Finnancial Development and Growth

Econometrics

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DATA

The data set we put together for this paper reflects the main factors identified by economic historians discussed above.
The factors often associated with the economic performance of Brazil are the following:
financial development, macroeconomic volatility, trade openness, public deficit, and international financial integration.
Our basic data source is "International Historical Statistics: The Americas: 1750 – 2000" (Mitchell. B. R., 2003).
Data was recorded yearly for Brazil including: Gross Domestic Product, Deposits at Banco do Brasil, Deposits in Commercial Banks, and M1.
However, the money standards of the data changed from time to time and figures are often incomplete for a given subperiod. Therefore, in order to find relatively complete series to avoid bias as much as possible, other resources are included.

Our two main measures of financial development try to capture the efficiency of the financial sector, not its relative size.
The first is the Commercial Bank Deposits over GDP. Deposits in commercial banks have been reported by Mitchell. B. R. (2003). However, due to the missing figures, we follow a more practicable method of Peláez and Suzigan (1976) to regenerate the series. Total deposits in commercial banks are defined as the summation of time deposits in commercial banks and deposits at the end of the period in commercial banks.
Our second measure is the deposits at Banco do Brasil over GDP. It is measured by the added value of time deposits and deposits at the end of the period in the central bank. Given its more restrictive nature we use this variable mostly for robustness check thereby attaching greater weight to commercial bank deposits (see Figure 1).

For robustness we also use two measures of financial development that reflect depth. The first indicator we use is the ratio of M2 to GDP. The main reason for considering this measure is that it has been used extensively in the finance-growth literature (see Campos et al. 2011). We also use a narrower version of this variable (M1 over GDP) to further check for the robustness of our results.

Further, our measures of trade openness and public deficits are both quoted from Mitchell (2007) and IBGE.
Actually, Mitchell (2007) provided data from 1870 until 2004. However, data are in millions of US dollars since 1949. Further, as our GDP series that we collected is in national currency, we adopted IBGE's figures from 1949 to 1980.
Public deficit is proxied as the ratio of total public deficit to GDP, while trade openness is measured as the ratio of imports plus exports to GDP (see Figure 2).

Finally, international financial sector developments should also have an impact on Brazil's economic growth, although for most of the period since 1930 Brazil remained a closed economy. Marcelo Abreu states that from 1930-1980 Brazil had a "cross-eyed" foreign economic orientation, with bold export promotion polices and a rather closed domestic market. But Brazil, as the largest economy in Latin America, and ninth largest in the world, cannot be isolated to the world economy environment.
However, it is still hard to measure the world economy environment itself, especially when we take both the depression and World War periods into account. Thus, in standard fashion in this type of study, we use the level of interest rate in US as our proxy of the global financial market. US interest rates are quoted from Milton Fridman (1982) (see Figure 3).

We present our main reasons in three interdependent blocs: the direct, indirect and dynamic (short and long-run) effects.

THE MODEL; DIRECT EFFECTS

Let growth (y_t) follow a white noise process augmented by a risk premium defined in terms of volatility:

$$y_t = c + kh_t + \lambda x_{it-l_1} + \epsilon_t, \tag{1}$$

where h_t is specified as a Power GARCH(1,1) process with lagged growth included in the variance equation:

$$h_t^{\frac{\delta}{2}} = \omega + \alpha h_{t-1}^{\frac{\delta}{2}} \left|\varepsilon_{t-1}\right|^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l_2}, \tag{2}$$

where δ (with $\delta > 0$) is the heteroscedasticity parameter,
α and β are the ARCH and GARCH coefficients respectively.

$$y_t = c + kh_t + \lambda x_{it-l_1} + \epsilon_t,$$

We first, examine the direct effect of each variable (denoted by x_{it-l_1}) on growth. If λ is positive and significant the effect is positive. If λ is negative and significant the effect is negative.
We would expect that:
Financial development, public deficit and trade openness have a negative direct effect on growth.
Whereas international financial development has a positive direct effect.

