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Financial Development, Political Instability, Trade Openness and Growth in Brazil: Evidence from a New Dataset, 1890–2003

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Abstract

What is the relationship between financial development, political instability, trade openness and economic growth and how does it change over time? This paper examines these links 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. In addition, political instability displays a negative effect on growth whereas trade openness a positive one. Finally, 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.

Keywords Economic growth · Financial development · Political instability · Trade openness · Smooth transition models

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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.

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. The latter highlights the prominent role of Brazil among emerging markets and the representativeness of our research findings in other countries especially in the region of Latin America. 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 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? Has the transition between such possible regimes been often smooth or has it generated substantial costs and negative externalities?

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. 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 (i.e. annual growth rate of gross domestic product (gdp), financial development, trade openness and a set of political instability indicators) covering the period from a very long time window, from 1890 to 2003. The new data we use in this paper is for political instability. The existing measures of both formal and informal political indicators for Brazil are yearly from 1919 to 2003 with the exclusion of the World

War II period (1940–1945). Our research contributes further to the literature by extending the track of political instability back to the year of 1890. More specifically, we constructed our own informal and formal political instability series from 1890 to 1919 (a period with high political uncertainty in Brazil).

Our main findings are that (a) financial development has a mixed (positive and negative) time-varying impact on economic growth (which significantly depends on jointly estimated trade openness thresholds); (b) trade openness has a positive effect, whereas (c) the effect of political instability, both formal and informal, on growth is unambiguously negative. Our findings (with respect to point (a) and (b)) provide supporting evidence on the implications of the theoretical model of Antras and Caballero (2009) who argue that when variation in financial development is a significant determinant of comparative advantage, trade flows (as well as capital flows) becomes complement in financial underdeveloped countries.

We may add that this paper relates to several literatures in financial development, political instability, trade openness and 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, Loayza and Ranciere 2006), 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.

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 1998; Alper and Cakici 2009; Fidrmuc et al. 2015; Durusu-Ciftci et al. 2017; Asteriou and Spanos 2019). 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 financial 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. The long time-series could allow for re-testing the hypothesis that there is a mixed time-varying impact of financial development on economic growth and the regime switching modelling (LST) would be a significant methodological approach in exploring this cavity in the case of Brazil.

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 and 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.

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.

Another literature strand to which we contribute is that of trade openness. The idea that trade liberalization is the horsepower of growth has its roots back in Adam Smith. Among others Krueger (1978) and Wacziarg and Welch (2008) argued that trade openness does indeed lead to higher growth rates. The IMF (1997) has 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 the OECD (1998) concluded that more open and outward oriented economies tend to surpass countries with restrictive and more isolated trade policies. Finally, Fischer (2000) during a lecture (for further information see Rodriguez and Rodrik 2001), argued that the optimal way for a nation to grow is to harmonize 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 the so-called Import Substitution Industrialization policies that imposed barriers on international trade (see also Dean 1995 for more details). 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). However, these arguments were lacking general approval especially after the Great War in developing countries and in particular Latin America, which very often adopted the so-called Import Substitution Industrialization policies that 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).

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 describes the data whereas Sect. 4 provides details and justification for our econometric methodology. Section 5 discusses our baseline econometric results. Section 6 concludes and suggests directions for future research.

2 Background: Brazilian Economic and Political History

This Section, provides general background information about the main developments in Brazilian economic history. The reason for this is to help judge the range of variables we choose to focus on in the econometric analysis as well as to better evaluate our main estimation results. Our data start in 1890 as such covers the following main political periods: the First Republic from 1889 to 1930, the Vargas Era from 1930 to 1945, the Second Republic from 1945 to 1964, the Military Dictatorship from 1964 to 1985, and the new democratic period since 1985.

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 15th 1889, the army captured the Royal Palace, the main governmental building and silenced Rio de Janeiro. The day after November the 15th, 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 São 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 Paraíba and the assassination of João Pessoa, the governor of Paraíba, occurred. Shortly after Pessoa's death, more riots followed, including the Revolution of 1930, on October 24th 1930. Getúlio 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 dictator¹, 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 Getúlio 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 corporatism². 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. 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

¹ In 1930 Getúlio Vargas was selected as the candidate of the Aliança Liberal (Liberal Alliance).

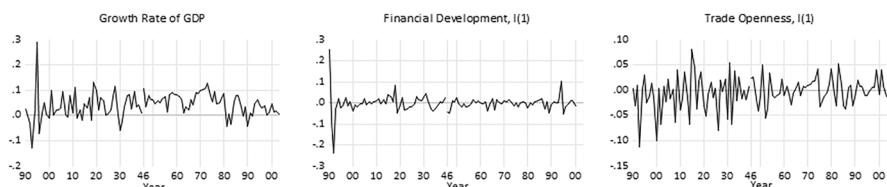
² The term developed mostly in Italy under Benito Mussolini. Corporatism is a concept opposite to that of Marxism and Liberal Democratic political philosophies.

