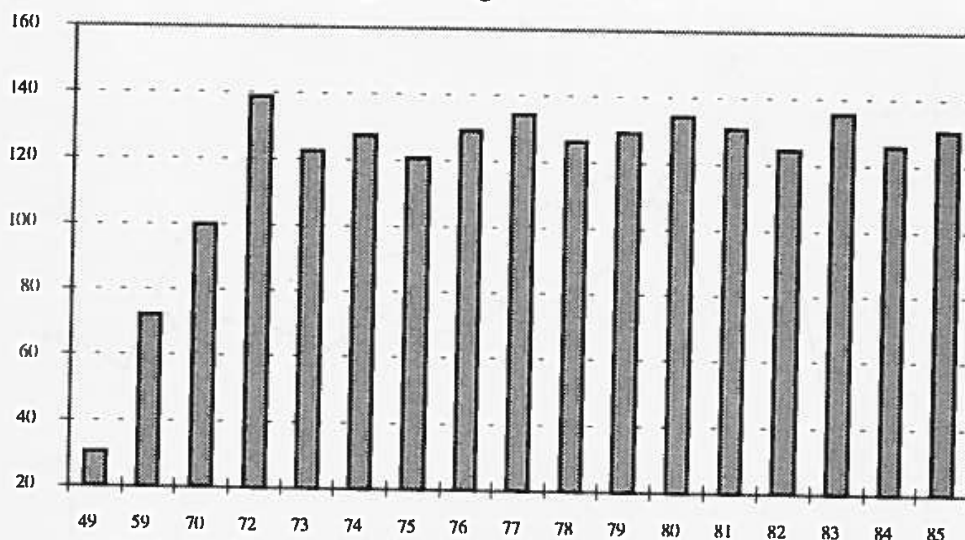
Source: Table 2

Figure 1. Rate of Surplus Value and Composition of Capital, 1949-1985

⁵ However, for the 1959-1973 period the annual rate of growth in the rate of surplus value was 0.62 and for the composition of capital it was -0.72.

Thus, in the golden age of ISI the expansion in the labor productivity acted, on one hand, raising the relative surplus value, on the other, lowering the price of the constant capital. The labor productivity in the Brazilian manufacturing industry is presented in Figure 2.

The demand conditions reflected in the rate of turnover of capital had a positive impact in the rate of profit between 1959 and 1973. Estimates for the rate of turnover of capital for 1949 indicate, with high probability, that it also had a positive influence on the rate of profit for the whole golden age of ISI.⁶



Note: 1970 = 100, Source: IBGE

Figure 2: Labor Productivity in the Brazilian Manufacturing Sector 1949-1985

Exercises for the rate of profit based on the estimates of the rate of turnover of capital above referred indicate that the former had an expansion between 1949 and 1973.⁷ This growth, as can be seen in Table 3, was mainly a consequence of the increase in the markup.

On the other hand, during the crisis and end of ISI the profit rate declined at an annual average of 1.3 percent. It is interesting to observe that the markup had a negative effect over the rate of profit in this period, while the rate of turnover of capital presented a positive one (see Table 3).

The shift in the markup evolution after 1973 is explained by a twofold movement. First, a strong decrease in the composition of capital, which in fact began in 1972. Second, a reduction in the growth of the rate of surplus value.

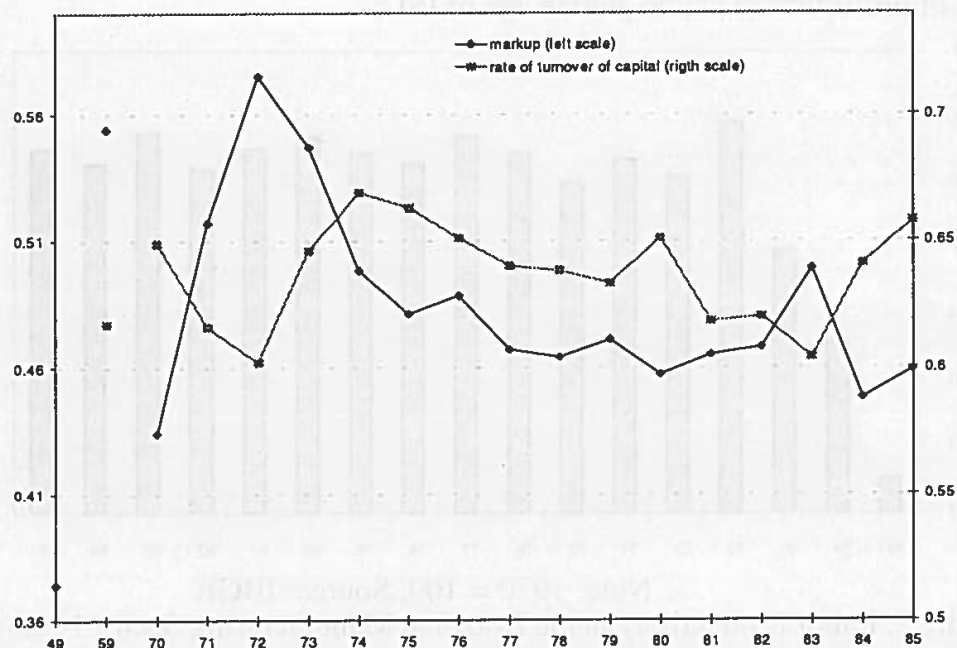
These results deny the structuralist interpretation for the Brazilian crisis in the 1970s. According to this conception the crisis was caused by problems in the circulation sphere.⁸ A close look at the 1970s is important to better understand the initial source in the reduction of the profit rate and to show that the Brazilian crisis at this moment was not related to demand complications.

