Economic Growth, Financial Development and Political Instability: Brazil, 1890-2003

Abstract

What is the relationship between financial development and economic growth and how does it change over time? This paper examines the growth-finance nexus using a new econometric approach and unique data set. In this paper, we apply the logistic smooth transition model (LST) to annual data for Brazil from 1890 to 2003. The main finding is that financial development has a time-varying effect on economic growth, which depends significantly on (jointly estimated) trade openness thresholds. Our estimates show that in 56% of the years in which financial development has a 'below the mean' effect, we find that trade openness experiences a substantial 'above the mean' change.

JEL classification: C14; D72; E23; N96; O40

Keywords: Economic Growth; Financial Development; Trade Openness; Political Instability; Smooth Transition Models

1 Introduction

In 2001, Goldman Sachs published an influential report. It was responsible for popularizing the BRICS acronym in business and economics. BRICS, of course, stands for Brazil, Russia, India, China and South Africa. The time of the report also marks the start of a shift in relative weights in the world economy towards the so-called emerging market countries. Although many analysts questioned whether Brazil should be included in such a distinguished group, few questioned that the country has undergone a most remarkable transformation in the last 100 years or so. From a poor, unsophisticated, primary exporter economy about one hundred years ago it became one of the largest and richest emerging markets of today. Economists have gone to great lengths to try to understand this important transformation. One class of potential explanations that has received considerable attention is related to finance. Various hypotheses have been put forward to explain this process of deep structural transformation but attention has focused on the roles of financial development, public finances and international financial integration. Few previous studies have tried to evaluate how the explanatory power of these factors has changed over time and this is one of the main contributions of this paper. We apply the LST model and use annual time series data for Brazil covering the period from 1890 to 2003.

The Brazilian case is particularly interesting to study the relationship between financial development, the instability of political institutions and economic performance because of its size (both in terms of populations and output), its hegemonic role in South American and its relatively important role globally. Furthermore, Brazil is important because despite the reputation of having a relatively peaceful history, this is a country that exhibits a huge variety of types of instability of political institutions (indeed of all the formal and informal types one can find in large cross-sections of countries) under considerable variation of contexts (empire and republic as well as over varying degrees of democracy and autocracy), over the very long time window we consider.

The focus of this study is on the relationship between financial development, political instability and economic growth. There is a growing body of evidence showing that the expansion of a country's financial sector promote its economic growth (see for instance Demirguc-Kunt and Maksimovic, 1998; King and Levine, 1993; Jayaratne and Strahan, 1996; Rajan and Zingales, 1998a). However, Levine (1997) argued that our understanding of long-run economic growth will be limited until we understand the evolution and functioning of financial systems. An authoritative and up-to-date review of this literature is Zingales (2015), which highlights an important yet under researched finding in terms of divergent short and long-run effects of finance on growth. For example, Gavin and Hausmann (1996) argue that rapid financial development and expansion could cause banking crises and economic collapse. Archand et al. (2015) showed that in countries with very large finacial sector, there is no positive correlation between financial depth and economic growth, while to those countries with small and medium financial sectors a positive correlation was detected.

Kaminsky and Schmukler (2003) argue that while financial development is robustly associated with economic growth, it has also often been found to be the main predictor of financial crises. That is, while the long-run effect of finance on growth is positive, the short-run effect is negative. Loayza and Ranciere (2006) report panel evidence that the negative short-run effect is sometimes larger than the positive long-run effect. Focusing on time-series evidence specifically for Argentina, Campos et al. (2012) show that the short-run effect of finance on growth was likely to be negative, but smaller than the positive long-run effect. The depth and extent of the debate surrounding substantial differences in the effect of finance on growth depending on whether one focuses on the shorter- (negative) or the (positive) longer-run suggests that further research examining this time-varying relationship would be valuable.

An important issue regards the channels through which political instability (that is, changes in formal and informal institutions) is expected to influence growth. It might be expected that instability will make property rights less secure and transaction costs too high, the rule of law weak and state capacity too thin to support sustained growth episodes. For example, Torstensson (1994) argues that many developing countries lack secure private property rights and that arbitrary seizures of property slow down economic growth. Kovac and Spruk (2016) quantified the impact of transaction costs on cross-country economic growth and find a significant negative effect of increasing transaction costs on growth. Weingast (1997) puts forward a game-theoretic framework to study the issue of political officials' respect for the political and economic rights of citizens in which democratic stability and the rule of law entails that political officials have motives to honor a range of self-enforcing limits on their behavior. Concluding, Acemoglu et al. (2015) study the direct and spillover effects of local state capacity in Colombia and find that the existence of central and local states with the ability to impose law and order is vital for economic development. They also note that the efficiency of state capacity is affected by various factors such as geographic, historical, political and social ones.

Recently there has been a lot of interest in the relationship between political instability and economic growth. In a seminal paper, using a cross section framework, Barro (1991) finds that assassinations, number of coups and revolutions have negative effects on economic growth. Campos and Nugent (2002) confirm this result by using panel data analysis but find that this negative impact (on growth) is mostly driven by sub-Saharan African countries. Yet, other researchers claim that there is no significant relationship between political instability and output growth. Easterly and Rebelo (1993) suggest that assassinations and war casualties have no significant effect on growth, while Benhabib-Spiegel (1997) and Sala-i-Martin (1997) support this argument using different data and methodologies. Knack and Keefer (1995) compared more direct measures of institutional environment (such as the security of property rights and the Gastil indicators of political freedoms and civil liberties) with instability proxies utilized by Barro (1991). They argue that institutions that protect property rights are important for economic growth.

Roland (2008) proposes a classification of "slow-moving" and "fast-moving" institutions and explains the potential implications of their interaction. This interaction reveals the problem of transplanting institutions into distinct cultural environments and the advantages of very different institutional systems for efficient growth and development. Finally, Spruk (2016a) examined the impact of de jure and de facto political institutions on the long-run economic growth for a large panel of countries. The empirical evidence suggested among others that societies with more extractive political institutions in Latin America experienced slower long-run economic growth and failed to converge with the West.

This paper tries to contribute to the existing literature by further investigating the time-varying link basically between finance, political instability and economic growth. It uses the smooth transition framework and annual time series data for Brazil covering the period from a very long time window covering 1890 to 2003. The paper chiefly addresses the following questions: What is the relationship between economic growth, on the one hand, and financial development, trade openness and political instability, on the other? Does the intensity and sign of these effects vary over time?

We may add that this paper also contributes to the literature on economic growth. Regarding the body of scholarly research on the main causes of economic growth, Durlauf et al. (2005) and Acemoglu (2009) provide recent, authoritative surveys that support the view that there seems to be dissatisfaction with the empirical growth literature. This paper tries to improve matters in this regard by focusing on a single country as opposed to following the common practice of trying to learn something about growth by focusing on the mean or median country. We believe this study can further our understanding of economic growth mainly because of two considerations. Firstly, we study only one individual country over a very long period of time with annual frequency data. Various papers allow analysis of Brazil's performance from a cross-country perspective (among others, Loyaza and Ranciere, 2005), while those focusing solely on Brazil tend to cover the period from the 1930s onwards (e.g. de Paiva Abreu and Verner, 1997). Secondly, we employ an econometric methodology that has been seldom used in the empirical growth literature.

Our main finding is that financial development has a mixed (positive and negative) time-varying impact on economic growth; trade openness has a positive effect, whereas the effect of political instability, both formal and informal, on growth is unambiguously negative. Moreover, the positive time-varying effect of financial development on economic growth significantly depends on jointly estimated trade openness thresholds.

The paper is organized as follows. Section 2 presents a brief early economic and political history, which explains the economic performance of Brazil from 1890 to 2003. Section 3 provides details and justification for our econometric methodology. Section 4 describes the data. Section 5 discusses our baseline econometric results. Section 6 concludes and suggests directions for future research.