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 world's 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 Goulart³, in a huge rally in Rio de Janeiro on March 13th 1964, attempted to promote reforms. An opposition rally was held six days later in São 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

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



Notes: The y-axis shows the growth rate and the first difference of the gdp and financial development and trade openness respectively.

Fig. 1 Growth Rate of GDP, Financial Development and Trade

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 15th 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 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 20th 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 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

Fig. 1. Economic growth is measured as annual growth rate of 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 sector⁴. 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.

One note of caution is that there are various aspects of financial development that may be considered important but for which data are only available after approximately 1950 or 1960 (e.g., share of credit to the private sector over gdp⁵, intermediation spreads, bank credit, and bank credit/deposits ratio) and hence, cannot be used in the present study.

As far as trade openness is concerned we use the ratio of exports plus imports as a share of gdp (we also plot the exports and imports as a share of gdp, see Fig. 7 in the Appendix). In addition the correlation coefficient of exports and imports (as a share of gdp) with respect to openness, that is $\rho_{\text{exp},\text{to}} = 0.98$ and $\rho_{\text{imp},\text{to}} = 0.97$ respectively.

This paper captures the changes in trade policies by using trade openness as the transition variable in the case of Brazil for the following reasons. According to the United Nations' statistical agency⁶ it is a major exporter of 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). Table 5 in the Appendix reports the descriptive statistics.

3.1 Construction of the New Political Instability Dataset

The new data we use in this paper is for political instability (available from 1890 to 2003, Campos et al. 2020). 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 Fig. 2).

Formal political instability is measured by legislative selection (ls) and legislative elections (le). The latter is defined as follows:

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

⁵ Though not a measure of “efficiency” and is also a very poor measure of financial development, see IMF Financial Development database and the associated IMF staff discussion note by Sahay et al. (2015).

⁶ For further information regarding Brazil's profile please check the: <http://comtrade.un.org>

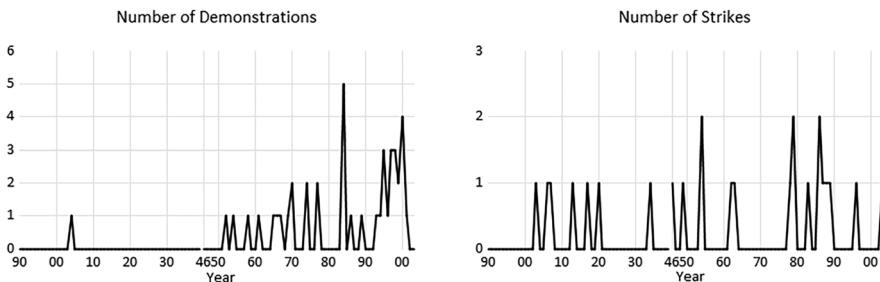
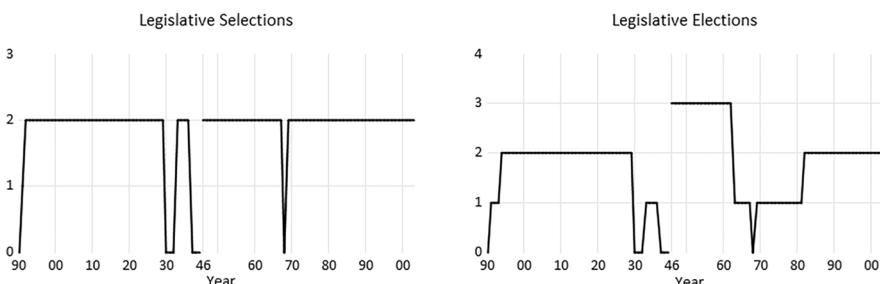


Fig. 2 Informal Political Instability Measures

1. None. No legislature exists.
2. Ineffective. There are three possible bases for this coding: first, legislative activity may be essentially of a “rubber stamp” character; second, domestic turmoil may make the implementation of legislation impossible; third, the effective executive may prevent the legislature from meeting, or otherwise substantially impede the exercise of its functions.
3. Partially Effective. A situation in which the effective executives’ power substantially outweighs, but does not completely dominate, that of the legislature.
4. Effective. The possession of significant governmental autonomy by the legislature, including, typically, substantial authority in regard to taxation and disbursement, and the power to override executive vetoes of legislation.

Legislative selection takes the value 0 when no legislature exists, the value 1 in the case of nonelective 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 Fig. 3).

For these formal and informal political instability variables, Banks data (2005) do not exist for the pre-1918 period. In the spirit of Acemoglu et al. (2019) and according to the definitions of the political instability variables above, all relevant political events from years 1890 to 1939 were catalogued and classified into different types of political instability (see Campos et al. 2020). We then took advantage



Notes: The y-axis shows the number of demonstrations, strikes and legislative selections/elections.

Fig. 3 Formal Political Instability Measures

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 a reliable as the more standard CNTS data⁷. This extension increases the availability of the data in the case of Brazil which in turn is crucial in time series analysis as well as for future research⁸.

Our political instability variables enter our econometric framework one by one and thus the results are not affected by the taxonomy itself. Our main formal and informal political instability measurements are demonstrations and legislative selections whereas the other two (i.e. strikes and legislative elections) serve as robustness checks.