Table 1A. Direct Effect on Economic Growth with Level Effects

$x_{it}\downarrow$	k	λ	α	β	γ	δ
Panel A: Financial Development						
M1	0.011 (17.05)	−0.396 (−1.78) $l-6$	0.61 (3.75)	0.39 (3.23)	0.120 (4.73) $l-8$	1.00 –
Commercial Bank Deposits	0.006 (4.83)	−0.016 (−0.30) $l-2$	0.59 (3.54)	0.49 (3.93)	−0.048 (−0.67) $l-4$	0.80 –
Deposits at Banco do Brasil	0.010 (6.90)	−0.069 (−4.41) $l-3$	0.72 (5.09)	0.32 (3.48)	0.148 (7.37) $l-8$	1.00 –

Table 1A reports parameter estimates for the following model:

$y_t = c + kh_t + \lambda x_{i,t-l_1} + \varepsilon_t,\ h_t^{\frac{\delta}{2}} = \omega + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l_2}$

$x_{i,t-l_1}$ is a measure of financial development

(l_i is the order of the lag).

The numbers in parentheses are t statistics.

Table 1B. Direct Effect on Economic Growth with Level Effects

$x_{it} \downarrow$	k	λ	α	β	γ	δ
Panel B: Trade Openness						
Exports	0.010	−0.041	0.74	0.30	0.194	0.90
	(7.90)	(−2.02)	(5.52)	(3.41)	(7.48)	−
		$l-3$			$l-8$	
Imports	0.010	−0.109	0.59	0.38	0.177	0.90
	(6.22)	(−2.63)	(4.52)	(4.07)	(6.04)	−
		$l-2$			$l-8$	
Trade Openness	0.010	−0.038	0.69	0.34	0.150	1.00
	(6.17)	(−1.98)	(5.62)	(3.67)	(7.41)	−
		$l-5$			$l-8$	

Table 1B reports parameter estimates for the following model:

$$y_t = c + kh_t + \lambda x_{i,t-l_1} + \varepsilon_t,\ h_t^{\frac{\delta}{2}} = \omega + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l_2}$$

$x_{i,t-l_1}$ is either trade openness or exports or imports. (l_i is the order of the lag).

The numbers in parentheses are t statistics.

Table 1C. Direct Effect on Economic Growth with Level Effects

$x_{it} \downarrow$	k	λ	α	β	γ	δ
Panel C: Public Deficit						
Expenditures	0.005	−0.023	0.61	0.52	−0.057	1.00
	(4.81)	(−1.82) $_{l-1}$	(3.45)	(4.61)	(−0.76) $_{l-2}$	−
Revenues	0.010	−0.040	0.67	0.35	0.110	1.00
	(6.70)	(−3.70) $_{l-6}$	(3.84)	(2.81)	(3.12) $_{l-8}$	−
Public Deficit	0.009	−0.220	0.65	0.36	0.111	1.00
	(5.69)	(−4.49) $_{l-6}$	(3.82)	(3.31)	(4.86) $_{l-8}$	−
Panel D: International Financial Development						
US Interest Rate	0.009	0.010	0.60	0.41	0.124	1.00
	(4.93)	(2.38) $_{l-1}$	(5.70)	(4.21)	(2.43) $_{l-8}$	−

Table 1C reports parameter estimates for the following model:

$y_t = c + kh_t + \lambda x_{i,t-l_1} + \varepsilon_t$, $h_t^{\frac{\delta}{2}} = \omega + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l_2}$

$x_{i,t-l_1}$ can be public deficit or US interest rate. (l_i is the order of the lag).

The numbers in parentheses are t statistics.

THE MODEL; INDIRECT EFFECTS

Let growth (y_t) follow a white noise process augmented by a risk premium defined in terms of volatility:

$$y_t = c + kh_t + \epsilon_t, \tag{3}$$

where h_t is specified as a Power GARCH(1,1) process with lagged growth included in the variance equation:

$$h_t^{\frac{\delta}{2}} = \omega + \alpha \left|\varepsilon_{t-1}\right|^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \phi x_{i,t-l_1} + \gamma y_{t-l_2}, \tag{4}$$

and a lagged value of our variable included in the variance equation as well. The coefficient ϕ captures the indirect effect of the variable $x_{i,t-l_1}$ on growth: If ϕ is negative and significant then x_i affects h_t negatively, and therefore (if k is positive and significant) it has a positive indirect impact on growth.