2 Background: Brazilian Economic and Political History

In this Section, we will briefly present key aspects of the economic history of Brazil as well as stressing both financial development and political instability. The military started to express opinions publicly and debate governmental policies in 1879. More specifically they supported education, industrialization, the abolition of the slavery, regeneration of the nation and the guarding of the fatherland (the so-called soldier citizen), by proclaiming them as agents of social change. Under Mariscal Deodoro's orders, on November 15^{th} 1889, the army captured the Royal Palace, the main governmental building and silenced Rio de Janeiro. The day after November the 15^{th}, Deodoro declared Brazil a federal republic. The period that followed, the First Republic (1889-1930), was characterized by political unrest as well as the politics of 'coffee and milk' (known as cafe com leite), a combination of the Sao Paulo coffee and the Minas Gerais milk political elites. The main target of the First Republic was to balance the power between these two oligarchic elites and the army. However, the problems of the oligarchic system developed further. More specifically the 'tenent revolt' of 1922 and 1924 rocked the interior of Brazil.

During the Great Depression of 1929, coffee exports were brought to a deadlock, while the Paulista elites chose to end of the politics of coffee with milk agreement unilaterally. In 1930, political protest erupted, for example the Revolta da Princesa outburst in the Northeastern state of Paraiba and the assassination of João Pessoa, the governor of Paraiba, occurred. Shortly after Pessoa's death, more riots followed, including the Revolution of 1930, on October 24th 1930. Getulio Vargas, after failing to be elected president in 1930, led a revolt that took him to power. From 1930 until 1934 he ruled Brazil as a dictator[1], from 1934 to 1937 he was elected as president and then again as a dictator from 1937 to 1945. Under the Estado Novo (1937-1945), all political parties were dissolved and governors were replaced (see Hudson, 1998). After 1945, Vargas still served as a senator until 1951, when he was elected President in general elections, a position which he held until 1954. Hence Getulio Vargas played a central political role in Brazil for nearly 24 years. According to Maddison (1995), during the Vargas era (and up to 1980) Brazilian economic growth rates were among the highest in the world. The Vargas years had a significant impact on national politics and economics. Even in the 1990s, the local political leaders were still called colonels. During this era, reorganization of the armed forces, the economy, international trade and foreign relations took place. The average annual gdp growth rate during that period was 4%. Finally, the 1930-1945 period added a new term to the Brazilian political lexicon, that of corporatism[2]. Vargas's influence in Brazilian politics remained indelible for decades (Hudson, 1998).

If corporatism was the benchmark of the 30s and 40s period, populism, nationalism and developmentalism dominated the two following decades (the 50s and 60s). Each of these terms contributed to the crisis that occurred in Brazil, which resulted in the authoritarian regime that occurred after 1964. By the early 1960s, Brazilian society was in ferment.

[1] In 1930 Getulio Vargas was selected as the candidate of the Alianca Liberal (Liberal Alliance).

[2] The term developed mostly in Italy under Benito Mussolini. Corporatism is a concept opposite to that of Marxism and Liberal Democratic political philosophies.

Labor classes became more and more active, seeking a better future, and the population continued to grow beyond the state's capability to increase educational and social services. As a consequence, the conservative elites alongside the middle classes, which tended to follow the elites' vision and considered the lower classes as a threat, feared that they were going to lose control of politics and of the state. It was the same elites that opposed Vargas due to his intention to use the state for a fairer distribution of resources. During the period 1956-1961 Juscelino Kubitschek (who was the only post Vargas elected president to serve a full term), promoted the establishment of an automotive industry, which could help Brazil to overcome economic stagnation. The new factories produced 321,000 vehicles in 1960. Among his legacies are the world's eighth largest automobile production and a great highway network of the late twentieth century. Constant motorized advancement in farm equipment and changes in transportation transformed the vast countryside areas of Mato Grosso and Goias, making Brazil the worlds number two food exporter. All these led the overall economy to grow by 8.3% a year. Hence it could be argued that there was a lot of truth in the Kubitschek government's motto 'Fifty Years' Progress in Five'(Hudson, 1998).

Brazil in 1960 was completely different from that of 1930. The population reached 70 million from 34 million in 1930, with 44% residing in urban areas. Life expectancy increased as well. The number of workers increased from 1.6 million in 1940 to 2.9 million in 1960, an approximate 100% increase in 20 years. The share of industrial productivity as a percentage of gdp was higher (25.2%) than that of agriculture (22.5%). On the other hand the annual rate of inflation kept rising from 12% in 1949 to 26% in 1959 and to a shocking 39.5% in 1960. Savings depreciated and lenders were unwilling to offer the long term loans that are essential for investment. High interest rates and the government's refusal to comply with the International Monetary Fund (IMF) conditions created a negative environment among the people. The large differences between the poor and rich remained, with 40% of the national income to be enjoyed by 10% of the population, 36%

going to the next 30% and the remaining 24% distributed to the remaining 60% of the population. Struggling to maintain control, the government of João Goulart[3], in a huge rally in Rio de Janeiro on March 13^{th} 1964, attempted to promote reforms. An opposition rally was held six days later in Sao Paulo, putting 500,000 people in the streets. Rio de Janeiro's Correio da Manha (a daily newspaper of Rio de Janeiro) published an unusual front cover with the headline 'Enough' whereas the next day's front cover had the title 'Out'. In the next few days the military intervened to secure the country and Goulart fled to Uruguay. The period of the military republic (1964-1985) had begun. In summary, the 1950s and 1960s were marked by high political instability, which in turn affected the level of the trade openness of the Brazilian economy in different ways.

As with the previous regime changes of 1889, 1930 and 1945, the coup of 1964 divided the military into two groups. The first one included those who believed that they should focus on their professional duties and the second group, the hard-liners, were those who believed that politicians were betrayers that would deliver Brazil to communism. The dominance of the hard liners' opinion led Brazil into what a political scientist (named Juan J. Linz) defined as an authoritarian situation. In 1983 the economy was running with average gdp growth of 5.4%, but the importance of this was diminished by the rising inflation and weak and disheartening political leadership. Millions of Brazilians went out to the streets in all major cities demanding a direct vote (diretas ja). In April 1984, Congress failed to achieve the necessary numbers in order to satisfy the people's wish and the choice was left to an electoral college. On January 15^{th} 1985, the Electoral College elected Tancredo Neves of Minas Gerais (Varga's minister of justice in the 1950s and former federal deputy, senator and prime minister), who died a year later. Similarly to the regime changes of 1822, 1889, 1930, 1946 and 1964, the 1985 change would prove to be full of obstacles as well. Some years later it was Fernando Collor de Mello's turn to rule the country (in office from 1990 to 1992). Mello was the first Brazilian president elected

[3] 4^{th} Vice President, a populist and a minister of labor under Vargas won the presidency on the 7^{th} of September 1961 unitl the 1^{st} of April 1964 that he abolished the power.

directly by the people. During his term in office he attempted to control hyperinflation and started a massive program of privatization of state-owned firms. His tenure ended in 1992 with the presidency of Itamar Franco, who stayed in power until 1995. The last five years of the 20^{th} century found Fernando Henrique Cardoso in office. His administration was characterized by the promotion of human rights in Brazil.

To sum up, the period since 1890 is a significant era for Brazilian history since the country experienced significant economic and political expansion, being transformed to an emerging market and forming one of the BRIC countries. However, there is an ongoing debate which tries to identify the key factors that are responsible for this astonishing route. Financial development, trade openness, financial integration and macroeconomic stability are the main factors that most of the previous literature has paid attention to. This paper will attempt to shed light on the main causes of economic growth since there seems to be dissatisfaction within the empirical growth literature. Using data that cover a period from 1890 to 2003 we will try to explain (under a smooth transition approach) the role that financial development, trade openness and political instability played in economic growth and the transformation of Brazil in general.