3.2 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, b) such as the executive constraints, dichotomous measures of democracy, various electoral factors and *de jure* and *de facto* political institutions respectively. The latter highlights and assesses the comparability and accuracy of our new dataset respectively as well as enhances the contribution of our paper to economic growth literature.

More specifically, Acemoglu et al. (2002) argue in favor of a reversal in relative incomes among the former European colonies due to European intervention which in turn created an “institutional reversal”. To quantify institutions, they employed among others the constraints on the executive (a variable described in Gurr 1996, and later updated in Marshall et al. 2015) from Polity III data set, which serves as a proxy for the level of concentration of political power in the hands of ruling groups. We then explore how our coding matches with that of Marshall et al. (2015). Despite the different scaling between our measures and that of Marshall et al. (2015) we notice from Fig. 3 (see legislative selection) and Fig. 6a (in the Appendix) that legislative selection and executive constraints are highly correlated.

Boix et al. (2013) update and describe an extensively used dataset on democracy covering a very long period of time, from 1800 to 2007 and 219 countries and representing the most comprehensive dichotomous measure of democracy (see Fig. 6b).

⁷ For more details regarding the construction of the political instability data see Campos et al. (2020).

⁸ Following Campos et al. (2020), since 2003 the political environment of Brazil became significantly less unstable meaning that most of the political instability indicators would take the value of 0 (affecting adversely the robustness of our results in the context of the smooth transition modelling).

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***	

*** 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

Figure 2 (see demonstrations) and Fig. 6b entail that there is a significant correlation between the dichotomous measure of democracy (Boix et al. 2013) and our political instability indicator of demonstrations. Looking at those two graphs we notice that up to almost 1950 where the country was democratically repressed the number of demonstrations were almost zero. This trend started reversing from 1950 and especially from 1980 onward when democratic values began to emerge.

Furthermore, Lindberg et al. (2014) generated a new dataset that measures democracy, the so-called Varieties of Democracy Project (V-Dem). Due to the lack of consensus on how to measure democracy they emphasize on its multidimensionality. Out of the five principles that the authors follow in order to conceptualize democracy, we estimate high correlation coefficients between various electoral [such as election vote buy, elections free and fair, head of state legislation in practice and party ban (see Fig. 6c)] and liberal [such as executive respects constitution and freedom from political killings (see Fig. 6d)] components and our informal (namely demonstrations and strikes) and formal (namely legislative selection and legislative elections) political instability indicators (due to space limitations, we project only a sample of the electoral and liberal components).

Concluding, Spruk (2016a, b) measured institutional changes and investigated the impact of de jure and de facto political institutions on the long-run economic growth for a large panel of countries in the period 1810-2000 (due to space limitations see Fig. 6e for a sample of those components). Comparing with their data set we estimate high correlation between their de jure (and in particular competitiveness and openness of executive recruitment) and de facto components (civil liberties and political rights) and our informal (namely demonstrations) and formal (such as legislative elections and legislative selection) political instability indicators. The data for the de facto components, namely civil and political rights, were available from 1972 onward for Brazil.

Because the original series (with the exemption of growth rate of gdp and the political instability measures) of financial development and trade openness are I(1), they are included in our models in first differences for stationarity purposes. Results

from the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests are presented in Table 1. 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 6 in the Appendix). In all cases the unit root hypothesis is rejected at 1% and 10% level respectively (with the exception of one that fails to reject the unit root hypothesis when we allow for a break in the trend: see Table 6 in the Appendix, third column).

4 Econometric Framework

Non-linear models have attracted the interest of more and more researchers in recent years. Economic variables are subject to switching regimes. From recent studies in univariate modelling, we learn that there are a lot of benefits in allowing non-linear specifications. While from one side the regime switch implies a sudden abrupt change on the other most economic variables change regimes in a smooth way (i.e., transition from one regime to the other needs some time to take place). To address this issue the smooth transition regression models have recently been developed (Kavkler et al. 2007).

An advantage of the smooth transition regressions (comparing to the discrete switching models see for example Hansen 2000) is that they model transition as a continuous process dependent on the transition variable. The latter allows for incorporating regime switching behaviour (i) when the exact time of the regime change is not known with certainty and (ii) when there is a short transition period to a new regime. Therefore, these models provide additional information on the dynamics of variables that show their value even during the transition period.

Capturing nonlinearities and regime switching makes smooth transition models good candidates for analysis of numerous transition economies, such as Brazil, and economic variables. First, because these models naturally lend themselves to modelling institutional structural breaks. Thus, they may be a useful tool to study transition economies characterised by many structural breaks in the early part of transition. Second, several authors provide evidence of asymmetries in the dynamics of economic variables, depending on the magnitudes of parameters, in established market economies (see Johansen 2002; Milas and Legrenzi 2006).

