The Brazilian Depression in the 1980s and 1990s

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Abstract

After being one of the fastest growing countries from the end of World War II to the beginning of the 80s, the Brazilian GNP per working-age person dropped 30% below trend during the 80s and 90s. The present study investigates how much of this performance can be explained by the neoclassical growth model. We found that the basic growth model, with exogenous productivity shocks, can account for as much as two-thirds of the actual decline in the Brazilian real GNP per working-age person for the period 1981-1998. The remaining one third could be mostly explained as responses to fiscal policy shocks. The main question that remains to be answer is why the TFP growth rate declined so much, pushing down the growth rate of the Brazilian GNP per working-age person.

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1 Introduction

In the post war period the Brazilian economy has two distinct periods. The first one goes from the end of the World War II until 1980. In this period Brazil was one the fastest growing countries. The second period goes from 1980 on. In this period the Brazilian economy stagnated. The Brazilian GNP per working-age person in the second period dropped 30% below the growth trend of the first period.[1]

Particularly for the 90s this result comes as a surprise. In this period the Brazilian economy has undergone a major process of reforms that went from a trade liberalization in the beginning of 90s until to an aggressive process of privatization.

Using the definition given by Kehoe and Prescott (2002) we would say that the Brazilian economy has been in a depression in the last 20 years. In this paper we try to address the question of what are the main sources of the stagnation of the Brazilian economy. To answer this question we use a standard neoclassical growth model with technology shocks. We founded that the standard model can account for as much as two-thirds of the actual decline in the Brazilian real GNP per working age person for the period 1980-1999.

To account for the remaining one third we introduce a fiscal policy in our model. The reason is that the tax revenue as well as the government expanding has been going up since the beginning of the 90s. In the beginning of the 90s the the government revenue was around 24% of the GDP. In 2000 the government collected 32.6% of the GDP.

This paper follows the research line of Kehoe and Prescott (2002) Along the above line of argument and using the same analytical framework, we would like to stress some studies done for other Latin American countries. Bergoeing, Kehoe, P., Kehoe, T. and Soto (2001), for example, compared the Chilean and Mexican severe economic crises of the early 1980s. They show that the much faster Chilean recovery was driven by their earlier reforms, particularly in banking regulation procedures and bankruptcy law reform, which stimulated a rapid productivity growth in the country. Moreover, they also demonstrated that the commonly accepted monetarist, exchange rate, declining real wage as well as debt overhang explanations could be rule out as convincing leading factors for these Latin American countries depressions.

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[1]See Parente and Prescott (2000, p. 19).

Kydland and Zarazaga (2002) analyzed the Argentinean sharp decline in economic activity during 1974-1990 which, despite the deep structural reforms in the 1990s, per capita GDP remained still 20% below its trend in 1990. The quantitative assessments presented by the authors strongly suggest that the total factor productivity-based neoclassical growth model can appropriately account for the dynamics of employment and investment during the 1980s and the 1990s. According to their interpretation, the "once-for-all" productivity gains of the 1990s induced by the structural reforms were not enough to fuel a sustained productivity growth, which is proved to be the key determinant of capital accumulation and employment creation for this country. Furthermore, they suggest that, since by construction the model abstracts completely from considerations on the relative price of capital, shocks to the real interest rate, induced for instance by policy oriented subsidies to the cost of capital, could have been meaningless or even harmed the objective of sustained economic growth.

The main contribution of this paper is to used the proposed framework to study the Brazilian depression in the last 20 years. What makes Brazil a interesting case is its sharp move from the group of the fastest growing countries to the group of countries that do not grow at all.

The rest of the paper is divided as follows. Section 2 briefly presents the main empirical evidences of the Brazilian "lost decade(s)", the 1980s and the 1990s. Section 3 describes the growth accounting exercise as well as the calibrated growth model used for the numerical experiments. Section 4 analyzes the main findings and, Section 5 concludes discussing the implications of the results for ongoing and future research.

2 The Brazilian Depression: the 1980s and 1990s

According to Kehoe and Prescott (2002) a depression is characterized by a sufficiently large and persistent deviation of aggregate output per working age person from its trend, such that it remains at least 20 percent below trend and also it falls at least 15 percent within the first decade of the depression.

The Brazilian experience shows that the trend is about 2.55%, implied by a growth rate of total factor productivity (TFP) of 1.6% for the period 1950-1970. Although this trend appears to be much higher than the one

corresponding to other Latin American countries as Argentina, Chile and Mexico, is consistent with the fact that Brazil was the Latin American growth leader from the 1950s up to the 1970s. For example, as stated by Parente and Prescott (2000, p. 19) the Brazilian income grew at rates significantly higher than in the U.S. during the period 1952-1972.

The data introduced in Figure 1 show that the Brazilian detrended real GNP per working-age person fell more than 20% below trend between 1981 and 1992, touching a level 30.6% below trend in 1993 and still remaining more than 30% below trend in the late 1990s.

Therefore, the Brazilian experience can be clearly characterized as a deep and long depression that started in 1982 or 1983 and continues to be so through the 1990s. The persistence of this depression is only similar to the ones experienced by other Latin American countries such as Mexico and Argentina in the 1980s and 1990s and by New Zealand during 1974-1992[2], for similar to the Argentinean and Mexican cases, the Brazilian contraction lasted at least 10 years or about 2.5 times longer than the U.S. Great Depression of 1929-1933[3].

Moreover, comparing the Brazilian data to other depression experiences in the 20th century, the former can be viewed as a very harsh one. For instance, Cole and Ohanian (1999) report that U.S. per capita GDP was 38.3% below trend in 1933. Amaral and MacGee (2002) report a deviation of 40.4 % for Canada in 1933. For European countries such as Germany and France, output fell 32.2% (in 1932) and 32.5% (in 1939) below trend, respectively, according to Fisher and Hornstein (2002) and, Beaudry and Portier (2002). More recently, during the 1980s and the 1990s, among Latin American countries, Argentina has suffered a depression of a magnitude of 37% below trend in 1990 according to Kydland and Zarazaga (2002), in Chile of approximately 20% below trend in 1983 and, in Mexico of approximately 40% in 1993 with their output standing still at 70% of its trend (Bergoeing, Kehoe, P., Kehoe, T. and Soto, 2002).