3 Econometric Framework

Non-linear models have attracted the interest of more and more researchers in recent years. Teräsvirta (1994) suggested a specification technique of three stages, assuming that if the process is not linear, then the alternative might be a smooth transition (ST) autoregressive model, which captures regime-switching behavior. The first stage of the estimation procedure is to identify a linear autoregressive model. The second focuses on testing linearity for different values of d, the delay parameter, and the third one on choosing between an exponential ST (EST) or a LST model by testing a sequence of three hypotheses (see Teräsvirta, 1994). Nevertheless, initial estimation of both EST and LST models and the usage of postestimation information criteria could provide us with the final choice between models, Teräsvirta (1994). The ST model for the economic growth series y_t is given by

$$y_t = \boldsymbol{\phi}_1'\mathbf{x}_{t-l} + \boldsymbol{\phi}_2'\mathbf{x}_{t-l}G(s_{t-d}) + \epsilon_t \tag{1}$$

where $\mathbf{x}_{t-l} = (1,\, x_{2,t-l}, \ldots, x_{k,t-l})'$ is the $k \times 1$ vector of the explanatory variables, $\boldsymbol{\phi}_i = (\phi_1^{(i)}, ..., \phi_k^{(i)})'$, $i = 1, 2$, are the $k \times 1$ vectors of coefficients and $G(s_{t-d})$ is the transition function (see eq. 2 below), which changes smoothly from 0 to 1 as the transition variable s_{t-d} increases. The term d determines the lag-length of the transition variable and $\{\varepsilon_t\}$ are independently and identically distributed *(i.i.d)* random variables. Here we use the first order logistic function, which is defined as:

$$G(s_{t-d}) = \frac{1}{1 + e^{-\gamma(s_{t-d}-c)}}, \tag{2}$$

where γ determines how smooth the change in the value of the logistic function is (and hence the transition from one regime to another) and the intercept c is the threshold between regimes. In eq. 2, when the smoothness parameter becomes very large, $\gamma \to \infty$, then the transition is said to be abrupt. When $\gamma \to 0$ the logistic function approaches a constant. Thus when $\gamma = 0$ the LST model reduces to the linear model. The advantage of an ST against a threshold autoregressive (TAR) model is that the conditional mean function is differentiable (Tsay, 2010). However, previous research shows that the transition parameters γ and c are quite difficult to estimate (see Teräsvirta, 1994). Following Teräsvirta (1994) we test whether the non-linear model is preferred and if the use of the logistic function is warranted.

4 Data

Our data set contains annual data for economic growth, financial development, trade openness and political instability for Brazil between 1890 and 2003, excluding the World

War years. The main data source for the first three is Mitchell (2003), see Figure 1 below and Figure A1 in the Appendix. Economic growth is measured as annual growth rate of gross domestic product (gdp) at level. Our measure of financial development is commercial bank deposits over gdp (cbd) defined as the sum of time deposits in commercial banks and deposits at the end of the period in commercial banks and it tries to capture the efficiency of the financial sector[4]. Data have been reported by Mitchell (2003) but due to missing values we follow the approach of Pelaez and Suzigan (1976) to reconstruct the series.

As far as trade openness is concerned we use the ratio of exports plus imports as a share of gdp. Among others, Krueger (1978) and Wacziarg and Welch (2008) argued that trade openness leads to higher growth rates. International Monetary Fund (IMF, 1997) stated that policies favoring international trade are among the most significant elements in promoting economic expansion and convergence in developing countries. In addition, a report from OECD (1998) suggested that more open and outward oriented economies tend to surpass countries with restrictive and more isolated trade policies. Finally, Fischer (2000) during a lecture (see also Rodriguez and Rodrick, 2001) noted that the optimal way for a nation to grow is to harmonise its policies with the global economy.

However, these arguments were lacking general approval especially after the Great War in developing countries and in particular Latin America, which very often adopted so-called Import Substitution Industrialization policies (ISI), which imposed barriers on international trade. The outbreak of World War II turned Latin America back to protectionism and to high tariff policies and it was not until the 1990s when liberal policies took effect (Edwards, 1994). This paper tries to capture these changes in trade policies by using trade openness as the transition variable in the case of Brazil for the following reasons. Brazil is the most advanced industrial economy in South America (Pereira et al., 1993). According to the United Nations' statistical agency[5] it is a major exporter of

[4] A similar indicator of financial development has been used by Rajan and Zingales (2003).

[5] For further information regarding Brazil's profile please check the: http://comtrade.un.org

iron ore and concentrates, petroleum oil, soya beans, coffee and processed meat, as it is involved in the manufacture of small aircraft. Finally, the importance of trade policies for successive Brazilian governments is apparent from: the fact that its patent law dates back to 1809; their participation in every international conference associated with intellectual property rights since that time; and their signing of GATT in 1947 (General Agreement on Tariffs and Trade) founding declaration (Lattimore and Kowalski, 2009).

Construction of the new political instability dataset

The new data we use in this paper is for political instability. We use a taxonomy of political instability divided into two categories, informal and formal (Campos et al., 2012). Formal political instability originates from within the political system, informal from outside. Our starting point as the source of historical annual data for various types of political instability is Arthur Banks's Cross National Time Series Data Archive (CNTS). The informal political instability measures consist of the number of demonstrations (dem), defined as peaceful public gatherings of at least 100 people and the number of strikes (str) of 1000 or more workers involving multiple employers and aimed at government policies (see Figure 2 below and Figure A2 in the Appendix).

Formal political instability is measured by legislative selection (ls) and legislative elections (le). The latter is defined as the number of elections for the lower house each year. The former takes the value 0 when no legislature exists, the value 1 in the case of non-elective legislature and 2 when legislators or members of the lower house in a bicameral system are selected by means of either direct or indirect popular election (see Figure 3 below). For these formal and informal political instability variables, Banks data (2005) do not exist for the pre-1918 period. In order to generate this new political instability series, all relevant political events from years 1890 to 1939 were catalogued and classified into different types of political instability (see Campos et al., 2019). We then took advantage of an intentional overlap between the series during the period 1919 to 1939 to assess the reliability of the new information. We find that there are a few circumstances where there is mild disagreement between the two series and thus argue that the new data series is as reliable as the more standard CNTS data[6]. Our political instability variables enter our econometric framework one by one and thus the results are not affected by the taxonomy itself.

However, the substantial number of informal and formal indicators may introduce strong biases and inflate the measurement error by increasing the noise-to-signal ratio. To circumvent these concerns we conduct principal component (PCA) as well factor (FA) analysis in order to classify variables into components/factors and hence check whether this kind of latent analysis confirms the dominant blocks of informal and formal political instability[7]. From the PCA and FA two main components/factors were extracted (with a zero correlation coefficient). The first component has an eigenvalue of 2.53 and it consists of formal political instability indicators whereas the second component has an eigenvalue of 2.26 consisting of the informal political instability measurements. Moreover, based on the explained and unexplained variation of each of the two components the formal instability is more powerful than the informal one.

Comparison with other measures of democracy and institutional development

How are our measures of informal and formal political instability related to the existing measures of Brazil's institutional development? Although our definitions and coding do not strictly match the concepts and measurements of democracy and institutional development introduced in past literature, we can still find some substantial correlations between our political instability indicators and those measures introduced by Acemoglu et al. (2002), Boix et al. (2013), Lindberg et al. (2014) and Spruk (2016a, 2016b) such as the executive constraints, dichotomous measures of democracy, various electoral factors and "de jure" and "de facto" political institutions respectively (due to space limitation the series are not projected but are available upon request).

[6] For more details regarding the construction of the political instability data see Campos et al., (2016a).

