

Public Vices, Private Serfdom?*

Comments on the optimal size of the Brazilian State

ABSTRACT: In this paper Scully's model (1995) was implemented empirically to determine the optimal size of the public sector in Brazil in terms of "serfdom" days allocated by individuals for the payment of taxes (the so-called tax freedom day). The results indicate that this number would be approximately 118 days per year, which corresponds to a total tax burden of about 32% of GDP. As comparisons between countries are limited by the distinct taxation systems adopted, we seek to explain this result in light of the main hypotheses about government growth in literature.

KEYWORDS: government size, rent-seeking, public choice, tax freedom day.

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1. Introduction

Why should you give someone part of your time? The rational answer is simple: because you expect to get a benefit in return. In the labor market, the hours of work offered to the employer correspond to a certain amount of money which, according to the preferences of each consumer, is turned into spending or savings.

However, there is another form of exchange, an involuntary one, common in the most diverse economic systems: the exchange of individual hours for collective goods: the tax collection promoted by the state. The justification, as it is said, is based on the nature of public goods, which would hardly be supplied by the private sector.

In some cases, these hours are taken according to criteria determined by a democratic political system, as in great part of modern democracies. In other cases this allocation is made arbitrarily, according to the will of a (not-so?) benevolent planner. Even in the first cases, as we know, there can be inefficiencies derived from the actions of the state in the economy (so-called government failures), which can lead to a growth of government to levels that are harmful to the efficient workings of the markets, that is, above the *optimal level*.

Proof that this is the case comes not only from the growth of the Brazilian government¹, but also from the widespread growth of its counterparts around the world along the twentieth century. For instance, in 1913, the average size of the public sector in 17 industrialized countries was 12% of GDP, as opposed to 11% in 1870. After World War I, and especially after the Great Depression, the size of government in high-income countries never stopped growing: in 1937 the average size of government in these countries was already around 23% of GDP, while currently, in some European countries like France, Germany and Scandinavia, the public sector controls over 50% of GDP. In Brazil, things are no different: public spending was 14% of GDP in 1947 and 20% in 1964. At the beginning of Fernando Henrique Cardoso's presidential term (1994) public spending reached 28% of GDP, while government revenue was above 40% of GDP in the first quarter of 2003.²

Explanations for the growth of government are abundant in literature and good reviews can be found, for example, in Müller (1989), Higgs (1991) and Drazen (2000). However, as Tullock (2004) points out, in the specific case of the USA – although the authors believe this can be generalized – the problem of explaining government growth is not a matter of consensus among economists. It is not difficult to see why this should be so, as over time, even the most exogenous restrictions on the action of politicians can become endogenous³ for a number of reasons, ranging from institutional to technological shocks (that alter, for instance, the *public* character of a given good, which can alter the institutional arrangements in existence for supplying the good).

Briefly, the different causes for government growth can be grouped into three broad categories: economic, political and ideological⁴. In the first case, the rising demand for government services is explained by the fact that the private sector is unable to provide the desired levels of public goods. The conventional analysis holds that the last quarter of the nineteenth century saw a structural change in high-income countries, brought about by industrialization and urbanization. With the rise of urban centers, the growing demand for justice, education, sanitation, paved roads and drinking water eventually forced greater government activity. On the other hand, government services are usually labor intensive when compared to the private sector. As the government's productivity gains are lower than those in the private sector, and government services are price inelastic, real salary gains in the economy induce an increase in the relative size of government. In short, the economic explanation is based on optimal governmental intervention, which solves efficiently problems of allocation, so as to allow for a higher GDP growth. The problem with this explanation is that empirical studies point out that it explains less than half of government growth in high-income countries⁵. Furthermore, empirical evidence indicates that further growth in government size has had negative impact on growth rates. In Brazil, the economic explanation seems even less important, if one considers that the quality of many typical government activities (education, health, infrastructure, social

¹ For a good analysis of the recent growth of government in Brazil, see Monteiro (2004). For other countries, see, for example, Müller (1989).