In the literature of business cycles or trade openness, it is very common practise to distinguish only two regimes associated with recessions and expansions. Given that in our paper the transition function is trade openness we consider two-regimes associated with open (high level of trade openness) and closed economy (low level of trade openness). At this point it is worth mentioning that the smooth transition modelling allows for only two regimes (associated with the extreme values of the transition function $G = 0$ and $G = 1$, whereas the transition between the two regimes is gradual). Nevertheless, we acknowledge the fact that while this is sufficient for most practical cases such as the case of Brazil, sometimes it might be interesting to consider the possibility of more than two regimes. The latter could be examined in future research by utilizing models that allow for multiple regimes.

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, 1998). 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, 1998). The ST model for the economic growth series y_t is given by

$$y_t = \Phi_1' \mathbf{x}_{t-l} + \Phi_2' \mathbf{x}_{t-l} G(s_{t-d}) + \epsilon_t \quad (1)$$

where $\mathbf{x}_{t-l} = (1, x_{2,t-l}, \dots, x_{k,t-l})'$ is the $k \times 1$ vector of the explanatory variables, $\Phi_i = (\phi_1^{(i)}, \dots, \phi_k^{(i)})'$, $i = 1, 2$, are the $k \times 1$ vectors of coefficients and $G(s_{t-d})$ is the transition function (see Eq. 2), which changes smoothly from 0 to 1 as the transition variable s_{t-d} (which can be a lagged endogenous variable y_{t-d} for a certain integer $d > 0$, an exogenous variable, a possibly nonlinear function of lagged endogenous and exogenous variables or a linear time trend, see van Dijk 1999) increases. Because of this property (i.e. the transition function changes smoothly from 0 to 1), not only the two extreme states can be explained by the model, but also a sequence of regimes that lie between those two extremes. The term d determines the lag-length of the transition variable and $\{\epsilon_t\}$ is a sequence of independently and identically distributed (i.i.d) errors ($\epsilon_t \sim iid(0, \sigma_\epsilon^2)$). Here we use the first order logistic function, which is defined as:

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

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, $\gamma \rightarrow \infty$, then the transition is said to be abrupt. When $\gamma \rightarrow 0$ 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). For recent developments of the ST regression model and its applications see Espinoza et al. (2010), Dueker et al. (2013), Silvennoinen and Teräsvirta (2015), Gonzalez et al. (2017) and Shahbaz et al. (2017).

However Teräsvirta (1994) noted that the joint estimation of the transition parameters γ and c is uncertain. Nonetheless, these uncertainties around the accurate estimation of transition parameters γ and c , do not affect the other estimates of the model. Following Teräsvirta (1994, 1998) we test whether the non-linear model is preferred and if the use of the logistic function is warranted.

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

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	<i>p</i> -value H01	<i>p</i> -value H02	<i>p</i> -value H03	<i>d</i> -value 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*

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 LM₂, H01, H02 and H03 follows Teräsvirta (1994).

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 LM₂) in two cases (demonstrations and legislative elections) while for the other two (strikes and legislative selections) the *p*-values of LM₂ are weaker than those when trade openness is the transition variable. Similarly, economic growth fails to reject the linearity hypothesis in most of the cases when it serves as a transition variable⁹.

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 Eq. (2)) becomes 0 and hence the model, in Eq. (1), reduces to a linear one. A range of linearity tests suggests the use of LST instead of the EST model (see Table 2). 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 suitable¹⁰. We use the RATS software to estimate Eqs. (1) and (2). As mentioned above, 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. For trade openness and

⁹ See Tables 2, 7 and 8 in the Appendix.

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.

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

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

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). The choice of the delay parameter is determined by the strongest linearity rejection relative to different values of d . Accordingly, we set $d = 4$. Based on AIC and Ljung and Box (LB) statistic for remaining residual autocorrelation, the most parsimonious model (the model with the greatest explanatory power) was the one where 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, $x_{t-l} = (1, cbd_{t-3}, pi_{t-4}, to_{t-4})$. 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} . The autoregressive coefficients of economic growth are highly insignificant and thus omitted from the model. For that reason, the model collapses to a smooth transition regression (STR), for a thorough examination of the STR model see Teräsvirta (1998).

Concluding, our lagged regression coefficients report the time-varying effect of financial development, trade openness and political instability on growth in the short-run.

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 variable¹². By estimating Eq. 2, Table 4 reports our baseline results:

¹² To validate our results we additionally used money supply and deposits at Banco do Brasil as financial development measurements (for more details see Campos et al. 2016).

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** (0.028)	-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)

Table 4 reports parameter estimates for the following model (see Eq. 2):

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

The numbers in parentheses represent standard errors

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

To assess the robustness of our results a portmanteau LB test was conducted to control for remaining residual autocorrelation in our model and hence possible misspecification. The results indicated no remaining residual serial correlation (see Table 9 in the Appendix for the LB statistic as well as the F-statistic for each model of Table 4).