[7] To ensure the usage of principal component analysis the Kaiser-Meyer-Olkin measure of sampling adequacy was conducted. Results are not reported, but are available upon request.

Results from the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests are presented in Table 1 below. Both suggest that either the level of the series or their first differences are stationary. In addition, unit root tests with breaks provided by Zivot and Andrews (1992) have been conducted (Table A1 in the Appendix). In all cases the unit root hypothesis is rejected at 1% and 10% level respectively (with the exception of le that fails to reject the unit root hypothesis when we allow for a break in the trend: see Table A1 in the Appendix, third column).

Figure 1. Growth rate, Financial Development and Trade Openness

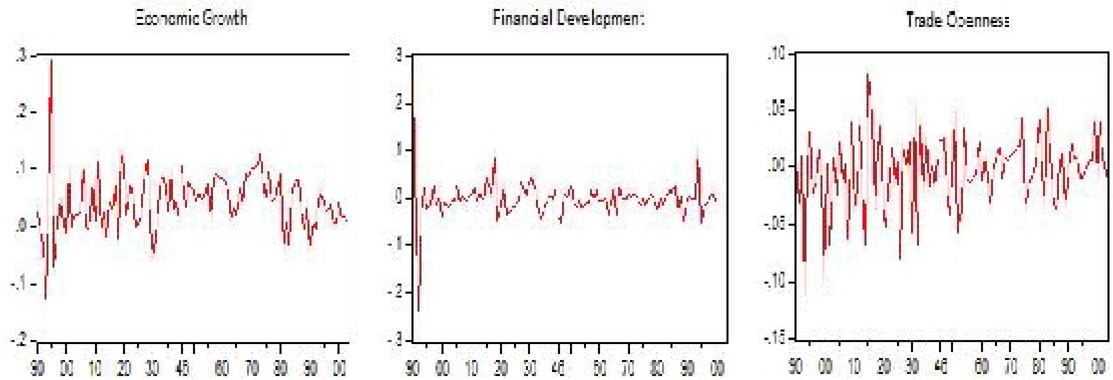


Figure 2. Informal Political Instability measures

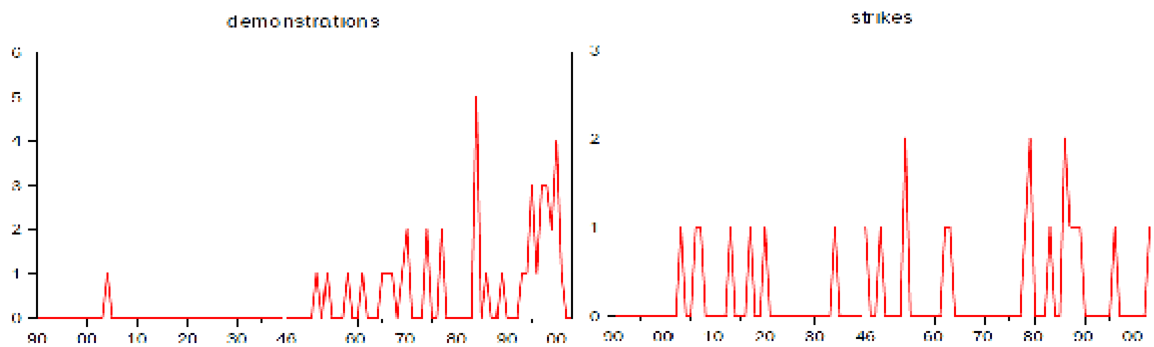


Figure 3. Formal Political Instability measures

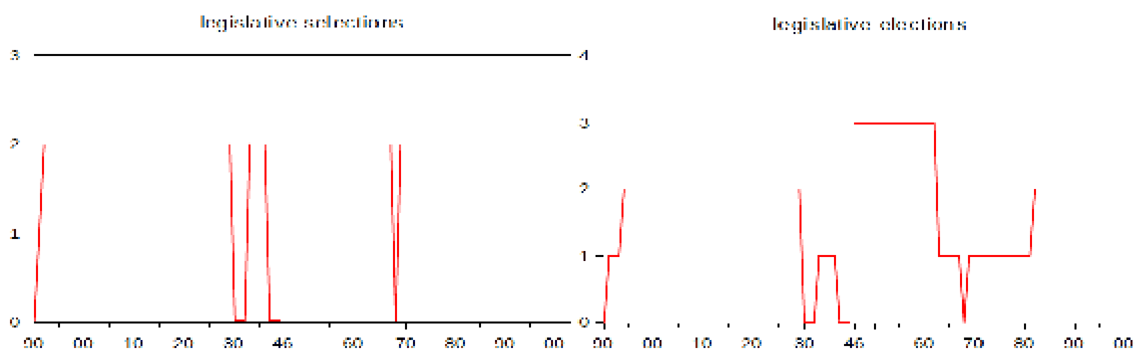


Table 1. Augmented Dickey Fuller (ADF) and Phillips Perron (PP) Unit Root Tests.

Variable	ADF at level	ADF at first difference	PP at level	PP at difference
gdp	-9.29^{***}		-9.29^{***}	
cbd		-12.35^{***}		-11.94^{***}
to		-13.00^{***}		-13.00^{***}
dem	-4.54^{***}		-7.37^{***}	
str	-8.99^{***}		-8.99^{***}	
ls	-6.29^{***}		-6.37^{***}	
le	-3.63^{***}		-3.69^{***}	

Notes: *** indicate significance at 1% level. Numbers represent the estimated ADF and PP t-statistics respectively. Both tests suggest that either the level of the series or their first difference are stationary at 1% level.

5 Empirical Results

In this section we use the smooth transition model [following the model specification procedure of Teräsvirta (1994)] to investigate the relationship between economic growth, financial development and political instability with the level of trade openness in the economy as the transition variable[8]. The economic history of Brazil demonstrates the close relation between trade openness and economic growth (Baer, 2013), so trade openness is clearly the most intuitive choice for our transition variable. The reasons for the choice of trade openness as our transition variable are not just easily found in economic history but this choice is also fully supported econometrically by standard linearity tests. In particular, when financial development is used as the transition variable they fail to reject the linearity hypothesis (from now on LM_2) in two cases (demonstrations and legislative elections) while for the other two (strikes and legislative selections) the p-values of LM_2 are weaker than those when trade openness is the transition variable[9].

The reason why we do not test linearity using political instability as the transition variable is simply because our measures contain many 0 values. When $s_{t-d} = 0$, then the transition function (see equation 2 above) becomes 0 and hence the model, in equation 1,

[8] To validate our results we additionally used money supply and deposits at Banco do Brasil as nancial development measurements (for more details see Campos et al., 2016).

[9] results not reported.

reduces to a linear one. A range of linearity tests suggests the use of LST instead of the EST model (see Table 2 below). The only case in which an ESTAR is the preferred choice is when legislative elections serve as the political instability measure. However, based on Teräsvirta (1994) the choice between an EST or an LST model could be postponed until both types of models are estimated and evaluated using postestimation criteria. In our case, an LSTAR model seemed more suitable[10]. We use the RATS software to estimate equations (1) and (2) above. As mentioned in Section 2, Teräsvirta (1994) argues that specifying a linear autoregressive model constitutes the first stage of the estimation procedure. We select the optimal lag length that rejects stronger linearity, that is, for financial development $l = 3$, while for demonstrations $l = 4$.[11]

Table 2. Linearity testing, determining the delay parameter and selection between LSTAR and ESTAR. Trade Openness is used as a Threshold.

