Financial Liberalization, Volatility and the Finance-Growth Nexus

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This version: February 4 2011

Abstract

This paper studies the impact of financial liberalization on economic growth. It contributes to this literature by using an innovative econometric methodology and unique data set of historical series. It presents power ARCH estimates for Argentina for the period from 1896 to 2000. The main results show that the long-run effect of financial liberalization on economic growth is positive while the short-run effect is negative, albeit substantially smaller. Interestingly we find that financial development affects growth only directly, that is, not through growth volatitlity.

JEL Codes: C14, O40, E23, D72

Keywords: economic growth, financial development, volatility, political instability, power-ARCH

* We thank Luis Catao, Alec Chrystal, Stijn Claessens, Bertrand Candelon, Richard Easterlin, John Hunter, Marika Karanassou, Michail Karoglou, Ayhan Kose, Christopher Martin, Andrew Powell, Marianne Schulze-Ghattas, Mariano Tommasi, anomymous referees and seminar participants at the Centre for Financial and Management Studies at the University of London, University of Macedonia, ETH Zurich, Cass Business School (EMG Conference), University of Mannheim, Annual Conference of the Money, Macro and Finance Research Group (London) and Inter-American Development Bank for valuable comments on previous versions. We would also like to thank Lee Alston, Andres Gallo and Allan Timmermann for kindly sharing their data with us. Previous versions of this paper circulated under the title "Two to Tangle: Financial Development, Political Instability and Economic Growth in Argentina." The usual disclaimer applies.

1 Introduction

Instability and performance are often inversely related. Financial crises are associated with growth decelerations and contractions, while political protest tends to disrupt productive activities thereby negatively affecting economic growth. Such amplified uncertainties, driven either by economic or political events, have deleterious consequences in terms of economic performance, especially in the short-run. In the long-run, however, financial development and political stability may instead have positive effects on growth. For example, the supply of credit to the private sector and transitions from autocracy to democracy are often considered key determinants of long-run growth across countries. In this light, this paper tries to answer the following questions. What is the relation between financial development on the one hand and economic growth and its volatility on the other? Do the sign and intensity of such effects vary over time and do they vary with respect to short- versus long-run considerations? Is there a dynamic asymmetry in the impact of financial development and political instability (that is, is it negative in the short- and positive in the long-run)?

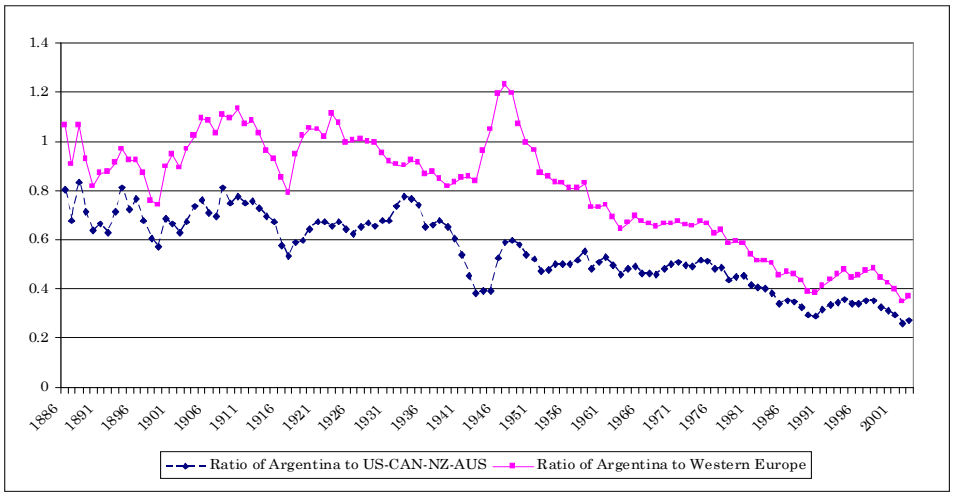
This paper tries to tackle these questions using an innovative econometric framework and a unique type of data as it employs the power-ARCH (PARCH) framework and annual time series data for Argentina covering the period from 1896 to 2000. The "Argentinian puzzle," according to della Paolera and Taylor (2003), refers to the fact that since the Industrial Revolution, Argentina is the only country in the world that was developed in 1900 and developing in 2000 (see Figure 1)[1]. Campos et al. (2008) provide evidence that the development of financial markets as well as political instability are the most important factors in understanding this puzzle (these are more important than reasons normally given for the Argentinian puzzle such as inflation, trade openness and international financial integration.)

As far as the literature on the finance-growth nexus is concerned, the present paper tries to contribute by offering econometric evidence based on historical data. Levine (2005) and Fecht et al. (2008) argue that the prevailing consensus favors a positive, lasting and significant effect from financial development to economic growth and that such effects are predictably stronger from measures of financial efficiency (for instance, the share in GDP of credit to the private sector) than from standard measures of financial depth (such as M3 over GDP). By using a range of financial development measures we can throw light on the impacts of these different dimensions over a period of time much longer than that normally considered in the literature. Doing so, also allows us to investigate, inter alia, whether the impact of financial development on growth occurs directly or through growth volatility[2].

[1] Authors' calculations using GDP per capita data from Maddison (2007), Western Europe is defined as Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland and United Kingdom. The other group, Western Offshoots, includes Australia, Canada, New Zealand and United States.

[2] Levine (2005) surveys the finance and growth literature. On finance and volatility, see Bekaert et al. (2006) and Prasad et al. (2004).

Figure 1: Ratio of Argentina's GDP per Capita to Developed Countries' GDP per Capita, 1885-2003

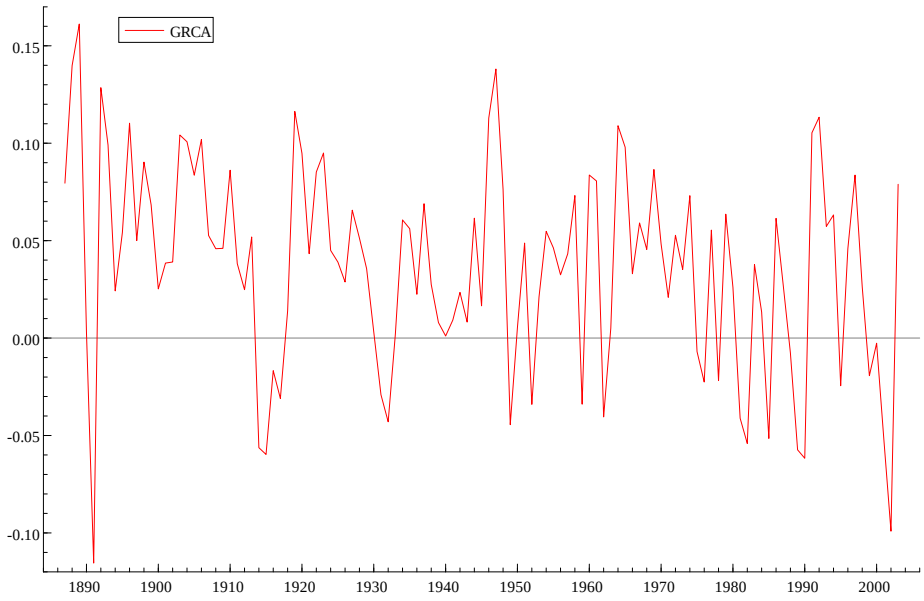


An important issue we tackle is that of the contrasting short- versus long-run effects of finance on growth. Seminal papers are those by Kaminsky and Schmukler (2003), Tornell et al. (2004) and Loayza and Rancière (2006). Despite the development of the financial system being robustly associated with economic growth, it is also often found to be the main predictor of financial crises. That is, while the long-run effect of finance on growth is positive, in the short-run it is negative. However, cross-country heterogeneity and business cycle synchronization issues may play an undesirably large role in generating this result and in particular regarding the relative magnitudes of these two effects. For instance, Loayza and Rancière (2006) report that the size of the effects is similar but the negative short-run effect is often larger than the positive long-run effect. In this paper we use data for a sufficiently long period of time and find supporting evidence for this asymmetric dynamic effect with the negative short-run effect being substantially smaller than the positive long-run effect[3]. Moreover, we try to shed light on important puzzles such as the one regarding the duration of the political instability effects. While the conventional wisdom is that these effects are severe in the long-run, Campos and Nugent (2002)[4] and Murdoch and Sandler (2004) argue that they are stronger in the short- than in

[3] One important issue, which is beyond the scope of this paper, is regarding the causes of financial development, in particular, the legal origins versus political institutions debate (see Haber and Perotti, 2007).

[4] They argue that the long-run negative effect of political instability on growth depends on the inclusion of African countries and of institutions.

Figure 2: Real GDP Growth



the long-run.