² See Hillbrecht (2003).

³ Hence the need, defended by Buchanan, for concern with the constitutional aspects of political economy. For the Brazilian case, the most detailed reference on this important area of research is Monteiro (2004).

⁴ This section relies heavily on Hillbrecht (2003).

⁵ The traditional references are Samuelson (1954, 1955), Musgrave (1959) and Stiglitz (1989).



security, justice and law enforcement) is, to say the least, questionable. If the government has increased in size in Brazil, this is not due to the supply of goods which, supposedly, could not be provided efficiently by the private sector.

The second group refers to political causes. The structural changes mentioned earlier led to a change of perception of cost and benefit of government activities. On the one hand, the rise of democracy as the political regime of choice increased demands for income redistribution. As is well known, it is the median voter who decides an election, and that voter, considering redistributive policies to be the main activity of democratic governments, will vote for more redistributive policies if his/her income is lower than the society's average income. In other words, he/she will vote for more government activity. On the other hand, urbanization and industrialization made the action of special interest groups more effective, on account of collective action: relatively small special interest groups, geographically close, perceived that it would be possible, through political action, to extract income from the rest of society. This is the phenomenon known as rent-seeking⁶, where given groups, regardless if coming from the private sector or public bureaucracies, obtain protection from competition and increase their income by influencing legislators, who approve laws and regulations in their favor, or even by inducing certain expenses by the Executive. In effect, both forms of distributive dispute have the same outcome: they weaken the economic incentives for productive activities, reducing the possibilities of economic growth. In end effect, it is not clear who the winner is in this perverse redistributivist game, if the elector who votes for larger government or the politicians and special interest groups that take decisions or influence government decisions. What we do know is that this dispute impoverishes society in the end. The Brazilian government is no different from any other, in this sense. The distribution of advantages and privileges to the groups that have taken control of government is its trademark⁷. While, on the one hand, Brazilian statism and protectionism have produced, over decades, a tremendous concentration of wealth, the recent redemocratization has given rise to demands from the

underprivileged classes that resulted in the implementation of social safety nets in both previous federal governments administrations. The problem is that, by not carrying out any substantial change in the government's *modus operandi*, in the sense of limiting the concession of privileges, the size of government increased significantly in those administrations.

The issue of incentives brings us to the analysis of a perspective strongly linked to public choice, the so-called New Institutional Economy. Thus, for example, North (1981) develops what he calls "a neo-classical theory of state", that is based on the idea of a contract between the authority (represented by a person or group of persons) and its constituents. According to this theory, the authority exchanges protection and justice for income. As there are gains of scale in organizing these activities, society is better off if an organization specializes in providing these services, instead of having each individual in society protecting their property on their own. On account of this, the authority, through the state, acquires the right of command over its constituents and, consequently, the ability to establish compulsory contributions. As its objective is to maximize revenue, government will act as a monopoly with discrimination, setting its constituents into categories and allocating rights for each one so as to maximize its income. These activities are restricted by the constituents' possibility of immigrating to other regions that offer better conditions of life (*exit*) and by the possibility that the constituents will destitute the current authority and appoint a rival that promises better services (*voice*).

Still according to North (1981), another restriction to the activity of the authority comes from the existence of transaction costs. Because of transaction costs, the structure of property rights that maximizes the wealth of society is not necessarily the one that maximizes the authority's long term revenue (*rent*). In order to maximize its power, the authority must establish a structure of property rights that is favorable to groups with higher access to incumbent rivals, in spite of the effects of this structure on efficiency. Furthermore, the revenue of the authority tends to be dissipated, for the problems of agency are usually present. The services

⁶ On this approach, see, for instance, Becker (1983), Buchanan (1980), Buchanan & Tullock (1962), Krueger (1974), Mueller (1989), Olson (1965, 1982) and Tullock (1959).