⁶ The estimates for the rate of turnover of capital in 1949 were 0.603, 0.670, and 0.630, calculating the fixed capital with, respectively, the bigger, the smaller, and the average capital-output relation of the studied years. These results for the rate of turnover of capital indicate that there is a higher probability that its influence over the rate of profit was positive in the period 1949-1973.

⁷ The rate of profit in 1949 for the above rates of turnover of capital ranges between 0.226 and 0.251 while it was 0.353 in 1973.

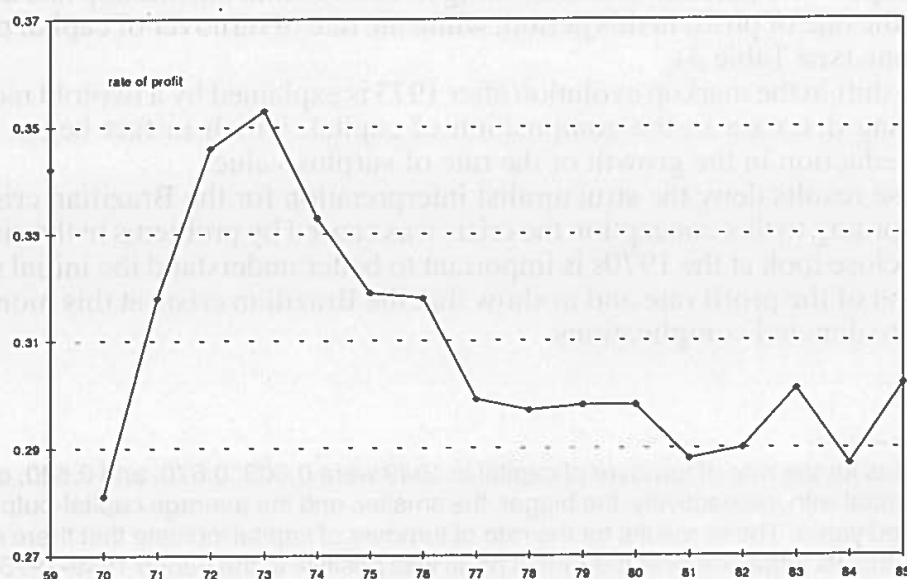
⁸ For example Mello and Belluzo (1982, p. 155): "the crisis arises due to the incompatibility among the rates of accumulation and the effective demand growth in the durable consumer good".

The rate of profit started to fall in 1974 as can be observed in Figure 4. Its increasing in 1973 was due to the expansion in the rate of turnover of capital, since the mark-up presented a reduction in this year (see Figure 3). Indeed, the rate of turnover of capital began to fall only in 1975. Therefore, it is possible to say that the crisis happened despite the demand conditions. The Brazilian crisis origin cannot be imputed to demand problems.



Source: Table 3

Figure 3. Markup and Rate of Turnover of Capital, 1949-1985



Source: Table 3

Figure 4. Rate of Profit in the Brazilian Manufacturing Sector, 1959-1985

The markup decrease in 1973 and 1974 was caused exclusively by the impressive fall in the composition of capital in these years (see Figure 1). The rate of surplus value continued its expansion until 1974. However, the markup contraction in the second half of the 1970s is explained by the reduction in the rate of surplus value. The movements in the rate of surplus value and in the composition of capital at this moment were opposed: the former fell and the latter rose.

Such evolution of the rate of surplus value may be associated to an interpretation of the crisis as a profit squeeze. Nevertheless, two points must be considered before one can arrive at this conclusion. First, the rate of surplus value presented a procyclical behavior in the Brazilian manufacturing industry.⁹ Second, and more important, the labor productivity in the manufacturing industry remained practically constant over 1972-1985 (see Figure 2). There was little room for the increase in the rate of surplus value. Thus, the conception of the crisis as a profit squeeze requires a very broad interpretation of this phenomenon.