2.1 Brazilian Aggregate Output and its Components

The aim of the present study is to view the Brazilian data through the lens of growth theory in order to find out how much of the observed changes can be

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[2]For this case refer to Kehoe and Prescott (2002).

[3]For the analysis of the Argentinean experience refer to Kydland and Zarazaga (2002)

explained as perfect foresight equilibrium responses of endogenous variables of the model to exogenous productivity shocks.

Therefore, the actual allocation of output between consumption and investment are key aggregate variables the basic model economy should be able to mimic in order to gain some analytical insight for understanding the Brazilian macroeconomic performance in the 1980s and the 1990s.

In Table 1 the detrended measures of per capita output and its components are presented, indicating in bold format the lowest level of each variable: Brazilian per capita output, private consumption, investment, government consumption and foreign trade from 1981 to 1998.

The data show a clear decline of about 27% in per capita output from 1981 to 1998 and, despite some evidence of recovery during the subperiod 1985-1988 and, much more timidly from 1993 to 1997, this variable was not able to reach the 1981's level during the considered time span.

All aggregate demand components did not reach, in any considered year, the respective 1981's level except for government consumption which increased more than 35% from 1981 to 1998. Moreover, the foreign trade index shows that Brazil had a positive trade balance in 1981 but had became a net debtor country since 1995.

3   Growth Accounting and the Growth Model

A careful look on the data of the Brazilian National Income Accounts, can identify the capital share of the economy to be about 50 percent of output. This measure seem to be quite high accordind to international evidences and, in particular, considering the significant unreported income generated by self-employed and family workers, common features in Latin American countries, leads to treat this parameter value with caution due to possible measurement errors. In order to cope with the problem associated with adopting this dubious number, an approximation method, applied by Gollin (1998) and by Young (1995, p. 655) to East Asia countries, is implemented using information from a survey on household income. According to this approximation, the capital share in the Brazilian economy should be approximately 35 percent[4]. Then, with this parameter value in hand the aggregate Cobb-Douglas

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[4]Data from the National Income Accounts is used for the period 1990-1998 and also the very poor data set for the period 1960-1968. The methods of Gollin (1998) and Young (1995) were applied to the first sample period. For the 1960s sample period is not available

function below is used to proceed with the growth accounting exercise aiming to identify the contribution of capital accumulation, productivity and labor input, respectively, to the performance of the Brazilian economy.

$$Y_t = A_t K_t^{\theta} L_t^{1-\theta} \tag{1}$$

where Y_t is output, K_t is capital, L_t is labor, and A_t is total factor productivity (TFP).

3.1 Growth Accounting

Taking the natural logarithms and rearranging the terms of the production function as in Hayashi and Prescott (2001) is possible to obtain the following expression:

$$\ln\left(\frac{Y_t}{N_t}\right) = \frac{1}{1-\theta}\ln A_t + \frac{\theta}{1-\theta}\ln\left(\frac{K_t}{Y_t}\right) + \ln\left(\frac{L_t}{N_t}\right) \tag{2}$$

where N_t is the working age population. From equation (2), the change in real GDP per capita over the period t to $t+s$ can be obtained as:

$$\left[\ln\left(\frac{Y_{t+s}}{N_{t+s}}\right) - \ln\left(\frac{Y_t}{N_t}\right)\right]/s = \frac{1}{1-\theta}\left[\ln A_{t+s} - \ln A_t\right]/s$$

$$+ \frac{\theta}{1-\theta}\left[\ln\left(\frac{K_{t+s}}{Y_{t+s}}\right) - \ln\left(\frac{K_t}{Y_t}\right)\right]/s + \left[\ln\left(\frac{L_{t+s}}{N_{t+s}}\right) - \ln\left(\frac{L_t}{N_t}\right)\right]/s \tag{3}$$

where the terms on the right-hand side of this equation, from left to right, are the contribution to growth of TFP changes, of changes in the capital intensity and of changes in hours worked per working-age person respectively. On a balanced growth path, the second and the third terms are equal to zero once the capital-output ratio and the hours worked per working-age person are constant, hence all growth is attributed to changes in TFP in the growth accounting exercise. Therefore, as in Bergoeing, Kehoe, T., Kehoe, P. and Soto (2002) it is assumed in this numerical exercise that changes in output not related to changes in TFP are associated to deviations of the investment rate and work effort decisions from their respective balanced-growth behavior.

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any household survey that supports the methods applied to the 1990s. But this turns out not to be a problem, because the mean of capital share in the second sample was close to 35 percent.

Table 3 presents the growth accounting for Brazil. For the entire considered period 1980-1998, the Brazilian data show that the economy grew at an annual rate of 0.28%, well bellow the average annual growth rate of 4.19% observed from 1950 to 1980. For the sub-period 1980-1988 of stagnation, the economy grew at an annual rate of 1.06%. This performance was driven by the more intensive use of factors as shown by the positive annual growth rate of the capital-output ratio of 1.58% as well as the positive and higher growth rate of the hours worked per working-age person of 1.88%. The total factor productivity is shown to be falling at an annual rate of -2.41%. After 1988 the Brazilian economy enters a period of depression; per capita GDP showed a negative growth rate of -0.34% as a consequence of the average investment rate of 0.59% completely offset by a negative growth rate of work effort (-0.07%) and a negative growth of total factor productivity (-0.85%) as well. Moreover, from 1988 to 1992 per capita GDP shrinked by almost 15% and, in 1998 it still remained more than 20% bellow its 1988 level.