One last intended contribution is to try to bridge the literature on the macroeconomics of instability (based on cross-sectional and short-panels) with that on the relationship between growth and its volatility, which is mostly time-series based[5]. The latter tends to downplay the potential dependence between growth and its volatility by assuming a linear relationship, the so called Bollerslev GARCH specification. Another final puzzle we try to address is on the sign of the growth-volatility link: while Grier and Tullock (1989) argue that larger standard deviations of growth rates are associated with larger mean growth rates, Ramey and Ramey (1995) show that output growth rates are adversely affected by their volatility.

Anticipating our main findings, we note the following in relation to the questions raised at the outset. The relationship between, on the one hand, financial development and political instability and economic growth, on the other, is not as straightforward as one may think at first. We find that it crucially depends on the type of political instability and of financial development, as well as short-

[5] Durlauf et al. (2005) survey the former, and Grier et al. (2004), Fountas and Karanasos (2006) and Fountas et al. (2007) review the latter. One paper that tries to link these literatures, and is close to ours in this sense, is Asteriou and Price (2001), which present time series (quarterly) data evidence for the UK since 1960.

versus long-run considerations. The short-run effect on economic growth of both informal instability and financial development is negative and direct and these results are robust to accounting for structural breaks, which are important in light of the long time span we cover in this study. Yet, while the long-run influence of finance is positive, that of informal instability remains negative. We also find that the impact of formal instability is mostly indirect and operates through growth volatility. These results suggest that the "severity" of the political instability effects in a sense "dominates" that of financial development: while the short- and long-run finance effects work in opposite directions, the effects of political instability are both negative and seem to operate through different channels. In this paper, we show that formal political instability is detrimental to growth via the volatility channel and our results suggest that, together with informal instability, may have played a truly substantial role in the decline of the Argentinian economy during the XXth century.

The paper is organized as follows. Section 2 sets the context by showing how political instability and financial development contributed to the decline of Argentina from a position of a rich or developed country in year 1900 to that of a middle-income or developing country in year 2000. Section 3 describes the data. Section 4 details the econometric methodology. Section 5 discusses the main results. Section 6 concludes and suggests directions for future research.

2 The Role of Finance and Instability in Argentinian Growth

Among economic historians, there is little disagreement that the period from 1875 to the eve of World War I is the Belle Époque of Argentinian economic history (Taylor, 1992; Sanz-Villarroya, 2007). There is also little disagreement that Argentina's uniqueness derives from no other country having ever climbed so dramatically down from the selected group of developed countries (Figure 1). The two major disagreements remain not about whether but when the decline started and why. Some authors argue that it started with the 1930 crisis (e.g., Diaz-Alejandro 1985). Others argue for an earlier turning point (Taylor, 1992, argues for 1913), while Sanz-Villarroya (2005) argues for an even earlier structural break[6].

Irrespective of exactly when the decline started, until the immediate post II World War, Argentina was still ranked 10th country in the world in terms of per capita income (Alston and Gallo, 2007, p. 6). Della Paolera and Taylor (2003, p.5) note that "by 1900 Argentina's income per capita had risen from about 67 per cent of developed country-levels in 1870, to 90 percent in 1900, and 100 per cent in 1913. Whatever its exact status in 1913, for all practical purposes Argentina was an advanced country". They also calculate that after that the

[6] Below we present and discuss our Bai-Perron estimates of the date of structural breaks in Argentinean growth. We find (and adjust our estimates accordingly) evidence for two structural breaks: 1922 and 1964.

ratio of Argentina's income to OECD income fell to 84 percent in 1950, and then to 43 percent in 1987 (see also Figure 1). We calculate that this ratio rebounds in the 1990s but again reverts with the 2001 crisis[7]. It must not go unnoticed that in a recent book on the Great Depressions of the XXth Century (Kehoe and Prescott, 2007), Argentina is the only country that has two chapters (out of 16) entirely and solely dedicated to its economy.

It is not surprising, therefore, that there is a vast literature on the Argentine puzzle, providing alternative explanations for the long-run relative economic decline. Campos et al. (2008) provide a quantitative assessment of the relative importance of the causes that have been identified in the economic history literature (namely political instability or institutions, financial development, inflation rates, public deficits, trade openness and international financial integration). They find that the two most important ones are political instability and financial development.

A large number of studies underscore financial development as a major factor in the Argentinian puzzle (della Paolera and Taylor, 1998). Taylor (2003) associates the Argentinian decline with low savings rates (the high dependency rate linked to the liberal immigration policies). A related argument is that (restricted) access to finance perpetuates high levels of wealth and income inequality. More recently, Prados de la Escosura and Sanz-Villarroya (2009) have argued that the size and efficiency of financial intermediation ("contract intensive money") is key to explaining the Argentine puzzle.

Although a large literature associates the long-run relative decline of the Argentinian economy with political factors (see della Paolera and Taylor, 2003, and references therein), we are unaware of studies that try to evaluate this association quantitatively. For instance, Acemoglu and Robinson (2006, p.7) observe that: "The political history of Argentina reveals an extraordinary pattern where democracy was created in 1912, undermined in 1930, re-created in 1946, undermined in 1955, fully re-created in 1973, undermined in 1976, and finally reestablished in 1983". In a recent paper, Alston and Gallo (2007) identify the onset of widespread electoral fraud in the 1930s as a turning point for the erosion of the rule of law and thus as a major reason for the Argentinian decline.

In what follows, we take these considerations on board to provide a quantitative account of the relative importance of two of the main reasons often identified with the Argentinian debacle, political instability and financial development.

3 Measurement

Our data set contains measures of political instability, financial development and economic growth. The main data source is the Cross National Time Series

[7] Growth was negative from 1999 culminating with -10% in year 2002. The 2001 crisis entailed a default on large part of the external debt, devaluation, inflation, and the freezing of bank accounts (the corralito.) Riots, looting and anti-government demonstrations followed. See Kehoe (2003) for a discussion.

Data set (Banks 2005), which has historical series on income per capita and various dimensions of instability. This is a commercial database that has been extensively used in the scholarship on growth, financial development and political instability (Durlauf et al., 2005.) Data are available yearly for Argentina from 1896 until 2000, excluding the years of the two World Wars.

Drawing upon the literature on growth and finance (Levine 2005) we use a broad range of measures of financial development, some reflecting depth and others efficiency aspects (see Figure 3). One note of caution is that there are various aspects of financial development which may be considered important but for which data are only available after about 1960 (e.g., intermediation spreads) and hence can not be used in the present study.

The first indicator we use is the ratio of M3 to GDP, from Alston and Gallo (2007). The main reason for considering this measure is that it has been used extensively in the finance-growth literature (King and Levine, 1993; Levine, 2005). One well-known drawback of this measure, however, is that the ratio of M3 to GDP reflects financial depth or the relative size of the financial system. It does not necessarily reflect how efficient the financial system actually is. We also use a narrower version of this variable (M1 over GDP) to check for the robustness of our results (source of the data is Bordo et al., 2001).

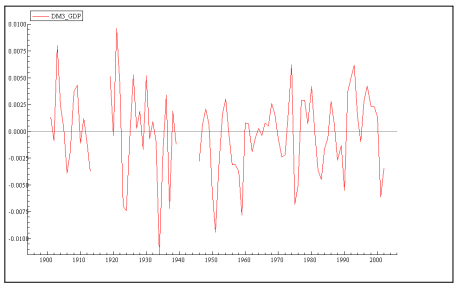
Our two other measures of financial development try to capture the efficiency of the financial sector, not its relative size. The source for both is Mitchell (2003). The first is the bank deposits by the private sector as a share of GDP (private deposits). A second measure is the total deposits in savings banks as a share of GDP. Given its more restrictive nature, we use the latter mostly for robustness checks**,** thereby attaching greater weight to private deposits[8].

We use a taxonomy of political instabilities based on the distinction between formal and informal (that is, whether or not instability originates from within the political system)[9]. Our informal political instability variables are as follows: annual number of anti-government demonstrations (peaceful public gatherings of at least 100 people), assassinations (defined as politically motivated murders or attempted murders of a high government official or politician), guerrilla warfare (armed activity, sabotage, or bombings by independent bands of citizens and aimed at regime overthrow), strikes (a general strike of 1,000 or more workers involving more multiple employers and aimed at government policies), and revolutions (illegal or forced change in the top governmental elite, attempts at, or successful or unsuccessful armed rebellion). These series are available since 1919 (Figure 4). Our formal political instability variables (Figure 5) are as follows: the number of cabinet changes, the size of the cabinet, the number of constitutional changes, government crises, the number of legislative elections, and purges (which measure any systematic elimination by jailing or execution

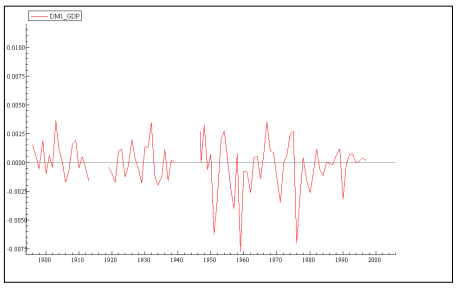
[8] Because these financial development variables are found to be I(1), in the estimation they all enter in first-differences (see Figure 3).