In order to estimate the time-varying effects of trade openness, political instability and financial development on growth we use the following three equations:

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

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

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

First, notice that there is a positive and statistically significant time-varying relationship between trade openness and economic growth (see Eq. 3 and Fig. 4¹³). The average marginal effect of trade openness on economic growth is reported in Table 10 in the Appendix. 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

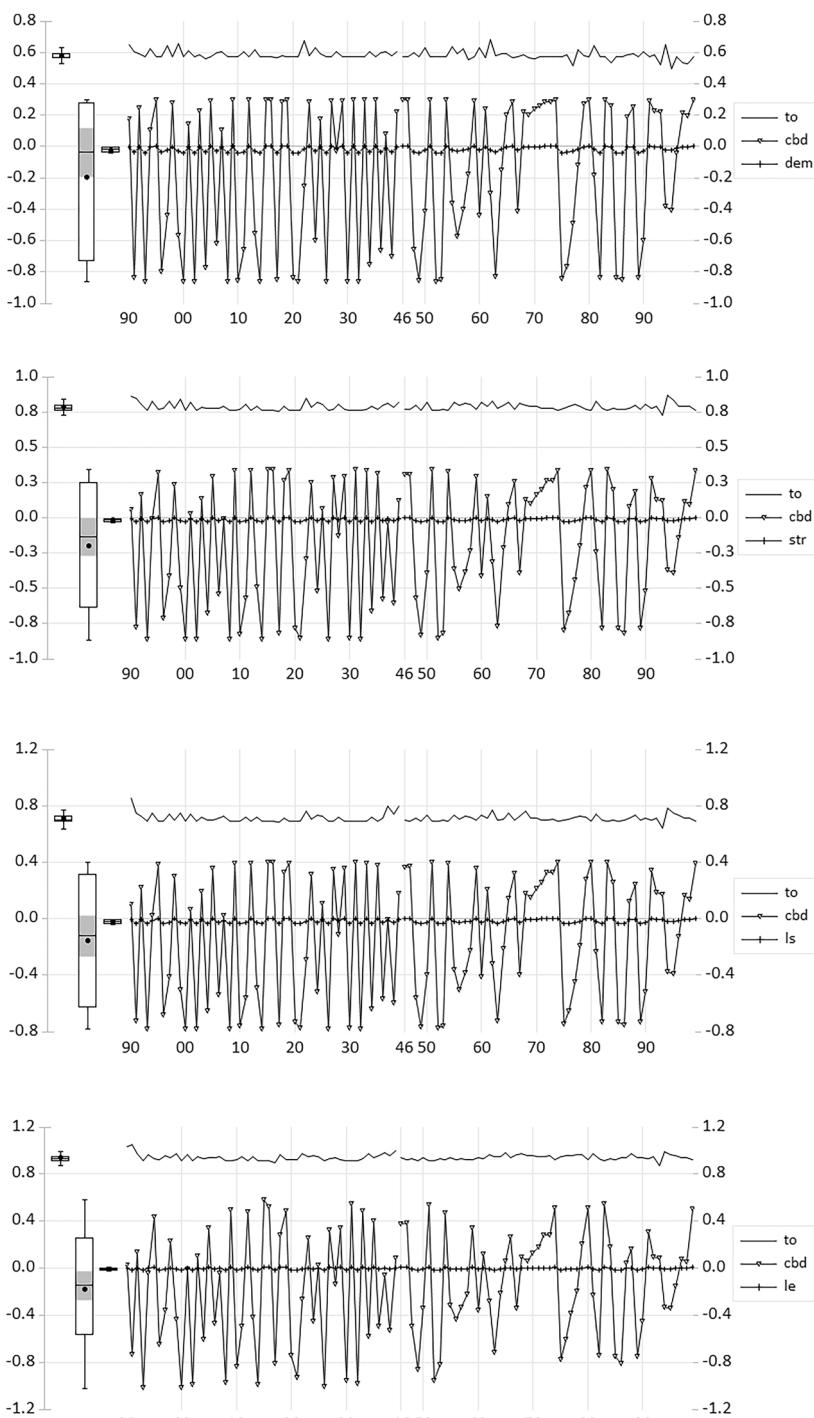
¹³ Boxplots display the mean (•) and the median (—) for each variable as well as the shaded confidence intervals at 95% for the mean.

Fig. 4 Time-varying Effects of Trade Openness (to), Financial Development (cbd) and Political Instability (Either dem Or str Or ls Or le) On Growth

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 Eq. 4 and Table 10 for the average marginal effects).

Our principal findings refer to financial development: Fig. 4 shows our estimates for this mixed time-varying relationship (see also Table 10 for the average marginal effects of financial development on growth). Notwithstanding the annual frequency, we estimate a negative effect in 56 cases (years) out of 104 (see Eq. 5). 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 Brazil¹⁴. 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.

¹⁴ This finding is really interesting given the results provided by Rajan and Zingales (2003).



Notes: Boxplots display the mean (•) and the median (—) for each variable as well as the shaded confidence intervals at 95% for the mean.