Variable	Linearity LM_2	p-value H01	p-value H02	p-value H03	d-delay parameter	TP choice
dem	0.02	0.01	0.84	0.03	4	LSTAR
str	0.01	0.02	0.16	0.13	4	LSTAR
ls	0.01	0.27	0.13	0.01	4	LSTAR
le	0.01	0.25	0.02	0.03	4	ESTAR*

Notes: Column 2 represents the p-value (strength) of the linearity rejection. Based on the Teräsvirta (1994) selection process, columns 3 to 5 suggest an LSTAR model except from *le*. However, the use of the LSTAR model fits better in our data. Column 6 represents the delay parameter, which in our case is 4, since the power of linearity rejection is stronger relative to other values of d. The usage of LM_2, H01, H02 and H03 follows Teräsvirta (1994).

For trade openness and legislative selections the selection of $l = 4$ is made on the basis of the minimum value of LBQ and the General to Simple (GS) information criterion (see Table 3 below). Finally, a portmanteau test of Ljung and Box was conducted to control

[10] This choice was derived from postestimation Ljung and Box statistic for residual autocorrelation (LBQ) and on the basis of the minimum value of Akaike information criterion (AIC).

[11] A common way would be the usage of the AIC or the Schwarz information criterion (SBIC) in order to select the appropriate lag structure of the model. However, a choice based on SBIC could lead to too parsimonious models since the estimated residuals derived from the selected model may not be free from serial correlation. Hence, models suggested by any information criteria should be followed by a test of residual serial correlation, for instance the Ljung and Box portmanteau test. In addition, Luukkonen et al. (1990) stressed that in the case of US unemployment, the linearity might be rejected when the lag length is increased, which indicates on one side the significance of longer lags in explaining nonlinearity and the weakness of shorter ones on the other side.

for residual autocorrelation in our model and hence possible misspecification. The results indicated no residual serial correlation (results, not reported, are available upon request). The choice of the delay parameter is determined by the strongest linearity rejection relative to different values of d. Accordingly, we set $d = 4$. The vector of explanatory variables contains the drift, the third lag of commercial bank deposits (cbd) and the fourth lags of the various measures of political instability (pi), and trade openness (to). That is, $\mathbf{x}_{t-l} = (1, cbd_{t-3}, pi_{t-4}, to_{t-4})$. The preferred model was the one with $\phi_4^{(2)} = 0$ and where the regime indicator variable s_{t-d} was chosen to be to_{t-4}.

Table 3. Lag Specification

Variables	Information Criteria				
	AIC	SBIC	LBQ	LM	GS
cbd	0	0	1	0	2
to	5	1	1	1	**4**
dem	3	2	2	2	2
str	0	0	0	0	0
ls	7	1	**4**	1	3
le	8	1	1	1	8

Notes: The Table reports the maximum lag-length on the basis of minimum information criteria*. For the cases of *to* and *ls* we choose four lags (numbers in bold). For *cbd*, *dem* the optimal lag-length is two for *str* zero and for *le* eight. However, for linearity rejection purposes we use three lags for *cbd* and four for *dem, str* and *le* respectively. *LM stands for Lagrange multiplier test for residual serial correlation.

Table 4 reports our baseline results. In order to estimate the time-varying effects of trade openness, political instability and financial development on growth we use the following three equations:

$$\frac{\vartheta(y_t)}{\vartheta(to_{t-4})} = \phi_4^{(1)} + \gamma(\phi_1^{(2)} + \phi_2^{(2)} cbd_{t-3} + \phi_3^{(2)} pi_{t-4}) \exp[-\gamma(to_{t-4} - c)](1 + \exp[-\gamma(to_{t-4} - c)])^{-2}, \tag{3}$$

$$\frac{\vartheta(y_t)}{\vartheta(pi_{t-4})} = \phi_3^{(1)} + \phi_3^{(2)}(1 + \exp[-\gamma(to_{t-4} - c)])^{-1}, \text{ and} \tag{4}$$

$$\frac{\vartheta(y_t)}{\vartheta(cbd_{t-3})} = \phi_2^{(1)} + \phi_2^{(2)}(1 + \exp[-\gamma(to_{t-4} - c)])^{-1}. \tag{5}$$

Table 4. Logistic Smooth Transition Model

	$\phi_1^{(1)}$	$\phi_2^{(1)}$	$\phi_3^{(1)}$	$\phi_4^{(1)}$	$\phi_1^{(2)}$	$\phi_2^{(2)}$	$\phi_3^{(2)}$	γ	c
dem	0.08^{***} (0.02)	-0.86^{***} (0.18)	-0.04^{***} (0.02)	0.58^{**} (0.28)	-0.04 (0.02)	1.16^{***} (0.38)	0.04^{**} (0.02)	5.54 (5.07)	-0.008 (0.00)
str	0.09^{***} (0.03)	-0.86^{***} (0.25)	-0.03^{**} (0.01)	0.76^{*} (0.41)	-0.06 (0.05)	1.21^{***} (0.51)	0.03 (0.02)	3.52 (2.84)	-0.007 (0.00)
ls	0.14^{***} (0.03)	-0.78^{***} (0.21)	-0.04^{***} (0.01)	0.69^{**} (0.34)	-0.12^{*} (0.06)	1.18^{***} (0.46)	0.04^{*} (0.02)	3.94 (3.11)	-0.005 (0.00)
le	0.13^{**} (0.06)	-1.02^{**} (0.46)	-0.02^{**} (0.01)	0.91 (0.60)	-0.14 (0.11)	1.62^{*} (0.88)	0.03 (0.02)	2.02 (1.50)	-0.005 (0.00)

Notes: Table 4. reports parameter estimates for the following model:

$$y_t= \phi_1^{(1)}+\phi_2^{(1)}cbd_{t-3}+\phi_3^{(1)}pi_{t-4}+\phi_4^{(1)}to_{t-4}$$
$$+(\phi_1^{(2)}+\phi_2^{(2)}cbd_{t-3}+\phi_3^{(2)}pi_{t-4})(1+\exp\left[-\gamma(to_{t-4}-c)\right])^{-1}+\epsilon_t.$$

The numbers in parentheses represent standard errors.

***, **, * indicates significance at the 1%, 5% and 10% level respectively.

First, notice that there is a positive and statistically significant time-varying relationship between trade openness and economic growth (see equation 3 above and figure 4 below). The lowest effects of trade openness are observed in five periods. The first one is between 1908-1910, which shows the consequences of the Taubate Convention, signed in 1906, in which it was proposed that the government should buy the excess coffee production at a minimum preestablished price and that it should also restrict the production of low-quality coffee, stimulate internal consumption, and promote the product abroad (Luna and Klein, 2014). The second period in which low trade openness effects were observed covers the period from 1929 to 1933 (Great Depression), the third one from 1951 to 1954(adoption of Import Substitution Policies, Korean War), the fourth from 1982 to 1989 (hyperinflation, low net capital inflows as a share of gdp, Edwards 1994) and the final one during 1993, where slow down of the world economy and of productivity gains, and real exchange rate appreciation in Latin America occurred. Regarding the time-varying impact of political instability (either informal or formal) on economic growth the results show that they are negative throughout (see equation 4 above).

Our principal findings refer to financial development: figure 4 shows our estimates for this mixed time-varying relationship. Notwithstanding the annual frequency, we estimate a negative effect in 56 cases (years) out of 104 (see equation 5 above). For example, in three periods financial development has a clearly positive effect on economic growth, namely 1968-1974, 1991-1993 and 1997-1999. The first period is the one known as the "Brazilian Miracle", when average annual growth rates were high following a number of important financial sector reforms that underpinned a massive increase in infrastructure investment (Goldsmith et al., 1986). During the 1990s there were various attempts to develop non-inflationary sources of finance and to diminish Brazil's dependency on foreign savings. Despite the political turmoil that marked the early 1990s, 1991 saw law changes allowing foreign institutions to trade domestically issued bonds and securities (Studart, 2000). From 1992 onwards capital flows rose rapidly. One main source of this capital was repatriation of the capital that fled in the 1980s after the interest rate shocks of 1979. The third period covers the late 1990s and this might be explained as the consequences of the successful implementation of the "1994 Real Plan" and the expansion of the PROER programme from 1997 onwards, which supported a wave of mergers and acquisitions in the financial sector (Folkerts-Landau et al., 1997). Moreover, the opening of the Brazilian market to new financial institutions led to the development of the financial system (Bittencourt, 2011). Finally, we find that in the majority of the cases/years financial development is negatively correlated with trade openness in Brazil[12]. In particular our estimates show that in 56% of the years in which financial development has a 'below the mean' effect, we find that trade openness experiences a substantial 'above the mean' change.