[9] Our political instability variables enter one by one in the econometric estimation, thus they are not affected by the taxonomy itself. The taxonomy is introduced in Campos and Karanasos (2008).

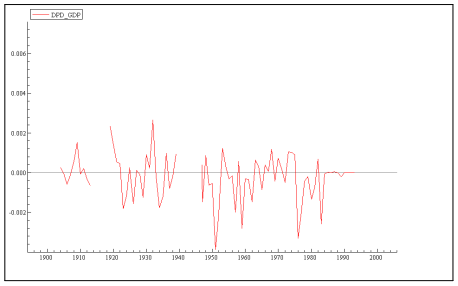
Figure 3: Measures of Financial Development



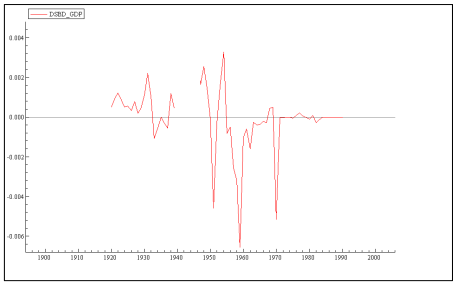
M3 over GDP



M1 over GDP



Private deposits over GDP



Savings banks deposits over GDP

of political opposition within the ranks of the regime or the opposition)[10].

Before discussing methodological issues, we note that Granger causality and Hausman exogeneity tests were carried out and these support treating causality as flowing from financial development and political instability to economic growth, and not the other way around (these results are available upon request).

4 Econometric Framework

The PARCH model was introduced by Ding, Granger and Engle (1993) and quickly gained currency in the finance literature[11]. Let growth (y_t) follow a white noise process augmented by a risk premium defined in terms of volatility (h_t):

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

with

$$\epsilon_t = e_t h_t^{\frac{1}{2}},$$

where x_{it} is either the political instability or the financial development variable.

In addition, $\{e_t\}$ are independently and identically distributed (i.i.d) random variables with $E(e_t) = E(e_t^2 - 1) = 0$, while h_t is positive with probability one and is a measurable function of the sigma-algebra $\sum_{t-1}$, which is generated by $\{y_{t-1}, y_{t-2}, \ldots\}$.

In other words, h_t denotes the conditional variance of growth. In particular, h_t is specified as an asymmetric PARCH(1,1) process with lagged growth included in the variance equation:

$$h_t^{\frac{\delta}{2}} = \omega + \alpha f\left(\boldsymbol{\varepsilon}_{t-1}\right) + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l} + \phi x_{it}, \tag{2}$$

with

$$f\left(e_{t-1}\right) = \left[|e_{t-1}| - \varsigma e_{t-1}\right]^{\delta},$$

where δ (with $\delta > 0$) is the heteroscedasticity parameter, α and β are the ARCH and GARCH coefficients respectively, ς with $|\varsigma| < 1$ being the leverage term and γ being the level term for the lth lag of growth. In order to distinguish the general PARCH model from a version in which δ is fixed (but not necessarily equal to two) we refer to the latter as (P)ARCH.

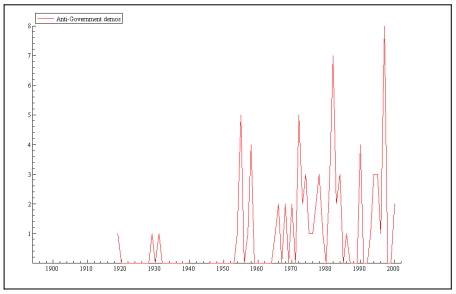
The PARCH model increases the flexibility of the conditional variance specification by allowing the data to determine the power of growth for which the predictable structure in the volatility pattern is the strongest[12]. This feature in the volatility process has important implications for the relationship between

[10] Among all formal instability variables, "purges" is the closest to what we call informal instability, while "revolutions" is the one we think is closer to the formal instability variables.

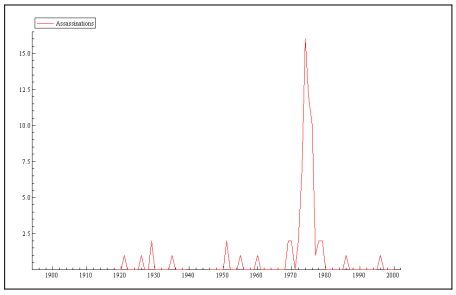
[11] See, for example, Karanasos and Kim (2006). Karanasos and Schurer, (2005, 2008) use this process to model output growth and inflation respectively.

[12] See Karanasos and Schurer (2005) and Karanasos and Kim (2006).

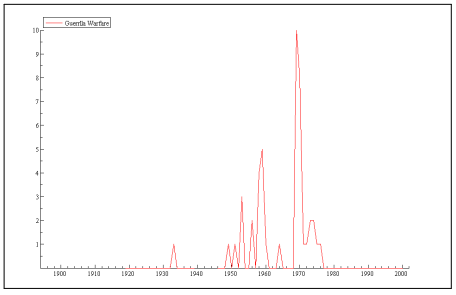
Figure 4: Measures of Informal Political Instability



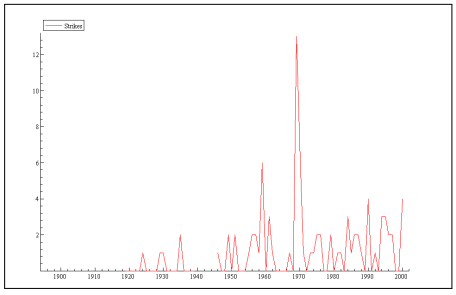
Anti-government demonstrations



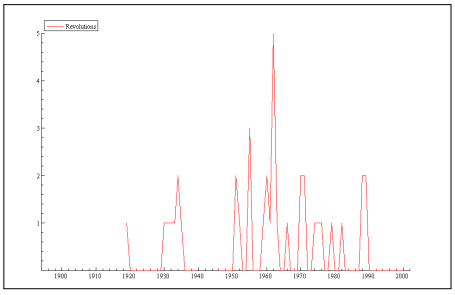
Assassinations



Guerrilla warfare

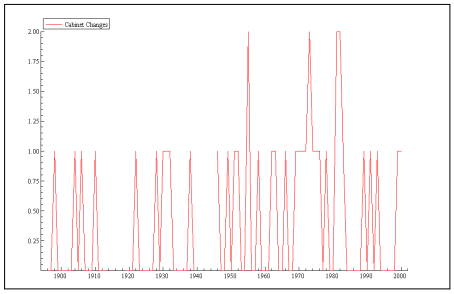


Strikes

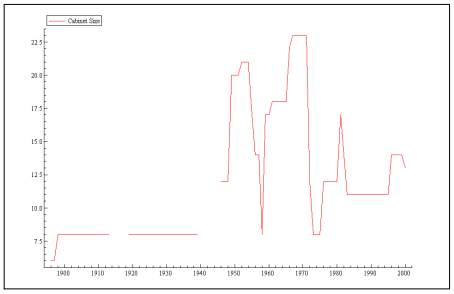


Revolutions

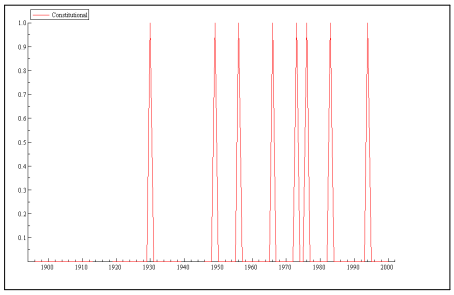
Figure 5: Measures of Formal Political Instability



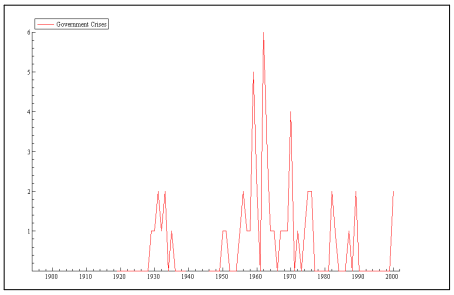
Cabinet changes



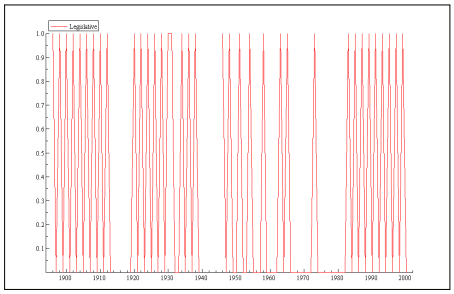
Size of the cabinet



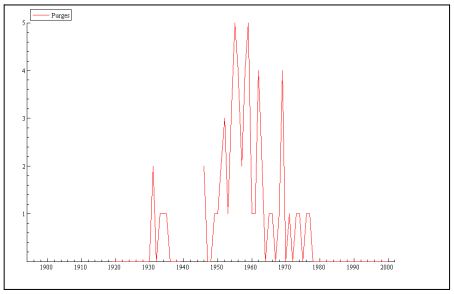
Constitutional changes



Government crises



Legislative elections



Purges

political instability, finance, inflation, and growth and its volatility. There is no strong reason for assuming that the conditional variance is a linear function of lagged squared errors. The common use of a squared term in this role is most likely to be a reflection of the normality assumption traditionally invoked. However, if we accept that growth data are very likely to have a non-normal error distribution, then the superiority of a squared term is unwarranted and other power transformations may be more appropriate.