⁷ It is worthwhile here to quote Monteiro (2004): "At the start of 2003, political leaders set out to take up a previous bill draft (...) increasing control over the activity of special interest groups within National Congress (...) – but quickly dropped the subject. We live in a rent-seeking economy, with the political process continually generating opportunities of substantially elevated gains (...)" [Monteiro (2004), p. 51]

provided to the constituents must be produced by a self-serving bureaucracy, willing to capture part of the income of the authority's monopoly, and the revenue must be collected by a group of agents that likewise have an interest in capturing part of the income. The existence of transaction costs also appears as a determinant of the characteristic called *path dependence*: once a given structure of property rights is established, groups that benefit from it have an incentive to keep it from changing. In this way, inefficient structures of property rights can persist for a long time.

The third group of explanations for government growth refers to ideological causes⁸. Starting in the second half of the nineteenth century, collectivist ideologies gained popular and intellectual support, reducing the influence on politics of classical liberalism and conservatism. Specifically, various forms of socialism became influential. While intellectuals lent respectability to these ideologies, it was by the adherence of the common citizen that these ideas had an impact on the activity of the government, by means of support for increased regulation of the markets, statization and nationalization of companies or outright confiscation of property. Political parties of collectivist ideologies thus managed to obtain increased space in legislative assemblies of various countries.

An important issue arises with respect to the dynamics of government growth. The current "state capitalism" as a form of organizing society is unlikely to revert to its antagonistic poles, free market capitalism and socialism. It can be perceived that a reversal to free market capitalism is practically impossible, for, although the expansion of individual liberties under the free market produces wealthier societies, its cost, namely individual responsibility, can be unbearable for most people. It is interesting to note that Tocqueville was keenly aware of this problem when he wrote in "Democracy in America" what can happen when government takes away from civil society its roles and attributions:

"(Then, the government) covers the surface of society with a network of small complicated rules, minute and uniform, through which the most original minds and the most energetic

characters cannot penetrate, to rise above the crowd. The will of a man is not shattered, but softened, bent, and guided: men are seldom forced by it to act, but they are constantly restrained from acting: such a power does not destroy, but it prevents existence; it does not tyrannize, but it compress, enervates, extinguishes, and stupefies a people, till each nation is reduced to nothing better than a flock of timid and industrious animals, of which the government is the shepherd".

[Tocqueville, A. de apud BOAZ, D. (1997), p.145].

The other pole, socialism, is equally unattainable. It is hard to imagine that there is support beyond small groups of political activists for the implementation of regimes such as the ones in Cuba, the former Soviet Union, North Korea, etc. The human cost is simply too high for someone to want to live in such a society. The most likely is that the current interventionist regime will continue for a long period, with waves of liberalization followed by greater intervention. Thus, liberalizing reforms will be undertaken whenever the cost of government starts becoming unbearable. When these reforms have served their purpose, a growing interventionist demand will initiate a new cycle of government growth.

Having made these initial considerations, we will now present a model from which the optimal size of the Brazilian government can be derived and, following that, put forward an estimate of the tax burden associated with this optimal size. The objective is to obtain a measure that might be used to determine the level of what we call optimal serfdom, which will be explained in the following section. Section 2 presents the model used in the empirical implementation (section 3). And section 4 concludes.

2. The Model

The model below is inspired by Scully (1994, 1995), in which the product of a country is divided into the public and the private sector. The public appropriation takes the form of the total tax burden as a percentage of GDP (T/Y)⁹ and the remaining

⁸ See, for instance, Higgs (1989).