As far as the level of γ (γ determines how smooth the change in the value of the logistic function is, cf eq. 2) is concerned the change between the two regimes is not so smooth, with the exception of legislative elections, where the transition is smoother (see Figure 5 below).

[12] This finding is really interesting given the results provided by Rajan and Zingales (2015).

Figure 4. Time-varying effects of financial development and trade openness on growth using various political instability measures.

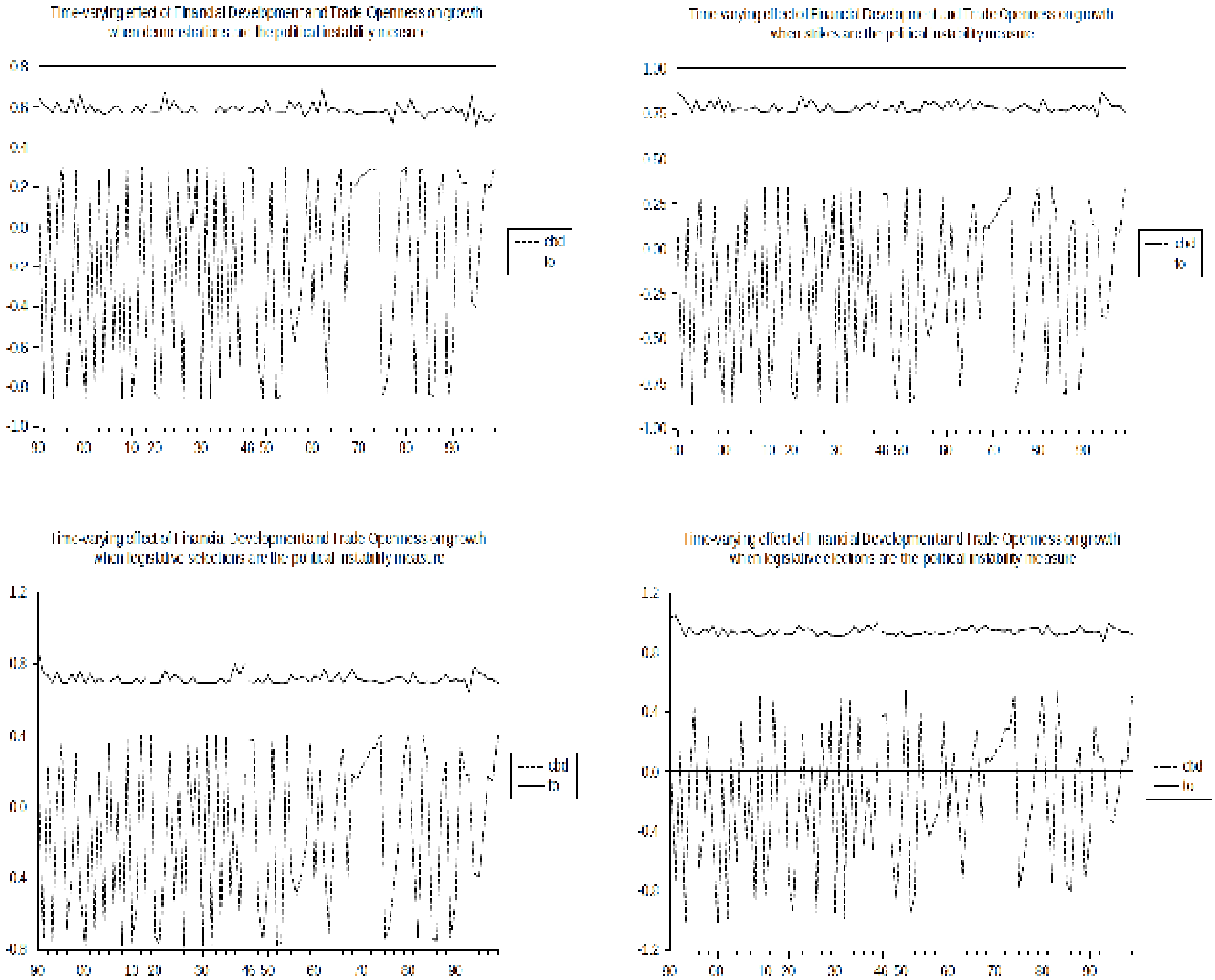
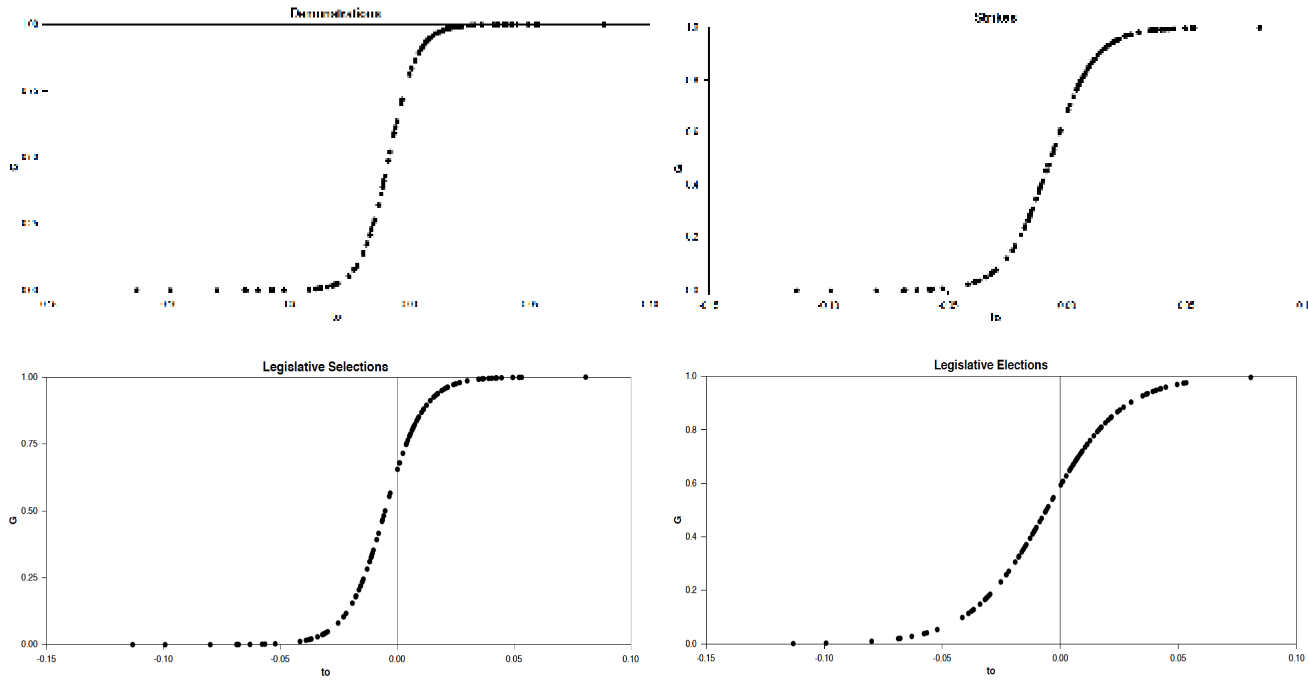


Figure 5. Smooth Transition Function ($G(s_{t-d})$) vs Transition Variable (to_{t-4}).