The PARCH model may also be viewed as a standard GARCH model for observations that have been changed by a sign-preserving power transformation implied by a (modified) PARCH parameterization. He and Teräsvirta (1999) emphasize the point that if the standard Bollerslev type of model is augmented by the heteroscedasticity parameter (the power term), the estimates of the ARCH and GARCH coefficients almost certainly change.

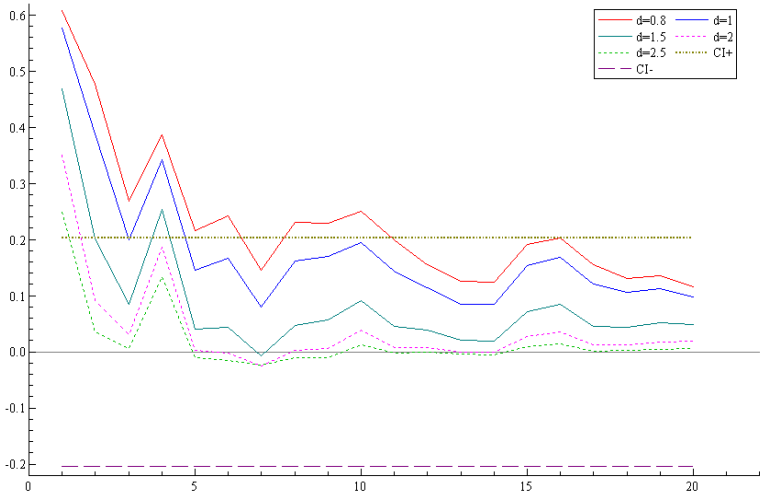
Moreover, by squaring the growth rates one effectively imposes a structure on the data which may potentially yield sub-optimal modeling and forecasting performance relative to other power terms. One way to assess the severity of this assumption is to investigate the temporal properties of the power transformed absolute growth $|y_t|^d$. First, we examine the sample autocorrelations of the power transformed absolute growth $|y_t|^d$ for various positive values of d. Figure 6 shows the autocorrelogram of from lag 1 to 20 for a range of d values. The horizontal lines show the $\pm 1.96\sqrt{T}$ confidence interval (CI) for the estimated sample autocorrelations if the process y_t is i.i.d. In this particular case, $CI = \pm 1.96\sqrt{T} = \pm 0.2032$.

The sample autocorrelations for $|y_t|^{0.8}$ are greater than the sample autocorrelations of $|y_t|^d$ for d= 1, 1.5, 2 and 2.5 at every lag. Or to put it differently, the most important conclusion from the autocorrelogram is that $|y_t|^d$ has the largest autocorrelation when $d = 0.8$. Furthermore, the power transformations of absolute growth when d is 0.8 have significant positive autocorrelations at least up to lag 10. Moreover, note that at all lags, $|y_t|^d$ has the lowest autocorrelation when d is 2 and 2.5. This result appears to argue against Bollerslev's specification.

Above all, the statistical significance of the in-mean effect is highly dependent on the choice of the value of the heteroscedasticity parameter. The effect might become insignificant if the power term surpasses a specific value. This suggests that if one assumes a priori a linear relationship between a variable and its uncertainty, the so-called Bollerslev specification, a significant link between the two might not be detected[13].

[13] Karanasos and Schurer (2008) find that the relationship between the variable and its conditional variance is sensitive to changes in the values of the heteroscedasticity parameter. Put differently, the estimated values of the in-mean and the level effects are fragile to changes in the power term.

Figure 6: Autocorrelation of $|y_t|^d$ from High to Low



5 Econometric Results

In this section we discuss our estimation results on the effects of political instability and financial development on economic growth in Argentina[14]. We start with a comparison between their direct and indirect effects on growth (the latter defined as taking place through growth volatility). We proceed by examining their asymmetric dynamic effects with emphasis on the economic significance of their long- and short-run impacts. This section closes with a discussion of a crucial robustness check (given the long span of time covered by our data), namely an assessment of the effects on our main results of accounting for structural breaks.

5.1 Baseline Results

We start with the estimation of the (P)ARCH(1,1) model in equations (1) and (2) in order to take into account the serial correlation observed in the levels and power transformations of our time series data. The tables below report the estimated parameters of interest for the period 1896-2000. These were obtained

[14] As mentioned above, Campos et al. (2008) study the relative importance of the various factors often identified as main causes of the long-term relative decline of Argentinean per capita GDP since the late XIXth century. These include political instability (institutions), financial development, trade openness, international financial conditions, and inflation. They find that institutions (formal and informal political instability) and financial development are the most important factors.

by quasi-maximum likelihood estimation (QMLE) as implemented in EVIEWS. The best fitting specification is chosen according to the Likelihood Ratio (LR) results and the minimum value of the Akaike Information Criteria (AIC) (not reported). Once heteroscedasticity in the conditional variance has been accounted for, our specifications appear to capture the serial correlation in the growth series[15].

We specify model 1 with $\phi = \gamma = 0$ in equation (2) in order to study the direct effects of political instability and financial development, while model 2 with $\lambda = 0$ in equation (1) allows us to investigate their indirect impacts on growth. In all cases the estimates for the in-mean parameter (k) are statistically significant and positive. The estimated ARCH and GARCH parameters (α and β) are highly significant throughout[16].

For model 1 ($\phi = \gamma = 0$), when the informal political stability variables are used, the power term coefficient δ ranges from 0.8 (revolutions) to 1.0 (anti-government demonstrations). The corresponding value for all but one specification with formal instability variables is 0.8 (last column of Table 1). For model 2 (with $\lambda = 0$), with the informal instability variables AIC selects (P)ARCH models with δ equal to 0.9 (anti-government demonstrations, guerrilla warfare and strikes) or to 0.8 (assassinations and revolutions)[17]. For three out of the six formal variables the estimated value is 1 (last column of Table 2). Finally, for both models 1 and 2, when the financial development variables are used, in all but one case the IC chooses a (P)ARCH specification with estimated power term 0.8.

From the results for Model 1, the parameters λ for assassinations, guerrilla warfare and strikes (three measures of informal political instability) reveal their direct, negative and statistically significant impact on economic growth. Note also that none of the corresponding effects for the formal instability variables are statistically significant (Panel B). Importantly, we find the impact of financial development on economic growth to be positive and statistically significant, irrespective of the variable we use to measure it[18].

The results in Table 1 are interesting for at least two reasons. One is that

[15] For all cases, we find that the leverage term is insignificant, so we re-estimate excluding this parameter. Controlling for both autoregressive terms as well as in-mean terms is important, because as shown in Ghysels et al. (2005), Conrad et al. (2010) and Conrad and Karanasos (2010) the omission of autoregressive terms may lead to spuriously significant in-mean terms. However, for all cases, we find that the IC choose the model without the lagged growth and since its inclusion is insignificant, we re-estimate excluding this parameter. Moreover, the coefficients of lagged growth, which are always insignificant, do not qualitatively affect the main results below. These results are available from the authors upon request.

[16] With a limited number of observations the non-linear structure should not be overextended as this imposes excessive requirements on the data. Therefore we estimate the direct (model 1) and the indirect (model 2) effects separately.

[17] In the expressions for the conditional variances reported in Table 2, various lags of growth (from 1 to 12) were considered with the best model ($l = 6$) chosen on the basis of the minimum value of the AIC.