⁹ We assume a balanced government budget.

part $(1 - T/Y)$ is held by the private sector. The chosen functional form then, is:

$$Y = A(T/Y)^b(1-T/Y)^c \quad (1)$$

By taking logarithms of this function we can obtain its linearized version.

$$\ln Y = \ln A + b \ln(T/Y) + c \ln(1-T/Y) \quad (2)$$

The tax burden will have positive effects on GDP as long as the following relation is respected¹⁰:

$$\frac{\partial \ln Y}{\partial T} = b \left(\frac{1/Y}{T/Y} \right) + c \left(\frac{-1/Y}{(Y-T)/Y} \right) = b \frac{1}{T} - c \frac{1}{Y-T} > 0 \xrightarrow{\text{if}} \frac{Y-T}{T} > \frac{c}{b} \quad (3)$$

Optimal tax burden, as a percentage of GDP, can be obtained by maximizing (1) in relation to T/Y :

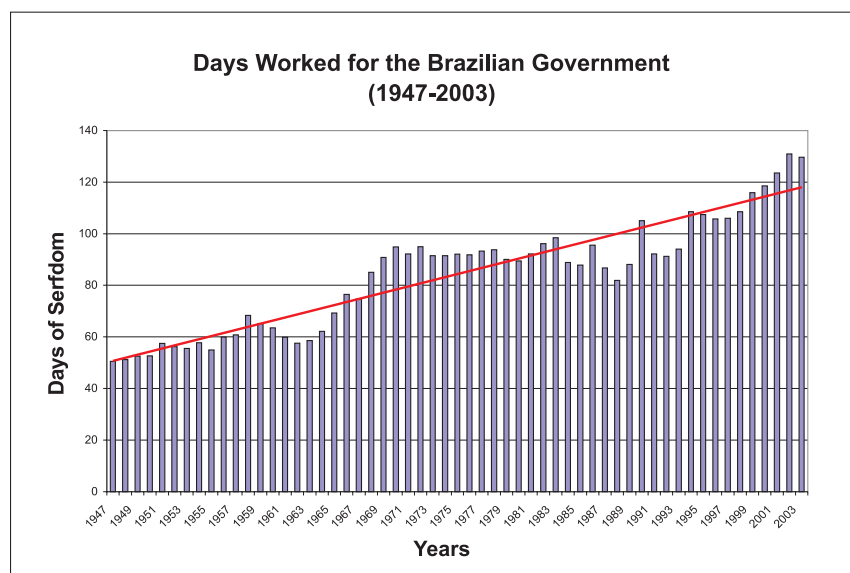
$$\frac{\partial \ln Y}{\partial (T/Y)} = 0 \rightarrow \frac{b}{T/Y} + c \frac{-1}{1-T/Y} = 0 \rightarrow \left(\frac{T}{Y} \right)^* = \frac{b}{b+c} \quad (4)$$

Once we have an estimate for the parameters in (4), we can obtain an interesting measure, derived from the government tax burden: the optimal number of days of *serfdom* (without any normative connotation) that a representative Brazilian individual has to offer to the government, out of a total of 365 days a year, in order to obtain a GDP at its optimal economic level.

The concept of *serfdom* is nothing more than an application of the *tax freedom day* calculated by the *Tax Foundation* for the USA. The idea is to apply the percentage of total tax burden (federal, state and local government) of GDP to the total number of days in a standard year (normally, 365 days). Thus, for the sake of comprehension, a tax burden of 50% of GDP, applied to a year of 365 days would give us 182,5 (183) working days which, for all practical purposes, are dedicated to the payment of taxes (hence the choice of the term “*serfdom*”¹¹). In other words, only from the 184th day onward would that individual actually be working for himself¹².

The pattern of this indicator for Brazil can be followed in Graph 1 below.

Graph 1



Sources: Varsano *et alii* (1996) for 1947-1996.
Ministry of Finance (2000, 2001, 2002) for 1996-2002.
Authors' calculations for 2003.

¹⁰ Notice that, in (3), if $c, b > 0$, then the condition for tax variations to have positive relation with GDP in logarithms is such that $Y > 1$, something reasonable. Specifically, in the case where $c/b = 1$, then the condition is translated into: $T < Y/2$. Notice as well that, for any positive parameters, $\frac{\partial^2 \ln Y}{\partial T^2} < 0$, which, in a sense, could be thought of as a Laffer Tax Curve.

¹¹ In the appendix we present the calculations for the tax freedom days in Brazil, for the period 1947–2003. It is important to emphasize that any comparison with data from any other country should be undertaken with care, given the different tax institutions adopted.