Omitted variable bias

One possible drawback of the identification strategy is to neglect the omitted variable bias. Even though we know from the work of Knack and Keefer (1995) and Rodrik et al. (2004) onwards that the institutions trump the contribution of geography and trade in explaining cross-country income differences over time, it is impossible to isolate the confounding effects of human capital as a competing channel that feeds directly into growth rates. Glaeser et al. (2004) show that poor countries tend to escape the poverty trap through human capital investment often pursued by benevolent dictators while Jeffery Sachs, Jared Diamond and his followers believe that geography makes all the difference. Relatedly, could it be that the informal instability variables partially capture the role of culture which many, starting with Max Weber and David Landes, believe makes all the difference by acting as a brake or filter on economic development?

To address this issue, we control for the effect of human capital formation using the average years of education (data obtained from Spruk, 2016b) and see whether controlling for human capital renders the effects of informal and formal instability weak, stronger or intact. Furthermore, to eliminate any direct confluence of political instability induced by adverse physical geography (for more details see Miguel et al., 2004) we consider the variation in rainfall (rain) as well as the annual temperature (temp), which serve as observable measures of climatic shock (data obtained from the World Bank). Our findings show a positive (negative) impact of the average year of education (variation in temperature) on economic growth whereas the effect of both informal and formal political instability (on output) remains negative with either the same or slightly weaker magnitude.

In addition, we detect a negative link between the variation of rain and growth, though statistically insignificant. Relatedly, a measure of culture would be beneficial to rule out the direct effects of culture on long-run growth. Although we are aware of the difficulty of such an easily tractable measure, we exploited the approach of McCleary and Barro (2006) and we searched for the fraction of the population that is Catholic as well as the immigration rate as rough proxies for the effects of culture, which have been one of the defining characteristics of Brazil's economic and institutional history. However, the data available from the Brazilian Institute of Geography and Statistics (IBGE) were discontinued for both variables (for example the immigration rate is available from 1870 to 1975). To address this lack of data and thus avoiding further decrease of observations in our sample, we include the immigration rate in our models separately and we find that there is a negative impact on output growth, though statistically insignificant (due to space limitations results are not tabulated).

External validity

In this subsection we will cross-validate our results with a country that has experienced similar magnitudes of political and institutional instability, such as Argentina. Campos and Karanasos (2008) and Campos et al. (2012) investigated the link between financial development, political instability and growth for Argentina from 1896 to 2000. Their findings show that both financial liberalization and political instability have a negative effect on growth. Our parameter estimates for Brazil indicate (a) a strong negative effect of institutional instability on growth; (b) a mixed time-varying impact (in the short-run) of financial development on growth.

6 Conclusion

The objective of this paper was to further our understanding of the dynamics of relationship between economic growth, financial development and political instability. This paper revisits the growth-finance nexus using a new econometric approach and new and unique data set. The econometric approach we use, and that has been seldom used in this literature so far, is the logistic smooth transition model (LST). Our unique data set contains annual data for Brazil from 1890 to 2003. The logistic smooth transition framework allows us to study the dynamics of this relationship over the long-run, to evaluate the intensity and direction of its main drivers over time, and to assess how smooth (or not) was the transitions we estimate.

Our main finding is that financial development has a time-varying effect on economic growth, which significantly depends on jointly estimated trade openness thresholds, whereas the effect of political instability (both formal and informal) is unambiguously negative. We show that the finance-growth nexus in Brazil intrinsically depends on political institutions and on the regime-switching factor, which we estimate to be trade openness. Differently from most of the previous literature, which reports a negative short-run relation between financial development and growth, we argue in favour of a mixed time-varying effect (in the short-run). As far as the time-varying results are concerned we detect at least three periods, where financial development has a clearly positive and large effect on economic growth, interestingly all towards the end of our time window. Our estimates also show that a positive impact of trade openness on growth but with interesting variation regarding their size and power. For example, we estimate weaker (although still positive) effects between 1929 and 1933 which correspond to the Great Depression. Finally, our parameter estimates suggest that the change between the regimes tends not to be smooth.

Although the study conducted a thorough survey, there were certain limitations worth mentioning. One such limitation is that the empirical evidence does not provide a definite account of the causal link between finance, institutions and growth since we do not exploit plausibly exogenous sources of variation in Brazil's long-run growth and do not report a research design that would allow us to exploit such channels. However, we have addressed the omitted variable bias issue in greater detail (see the analysis in Section 5). Furthermore, we have not completely ruled out endogeneity. Nevertheless, the concern is greatly alleviated (with careful identification strategies and the lagged estimations) to the extent that our regressions yield consistent results. In addition, due to the historical scope of this paper, certain factors, such as culture, which potentially directly affect economic growth could not be considered due to the unavailability of data.

Future studies should investigate the link between political instability and economic growth in a panel of developing countries. A simulation analysis on how growth rate would have been in the absence of some shocks of instability would clearly represent progress and is something we feel future research should try to address.

References

[1] Acemoglu, D., Johnson, S. and Robinson, J.A., 2002. Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution. The Quarterly Journal of Economics, 117(4), pp. 1231-1294.

[2] Acemoglu, D., 2009. Introduction to Modern Economic Growth. Princeton University Press.

[3] Acemoglu, D., García-Jimeno, C. and Robinson, J.A., 2015. State Capacity and Economic Development: A Network Approach. American Economic Review, 105(8), pp.2364-2409.

[4] Arcand, J.L., Berkes, E. and Panizza, U., 2015. Too Much Finance?. Journal of Economic Growth 20(2), pp.105-148.

[5] Baer, W., 2013. The Brazilian Economy: Growth and Development, seventh ed. Lynne Rienner Publishers, Boulder, USA.

[6] Banks, A., 2005. Cross-National Time Series Data Archive. Databanks International, Jerusalem. (http://www.databanks.international.com).

[7] Barro, R. J. 1991. Economic Growth in a Cross-section of Countries. The Quarterly Journal of Economics, 106, 407-443.

[8] Benhabib, J. and Spiegel, M. 1997. Growth and Investment Across Countries: Are Primitives All that Matter. New York University and Federal Reserve Bank of San Francisco, mimeo.

[9] Bittencourt, M., 2011. Inflation and Financial Development: Evidence from Brazil. Economic Modelling 28(1-2), 91-99.

[10] Boix, C., Miller, M. and Rosato, S., 2013. A Complete Data Set of Political Regimes, 1800–2007. Comparative Political Studies, 46(12), pp. 1523-1554.

[11] Burns, E., 1970. A History of Brazil. New York and London.

[12] Campos, N. and Nugent, G., 2002. Who is Afraid of Political Instability? Journal of Development Economics 67, 157-172.

[13] Campos, N. and Karanasos, M., 2008. Growth, Volatility and Political Instability: Non-Linear Time-Series Evidence for Argentina, 1896-2000. Economics Letters, 100, 135-137.

[14] Campos, N.F., Karanasos, M.G. and Tan, B., 2012. Two to Tangle: Financial Development, Political Instability and Economic Growth in Argentina. Journal of Banking and Finance 36(1), 290-304.

[15] Campos, N.F., Karanasos, M.G. and Zhang, J., 2014. Political Instability and Growth in Brazil, 1890-2013. Brunel University London, mimeo.

[16] Campos, N.F., Karanasos, M.G. and Koutroumpis, P., 2016. On the time-varying link between financial development, political instability and economic growth in Brazil, 1890-2003. Brunel University London, mimeo.

[17] Campos, N.F., Karanasos, M.G., Zhang, J. and Koutroumpis, P., 2019. Institutional Change and Economic Growth in Brazil from 1870 to 2003. Brunel University London, mimeo.

[18] Demirguc-Kunt, A. and Maksimovic, V., 1998. Law, Finance, and Firm growth. Journal of Finance 53, 2107–2138.