3.2 The growth model

The above growth accouting had shown that for the Brazilian experience, the contribution of changes is TPF has been the most important factor behind the country's economic performance. Nevertheless, the same exercise suggests that the contribution of changes in the investment rate and the work effort to the dynamics of per capita GNP were important as well. In order to quantitatively asses the contribution of these changes which are understood as optimal responses to perfectly foreseen exogenous productivity shocks by the agents, a standard neoclassical growth model will be calibrated.

The growth model consists of a closed economy in which agents have perfect foresight over the exogenous productivity shocks to the economy. Denoting all variables in per capita terms, the representative household's utility for each period is defined over sequences of consumption $\{c\}$ and leisure $\{l = 1 - h\}$ such that these sequences are chosen to solve the following problem.

$$\max E \left\{ \sum_{t=0}^{\infty} \beta^t (1 + \eta)^t \left[\log(c_t) + \alpha \log(1 - h_t) \right] \right\} \qquad (4)$$

subject to the per period budget constraint which explicitly considers the available technology:

$$c_t + x_t = z_t (1 + \gamma)^{(1-\theta)t} k_t^{\theta} h_t^{1-\theta} \qquad (5)$$

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where h_t represents hours of work, η the population growth rate, α disutility of working, β the discount rate, such that $0 < \beta < 1$, k_t the per household available capital stock, x_t investment, z_t a stationary component of TFP, γ the rate of technical progress, and θ the capital share in output.

The dynamics of the exogenous shock to productivity, z_t, is characterized by the following stochastic process:

$$z_{t+1} = \rho z_t + \epsilon_t \tag{6}$$

where ϵ is assumed to be a white noise innovation process and, $0 < \rho < 1$ describes the persistence of such a shock.

Finally, assuming that capital stock depreciates geometrically, the law of motion for capital accumulation will be given by:

$$k_{t+1} = (1 - \delta)k_t + x_t \tag{7}$$

Therefore, on the balanced growth path, output, consumption and capital grow at the same rate given by $(1 + \eta)(1 + \gamma)$[5].

3.3   Calibration

The model economy is calibrated according to Cooley and Prescott's (1995) guidelines. The calibration reproduces the steady-state features of the Brazilian economy before the depression. Therefore, the population growth rate (η) of 2.6% and the average growth rate of technical progress (γ) of 1.6% corresponding to the period 1950-1970 are taken for this purpose.

Following the procedure used by Kydland and Zarazaga (2002), the capital-output ratio is set at the level it had right before the depression, i.e. the capital-output ratio of 1979 which was 1.97 and, the depreciation rate to 10%.

The calibration of the discount factor (β) is based on the first order conditions for capital and, of the disutility of working parameter α on the same conditions for labor choice in the growth model and, one of the Brazilian stylized fact that shows in this economy agents spend 31% of total available time in market activities[6]. Therefore, β is set to 0.96 and α to 2.1647. Finally,

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[5]For a more detailed descreption of the neoclassical growth model refer for example to Kehoe and Prescott (2002), King, Plosser and Rebelo (1988) or Cooley and Prescott (1995).

[6]This value is computed using the Brazilian Household Survey data from 1970-1998. See appendix for details.

to calibrate the persistence of the productivity shock given by ρ, a OLSQ regression was run between the detrended TFP and the TFP time trend (see Figure 2), setting this parameter value to 0.96 according to this estimation.

4 Preliminary Findings

With the above calibration in hand, a linear quadratic approximation of the growth model allowed to derive the associated optimal decision rules used to simulate the endogenous variables' paths of the moel economy.

The agents are assumed to have perfect foresight over the sequences of TFP shocks which are simulated as deviations from its trend given by the expression below.

$$z_t = W_t/W_{1979} \tag{8}$$

where W_t is the Brazilian productivity deviation from trend in $t = 1980, ..., 1998$.

These exogenous shocks produce equilibrium responses according to the optimal decision rules on work (hours) and investment. Hence, the perfect foresight competitive equilibrium output, consumption and real wage paths can be numeriacally generated.

The preliminary findings of this numerical experiment are reported in Table 4 and in Figure 3.

Table 4 shows that the model economy predicts a much deeper fall of working age per capita output (Y/N) from its trend than the actual deviation present in the data. For instance, for the entire period 1980-1998 the model generates a negative change of -1.62% whereas the data indicates an actual small positive change of 0.28%. For the stangnation sub-period 1980-1988 when the actual (Y/N) presents a small increase of 1.06%, the model predicts a -2.07% negative change and, for the depression sub-period 1988-1998, the model generates a more than 3.6 times deeper fall in output than the one actually present in the data.

Moreover, cross-comparing the last columns of both actual and generated growth accounting tables, it is apparent that those differences are driven by the opposite signs of the changes in (Y/N) due to changes in working age per capita work effort (hous) (L/N) generated by the model economy. In other words, the observed changes in the Brazilian (L/N) could hardly be modeled as perfect foresight equilibrium responses of working decisions to exogenous (actual) Brazilian productivity shocks in a competitive framework.

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Figure 3, on the other side, depicts the paths generated by the model economy in solid lines and the ones observed in the data in dashed lines for the main variables, namely output, consumption, investment, capital-output ratio, worked hours and wages.

For the output path, the model gradually drives this aggregate variable reaching a level 20% below the actual data in 1998[7]. Therefore, the model can account for about two-thirds of the actual fall in detrended output.

The generated trajectory of consumption falls closely with actual data but in a smoothier manner. However, from 1993 on, the model cannot account for the relative consumption stabilization present in the data.

The artificial investment series shows the deepest fall of almost 80% below its trend in 1993, against an actual deviation of 50% for the same year. In turn, the model predicts well the increasing capital-output ratio path up to around 1995, from where it starts to deviate gradually much more below the observed data, such that in 1998 the model predicts this ratio to reach the trend whereas the data show this ratio to be around 40% above trend.