[18] We check the robustness of our findings with respect to the presence of level effects (results not reported). That is, we estimate model 1 with $\gamma \neq 0$. As with model 2 below, for all cases but one, there is evidence of a positive bidirectional feedback between growth and its volatility.

they provide evidence strongly suggesting that the type of political instability matters vis-à-vis economic growth: informal instability has a direct and negative effect, while formal instability does not. Second, they show that financial development has a positive and direct effect on growth, with M3 over GDP (a measure of the size of the financial sector) arguably being the weakest effect. In order to assess the robustness of these results, we investigated the effects of specifying instead lagged values of the informal instability measures and we have concluded that this does not qualitatively affect our main findings (these results are available from the authors upon request).

Examining the results for Model 2 (reported in Table 2) and focusing our attention on the ϕ and k parameters[19], we can now see that the formal political instability variables have strong indirect (through volatility) negative effects on growth. This result obtains for cabinet changes and size and constitutional changes. That is, these variables affect volatility negatively ($\phi < 0$) and, since $k > 0$, they affect growth negatively as well[20]. Interestingly, none of the financial development and informal instability measures reveals such indirect effects (instead, as discussed above, they exhibit a direct impact on growth). These results reinforce the notion that the type of political instability matters with respect to economic growth: while informal instability may have a direct impact, the effect of formal political instability seems to operate indirectly, via growth volatility[21].

5.2 Short-Run and Long-Run Effects

In this section we investigate how short- and long-run considerations help us refine our baseline results. Another potential benefit is that the required use of lags may help allay any lingering concerns about endogeneity. In order to estimate short- and long-run relationships we employ the following error correction (P)ARCH form

$$\Delta y_t = \theta \Delta x_{i,t-l} + \varphi(y_{t-1} - c - \zeta x_{i,t-1}) + \varepsilon_t, \tag{3}$$

where θ and ζ capture the short and long-run effects respectively, and φ is the speed of adjustment to the long-run relationship.[22] This is accomplished

[19] Note that, for all cases in model 2, there is evidence of a positive bidirectional feedback between growth and its volatility. The existing empirical literature focuses mainly on the effect of volatility on growth, see Fountas et al. (2006) and Fountas and Karanasos (2007).

[20] We also estimate model 2 using an EGARCH specification. The results (not reported) are very much similar to the results we report in the paper.

[21] Because data is normally missing for the War years both for economic growth and for the key explanatory variables (i.e., financial development and political instability), most of the available direct imputation methods would be ineffective, in that they would not be able to generate different results from the ones we report here. Moreover, we were able to obtain another, independent, GDP growths series from Aioli, Catao and Timmerman (2010) which differs from most other GDP series in that it contains information for the War years. The results (discussed below) we obtain from this other series are very much similar to the results we report in the paper.

[22] As pointed out by Loayaza and Rancière (2006) the requirements for the validity of this methodology are that: i) there exists a long-run relationship between the variables of interest

Table 1: Direct Effect of Political Instability and Financial Development on Economic Growth. (P)ARCH estimates

	k	λ	α	β	δ
Panel A. Informal Political Instability					
Anti-Government Demos	1.00	−0.0010	0.83	0.44	1.00
	(1.66)	(1.36)	(4.15)	(1.90)	−
Assassinations	1.38	−0.0014	0.54	0.58	0.90
	(1.85)	(1.70)	(3.86)	(4.04)	−
Guerilla Warfare	1.00	−0.0013	0.77	0.47	0.90
	(3.69)	(4.35)	(5.43)	(3.13)	−
Revolutions	0.99	0.0001	0.61	0.59	0.80
	(4.31)	(0.14)	(5.17)	(4.95)	−
Strikes	0.99	−0.0012	0.79	0.44	0.90
	(3.07)	(2.13)	(4.66)	(2.38)	−
Panel B. Formal Political Instability					
Cabinet Changes	2.40	0.0001	0.31	0.72	0.80
	(3.97)	(0.03)	(3.89)	(5.09)	−
Cabinet Size	0.79	0.0002	0.90	0.46	1.00
	(1.78)	(1.47)	(4.13)	(2.32)	−
Constitutional	1.80	−0.0027	0.56	0.48	0.80
	(1.99)	(1.35)	(3.01)	(1.25)	−
Government Crises	1.03	−0.0004	0.65	0.54	0.80
	(2.53)	(0.42)	(4.89)	(3.59)	−
Legislative Elections	1.91	−0.0003	0.38	0.69	0.80
	(2.69)	(0.15)	(3.43)	(5.79)	−
Purges	1.27	−0.0010	0.58	0.56	0.80
	(1.92)	(1.55)	(4.03)	(3.69)	−
Panel C. Financial Development					
Private Deposits/GDP	0.76	0.98	0.70	0.57	0.80
	(2.66)	(9.21)	(4.99)	(4.94)	−
Savings Bank Deposits/GDP	0.74	0.58	0.76	0.56	0.80
	(1.80)	(3.43)	(4.36)	(4.97)	−
M3/GDP	0.81	0.32	0.94	0.43	1.00
	(1.94)	(1.71)	(3.76)	(2.04)	−
M1/GDP	0.69	0.58	0.75	0.56	0.80
	(2.30)	(5.14)	(5.29)	(5.85)	−

Note: This table reports parameter estimates for the following model:

$y_t = c + kh_t + \lambda x_{it} + \varepsilon_t,\ h_t^{\frac{\delta}{2}} = \omega + \alpha \mid \varepsilon_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}}$.

The numbers in parentheses are absolute t statistics.

Table 2: Indirect Effect of Political Instability and Financial Development on Economic Growth. (P)ARCH estimates

	k	α	β	γ	ϕ	δ
Panel A. Informal Political Instability						
Anti-Government Demos	1.25	0.65	0.46	0.17	−0.0002	0.90
	(2.56)	(4.52)	(5.94)	(4.51)	(0.31)	−
Assassinations	1.09	0.68	0.27	0.27	−0.0038	0.80
	(2.72)	(5.30)	(5.84)	(5.84)	(1.45)	−
Guerilla Warfare	1.12	0.73	0.46	0.10*	0.0007	0.90
	(2.46)	(4.80)	(4.00)	(2.00)	(0.82)	−
Revolutions	1.22	0.69	0.45	0.11*	−0.0002	0.80
	(2.03)	(3.73)	(2.37)	(1.80)	(0.14)	−
Strikes	1.14	0.70	0.48	0.06*	0.0011	0.90
	(2.33)	(3.55)	(2.69)	(1.73)	(1.27)	−
Panel B. Formal Political Instability						
Cabinet Changes	1.28	0.55	0.53	0.21	−0.0050	1.00
	(1.96)	(2.99)	(4.90)	(3.93)	(4.03)	−
Cabinet Size	1.14	0.60	0.54	0.18	−0.0002	1.00
	(1.77)	(3.89)	(5.02)	(2.48)	(2.13)	−
Constitutional Changes	1.18	0.69	0.45	0.18	−0.0077	1.00
	(1.94)	(4.40)	(4.15)	(3.75)	(3.40)	−
Government Crises	1.12	0.72	0.47	0.11	0.0007	0.90
	(2.30)	(4.59)	(3.28)	(2.44)	(0.57)	−
Legislative Elections	1.46	0.62	0.44	0.20	−0.0110	0.80
	(2.52)	(4.70)	(3.52)	(3.12)	(1.17)	−
Purges	1.06	0.75	0.46	0.09	0.0004	0.90
	(3.00)	(5.26)	(4.32)	(1.99)	(0.64)	−
Panel C. Financial Development						
Private Deposits/ GDP	2.05	0.41	0.62	0.40	0.58	0.80
	(2.23)	(3.04)	(6.75)	(5.69)	(0.53)	−
Savings Bank Deposits/ GDP	1.81	0.53	0.60	0.32	−0.38	0.80
	(1.92)	(2.95)	(6.37)	(6.84)	(0.38)	−
M3/GDP	1.35	0.58	0.48	0.23	0.29	0.80
	(2.48)	(4.22)	(4.49)	(4.03)	(0.36)	−
M1/GDP	1.22	0.49	0.59	0.34	−0.13	0.80
	(2.56)	(5.30)	(9.46)	(5.67)	(0.23)	−

Note: This table reports parameter estimates for the following model:

$y_t = c + kh_t + \varepsilon_t,\ h_t^{\frac{\delta}{2}} = \omega + \alpha \mid \varepsilon_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-6} + \phi x_{it}$.

* ⋆ The orders of the lags are seven and five respectively.