[19] Durlauf, S.N. and Johnson, P.A., Temple, J.R., 2005. Growth Econometrics. Hand-

book of Economic Growth 1, 555-677.
[20] Edwards, S., 1994. Trade and Industrial Policy Reform in Latin America. NBER Working Paper No. 4772.
[21] Easterly, W. and Rebelo, S. 1993. Fiscal Policy and Economic Growth. Journal of Monetary Economics, 32, 417-458.
[22] Fischer, S., 2000. Lunch Address given at the Conference on Promoting Dialogue: Global Challenges and Global Institutions. American University, Washington, DC.
[23] Folkerts-Landau, D., Mathieson, D.J and Schinasi, G.J., 1997. International Capital Markets: Developments, Prospects, and Key Policy Issues. In World Economics and Financial Surveys (IMF). International Monetary Fund.
[24] Gavin, M. and Hausmann, R., 1996. The Roots of Banking Crises: The Macroeconomic Context. Inter-American Development Bank. Office of the Chief Economist, 1-20.
[25] Glaeser, E.L., La Porta, R., Lopez-de-Silanes, F. and Shleifer, A., 2004. Do institutions cause growth?. Journal of Economic Growth, 9(3), pp. 271-303.
[26] Goldsmith, R.W., Contador, C.R. and de Mello, P.C., 1986. Brasil 1850-1984: Desenvolvimento Financeiro sob um Século de Inflaçäo. Banco Bamerindus do Brasil.
[27] Hudson, R.A., 1998. Brazil : A Country Study. Federal Research Division, Library of Congress, 5th Edition.
[28] IMF, 1997. World Economic Outlook, Washington.
[29] Jayaratne, J. and Strahan, P.E., 1996. The Finance-Growth Nexus: Evidence from Bank Branch Deregulation. Quarterly Journal of Economics 111, 639–670.
[30] Kaminsky, G. and Schmukler, S., 2003. Short-Run Pain, Long-Run Gain: The Effects of Financial Liberalization. NBER Working Paper No. 9787.
[31] King, R. and Levine, R., 1993. Finance and Growth: Schumpeter Might be Right. The Quarterly Journal of Economics 108, 681–737.
[32] Knack, S. and Keefer, P., 1995. Institutions and Economic Performance: Cross-country Tests Using Alternative Institutional Measures. Economics and Politics, 7(3), pp. 207-227.
[33] Kovač, M. and Spruk, R., 2016. Institutional Development, Transaction Costs and Economic Growth: Evidence from a Cross-country Investigation. Journal of Institutional Economics, 12(1), pp.129-159.
[34] Krueger, A., 1978. Foreign Trade Regimes and Economic Development: Liberalization Attempts and Consequences. NBER Working Paper. (http://www.nber.org/chapters/c3849.pdf)
[35] Lattimore, R. and Kowalski, P., 2009. Brazil in OECD. Globalisation and Emerging Economies: Brazil, Russia, India, Indonesia, China and South Africa. OECD, Paris.
[36] Levin, R., 1997. Financial Development and Economic Growth: Views and Agenda. Journal of Economic Literature 35(2), 688-726.
[37] Lindberg, S.I., Coppedge, M., Gerring, J. and Teorell, J., 2014. V-Dem: A New Way to Measure Democracy. Journal of Democracy, 25(3), pp. 159-169.
[38] Loayza, N.V. and Ranciere, R., 2006. Financial Development, Financial Fragility and Growth. Journal of Money, Credit and Banking 38(4), 1051-1076.
[39] Luna, F.V. and Klein, H.S., 2014. The Economic and Social History of Brazil since 1889. Cambridge University Press, Cambridge.

[40] Luukkonen, R., Teräsvirta, T. and Luukkonen, R., 1990. Testing Linearity of Economic Time Series Against Cyclical Asymmetry. Annales d'Economie et de Statistique, 125-142.
[41] Maddison, A., 1995. Historical Statistics for the World Economy: 1-2003 AD. (http://www.ggdc.net/maddison/Historical_Statistics/horizontal-le_03-2003.xls)
[42] McCleary, R.M. and Barro, R.J., 2006. Religion and Economy. Journal of Economic Perspectives, 20(2), pp.49-72.
[43] Miguel, E., Satyanath, S. and Sergenti, E., 2004. Economic Shocks and Civil Conflict: An Instrumental Variables Approach. Journal of Political Economy, 112(4), pp.725-753.
[44] Mitchell, B.R., 2003. International Historical Statistics, fourth ed. Palgrave MacMillan.
[45] OECD, 1998. Open Markets Matter: The Benefits of Trade and Investment Liberalisation. OECD, Paris.
[46] de Paiva Abreu, M. and Verner, D., 1997. Long-Term Brazilian Economic Growth: 1930-1994. OECD, Paris.
[47] Pelaez, C.M. and Suzigan, W., 1976. Historia Monetária do Brasil: Análise da politica. Comportamento e Instituiçőes Monetárias (Instituto de Planejamento Econômico e Social, Instituto de Pesquisas), no. 23, Table A.3, Rio de Janeiro.
[48] Pereira, L.C.B, Maravall, J.M. and Przeworski, A., 1993. Economic Reforms in New Democracies, first ed. Cambridge University Press, Cambridge.
[49] Rajan, R. and Zingales, L., 1998a. Financial Dependence and Growth. The American Economic Review 88, 559–586.
[50] Rajan, R. and Zingales, L., 2003. The Great Reversals: The Politics of Financial Development in the Twentieth Century. Journal of Financial Economics 69, 5-50.
[51] Rodrik, D., Subramanian, A. and Trebbi, F., 2004. Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development. Journal of Economic Growth, 9(2), pp. 131-165.
[52] Roland, G., 2008. Fast-moving and slow-moving Institutions. In: Institutional Change and Economic Behaviour, Palgrave MacMillan, London, pp. 134-155.
[53] Rodriguez, F. and Rodrik, D., 2001. Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence. NBER Macroeconomics Annual 2000 15, 261-338. MIT Press.
[54] Sala-i-Martin, X.X., 1997. I Just Ran Four Million Regressions, NBER Working Paper No. 6252.
[55] Spruk, R., 2016a. Institutional Transformation and the Origins of World Income Distribution. Journal of Comparative Economics 44(4), pp. 936-960.
[56] Spruk, R., 2016b. Replication Data for: Institutional Transformation and the Origins of World Income Distribution. Harvard Dataverse V1. Accessed at: https://doi.org/10.7910/DVN/YN7DVA
[57] Studart, R., 2000. Financial opening and Deregulation in Brazil in the 1990s. Moving Towards a New Pattern of Development Financing?. The Quarterly Review of Economics and Finance 40(1), 25-44.
[58] Teräsvirta, T., 1994. Specification, Estimation and Evaluation of Smooth Transition Autoregressive Models. Journal of the American Statistical Association 89(425), 208-

218.
[59] Torstensson, J., 1994. Property Rights and Economic Growth: An Empirical Study. Kyklos, 47(2), pp.231-247.
[60] Tsay, R.S., 2010. Analysis of Financial Time Series, third ed. John Wiley & Sons, New Jersey.
[61] Wacziarg, R., Welch, K.H., 2008. Trade Liberalization and Growth: New Evidence. The World Bank Economic Review 22(2), 187-231.
[62] Weingast, B.R., 1997. The Political Foundations of Democracy and the Rule of the Law. American Political Science Review, 91(2), pp.245-263.
[63] Zingales, L., 2015. Does Finance Benefit Society?. NBER Working Paper No. 20894.
[64] Zivot, E. and Andrews, D.W.K, 1992. Further Evidence on the Great Crash, the Oil-Price, and the Unit-Root Hypothesis. Journal of Business & Economic Statistics 10(3), 251-270.