For hours series, the actual path deviates below trend much less than the deviation predicted by the model economy from 1980 to 1993. From 1993 on, the model moves this series towards its trend and is unable to account for its actual fall of about 6% below trend in 1998.

Finally, for wage series, the model suggests a gradual fall down to 50% below trend in 1998, whereas the actual data shows a much more volatile, around and above the trend, wage series, its peack deviating almost 50% above trend in 1989.

5 Conclusion

In short, the numerical experiment has shown that the basic growth model in which the productivity shock, assumed to be entirely exogenous, generates perfect foresight equilibrium responses on endogenous variables paths, can account for as much as two-thirds of the fall in Brazilian output. However, this result can only be taken as a very preliminary one, for many short-comings of the basic model become apparent along the performed numerical experiment as shown above. Thus, the introduction of new elements into

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[7]Bergoeing, Kehoe,T., Kehoe, P. and Soto (2002) show that for both Mexico and Chile eventhough the same basic model captures well the actual decline in output from 1980 to 1985, it also predicts a fall about 20% below the observed data in 2000.

the basic model economy is called for improving the reading of the Brazilian empirical evidence. In particular, the impacts of the Brazilian mechanism of capital accumulation of the early 1970s, strongly led by the public sector, on the poor economic perfomance of the 1980s aggraveted by this decade's international recession; the new institutional framework introduced by the 1988 reformed Brazilian *CartaMagna* as well as the series of structural reforms introduced beginning the late 1980s, namely the country's openness to the world economy and, the much more disciplined public finance behavior brought about with the price stabilization from the mid 1990s and the increasing tax burden on the economy along the 1990s, are facts that create a new set of economic incentives for the Brazilian agents. In this sense, they are special characteristics that a specific neoclassical growth model for Brazil should consider and, this challenge constitutes the matter of this ongoing research.

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Appendix: Brazilian Data Sources

1. *Population*: Brazilian Decennial Census of 1950, 1960, 1970, 1980, 1991 and Contagem da População, 1996, both from IBGE (Brazilian Institute for Geography and Statistics) and, for the missing years between 1950 and 1996 interpolation techniques are applied to the available data set. For 1997 and 1998 the trend corresponding to the period 1991-1996 is used. To get the working age per capita figures the 10 to 69 years-old population is used instead of the commonly used interval of 15-64 due to the existence of child labor in Brazil.

2. *GDP and components*: These series are GDP, Non-durables and durables consumption, government and private investment (plus inventories), government consumption, imports and exports. All of these series is from the National Income and Product Accounts from IBGE, and was deflate with the implicit price deflator of GDP to 1998 Reais. IBGE does not provide a non-durables consunption series, this series was build by Ellery, Gomes and Sachsida (2002).

3. *Capital*: The capital series is from IPEA (Institute for Applied Economic Research), as described in Morandi (1998).

4. *Market hours*: The data about the time spend by households in market activities was computed from two different household surveys: the Brazilian Decennial Census and the PNAD (National Survey by Household Sample), both from IBGE. The data coverage is from 1970 to 1998, with missing values for 1974, 1975, 1991 and 1994. To analyze these data the methodology proposed by McGrattan and Rogerson (1998) is implemented.

5. *Employment*: This labor input is measured as total workforce employed with more than 10 years old. This series was build on Brazilian Decennial Census and PNAD, and the data coverage is the same of *market hours*.

6. *Industrial hours and wages*: These two series are from FIESP (bla bla bla) and describe the real wages and hours worked in the São Paulo state's industry. Actually, this is not a problem because a big portion of Brazilian industry is located in São Paulo. Real wages is in 1998 Reais.

7. *Capacity utilization*: This is the rate of industrial capacity utilization and is from Fundação Getúlio Vargas (FGV).

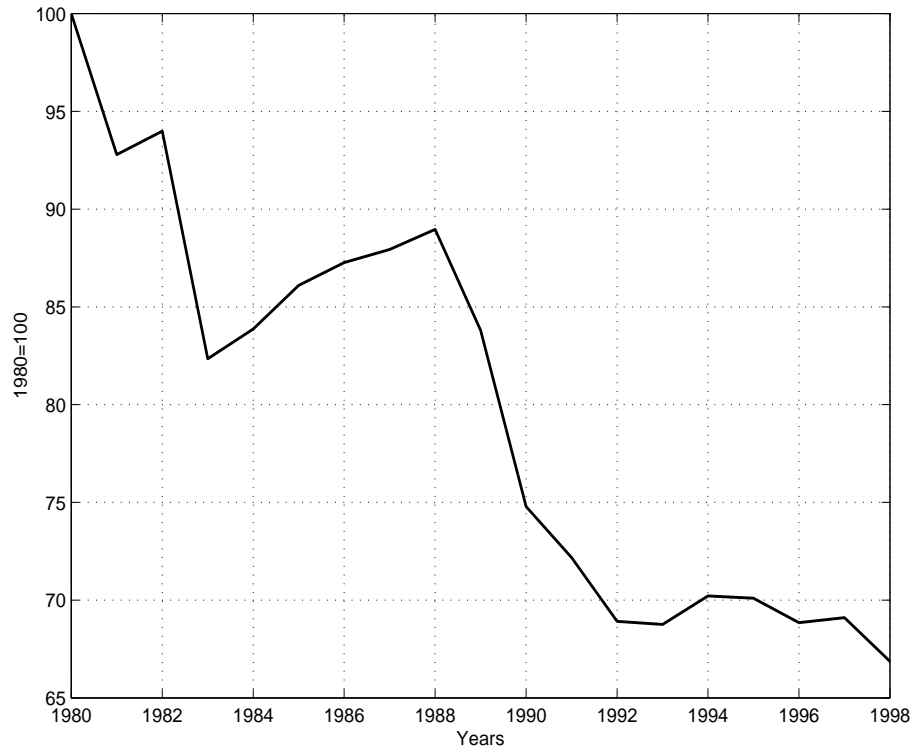Figure 1: Detrended real GNP per working-age (10-69) person