Table 2A. Indirect Effect on Economic Growth with Level Effects

$x_{it} \downarrow$	k	α	β	ϕ	γ	δ
Panel A: Financial Development						
M1	0.010 (6.16)	0.62 (3.66)	0.38 (2.98)	−0.349 (−1.76) $l-6$	0.157 (4.22) $l-8$	0.90 –
Commercial Bank Deposits	0.010 (5.97)	0.66 (3.97)	0.38 (3.28)	−0.007 (−0.53) $l-8$	0.140 (5.31) $l-8$	1.00 –
Deposits at Banco do Brasil	0.010 (4.57)	0.53 (3.26)	0.40 (3.03)	−0.121 (−2.88) $l-3$	0.128 (3.82) $l-8$	1.00 –

Table 2A reports parameter estimates for the following model:

$$y_t = c + kh_t + \varepsilon_t,\ h_t^{\frac{\delta}{2}} = \omega + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \phi x_{i,t-l_1} + \gamma y_{t-l_2}$$

(l_i is the order of the lag). $x_{i,t-l_1}$ can be financial development .

The numbers in parentheses are absolute t statistics.

Table 2B. Indirect Effect on Economic Growth with Level Effects

$x_{it} \downarrow$	k	α	β	ϕ	γ	δ
Panel B: Trade Openness						
Exports	0.012 (4.12)	0.47 (3.75)	0.36 (2.53)	−0.134 (−3.95) $l-8$	0.117 (4.75) $l-8$	1.00 –
Imports	0.010 (12.22)	0.72 (4.72)	0.33 (3.44)	−0.033 (−1.73) $l-4$	0.142 (7.73) $l-8$	1.00 –
Trade Openness	0.012 (3.82)	0.50 (3.82)	0.33 (2.19)	−0.143 (−2.54) $l-8$	0.170 (4.78) $l-8$	0.90 –

Table 2B reports parameter estimates for the following model:

$y_t = c + kh_t + \varepsilon_t,\ h_t^{\frac{\delta}{2}} = \omega + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \phi x_{i,t-l_1} + \gamma y_{t-l_2}$

(l_i is the order of the lag). $x_{i,t-l_1}$ can be trade openness (or exports or imports).

The numbers in parentheses are absolute t statistics.

Table 2C. Indirect Effect on Economic Growth with Level Effects

$x_{it} \downarrow$	k	α	β	ϕ	γ	δ
Panel C: Public Deficit						
Expenditures	0.010 (4.04)	0.51 (3.35)	0.42 (3.46)	−0.044 (−2.69) $_{l-2}$	0.107 (3.59) $_{l-8}$	1.00 –
Revenues	0.007 (5.18)	0.59 (3.21)	0.43 (3.21)	−0.099 (−6.41) $_{l-8}$	0.113 (3.20) $_{l-8}$	1.00 –
Public Deficit	0.010 (5.80)	0.58 (3.78)	0.38 (3.08)	−0.098 (−2.86) $_{l-3}$	0.195 (4.31) $_{l-8}$	0.80 –
Panel D: International Financial Development						
US Interest Rate	0.010 (4.90)	0.57 (4.46)	0.33 (3.06)	0.011 (10.26) $_{l-2}$	0.080 (2.91) $_{l-8}$	1.00 –

Table 2C reports parameter estimates for the following model:

$y_t = c + kh_t + \varepsilon_t,\ h_t^{\frac{\delta}{2}} = \omega + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \phi x_{i,t-l_1} + \gamma y_{t-l_2}$

(l_i is the order of the lag). $x_{i,t-l_1}$ can be either public deficit or US interest rate.

The numbers in parentheses are absolute t statistics.

We find that financial development (with the exception of Commercial Bank Deposits), trade openness and public deficit affect the volatility of growth negatively, and therefore (since k is positive and significant) they have a negative indirect impact on growth. In sharp contrast, US interest rate affects the volatility of growth positively.