The numbers in parentheses are absolute t statistics.

by embedding a long-run growth regression into an ARDL model.[23] In other words, the term in parenthesis contains the long-run growth regression, which acts as a forcing equilibrium condition

$$y_t = c + \zeta x_{it} + u_t, \tag{4}$$

where u_t is $I(0)$. The lag of the first difference of either the political instability or financial development variables ($\Delta x_{i,t-l}$) characterizes the short-run effect. The condition for the existence of a long-run relationship (dynamic stability) requires that the coefficient on the error-correction term be negative and not lower than -2 (that is, $-2 < \varphi < 0$). We also take into account the (P)ARCH effects by specifying the error term ε_t as follows

$$\varepsilon_t = e_t h_t^{\frac{1}{2}}, \tag{5}$$

where

$$h_t^{\frac{\delta}{2}} = \omega + \alpha \left|\varepsilon_{t-1}\right|^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}}. \tag{6}$$

Table 3 presents the results on the estimation of short- and long-run parameters linking informal political instability or financial development with growth[24]. In all cases, the estimated coefficient on the error correction term (φ) lies within the dynamically stable range(-2,0). More precisely, the estimates of φ for informal instability and financial development lie within the range -0.71 to -0.50 and -0.85 to -0.44, respectively.

Regarding the short- and long-run effect estimates, θ and ζ, we focus our analysis first on those obtained from the informal instability variables. In all cases the estimates of the short-run coefficients are highly significant and negative and their absolute values are higher than the corresponding values for the long-run coefficients (for anti-government demonstrations, the long-run effect is not significantly different from zero). This provides evidence for the notion that the duration of the political instability effect does indeed matter and, for informal instability, such effects tend to be considerably stronger in the short- than in the long-run, in line with Campos and Nugent (2002) and Murdoch and Sandler (2004). The unexpected result is for revolutions: we found that the long-run effect on growth is positive. One possible explanation is that of escalation: political instability comes in cycles in which the level of political violence accelerates, with maxima coinciding with revolutions. Because revolutions reflect illegal or forced change in government elites (as well as successful or unsuccessful armed rebellions), their occurrence may be the culmination of a cycle of political violence, thus marking the beginning of a period of relatively low levels of political instability (and higher or more stable growth rates.)

and, ii) the dynamic specification of the model is sufficiently augmented so that the regressors are strictly exogenous and the resulting residual is serially uncorrelated.

[23] For details on the "ARDL approach," see Pesaran (1997) and Pesaran and Shin (1999).

[24] In some cases where the routines did not converge we estimate the short- and long-run effects in two steps.

Another piece of evidence one can offer in support of this conjecture is that the revolutions series peaks around the date of the second structural break we identify in the GDP growth series (further details below.)

Next we discuss the important results regarding the financial development variables. In the long-run, we find that financial development affects growth positively ($\zeta > 0$). This result is in agreement with a large empirical literature (Levine 2005) and it is interesting that we reproduce it with a rather different methodology. However, the short-run coefficients tell a differently story: we find that the short-run impact of financial development on growth is negative and significant ($\theta < 0$). Thus our results square well with recent findings by Loayaza and Rancière (2006), among others, in that the sign of the relationship between economic growth and financial development crucially depends on the time horizon one takes (the effect being negative in the short- and positive in the longer-run.) It is also worth noting that our results are robust to various measures of financial development and also that the stronger long-run effects we obtain are for measures of financial efficiency rather than for measures of the size of the financial sector. Finally, as mentioned above, cross-country heterogeneity may play an undesirably large role in this type of result (e.g., Loayza and Rancière 2006) in that the size of the two effects this literature estimates is very similar, often with the negative short-run effect being somewhat larger. Because in this paper we use data for only one country and find supporting evidence for this asymmetric dynamic effect, one possible contribution is to help dispel such concerns about this result. We find that the negative short-run effect seems substantially smaller than the positive long-run effect (see also Table 6 below).

In sum, these results as a whole indicate that the severity of the political instability effects may "dominate" that of financial development: while the short- and long-run finance effects work in opposite directions, the effects of political instability are both negative and seem to operate through different channels. Formal political instability is detrimental to growth via the volatility channel and, together with informal instability (which has a negative direct effect on growth), may have played a truly substantial role in the relative decline of the Argentinian economy since its peak in the 1920s.

5.3 Accounting for Structural Breaks

In this section we subject our baseline results to an important robustness test. That is, we assess structural breaks. We use the methodology developed by Bai and Perron (2003) to examine whether there are any structural breaks in growth, its volatility, the various political instability and financial development variables[25]. This methodology is widely used because it addresses the problem of testing for multiple structural changes under very general conditions on the data and the errors. In addition to testing for the existence of breaks, these

[25] Campos et al. (2009) compare a range of estimation methodologies for structural breaks in this type of low-frequency long historical data series.

Table 3: Short- and Long-run effects of Political Instability and Financial Development on Economic Growth. (P)ARCH estimates

	θ	ζ	φ	α	β	δ
Panel A. Informal Political Instability						
Antigovernment Demos	−0.0009 (2.92) $_{l=2}$	0.0006 (1.04)	−0.70 (4.96)	0.98 (7.17)	0.41 (6.26)	0.80 –
Assassinations	−0.0019 (2.46) $_{l=4}$	−0.0012 (3.52)	−0.71 (3.89)	0.82 (5.68)	0.53 (9.10)	0.90 –
Guerilla Warfare	−0.0014 (3.38) $_{l=3}$	−0.0007 (2.59)	−0.60 (7.20)	1.10 (4.19)	0.36 (3.59)	0.90 –
Revolutions	−0.0015 (2.13) $_{l=5}$	0.0013 (2.37)	−0.50 (3.60)	0.83 (5.76)	0.52 (6.85)	0.80 –
Strikes	−0.0026 (2.13) $_{l=4}$	−0.0021 (2.74)	−0.54 (4.89)	0.76 (4.39)	0.55 (6.65)	0.80 –
Panel B. Financial Development						
Private Deposits/GDP	−1.35 (1.81) $_{l=5}$	0.94 (23.72)	−0.44 (4.64)	0.37 (2.63)	0.80 (6.69)	0.90 –
Savings Bank Deposits/GDP	−0.55 (1.89) $_{l=1}$	0.59 (4.84)	−0.70 (3.23)	0.74 (6.69)	0.56 (6.21)	0.80 –
M3/GDP	−0.16 (3.00) $_{l=4}$	0.16 (1.60)	−0.83 (4.11)	0.81 (6.59)	0.52 (7.19)	0.80 –
M1/GDP	−0.21 (1.91) $_{l=1}$	0.43 (4.20)	−0.85 (4.14)	0.74 (6.89)	0.54 (6.62)	0.80 –

Note: This table reports parameter estimates for the following model:

$\Delta y_t = \theta \Delta x_{i,t-l} + \varphi(y_{t-1} - c - \zeta x_{i,t-1}) + \varepsilon_t$, $h_t^{\frac{\delta}{2}} = \omega + \alpha \left|\varepsilon_{t-1}\right|^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}}$.

θ (l is the order of the lag) and ζ capture the short- and long-run effects respectively.

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

The numbers in parentheses are absolute t statistics.

statistics identify the number and location of multiple breaks[26].

In the case of the economic growth series (and, interestingly, also for growth volatility) the Bai-Perron methodology supports two structural break points. The first occurs for year 1922 and the second for year 1964 (see figure 7). For our political instability variables, we find no structural breaks for the assassinations, guerilla warfare, cabinet and constitutional changes series[27], and nor do we find any breaks in the four financial development variables.

However, our Bai-Perron results support the idea that general strikes and government crises have one common structural break, which is dated at year 1955. This is the year of the military coup in which President Juan Domingo Perón was overthrown by the military. Breaks in the revolutions and purges series are detected for about the same political period, more specifically for year 1951 (see figure 7)[28]. Further, we also find one structural break in cabinet size and legislative elections (these are dated 1946 and 1949, respectively) while in anti-government demonstrations we find two breaks dated 1954 and 1972. With arguably one exception (anti-government demonstrations in 1972, which were motivated by demands for the return of Perón from exile), all the structural breaks in our political instability series occur during Perón governments. Perón was elected president three times. His first term is from 1946 to 1952. He is re-elected in 1951, his second term starts in 1952 and ends abruptly in 1955. His third term is between 1973 (where he is allowed to return from Spain after an18-year exile) and 1974 (when he suffers fatal heart attack.) Although marked by severe economic problems, the second term (1951 to 1955) is more often remembered for its political instability (the various terrorist attacks being a sad prelude to the so-called "Dirty War" of the 1970s).