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

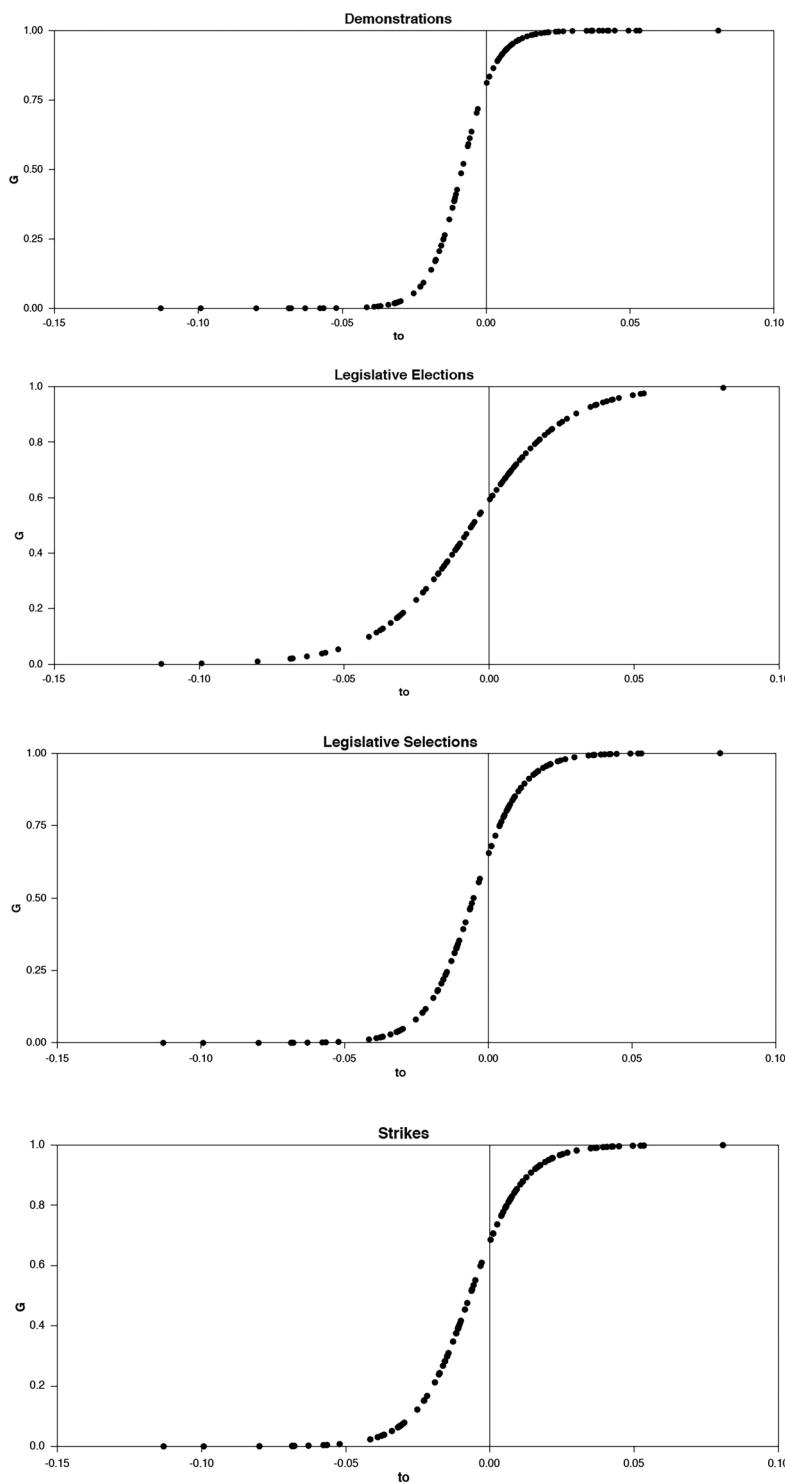
Despite the fact that in the period since 1930 Brazil remained a closed economy (see Fig. 7 in the Appendix), international financial development is expected to have played a significant role in Brazil's economic growth. Abreu and Verner (1997) argue that from 1930-1980 Brazil had a unique foreign economic orientation, with bold export promotion policies and a rather closed domestic market. Campos et al. (2022) argue that exogenous increases in domestic financial development have a negative indirect effect on growth. On the contrary, higher U.S. interest rates are linked with a larger proportion of growth volatility. Therefore, international financial integration leads to higher growth. This is intuitive, as reductions in the U.S. interest rate lead to a reduction of the price of money internationally, which in turn leads to reduced levels of risk.

As far as the level of γ (γ determines how smooth the change in the value of the logistic function is, see Eq. 2) is concerned the change between the two regimes, that is from a relatively open to a relatively closed economy, is not so smooth, with the exception of legislative elections, where the transition is smoother (see Fig. 5). Alternatively, the large value of γ indicates that the change between the two regimes is abrupt in the majority of the cases.

5.1 Robustness Checks

To corroborate further our results we perform a battery of robustness checks. 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 the issue of omitted variable bias, we re-estimate the regressions from Table 4 by controlling 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). We find qualitatively similar results. In



particular, 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. However, due to the fact that the aforementioned data series are not reported since 1890 the models of Table 4 included significantly reduced number of observations¹⁵.

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).

5.2 Discussion

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 as well as motivate our analysis with reference to recent negative trends or challenges for emerging market economies (EMEs) with respect to political instability. We will also discuss how our results speak to future growth outcomes for EMEs.