¹² “Tax Freedom Day is the day when Americans will finally have earned enough money to pay off their total tax bill for the year. Every dollar that’s officially called income by the government is counted, and every payment to the government that is officially considered a tax is counted. Taxes at all levels of government are included, whether levied by the Uncle Sam or state and local governments” [Tax Foundation (2004), p.2]. Notice that the hypothesis of 365 days a year is simply a change of scale, moreover, in order to obtain a TFD, it is necessary to assume that the individual, theoretically, works from the start of the year to pay the government its due. However, this hypothesis is unnecessary for calculating the days of serfdom.

As can be seen, in the period of the military government (1964–85) – initially supported by promises of steering Brazil away from a possible socialist path – the level of serfdom increased. Another significant period is that of President Fernando Henrique Cardoso (1994–2002), during which, again, in spite of accusations that branded his government as supposedly neoliberal, the average level of serfdom rose.

As we mentioned in section 1, the tendency of rise in days of serfdom is not a problem. The problem consists in knowing if this number of days is at its optimal point, that is, at the point where government offers public goods efficiently, without sacrificing the workings of the markets.

The estimation of this level is presented below.

3. Econometrics of Leviathan: how many days a year of serfdom?

For the econometric evaluation of the model exposed above, we used GDP data and total tax burden as percentages of GDP. The period of analysis was 1947–2003. Real GDPs at 2003 prices were obtained through IPEA.

The tax burden was obtained from Varsano *et alli* (1998), the Ministry of Finance (2002) and calculations by the authors. The series were tested for unit roots with both the Perron (1989) and Perron & Vogelsang (1998) methodologies. In the first case, both presented one unit root at level and none in difference. In the second case, the results indicated that the optimal break date was 1965 for the tax burden and 1975 for GDP¹³.

To determine the optimal tax burden, and, based on this, the optimal number of serfdom days, the problem was approached with the estimation of the Bewley transformation, which allows us to observe directly the long term relation among the variables and to test their cointegration. A dummy variable was included for the years 1973–1980 in order to capture the distinct pattern of government growth during the period posterior to the so called *Economic Miracle*¹⁴.

The specification proposed by Bewley (1979) employs a two-stage estimation using as an instrument the vector X_{t-1} for the variables $d(X)$, thus obtaining asymptotically efficient estimators. The Hendry procedure was employed for the choice of the adequate level of lags.

Table 1

Regression Results				
Dependent Variable: real GDP (in logs), 1947 -2003				
Method: Two-Stage Least Squares (Bewley)				
Included observations: 56				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Instrument list: MILAGRE LTRIB LPRIV LPIB(-1) LTRIB(-1) LPRIV(-1)				
Independent Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	-52.63874	20.49319	-2.568597	0.0133
LTRIB	6.022857	1.130611	5.327082	0.0000
LPRIV	12.58684	3.940197	3.194471	0.0025
MILAGRE	0.287680	0.147962	1.944287	0.0576
D(LPIB)	-12.24388	2.010251	-6.090724	0.0000
D(LTRIB)	-7.312006	3.096682	-2.361239	0.0222
D(LPRIV)	-16.14036	11.17999	-1.443683	0.1552
R-squared	0.847159	Mean dependent var	20.10216	
Adjusted R-squared	0.828444	S.D. dependent var	0.880730	
S.E. of regression	0.364793	Sum squared resid	6.520618	
F-statistic	53.38581	Durbin-Watson stat	1.739978	
Prob(F-statistic)	0.000000			

Source: Authors' calculations.

¹³ Descriptive statistics and the unit root tests can be found in Appendix I.

¹⁴ We didn't find statistical significance for the break date at 1965.