In what follows, we incorporate dummy variables in the equations (1) and (2), thus taking into account breaks in the political instability variables and in the volatility of growth. First, we introduce the following notation. D_{1t}, D_{2t} are (intercept) dummies defined as D_{1t}, $D_{2t} = 1$ in the periods 1922-2000 and 1964-2000, respectively, and D_{1t}, $D_{2t} = 0$ otherwise. Similarly, D_{it} is a (slope) dummy indicating the period which starts from the year of the break in the political instability variable (x_{it}). For example for strikes and government crises $D_{it} = 1$ in the period from 1955 to 2000 whereas for cabinet size $D_{it} = 1$ during the period from 1946 until the end of the sample.
The augmented model is given by

$$y_t = c + kh_t + \lambda x_{it} + \lambda_1 D_{it} x_{it} + \epsilon_t, \tag{7}$$

and

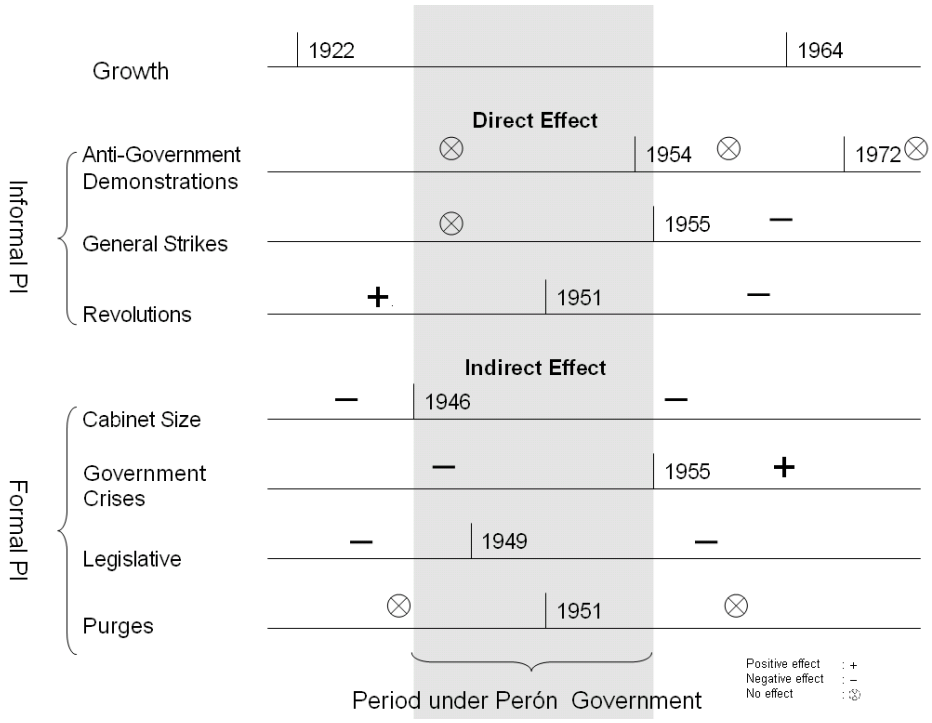
$$h_t^{\frac{\delta}{2}} = \omega + \omega_1 D_{1t} + \omega_2 D_{2t} + \alpha \left|\varepsilon_{t-1}\right|^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l} + \phi x_{it} + \phi_1 D_{it} x_{it}. \tag{8}$$

[26] Details are available from the authors upon request.

[27] Our data shows no guerilla warfare before 1948 and after 1977.

[28] In purges there is a second break dated 1978 but since after that year there were no purges we do not need to use a dummy variable to account for it.

Figure 7: Structural Breaks



Recall that the coefficients λ and ϕ capture the impacts of the political instability variable on growth and its volatility respectively. Similarly, λ_1 and ϕ_1 correspond to the two effects from the year of the break onwards. Thus the two effects are captured by λ and ϕ in the period up to the year of the structural break, and by $\phi + \phi_1$ and $\lambda + \lambda_1$ during the period from the year of the break until the end of the sample. As above in order to study the direct effects of political instability and financial development we specify model 1 with $\phi = \phi_1 = 0$, while model 2 with $\lambda = \lambda_1 = 0$ allows us to investigate their indirect impacts on growth.

We also incorporate intercept dummies and level effects in the conditional variance equation (6), as follows

$$h_t^{\frac{\delta}{2}} = \omega + \omega_1 D_{1t} + \omega_2 D_{2t} + \alpha \left|\varepsilon_{t-1}\right|^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-l}. \tag{9}$$

Overall, we find our results to be robust to the inclusion of the structural break dummies (see Tables 4- 6)[29]. That is, (i) informal instability has a direct negative effect on growth, while formal instability has an indirect (through volatility) negative impact on growth, (ii) the effects of informal instability are significantly stronger in the short- than in the long-run, (iii) financial development affects growth positively in the long-run but negatively in the short-run, with the former being the dominant effect. As mentioned above, this latter result is very important. Previous research has robustly established that financial development affects growth positively in the long-run but negatively in the short-run but has struggled with the fact that the magnitude (that is, the economic significance) of the short-run effect tends to be larger than the long-run effect. This has been in part attributed to country heterogeneity. In this paper, we show that this may indeed be a major cause: the bottom panel of Table 6 shows that for all four measures of financial development we estimate the negative short-run effect to be smaller than the positive long-run effect. Further, for our preferred measure (private deposits), the magnitude of the long-run impact is more than three times that of the short-run effect (-0.29 versus 0.9).

Note also that the causal negative effect of strikes reflects the period 1955-2000 (see Panel A of Table 4), which is not surprising given the intricate relationship between the governments of Peron and organized labor. In addition, the impact of revolutions on growth becomes negative after 1951. As mentioned above, this is surprising and one possible explanation we offer is in terms of a cycle of escalation of political instability (which culminates in a revolution). It is also worth noting that before 1951, economic growth seems to be independent of changes in purges, whereas after 1951 a negative causal relationship starts, which implies that purges after 1951 behave similarly to the other informal instability variables (see Panel B of Table 4). Interestingly, the causal effects from legislative elections and government crises to growth volatility, become stronger

[29] These results are also robust to the inclusion of intercept dummies in the mean equation for growth (not reported).

after we account for their structural breaks in 1949 and 1955 respectively (see Panel B of Table 5) with the latter result being the only unexpected one. Finally, note that when we take into account breaks and level effects in the volatility of growth, the long-run effects of assassinations and revolutions disappear (see Panel A of Table 6) thereby reinforcing our finding that the effects of informal political instability are more severe in the short- than in the long-run. Moreover, the coefficient of M3 over GDP also becomes insignificant, while the same does not happen to other, financial sector measures, in particular those reflecting efficiency (not size).

A final robustness test for our results was the use of alternative GDP growth series. Using the series constructed by Aiolfi et al. (2010) shown in Figure 2, we find that all our main conclusions regarding the direct and indirect effects remain unchanged. That is, (i) informal instability (anti-government demonstrations, guerilla warfare and strikes) have a direct negative effect on growth, while formal instability (constitutional, and legislative elections) have an indirect (through volatility) negative impact on growth, and (ii) financial development (private deposits/GDP and M3/GDP) has a positive and direct effect on growth. We also provide evidence for the notion that the duration of the political instability effect does indeed matter and, for informal instability, such effects tend to be significant only in the short-run but not in the long-run. Similarly, we find that the short-run impact of financial development on growth is negative and significant, whereas in the long-run the positive effect of financial development diminishes. Finally, we also note that we can not detect any structural break in the GDP growth series from Aiolfi et al. (2010) which provides additional support for our results in light of the above discussion.

Table 4: Direct Effect of Political Instability and Financial Development on Economic Growth: Accounting for Structural Breaks. (P)ARCH estimates