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 (a) political instability has a negative effect on growth whereas (b) the financial development effects are negative in the short-but positive in the long-run (with the positive being substantially larger than the negative one). Our estimates for Brazil report (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 (with clearly positive and large effects on economic growth during the end of our sample). While it is important to check for the external validity of our results, especially among Latin America countries, yet we should point out that Argentina is unique in a way that no other country in the world since the Industrial Revolution went from riches to rags. Put differently, Argentina is an outlier.

¹⁵ Results are available upon request.

EMEs have experienced diverse changes in their political stability with important implications for economic growth and business environments. While persistent and rising political instability has undermined confidence (consumer and investor) in countries such as India, Egypt and Ukraine, economies like Indonesia and Chile have seen growing capital inflows as a result of improvements in political stability and their business environments. For example, India recorded a low performance in both its political stability and business environment rankings (ranked 178th out of 203 countries in the Political Stability and Absence of Violence 2013 index and 142nd out of 189 countries in Doing Business 2015). Among the factors affecting the country's performance were poor governance, high disparities in rule of law, infrastructure deficits and corruption. Similarly, in Egypt, high political unrest such as demonstrations and strikes undermined business environment reforms. Egypt ranked relatively low in the Doing Business rankings, at 112th out of 189 countries in the 2015 report, compared to UAE's 22nd position (see Euromonitor International 2014).

Meanwhile, the outlook does not look good. Political unrest and geopolitical conflicts are expected to remain in some EMEs. Overcoming the pandemic crisis, returning to more normal policies and dealing with the emerging food crisis will increase the challenges in rebuilding their economies. Our results in the case of Brazil (that is lower level of political instability promotes economic growth) highlight the importance of a stable political environment in boosting economic growth by tackling rising income inequalities, high unemployment and corruption.

Concluding, it is important to distinguish policy and reality, i.e. between *de jure* and *de facto* for trade openness and for financial development. In that way we could explore how different types of economic openness as well as different indicators capture the impact of openness on economic growth in different ways, see Gräbner et al. (2018)¹⁶.

More specifically, Bataka (2019) argues that in overall globalization boosts economic growth in Sub-Saharan countries (SSA). However, distinction between *de jure* and *de facto* aspect indicates a positive economic growth impact of *de jure* globalization, whereas *de facto* impacts economic growth negatively. The study also finds that *de jure* political globalization has no effect on economic growth, while *de facto* political globalization hampers 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

¹⁶ Though given the historical perspective of this paper this would be a real challenge due to lack of data.

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 Sect. 5). Furthermore, we have not completely ruled out endogeneity (given the interrelation of our variables, reverse causality - growth causing faster financial development or trade openness - and potentially confounding factors). 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 as well as considering the possibility of more than two regimes would clearly represent progress and is something we feel future research should try to address.

Appendix

Table 5 Descriptive Statistics

Variable	Mean	Std. Deviation	Minimum	Maximum
Growth Rate of the Level of GDP (gdp)	0.04	0.05	-0.12	0.29
Financial Development	-0.001	0.04	-0.24	0.25
Trade Openness	-0.001	0.03	-0.11	0.08
<i>Informal Political Instability</i>				
Anti-Government Demonstrations (dem)	0.38	0.88	0	5
General Strikes (gs)	0.22	0.48	0	2
<i>Formal Political Instability</i>				
Legislative Selections (ls)	1.84	0.53	0	2
Legislative Elections (le)	1.77	0.80	0	3

Table 5 tabulates the descriptive statistics for growth, financial development, trade openness as well as the sample of informal and formal political instability measurements. In particular it reports the mean, the standard deviation as well as the minimum and maximum across the full sample period, 1890 to 2003 for Brazil

Table 6 Zivot and Andrews (1992) Unit Root Tests With Breaks

Variable	Type of Break		
	With Intercept	With trend	Both
gdp	-10.77*** (1981)	-10.37*** (1973)	-10.72*** (1981)
cbd	-12.94*** (1906)	-13.87*** (1906)	-14.34*** (1919)
to	-13.85*** (1909)	-13.81*** (1916)	-14.09*** (1920)
dem	-9.76*** (1984)	-9.58*** (1981)	-9.66*** (1984)
str	-9.41*** (1978)	-9.15*** (1988)	-9.82*** (1978)
ls	-7.09*** (1930)	-6.75*** (1933)	-7.58*** (1946)
le	-4.78* (1940)	-3.72 (1971)	-4.80* (1940)

***, * indicate significance at 1% and 10% level respectively. Columns 2, 3 and 4 report estimated t-statistics when we allow for breaks in the intercept, in the trend and in both respectively. Numbers in parentheses represent break points. Only the case of *le* is unit root when we allow for a break in the trend

Table 7 Linearity Testing, Using Commercial Bank Deposits (cbd) as the Transition Variable

Variable	Linearity	<i>d</i> -delay parameter
	LM ₂	
dem	0.25	4
str	0.03	4
ls	0.07	4
le	0.20	4