THE MODEL; SHORT AND LONG RUN EFFECTS

In order to estimate short- and long- run relationships we employ the following error correction form

$$\Delta y_t = \mu + \theta \Delta x_{i,t-l} + \varphi(y_{t-1} - c - \zeta x_{i,t-1}) + \varepsilon_t, \tag{5}$$

where θ and ζ capture the short and long-run effects respectively, and φ is the speed of adjustment to the long-run relationship (see also, Loayaza and Rancière,2006)

The lag of the first difference of our variable ($\Delta x_{i,t-l}$) characterizes the short-run effect.

The condition for the existence of a long-run relationship (dynamic stability) requires that the coefficient on the error-correction term be negative and not lower than -2 (that is, $-2 < \varphi < 0$).

In other words, the term in parenthesis contains the long-run growth regression, which acts as a forcing equilibrium condition

$$y_t = c + \zeta x_{it} + u_t, \tag{6}$$

where u_t is $I(0)$.
For details on the "ARDL approach," see Pesaran (1997) and Pesaran and Shin (1999).
As pointed out by Loayaza and Rancière (2006) the requirements for the validity of this methodology are that:
i) there exists a long-run relationship between the variables of interest and,
ii) the dynamic specification of the model is sufficiently augmented so that the regressors are strictly exogenous and the resulting residual is serially uncorrelated.

Table 3 below presents the results on the estimation of short and long-run parameters linking the four explanatory variables with growth.
In all cases, the estimated coefficient on the error correction term (φ) lies within the dynamically stable range $(-2, 0)$.
From investigating whether dynamic considerations affect our conclusions, we find important differences in terms of short and long-run behavior of our explanatory variables:

	DIR	INDIR	SR	LR
Financial Development	-	-	-	+
Trade Openness	-	-	-	0
Public Deficit	-	-	-	-
US Interest Rate	+	+	+	-

That is, direct, indirect and short run effects work in the same direction.
For the financial development and the US interest rate the long run effects work in the opposite direction than the short run effects.
There is no long run effect of trade openness on growth whereas for public deficit both short and long-run effects are negative.

Table 3A The Short- and Long-run Effects on Growth with Level Effects

$x_{it}\downarrow$	θ	ζ	φ	γ	δ
Panel A: Financial Development					
M1	-0.779 (-3.47) $l-6$	0.391 (6.76)	-0.997 (-6.18)	0.019 (0.41) $l-8$	1.00 –
Commercial Bank Deposits	-0.385 (-2.96) $l-3$	0.018 (1.77)	-0.907 (-6.11)	0.028 (0.64) $l-8$	1.00 –
Deposits at Banco do Brasil	-0.218 (-2.00) $l-4$	-0.135 (-1.30)	-0.625 (-7.74)	0.024 (0.34) $l-8$	0.90 –

Table 3A reports parameter estimates for the following model:

$$\Delta y_t = \mu + \theta \Delta x_{i,t-l_1} + \varphi(y_{t-1} - c - \zeta x_{i,t-1}) + \varepsilon_t,$$

$$h_t^{\frac{\delta}{2}} = \omega + \alpha \left|u_{t-1}\right|^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l_2}.$$ (l_i is the order of the lag)

θ and ζ capture the short- and long-run effects respectively.

φ indicates the speed of adjustment to the long-run relationship

$\Delta x_{i,t-l_1}$ can be financial development.

The numbers in parentheses are absolute t statistics.

Table 3B The Short- and Long-run Effects on Growth with Level Effects

$x_{it} \downarrow$	θ	ζ	φ	α	β	γ	δ
Panel C: Public Deficit							
Revenues	−0.086 (−1.88) $l-4$	−0.142 (−5.77)	−0.703 (−8.79)	0.56 (2.90)	0.54 (3.69)	0.056 (1.33) $l-8$	0.90 –
Expenditures	−0.049 (−2.34) $l-6$	−0.143 (−10.69)	−0.567 (−9.31)	0.96 (8.20)	0.26 (5.06)	0.148 (2.82) $l-5$	1.00 –
Public Deficit	−0.246 (−2.70) $l-8$	0.028 (0.70)	−0.528 (−7.29)	0.72 (5.70)	0.26 (3.32)	0.116 (3.03) $l-5$	1.00 –
Panel D: International Financial Development							
US Interest Rate	0.012 (3.19) $l-4$	−0.002 (−3.57)	−0.612 (−8.50)	0.52 (2.83)	0.53 (3.85)	0.044 (1.39) $l-5$	1.00 –