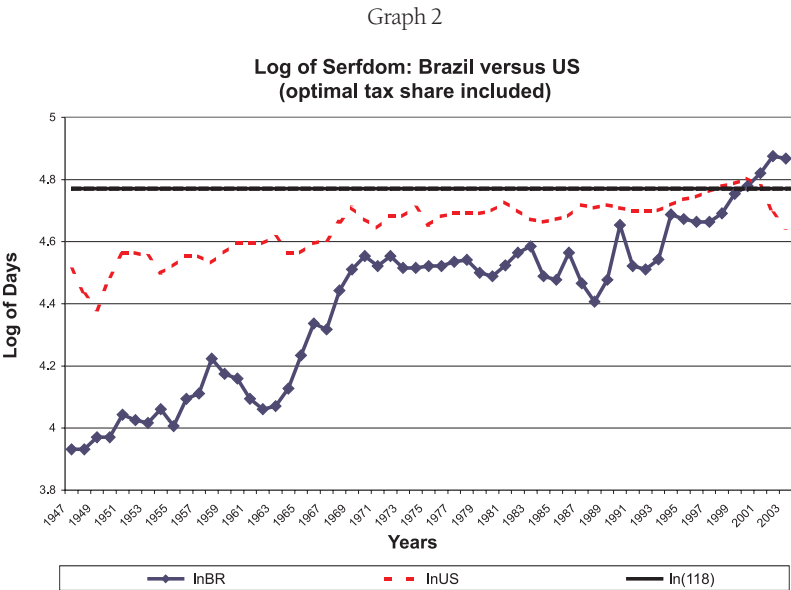
In the equation above, the Phillips-Perron unit root test returned $P = -6.626477$, which led us to reject the unit root hypothesis in the residuals at any of the recorded levels (1%, 5%, or 10%)

An optimal tax burden of 32.36% is obtained, which corresponds approximately to an optimal value of 118 days of serfdom. This figure is quite close to the one obtained in 2000 – 119 days – halfway through President Fernando Henrique Cardoso's second term in office. The current administration of President Luis Inácio da Silva (Lula) has been crossing this limit, as the tax burden in his first year of government was 35,85%, and remained practically unaltered in 2003 (35,53%).

4. Conclusions

The results above raise the question of whether the figure for the optimal days of serfdom is high or low. This, however, is a relative comparison. In this sense it is, a priori, very difficult to compare magnitudes such as these for different countries at any given point in time. This occurs because tax systems vary greatly from one country to another. Even though it gives us an imprecise idea, it might be interesting to make a comparison with the country that, at the start of the nineteenth century, did not possess a per capita income much different from ours, and was a former European colony, as well. We are referring to the USA.¹⁵

The graph below illustrates the pattern of serfdom days over time for both countries, in logarithmic scale. For the sake of comparison, we have included the optimal level of serfdom calculated for the Brazilian case.



Source: Authors' calculations.

A distinct pattern emerges for both countries: in the long run, apparently, the days of serfdom seem to have stabilized in the USA – or, in other words, the tax share – while Brazil already crossed it in 2001. Notice that the two series start off quite apart and, after vigorous growth in the 1960s, the Brazilian series stabilizes until around the mid-1980s.

In view of the difficulty of comparing these two countries, it might be worthwhile to pose some hypotheses on the Brazilian case. The pattern of the historical series above seems to indicate that demand for public goods may have had an important role in the increase of the annual serfdom of Brazilians.¹⁶

¹⁵ "In 1800 per capita income in the United States was slightly less than twice that in Mexico and roughly the same as in Brazil. By 1913 U.S. GDP was four times that of Mexico and seven times that of Brazil". [Haber, S. (1997), p.1]

¹⁶ While examining the demand for quality of life and government size, Scully (2001) found that government expenditures in developed countries are excessive in relation to the quality of life demanded. This leads to the question of whether a decrease of government size would be possible without harming the level of welfare. As the Brazilian economy went through significant development in the period under analysis (1947-2003), it may well be that part of the increase of serfdom was necessary for a greater coverage of public goods, both in terms of supply and diversity. For instance, the vast majority of regulatory agencies appear in Brazil only in the 1990s.