Table 1: Detrended output and components, per capita 1980-1998 (1980=100)

Years	Output	Consumption		Investment		Gov. Cons.	Foreign Trade	
		Nondur.	Dur.	Priv.	Gov.		Imp.	Exp.
1981	92.8	93.1	82.2	91.2	102.4	94.5	80.9	97.1
1982	94.1	95.7	96.5	85.6	94.4	103.5	69.6	79.9
1983	82.5	87.7	82.1	59.5	64.5	87.8	66.6	105.5
1984	84.1	86.1	96.3	55.4	67.8	**76.2**	59.3	126.6
1985	86.4	82.6	88.4	71.2	84.6	92.8	54.2	116.9
1986	87.6	84.1	97.4	68.6	114.1	101.7	49.3	85.4
1987	88.4	79.1	81.7	80.2	116.9	118.7	47.2	90.0
1988	89.5	80.2	71.0	80.8	113.1	118.7	42.6	101.9
1989	84.3	70.0	66.3	88.1	104.4	131.2	**37.6**	76.8
1990	75.3	**61.2**	62.2	59.8	102.9	129.9	46.0	61.0
1991	72.7	63.7	51.2	57.2	87.8	108.7	50.5	67.5
1992	69.5	61.6	**47.4**	**50.1**	100.4	104.3	50.9	76.5
1993	69.4	62.2	47.6	57.9	93.7	122.2	55.5	74.5
1994	70.9	65.6	55.2	60.3	106.6	125.5	56.6	66.5
1995	70.9	65.6	59.3	62.5	74.7	129.7	58.5	55.2
1996	69.6	62.4	55.4	60.8	66.8	137.8	54.0	**52.9**
1997	70.0	63.2	55.2	63.8	64.4	133.2	60.4	57.5
1998	**67.7**	62.5	48.4	60.2	**61.9**	128.1	57.4	54.1

Note: The series are: GNP, consumption of nondurables, consumption of durables, private investment, Government Consumption, Imports, and Exports. See appendix for description. All variables are real per capita (10-69 years old), detrended with the per capita real GNP trend growth rate implied by TFP trend (2.55%), and levels are normalized to 100 in 1980. Bold indicates the year of the trough in each series.

Table 2: Inputs measures, 1980-1998 (1980=100)

Years	Output	Employ- ment	Average length of workweek	Industrial hours (SP)	Real wages (SP)	Rate of capacity utilization
1980	100.0	**100.0**	44.7	100.0	100.0	83%
1981	92.8	104.9	44.3	87.7	98.4	84%
1982	94.1	107.9	44.3	80.5	102.0	78%
1983	82.5	106.5	44.1	70.7	**85.7**	76%
1984	84.1	107.7	44.3	71.8	89.3	73%
1985	86.4	112.5	44.3	79.7	106.7	74%
1986	87.6	113.2	44.2	86.9	128.6	78%
1987	88.4	114.4	44.0	85.2	117.4	83%
1988	89.5	114.2	43.8	81.7	125.9	81%
1989	84.3	115.1	43.5	77.9	143.0	80%
1990	75.3	115.0	43.5	70.5	105.8	81%
1991	72.7	115.2	42.8	61.6	97.3	74%
1992	69.5	115.4	42.2	56.5	102.6	75%
1993	69.4	114.6	41.8	55.4	106.0	**72**%
1994	70.9	114.4	41.7	53.5	109.6	77%
1995	70.9	114.1	41.6	51.8	113.0	80%
1996	69.6	108.8	41.7	45.7	106.3	83%
1997	70.0	108.2	41.6	43.0	105.0	82%
1998	**67.7**	106.6	**41.4**	**38.9**	101.6	83%

Note: The series are: GNP per capita, total workforce employed, average length of work-week, total of industrial hours worked in São Paulo state, total of real wages of São Paulo's industry, and rate of industrial capacity utilization. See appendix for description. Output, employment, industrial hours, and real wages are detrended with the per capita real GNP trend growth rate (2.55%) implied by TFP trend, and levels are normalized to 100 in 1980. Bold indicates the year of the trough in each series.

Table 3: Decomposition of average annual changes in real output per working-age person (percent)

Period	change in Y/N	due to TFP	due to K/Y	due to L/N
All period: 1980-1998	0.28	-1.54	1.03	0.80
Stagnation: 1980-1988	1.06	-2.41	1.58	1.88
Depression: 1988-1998	-0.34	-0.85	0.59	-0.07

Note: Working-age person are 10-69 years old.

Table 4: Decomposition of average changes in model output (percent)

Period	change in Y/N	due to TFP	due to K/Y	due to L/N
All period: 1980-1998	-1.62	-1.54	0.03	-0.11
Stagnation: 1980-1988	-2.07	-2.41	0.77	-0.43
Depression: 1988-1998	-1.25	-0.85	-0.55	0.15