Table 3B reports parameter estimates for the following model:

$$\Delta y_t = \mu + \theta \Delta x_{i,t-l_1} + \varphi(y_{t-1} - c - \zeta x_{i,t-1}) + \varepsilon_t,$$

$$h_t^{\frac{\delta}{2}} = \omega + \alpha \left|u_{t-1}\right|^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l_2}. \ (l_i \text{ is the order of the lag})$$

θ and ζ capture the short- and long-run effects respectively.

φ indicates the speed of adjustment to the long-run relationship

$\Delta x_{i,t-l_1}$ can be either public deficit or US interest rate.

The numbers in parentheses are absolute t-statistics

STRUCTURAL BREAKS

One final important robustness test regards the role of structural breaks. We use the methodology developed by Bai and Perron (2003) to examine whether there are any structural breaks in growth, its volatility, the three financial development variables, the various aspects of trade openness and the three forms of public deficit. Bai and Perron (2003) address the problem of testing for multiple structural changes under very general conditions on the data and the errors. In addition to testing for the existence of breaks, these statistics identify the number and location of multiple breaks.

In the case of the economic growth series the Bai-Perron methodology supports one structural break point which occur for year 1918.
For public deficit we find one structural break which is dated for year 1965.
The other two aspects of public deficit have two structural breaks: 1890 and 1980.
Our Bai-Perron results support that commercial bank deposits and deposits at banco de brasil have one structural break each, which are dated for year 1914 and 1901, respectively.
Further, we also find one structural break in all three measures of trade openness: it is dated 1899 for imports and trade openness (M1 also has one break at this date), and 1901 for exports.
US interest rate and, interestingly, also for growth volatility we find no structural breaks.

In what follows, we incorporate dummy variables in the above equations, thus taking into account breaks in growth and the other variables.
First, we introduce the following notation. D_{it} is a (slope) dummy indicating the period which starts from the year of the break in our variable (x_{it}).
For example for commercial bank deposits $D_{it} = 1$ in the period from 1914 to 2003 and zero otherwise, whereas for the trade openness and imports $D_{it} = 1$ during the period from 1899 until the end of the sample.

Table 4A. Direct Effect on Economic Growth with Dummies

$x_{it} \downarrow$	k	λ	λ_1	λ_2	δ
Panel A: Financial Development					
M1	0.008	-1.654	1.096	-0.649	0.80
	(6.13)	(-4.15)	(2.27)	(-1.88)	–
		$l-6$	$l-6$	$l-1$	
Commercial Bank Deposits	0.002	-0.216	0.186	-0.015	1.00
	(1.88)	(-2.00)	(3.20)	(-0.22)	–
		$l-2$	$l-5$	$l-1$	
Deposits at Banco do Brasil	0.010	-0.089	-0.066	–	1.00
	(8.31)	(-2.95)	(-0.47)		–
		$l-3$	$l-8$		

Table 4A reports parameter estimates for the following model:

$$y_t = c + kh_t + \lambda x_{i,t-l_1} + \lambda_1 D_{1,t-l_2} x_{i,t-l_2} + \lambda_1 D_{2,t-l_3} x_{i,t-l_3} + \varepsilon_t,$$

$$h_t^{\frac{\delta}{2}} = \omega + \omega_1 D_{gr} + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l_4}$$ (l_i is the order of the lag).

D_{it} is a slope dummy defined as $D_{1t} = 1$ in the period 1889-2003 (for M1); 1914 - 2003 (for commercial bank deposits); 1911-2003 for deposits at bank do brasil). $D_{2t} = 1$ in the period 1930 - 2003 (for M1); 1962-2003 (for commercia bank deposits) and $D_{it} = 0$ otherwise. $x_{i,t-l_1}$ can be financial development

The numbers in parentheses are absolute t statistics.