An explanation for this growth may be attempted. Firstly, as is recognized by a wide range of researchers, the Brazilian economy, in the period under study, presented a growth trajectory strongly influenced by governmental actions. According to the theory of rent-seeking, this would bring about an entrenchment of certain vested interests, curbing the possibility of any decrease in the size of the public sector. On the other hand, especially in the 1990s, privatization and the establishment of regulatory frameworks represented, to a certain point, a backlash, in the sense of increasing competition in some sectors and raising the interest of the state for issues such as “consumer defense”, “competition defense”. Although these may have been the justifications used, the creation of regulatory agencies was not accompanied by a decrease in the number of ministries. Indeed, the present government has made a point of repeatedly attempting to dilute the power of these agencies in favor of ministries which, in turn, are much less independent of the Executive. Thus, the problem is that, apparently, the *rent-seeking* society is still the main problem to deal with¹⁷. More than ever, a *fiscal constitution* to limit the government's power to tax, such as proposed by Brennan and Buchanan, is urgently needed.

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¹⁷ For a detailed explanation of the lack of control of special interest groups in Brazil, see Monteiro (2004).



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Appendix I – Descriptive Statistics/Unit Roots Tests

Descriptive Statistics

Sample: 1947 2003

	LPIB	LPRIV	LTRIB
Mean	20.07123	4.339411	3.106907
Median	20.36261	4.322011	3.205182
Maximum	21.16550	4.456206	3.579622
Minimum	18.33925	4.161068	2.627563
Std. Dev.	0.903525	0.077108	0.265701
Observations	57		

Unit Roots (Perron (1989))

Level

Null Hypothesis: LPIB has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 3 (Newey-West using Bartlett kernel)

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-0.113797	0.9934
Test critical values:		
1% level	-4.130526	
5% level	-3.492149	
10% level	-3.174802	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.001117
HAC corrected variance (Bartlett kernel)	0.002060

First difference

Null Hypothesis: D(LPIB) has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West using Bartlett kernel)

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.927314	0.0035
Test critical values:		
1% level	-3.555023	
5% level	-2.915522	
10% level	-2.595565	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.001068
HAC corrected variance (Bartlett kernel)	0.001058
Durbin-Watson stat	2.249241
Prob(F-statistic)	0.000241

Level

Null Hypothesis: LTRIB has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 3 (Newey-West using Bartlett kernel)

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.332239	0.4101
Test critical values:		
1% level	-4.130526	
5% level	-3.492149	
10% level	-3.174802	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.003234
HAC corrected variance (Bartlett kernel)	0.003100

First difference

Null Hypothesis: D(LTRIB) has a unit root
Exogenous: Constant
Bandwidth: 9 (Newey-West using Bartlett kernel)

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-7.796815	0.0000
Test critical values:		
1% level	-3.555023	
5% level	-2.915522	
10% level	-2.595565	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.003636
HAC corrected variance (Bartlett kernel)	0.002346

Level

Null Hypothesis: LPRIV has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 4 (Newey-West using Bartlett kernel)

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.237825	0.4599
Test critical values:		
1% level	-4.130526	
5% level	-3.492149	
10% level	-3.174802	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000331
HAC corrected variance (Bartlett kernel)	0.000338

First difference

Null Hypothesis: D(LPRIV) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 15 (Newey-West using Bartlett kernel)

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-8.009557	0.0000
Test critical values:		
1% level	-4.133838	
5% level	-3.493692	
10% level	-3.175693	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000366
HAC corrected variance (Bartlett kernel)	0.000224

Unit Roots with Unknown Break Date (Perron & Vogelsang (1998))

Y = LTRIB

Dependent Variable: Y
Method: Least Squares
Sample: 1947 2003
Included observations: 57