Column 2 represents p-values of the linearity rejection. Based on Teräsvirta (1994) most of the cases reject linearity at either 5% or 10%

Table 8 Linearity Testing, Using Economic Growth (gdp) as the Transition Variable

Variable	Linearity	<i>d</i> -delay parameter
	LM ₂	
dem	0.30	4
str	0.09	4
ls	0.28	4
le	0.40	4

Column 2 represents p-values of the linearity rejection. Based on Teräsvirta (1994) most of the cases reject linearity

Table 9 Postestimation Analysis of Models of Table 4

Variable	<i>F</i> -statistic	<i>LB</i>
dem	0.001	0.220
str	0.002	0.280
ls	0.000	0.160
ke	0.000	0.210

The table reports the F-statistic and the Ljung and Box (LB) statistic that tests remaining residual autocorrelation. Numbers reported are p-values

Table 10 Average Marginal effect of Trade Openness, Political Instability and Financial Development

Variable	<i>to</i>	<i>pi</i>	<i>cbd</i>
dem	0.58	-0.02	-0.19
str	0.79	-0.01	-0.20
ls	0.71	-0.02	-0.15
le	0.94	-0.01	-0.17

The table reports the average marginal effects obtained from Eqs. 3, 4 and 5 for trade openness (to), political instability (pi) and financial development (cbd)

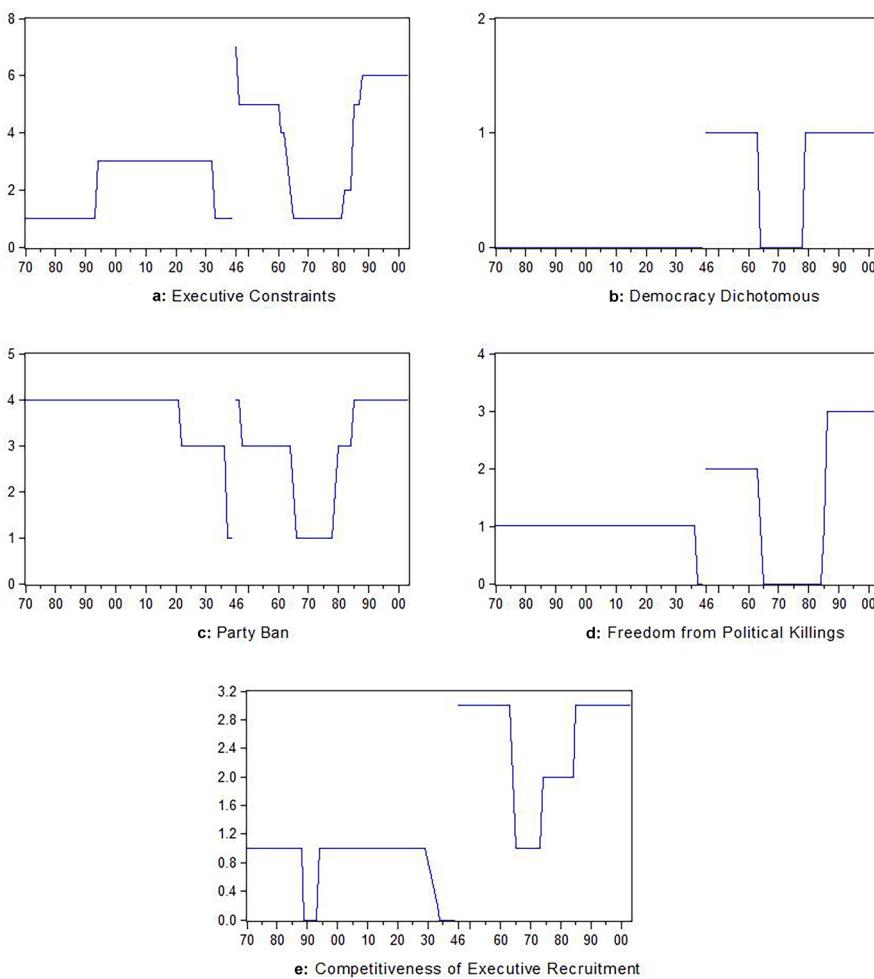
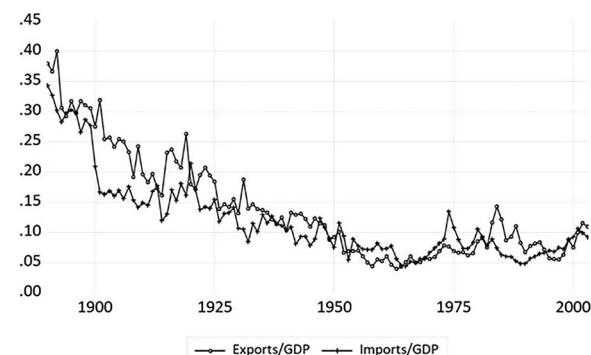


Fig. 6 Other Measures of Democracy and Institutional Development

Fig. 7 Exports and Imports as a Share of GDP Over Time



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Declarations

Conflicts of Interest The authors declare they have no conflict of interest.

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