Table 4B. Direct Effect on Economic Growth with Dummies

$x_{it} \downarrow$	k	λ	λ_1	ω_1	γ	δ
Panel B: Trade Openness						
Exports	0.011 (6.90)	−0.059 (9.59) $I-2$	0.056 (1.06) $I-7$	0.0008 (0.02)	0.221 (5.26) $I-8$	0.80 −
Imports	0.009 (5.77)	−0.103 (−2.76) $I-2$	−0.008 (−0.80) $I-4$	−0.0005 (−0.21)	0.141 (8.24) $I-8$	1.00 −
Trade Openness	0.014 (4.30)	−0.138 (−2.21) $I-8$	−0.113 (−1.15) $I-3$	0.0003 (0.08)	0.152 (3.75) $I-8$	1.00 −

Table 4B reports parameter estimates for the following model:

$y_t = c + kh_t + \lambda x_{i,t-l_1} + \lambda_1 D_{1,t-l_2} x_{i,t-l_2} + \varepsilon_t,$

$h_t^{\frac{\delta}{2}} = \omega + \omega_1 D_{gr} + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l_3}$ (l_i is the order of the lag).

D_{1t} is a slope dummy defined as $D_{1t} = 1$ in the period 1901 - 2003 (for exports); 1899 - 2003 (for imports and trade openness).

D_{gr} is an intercept dummy defined as $D_{gr} = 1$ in the period 1918-2003.

and $D_{gr} = 0$ otherwise. $x_{i,t-l_1}$ can be either exports or imports or trade openness

The numbers in parentheses are absolute t statistics.

Table 4C. Direct Effect on Economic Growth with Dummies

$x_{it} \downarrow$	k	λ	λ_1	λ_2	γ	δ
Panel C: Public Deficit						
Expenditures	0.010 (4.98)	−0.049 (−2.52) $_{l-5}$	−0.012 (−0.58) $_{l-4}$	−0.041 (−1.71) $_{l-3}$	0.105 (3.05) $_{l-8}$	1.00 −
Revenues	0.009 (5.01)	−0.051 (−1.89) $_{l-6}$	0.005 (0.17) $_{l-3}$	−0.045 (−2.04) $_{l-4}$	0.147 (3.06) $_{l-8}$	0.90 −
Public Deficit	0.010 (5.85)	−0.251 (−4.18) $_{l-6}$	0.194 (1.70) $_{l-1}$	−	0.135 (4.46) $_{l-8}$	0.90 −

Table 4C reports parameter estimates for the following model:

$$y_t = c + kh_t + \lambda x_{i,t-l_1} + \lambda_1 D_{1,t-l_2} x_{i,t-l_2} + \lambda_1 D_{2,t-l_3} x_{i,t-l_3} + \varepsilon_t,$$

$$h_t^{\frac{\delta}{2}} = \omega + \omega_1 D_{gr} + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l_4}$$

(l_i is the order of the lag). D_{it} is a slope dummy defined as $D_{1t} = 1$ in the period 1890 - 2003 (for expenditures and revenues) and 1965 - 2003 (for public deficit). $D_{2t} = 1$in the period 1980 - 2003 (for expenditures and revenues) and $D_{it} = 0$ otherwise.

$x_{i,t-l_1}$ can be public deficit (or expenditures or revenues).

The numbers in parentheses are absolute t statistics.

Table 5A . Indirect Effect on Economic Growth with Dummies

$x_{it} \downarrow$	k	ϕ	ϕ_1	ϕ_2	δ
Panel A: Financial Development					
M1	0.011	−0.789	0.684	−0.542	0.80
	(8.66)	(−3.02)	(1.93)	(−2.16)	−
		$l-6$	$l-7$	$l-8$	
Commercial Bank Deposits	0.007	0.038	0.003	−	1.00
	(4.55)	(1.04)	(0.06)1		−
		$l-4$	$l-$		
Deposits at Banco do Brasil	0.004	−0.216	0.202	−	1.00
	(6.87)	(−4.11)	(1.20)		−
		$l-3$	$l-3$		

Table A5 reports parameter estimates for the following model: $y_t = c + kh_t + \varepsilon_t$.