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.644411	0.035834	73.79560	0.0000
_T	0.012802	0.003143	4.073479	0.0002
_DU	0.210242	0.041390	5.079565	0.0000
_DT	-0.003764	0.003333	-1.129335	0.2638
R-squared	0.924521	Mean dependent var		3.106907
Adjusted R-squared	0.920248	S.D. dependent var		0.265701
S.E. of regression	0.075035	Akaike info criterion		-2.274131
Sum squared resid	0.298404	Schwarz criterion		-2.130759
Log likelihood	68.81273	F-statistic		216.3928
Durbin-Watson stat	0.702225	Prob(F-statistic)		0.000000

Dependent Variable: _DY
Method: Least Squares
Sample (adjusted): 1948 2003
Included observations: 56 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
_Y(-1)	-0.323338	0.104971	-3.080264	0.0033
_DTB	-0.102864	0.055719	-1.846117	0.0704
R-squared	0.207226	Mean dependent var		0.002834
Adjusted R-squared	0.192545	S.D. dependent var		0.061658
S.E. of regression	0.055405	Akaike info criterion		-2.913219
Sum squared resid	0.165767	Schwarz criterion		-2.840885
Log likelihood	83.57014	Durbin-Watson stat		1.833473

Break date = 1965

Y = LPIB

Dependent Variable: Y
Method: Least Squares
Sample: 1947 2003
Included observations: 57

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.26621	0.019535	935.0385	0.0000
_T	0.069195	0.001137	60.83725	0.0000
_DU	0.233959	0.027205	8.599866	0.0000
_DT	-0.044445	0.001653	-26.89446	0.0000
R-squared	0.996955	Mean dependent var		20.07123
Adjusted R-squared	0.996783	S.D. dependent var		0.903525
S.E. of regression	0.051246	Akaike info criterion		-3.036785
Sum squared resid	0.139184	Schwarz criterion		-2.893413
Log likelihood	90.54837	F-statistic		5785.101
Durbin-Watson stat	0.575151	Prob(F-statistic)		0.000000

Dependent Variable: _DY
Method: Least Squares
Sample (adjusted): 1950 2003
Included observations: 54 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
_Y(-1)	-0.462608	0.091364	-5.063338	0.0000
_DTB	-0.115134	0.026602	-4.327969	0.0001
_DY(-1)	0.447058	0.120585	3.707397	0.0005
_DTB(-1)	0.070588	0.031077	2.271374	0.0276
_DY(-2)	0.434210	0.135306	3.209086	0.0024
_DTB(-2)	0.061051	0.032584	1.873629	0.0671
R-squared	0.616548	Mean dependent var		-0.001232
Adjusted R-squared	0.576605	S.D. dependent var		0.038705
S.E. of regression	0.025185	Akaike info criterion		-4.420708
Sum squared resid	0.030445	Schwarz criterion		-4.199710
Log likelihood	125.3591	Durbin-Watson stat		1.959232

Break date= 1975

Appendix II - Days of Serfdom (Brazil/USA)

years	Brazil	USA	years	Brazil	USA
1947	51	91	1976	92	108
1948	51	84	1977	93	109
1949	53	80	1978	94	109
1950	53	89	1979	90	109
1951	57	96	1980	89	110
1952	56	96	1981	92	113
1953	55	95	1982	96	110
1954	58	90	1983	98	107
1955	55	92	1984	89	106
1956	60	95	1985	88	107
1957	61	95	1986	96	108
1958	68	93	1987	87	112
1959	65	96	1988	82	111
1960	64	99	1989	88	112
1961	60	99	1990	105	111
1962	58	99	1991	92	110
1963	59	101	1992	91	110
1964	62	96	1993	94	110
1965	69	96	1994	109	112
1966	76	99	1995	107	114
1967	75	100	1996	106	115
1968	85	106	1997	106	117
1969	91	111	1998	109	119
1970	95	107	1999	116	120
1971	92	104	2000	119	122
1972	95	108	2001	124	119
1973	91	108	2002	131	109
1974	91	111	2003	130	104
1975	92	105			

Sources: Brazil: Varsano et alli (1996) for 1947-1996.
Ministério da Fazenda (2000, 2001, 2002) for 1996-2002
Author’s calculations for 2003.
USA: Tax Foundation (2004).