The basic conclusion looking at the 1970s is that the crisis origin was the reduction in the composition of capital, even though the declining rate of profit in the second half of the 1970s was associated with the rate of surplus value and the rate of turnover of capital. Hence, the structuralist economists failed when they considered that the crisis origin was linked to the realization problems. In fact, there were important changes in the determinants of the mark-up in the Brazilian manufacturing industry in the 1970s. In the first half of this decade the composition of capital began to fall. In the second half the rate of surplus value remained constant mainly due to the stagnation of the labor productivity.

Conclusion

This paper analysis the evolution of the Brazilian manufacturing industry in the period 1949-1985 from a Marxian perspective. The Marxian categories were calculated according to Foley (1986). On the basis of these estimates the profit rate evolution was decomposed into variations of the rate of surplus value, composition of capital, whose addition gives us the variation of the mark-up, and the rate of turnover of capital. The aim was to link the evolution of manufacturing industry with the profit rate behavior, in special, to have a better understanding of the Brazilian's crisis in the 1970s.

For the period 1949-1985 the rate of surplus value, the composition of capital, and the mark-up behaved according to Marx conception. During the golden age of the ISI (1949-1973) the growth of the rate of surplus value was able to compensate the decline in the composition of capital. The mark-up, the rate of turnover of capital, and the profit rate expanded in this period. However, during the crisis and end of ISI (1973-1985) not only there was a reduction in the growth of the rate of surplus value but also there was a strong decline in the composition of capital. The result was a fall in the mark-up and in the profit rate, despite the expansion in the rate of turnover of capital.

A close examination of components of the profit rate in the 1970s revealed that the Brazilian crisis had its origin in the decline of the composition of capital. This result contradicts the structuralist economists. They consider that the crisis had its origin in the realization sphere. The analysis presented in this paper points out that the crisis had its origin in the reduction of the composition of capital, following the more traditional Marxian explanation.

⁹ See Marquetti (1994) for an explanation of the contracyclical behavior of the rate of surplus value in the 1980-1985 period.

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Appendix: Methods, sources, and discussion of the empirical consistency of the data

The Marxian categories were computed according to the following procedure.

1. Variable capital: the total compensation of the production workers, basically the wages of the production workers plus employer contributions to social security and to the "Fundo de Garantia por Tempo de Serviço" (Warranty Fund for Service Time). The data sources are: the Census Industrial (CI) for 1949, 1959, 1970, 1975, 1980, and 1985; the Pesquisa Industrial Anual (PIA) for the other years. The PIA data was adjusted to cover firms of all size. See Marquetti (1994) for the methodological procedure. However, for 1971 the PIA was not realized. For this year the variable

capital was estimated using its average participation in the value added in 1970 and 1972.

2. Surplus value: the difference between value added and variable capital. The value added data was obtained in IBGE (1990, 1994).
3. Constant capital: the value of industrial production minus the industrial value added. The data source for the value of industrial production are the CI and PIA. Again the PIA data was adjusted to cover firms of all size. The value of industrial production for 1971 was estimated deflating the 1972 value of industrial production with a price and a production index.
4. Fixed capital: the sum of the value of buildings, machines, and equipment used in production. The data source was Neves (1978) for 1959, 1970-1975 and, then, for the rest of the period were applied the growth rates in the manufacturing stock of capital obtained in Berni (1995).
5. Total capital tied up in production: the sum of variable capital, constant capital and fixed capital.

The main divergence of the estimates from theory is that the rate of surplus value was computed gross of depreciation while the composition of capital and the rate of turnover of capital were calculated net of depreciation. This implies in an overestimation of the rate of surplus value and of the composition of capital as well as in an undervaluation in the rate of turnover of capital. The markup is also overestimated, yet the final effect in the rate of profit is unknown.

Evidently there is other problem with these estimates, they concern only to the manufacturing sector. As Shaikh and Tonak (1994, p. 170) point out these estimates are not totally representative of the whole economy. Nonetheless, comparing the results of this paper with the obtained by Rosinger (1988) it is verified that the variable movements were basically the same in both set of calculations.

The estimates obtained by Rosinger (1988) for the rate of surplus value, the organic composition, and the rate of profit for the Brazilian economy as a whole in the case where the labor values were calculated according to the observed distribution of the labor force are reproduced in the Table 4.

Table 4. Rate of Surplus Value, Organic Composition, and Rate of Profit in the Brazilian Economy, 1970 and 1975

	1970	1975	Change (%)
Rate of surplus Value	1.49	2.20	48.04
Organic Composition	7.01	8.76	24.94
Rate of Profit	18.64	19.96	7.08

Source: Rosinger (1988)

The percentage rates of change for the same categories in the present paper are, respectively, 47.16, 37.89, and 9.05. The composition of capital was converted into organic composition (c/v) by the expression $c/v = (1-k)/k$ (Foley, 1986, p. 45).

Acknowledgments

I would like to thank Prof. Ducan Foley, Carlos Bastos, Dulio Berni, and Eduardo Maldonado Filho for helpful observations on an earlier version of this paper. All remaining errors are mine. Financial assistance was provided by CNPq.