$h_t^{\frac{\delta}{2}} = \omega + \omega_1 D_{gr} + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \phi x_{i,t-l_1} + \phi_1 D_{i,t-l_2} x_{i,t-l_2} +$
$+ \gamma y_{t-l_3}$. (l_i is the order of the lag). D_{it} is a slope dummy defined as $D_{1t} = 1$ in the period 1889-2003 (for M1); 1914 - 2003 (for commercial bank deposits); 1911-200 (for deposits at bank do brasil). $D_{2t} = 1$ in the period 1930 - 2003 (for M1); 1962 - 2003 (for commercial bank deposits) and $D_{it} = 0$ otherwise.

$x_{i,t-l_1}$ can be financial development

The numbers in parentheses are absolute t statistics.

Table 5B . Indirect Effect on Economic Growth with Dummies

$x_{it} \downarrow$	k	ϕ	ϕ_1	ω_1	δ
Panel B: Trade Openness					
Exports	0.013	−0.117	0.007	−0.0021	1.00
	(4.04)	(−2.94)	(0.09)	(−0.88)	−
		$l-8$	$l-1$		
Imports	0.010	−0.034	−0.010	0.0007	1.00
	(7.16)	(−1.66)	(−0.10)	(0.31)	−
		$l-4$	$l-2$		
Trade Openness	0.012	−0.102	−0.013	−0.0012	1.00
	(5.27)	(−2.23)	(−0.23)	(−0.45)	−
		$l-8$	$l-3$		

Table 5 reports parameter estimates for the following model: $y_t = c + kh_t + \varepsilon_t$.
$h_t^{\frac{\delta}{2}} = \omega + \omega_1 D_{gr} + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \phi x_{i,t-l_1} + \phi_1 D_{i,t-l_2} x_{i,t-l_2} + \gamma$
(l_i is the order of the lag). D_{it} is a slope dummy defined as $D_{1t} = 1$ in the period 1901 - 2003 (for exports); 1899 - 2003 (for imports and trade openness).
D_{gr} is an intercept dummy defined as $D_{gr} = 1$ in the period 1918-2003 and $D_{gr} = 0$ otherwise.$x_{i,t-l_1}$ can be trade openness (or exports or imports).
The numbers in parentheses are absolute t statistics.

Table 5C . Indirect Effect on Economic Growth with Dummies

$x_{it} \downarrow$	k	ϕ	ϕ_1	ϕ_2	ω_1	δ
Panel C: Public Deficit						
Expenditures	0.007	−0.148	−0.053	0.103	−0.0025	1.00
	(5.74)	(−2.81)	(−2.70)	(1.65)	(−0.86)	–
		$l-5$	$l-7$	$l-5$		
Revenues	0.010	−0.067	−0.041	−0.041	−0.0017	1.00
	(8.84)	(−7.56)	(−2.76)	(−4.96)	(−0.75)	–
		$l-8$	$l-4$	$l-5$		
Public Deficit	0.008	−0.222	0.053	–	−0.0008	1.00
	(7.97)	(−5.46)	(0.64)		(−0.38)	–
		$l-1$	$l-4$			

Table 5 reports parameter estimates for the following model: $y_t = c + kh_t + \varepsilon_t$.
$h_t^{\frac{\delta}{2}} = \omega + \omega_1 D_{gr} + \alpha h_{t-1}^{\frac{\delta}{2}} \mid e_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \phi x_{i,t-l_1} + \phi_1 D_{i,t-l_2} x_{i,t-l_2}$
$+ \gamma y_{t-l_3}$ (l_i is the order of the lag).. D_{it} is a slope dummy defined as $D_{1t} = 1$ in the period 1890 - 2003 (for expenditures and revenues) and 1965 - 2003 (for public deficit).$D_{2t} = 1$ in the period 1980 - 2003 (for expenditures and revenues).and $D_{it} = 0$ otherwise. D_{gr} is an intercept dummy defined as $D_{gr} = 1$ in the period 1918-2003 and $D_{gr} = 0$ otherwise.
$x_{i,t-l_1}$ can be public deficit (or expenditures or revenues).
The numbers in parentheses are absolute t statistics.