Figure 2: Total Factor Productivity (TFP), level (−) and projected 1950-1979 trend (- -)
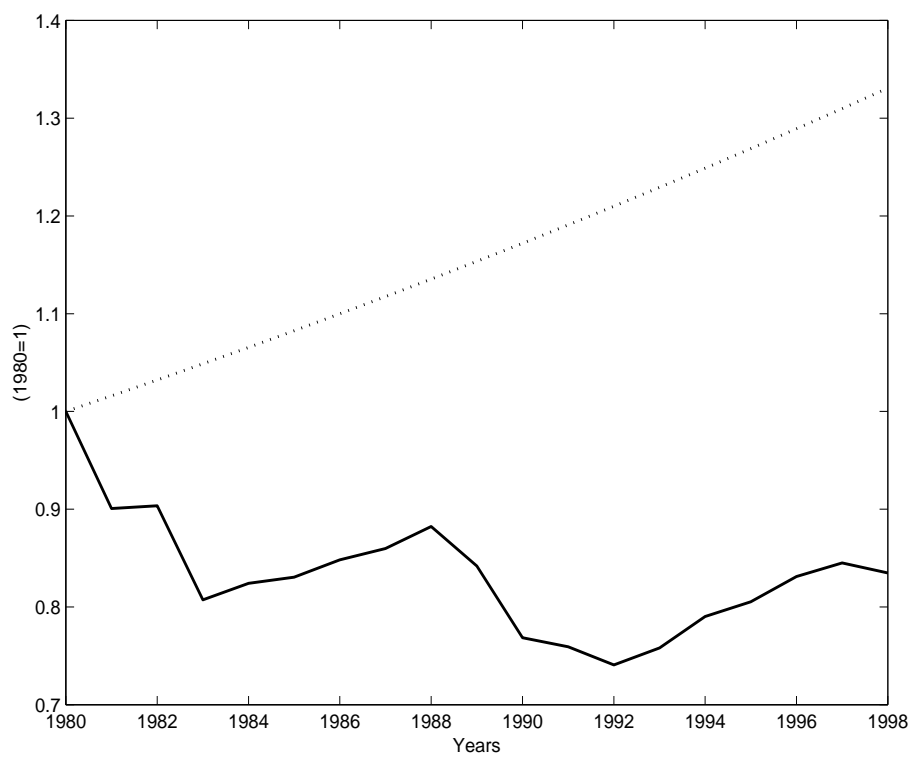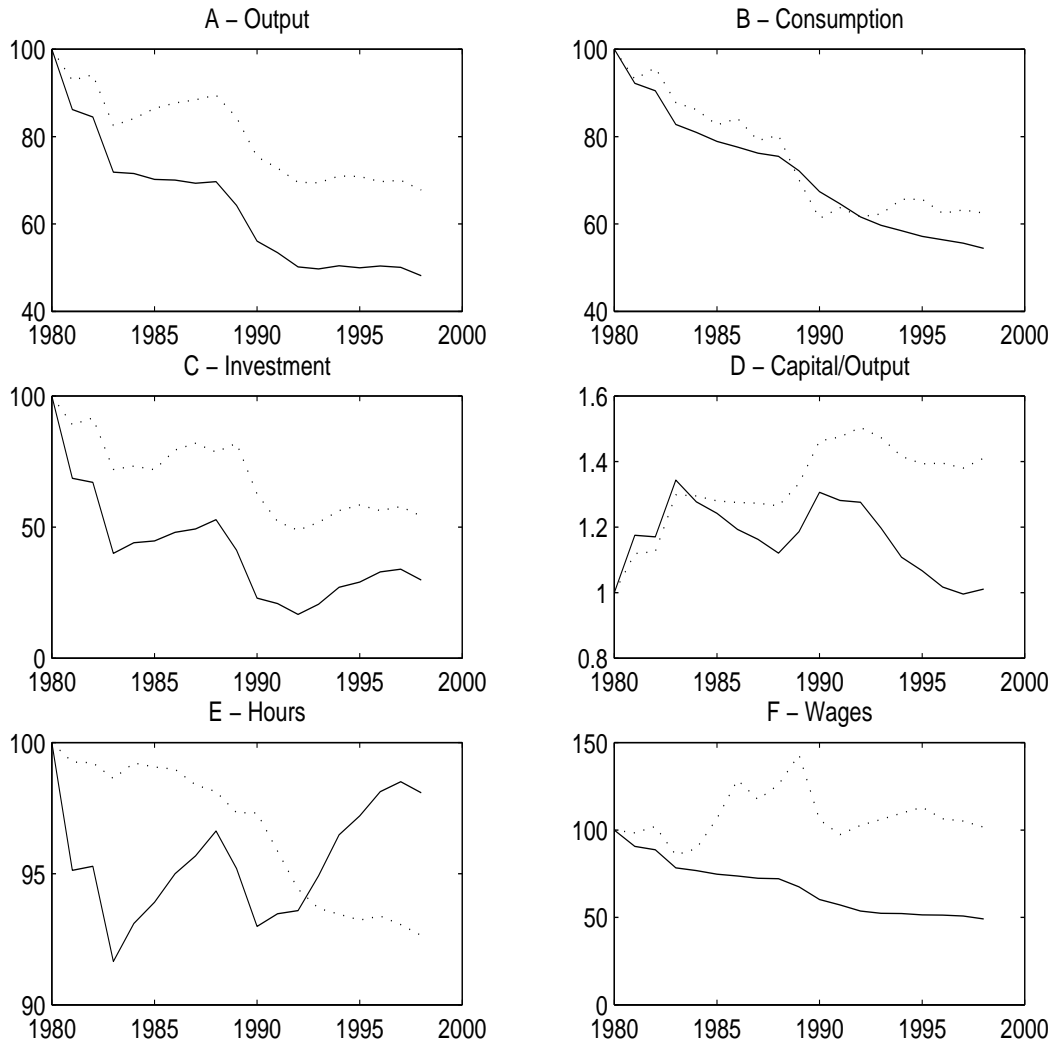
Figure 3: Findings, Model (—) and Data (- - -)