Table 6A. The Short- and Long-run Growth Effects with Dummy Variables

$x_{it} \downarrow$	θ	θ_{d1}	θ_{d2}	ζ	φ
Panel A: Financial Development					
M1	-0.960	-0.102	-0.783	0.391	-0.68
	$(--3.06)$	(-0.29)	(-2.77)	(6.76)	(-8.47)
	$l-3$	$l-2$	$l-6$		
Commercial Bank Deposits	-0.116	0.107	-0.089	0.018	-0.78
	(-1.60)	(4.55)	(-2.19)	(1.77)	(-11.21)
	$l-4$	$l-1$	$l-4$		
Deposits at Banco do Brasil	-0.251	0.116	$-$	-0.135	-0.62
	(-2.25)	(0.61)		(-1.30)	(-7.91)
	$l-4$	$l-5$			

$\Delta y_t = \mu + \theta \Delta x_{i,t-l_1} + \theta_d D_{i,t-l_2} \Delta x_{i,t-l_2} + \varphi(y_{t-1} - c - \zeta x_{i,t-1}) + u_t,$

$h_t^{\frac{1}{2}} = \omega + \alpha \left| u_{t-1} \right|^{\delta} + \beta h_{t-1}^{\frac{1}{2}} + \gamma y_{t-l_3}$. ($l_i$ is the order of the lag).

θ and ζ capture the short- and long-run effects respectively.

φ indicates the speed of adjustment to the long-run relationship.

D_{it} is a slope dummy defined as $D_{1t} = 1$ in the period 1889-2003 (for M1); 1914 - 2003 (for commercial bank deposits); 1911-2003 for (for deposits at bank do brasil); $D_{2t} = 1$in the period 1930 - 2003 (for M1); 1962 - 2003 (for commercial bank deposits) and $D_{it} = 0$ otherwise. $\Delta x_{i,t-l_1}$ can be financial development. The numbers in parentheses are absolute t statistics.

Table 6B. The Short- and Long-run Growth Effects with Dummy Variables

$x_{it} \downarrow$	θ	θ_{d1}	θ_{d2}	ζ	φ	ω
Panel B: Public Deficit						
Expenditures	-0.067 (-3.95) $_{l-6}$	0.323 (2.45) $_{l-3}$	-0.459 (-3.34) $_{l-3}$	-0.142 (-5.77)	-0.67 (-11.32)	0.0039 (0.76)
Revenues	-0.087 (-1.91) $_{l-4}$	-0.040 (-0.92) $_{l-6}$	-0.061 (-2.11) $_{l-3}$	-0.143 (-10.69)	-0.69 (-9.05)	-0.0023 $(-.74)$
Public Deficit	-0.245 (-3.20) $_{l-8}$	0.062 (0.40) $_{l-2}$	$-$	0.028 (0.70)	-0.52 (-7.54)	0.0021 (0.66)

$\Delta y_t = \mu + \theta \Delta x_{i,t-l_1} + \theta_d D_{i,t-l_2} \Delta x_{i,t-l_2} + \varphi(y_{t-1} - c - \zeta x_{i,t-1}) + u_t,$

$h_t^{\frac{1}{2}} = \omega + \alpha \left| u_{t-1} \right|^{\delta} + \beta h_{t-1}^{\frac{1}{2}} + \gamma y_{t-l_3}.$ (l_i is the order of the lag).

θ and ζ capture the short- and long-run effects respectively.

φ indicates the speed of adjustment to the long-run relationship.

D_{it} is a slope dummy defined as $D_{1t} = 1$ in the period 1890 - 2003 (for expenditures and revenues) and 1965 - 2003(for public deficit).

$D_{2t} = 1$ in the period 1980 - 2003 (for expenditures and revenues) and $D_{it} = 0$ otherwise. $\Delta x_{i,t-l_1}$ can be public deficit.

The numbers in parentheses are absolute t statistics.