Note: All variables are deviations from trend. Actual variables are: GNP (A), consumption of nondurables (B), private investment plus durables consumption (C), length of workweek (E), and real wages in São Paulo's industry (F).
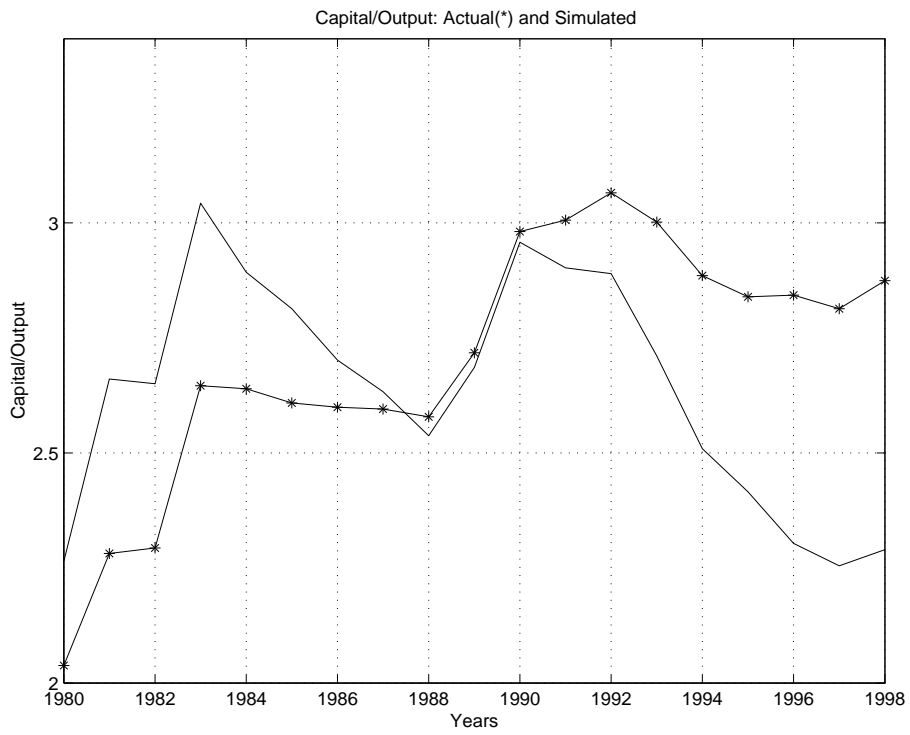
Figure 4: Capital/Output

Capital/Output: Actual(*) and Simulated

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Figure 5: GNP per working-age (10-69) person

Output per working pop (10–69 years)

Figure 6: Invstment/Output

Investment/Output: Actual(*) and Simulated

Figure 7: Consumprion/Output

Final Consumption as a Share of GDP: Actual(*) and Simulated
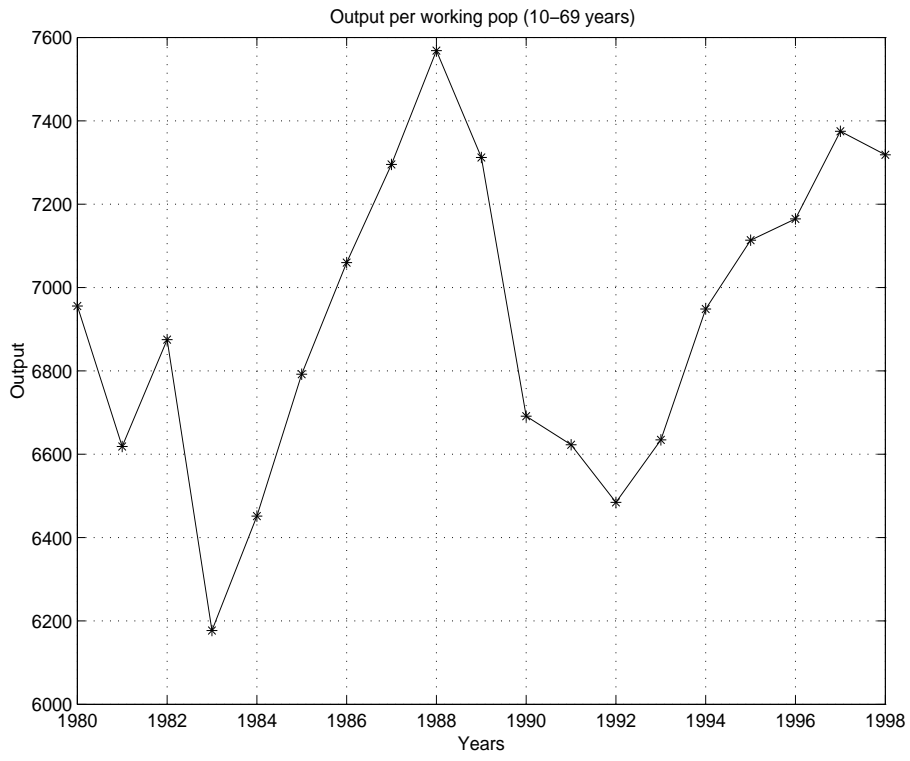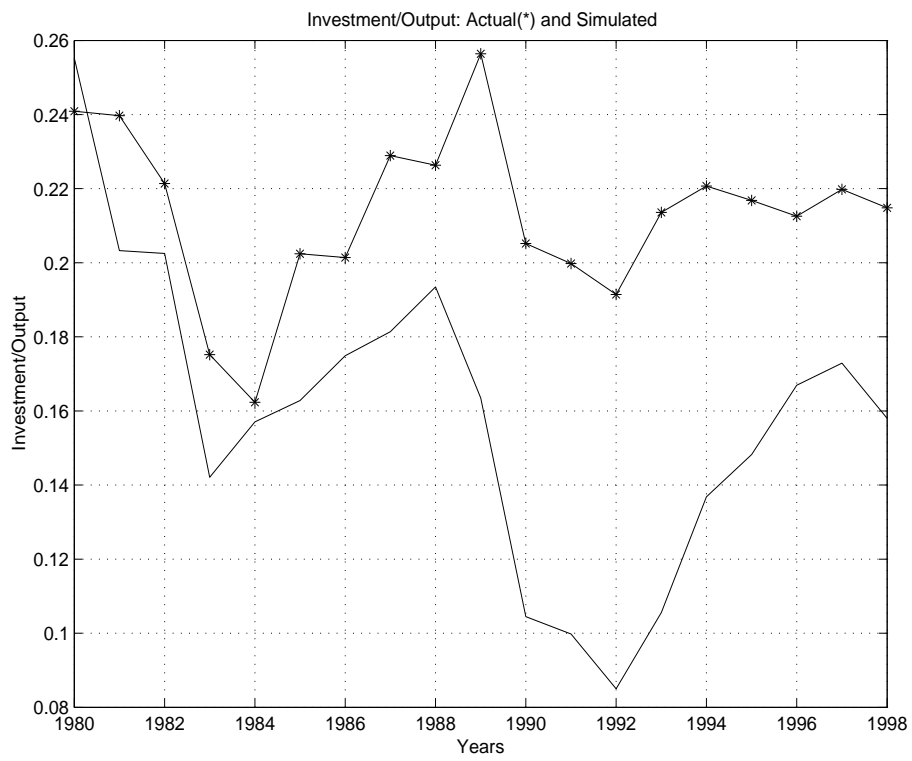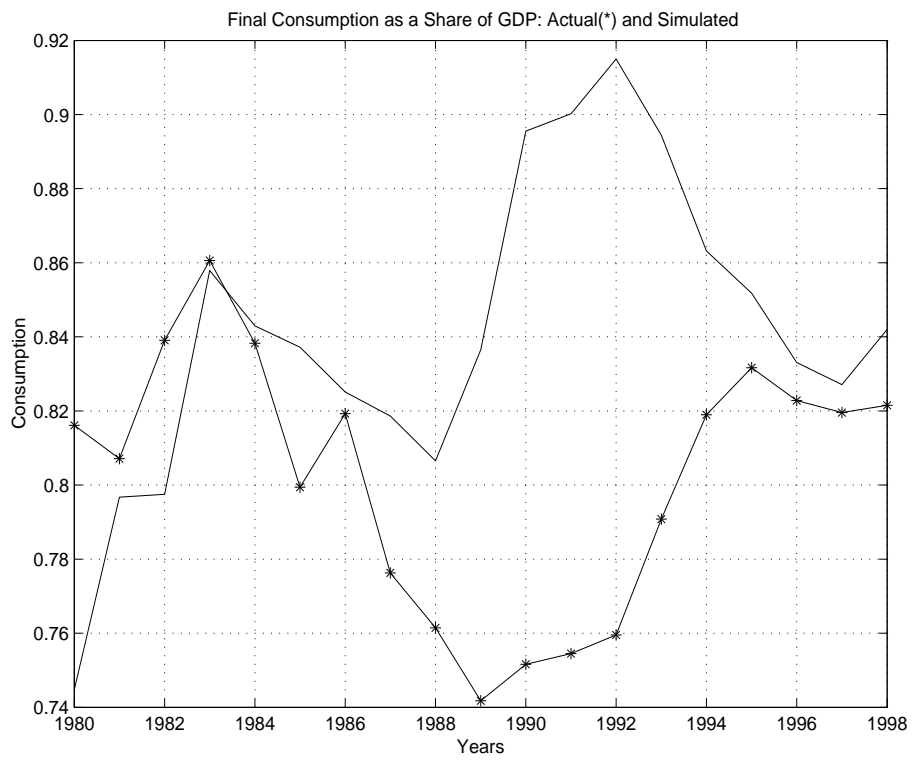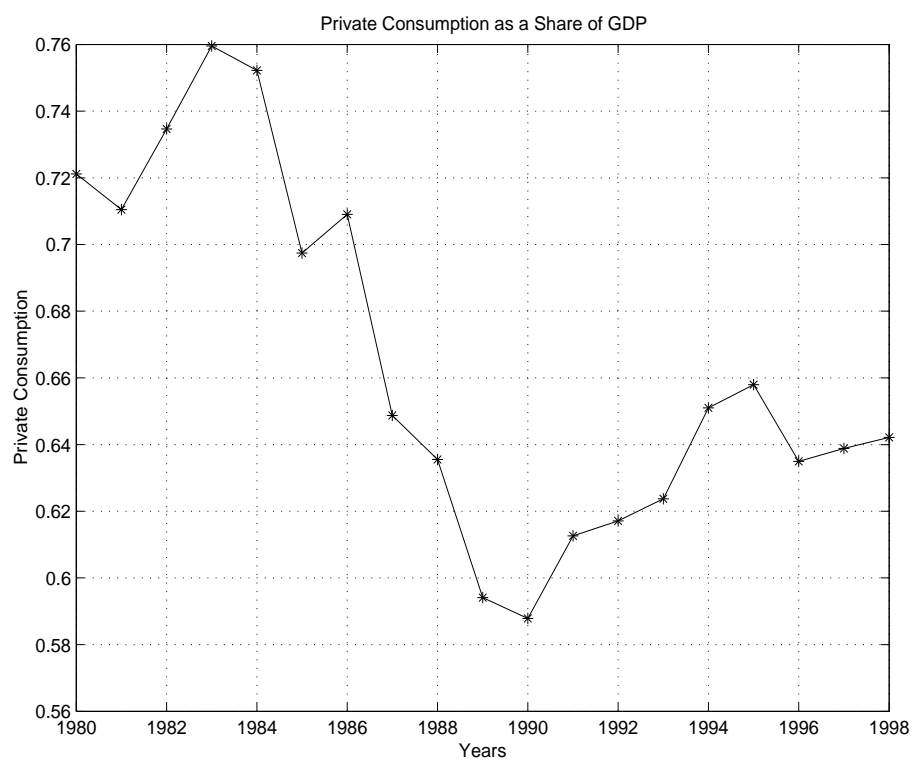
Figure 8: Private Consumption/Output

Private Consumption as a Share of GDP

Figure 9: Government Consumption/Output

Governement Consumption as a Share of GDP