	k	λ	λ_1	ω_1	ω_2	α	β	γ	δ
Panel A. Informal Political Instability									
Anti-Government Demos	2.68	−0.003	0.003*	−0.02	0.04	0.42	0.42	0.10	0.90
	(2.00)	(0.50)	(0.62)	(1.44)	(3.40)	(3.20)	(3.21)	(2.90)	−
Assassinations	2.17	−0.002	−	−	0.04	0.48	0.37	0.09	0.90
	(1.85)	(0.16)			(3.29)	(4.24)	(3.52)	(2.34)	−
Guerilla Warfare	2.07	−0.001	−	−	0.04	0.46	0.42	0.18	0.80
	(2.85)	(2.68)			(3.54)	(5.34)	(5.40)	(4.68)	−
Revolutions	1.71	0.002	−0.003	−0.04	0.07	0.57	0.11	0.25	0.80
	(2.63)	(4.19)	(4.75)	(1.82)	(3.52)	(5.40)	(1.12)	(5.70)	−
Strikes	2.17	0.0002	−0.001	−	0.03	0.49	0.41	0.06	1.00
	(1.71)	(0.38)	(1.78)		(3.44)	(3.74)	(4.00)	(2.40)	−
Panel B. Formal Political Instability									
Cabinet Changes	2.41	0.0007	−	−0.02	0.06	0.41	0.36	0.10	0.80
	(2.25)	(1.05)		(1.53)	(4.21)	(3.69)	(4.11)	(1.90)	−
Cabinet Size	2.12	−0.0006	0.0003	−0.02	0.05	0.44	0.42	0.16	0.80
	(3.01)	(1.24)	(0.89)	(1.56)	(4.01)	(4.09)	(5.03)	(4.56)	−
Constitutional Changes	2.24	0.0007	−	−0.02	0.06	0.43	0.36	0.10	0.80
	(2.13)	(0.50)		(1.70)	(4.21)	(3.28)	(2.74)	(1.99)	−
Government Crises	2.10	−0.0009	−0.0009	−	0.03	0.50	0.40	0.10	1.00
	(1.70)	(1.14)	(1.08)		(2.85)	(3.86)	(3.95)	(4.70)	−
Legislative Elections	1.53	0.0010	−0.0030	−	0.02	0.50	0.47	0.22	1.00
	(1.69)	(1.27)	(1.41)		(1.38)	(3.53)	(5.38)	(4.17)	−
Purges	2.43	0.0010	−0.0020	−	0.03	0.40	0.48	0.08	1.00
	(1.93)	(1.59)	(2.87)		(3.26)	(3.23)	(6.20)	(6.51)	−
Panel C. Financial Development									
Private Deposits/GDP	2.26	0.90	−	−0.02	0.05	0.36	0.50	0.11	0.80
	(2.64)	(4.03)		(1.58)	(4.33)	(2.72)	(4.04)	(1.79)	−
Savings Bank Deposits/GDP	3.75	0.63	−	−	0.03	0.51	0.45	0.04	1.00
	(3.05)	(2.34)			(4.52)	(4.50)	(5.13)	(2.03)	−
M3/GDP	2.96	0.09	−	−0.01	0.04	0.38	0.43	0.04	1.00
	(1.89)	(0.35)		(1.52)	(3.50)	(2.86)	(3.19)	(1.23)	−
M1/GDP	2.70	0.51	−	−0.02	0.05	0.39	0.43	0.06	0.90
	(2.15)	(2.85)		(1.65)	(3.99)	(3.09)	(3.40)	(1.71)	−

Note: This table reports parameter estimates for the following model:

$y_t = c + kh_t + \lambda x_{it} + \lambda_1 D_{it} x_{it} + \varepsilon_t,$

$h_t^{\frac{\delta}{2}} = \omega + \omega_1 D_{1t} + \omega_2 D_{2t} + \alpha \mid \varepsilon_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-6}.$

The numbers in parentheses are absolute t statistics.

*We include a second dummy (D_{it}) with estimated coefficient 0.0006(0.10).

Table 5: Indirect Effect of Political Instability and Financial Development on Economic Growth: Accounting for Structural Breaks. (P)ARCH estimates

	k	ω_1	ω_2	ϕ	ϕ_1	α	β	γ	δ
Panel A. Informal Political Instability									
Anti-Government Demos	2.06	–	0.04	0.006	−0.005*	0.50	0.42	0.06	0.90
	(2.08)		(2.05)	(0.53)	(0.43)	(3.32)	(3.06)	(1.21)	–
Assassinations	2.08	−0.03	0.05	−0.002	–	0.46	0.36	0.18	0.80
	(3.22)	(1.31)	(4.38)	(1.11)		(4.74)	(3.22)	(4.07)	–
Guerilla Warfare	2.43	−0.03	0.05	0.001	–	0.43	0.39	0.08	0.90
	(1.71)	(1.85)	(3.98)	(1.01)		(3.44)	(3.18)	(1.54)	–
Revolutions	1.93	−0.03	0.05	0.002	0.001	0.52	0.23	0.20	0.90
	(1.91)	(2.34)	(4.03)	(2.57)	(0.62)	(4.49)	(2.83)	(6.49)	–
Strikes	2.38	–	0.04	0.001	0.001	0.41	0.47	0.06	0.90
	(2.27)		(2.95)	(0.09)	(1.33)	(3.31)	(4.14)	(1.73)	–
Panel B. Formal Political Instability									
Cabinet Changes	2.29	−0.01	0.04	−0.003	–	0.43	0.33	0.12	1.00
	(1.73)	(1.51)	(4.03)	(4.39)		(3.18)	(2.98)	(4.44)	–
Cabinet Size	2.73	−0.01	0.04	−0.001	0.0004	0.36	0.47	0.04	1.00
	(1.83)	(1.66)	(4.25)	(1.79)	(1.58)	(3.00)	(5.06)	(1.56)	–
Constitutional Changes	2.84	−0.10	0.03	−0.020	–	0.30	0.53	0.07	1.00
	(2.22)	(1.42)	(3.57)	(4.60)		(2.21)	(5.10)	(3.30)	–
Government Crises	2.75	–	0.04	−0.002	0.003	0.33	0.55	0.008	0.90
	(2.25)		(3.30)	(1.80)	(3.50)	(2.66)	(4.74)	(0.03)	–
Legislative Elections	1.97	–	0.02	−0.010	−0.005	0.49	0.46	0.12	0.90
	(2.23)		(1.21)	(1.69)	(2.43)	(3.66)	(3.14)	(2.67)	–
Purges	1.96	−0.04	0.06	0.003	−0.002	0.55	0.21	0.15	0.90
	(1.38)	(2.30)	(3.79)	(1.57)	(1.11)	(5.05)	(2.37)	(5.02)	–
Panel C. Financial Development									
Private Deposits/GDP	2.89	−0.03	0.07	0.02	–	0.37	0.39	0.12	0.80
	(2.19)	(1.71)	(4.07)	(0.02)		(2.80)	(2.16)	(1.89)	–
Savings Bank Deposits/GDP	2.37	–	0.05	−0.57	–	0.35	0.54	0.16	0.80
	(1.71)		(3.24)	(0.61)		(2.43)	(3.37)	(3.23)	–
M3/GDP	1.78	–	0.04	0.59	–	0.62	0.29	0.24	0.80
	(2.33)		(1.95)	(0.64)		(4.66)	(2.31)	(3.43)	–
M1/GDP	2.73	−0.02	0.06	−0.16	–	0.40	0.38	0.13	0.80
	(2.73)	(1.64)	(3.74)	(0.17)		(3.16)	(2.53)	(2.87)	–

Note: This table reports parameter estimates for the following model:

$y_t = c + kh_t + \varepsilon_t$, $h_t^{\frac{\delta}{2}} = \omega + \omega_1 D_{1t} + \omega_2 D_{2t} + \phi x_{it} + \phi_1 D_{it} x_{it} + \alpha \mid \varepsilon_{t-1} \mid^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-6}$.

The numbers in parentheses are absolute t statistics.

*We include a second dummy (D_{it}) with estimated coefficient $-0.007(1.06)$.

Table 6: Short- and Long-run Effects of Informal Political Instability and Financial Development on Economic Growth: Accounting for Structural Breaks. (P)ARCH estimates

	θ	ζ	φ	ω_1	ω_2	α	β	γ	δ
Panel A. Informal Political Instability									
Antigovernment Demos	−0.0010 (1.92) $_{l=1}$	−0.0006 (0.93)	−0.37 (3.62)	–	0.03 (1.68)	0.47 (2.05)	0.48 (2.70)	0.12 (3.97)	0.90 –
Assassinations	−0.0018 (1.90) $_{l=4}$	0.0004 (0.54)	−0.31 (3.36)	–	0.04 (2.28)	0.52 (2.15)	0.39 (2.14)	−0.01 (0.27)	0.90 –
Guerilla Warfare	−0.0012 (1.61) $_{l=6}$	−0.0008 (2.46)	−0.27 (3.11)	–	0.04 (2.69)	0.62 (3.20)	0.30 (2.31)	0.04 (0.83)	0.90 –
Revolutions	−0.0004 (1.77) $_{l=0}$	−0.0002 (0.37)	−0.22 (2.10)	−0.03 (1.54)	0.06 (3.85)	0.57 (2.35)	0.28 (2.83)	−0.05 (1.25)	0.90 –
Strikes	−0.0012 (1.96) $_{l=6}$	−0.0012 (2.35)	−0.28 (2.83)	–	0.06 (2.43)	0.62 (3.49)	0.30 (2.18)	0.04 (0.53)	0.80 –
Panel B. Financial Development									
Private Deposits/GDP	−0.29 (3.22) $_{l=5}$	0.90 (3.50)	−0.26 (2.16)	−0.03 (1.96)	0.07 (4.87)	0.45 (1.79)	0.31 (2.81)	−0.02 (0.47)	0.90 –
Savings Bank Deposits/GDP	−0.54 (3.55) $_{l=5}$	0.60 (2.57)	−0.26 (2.27)	–	0.05 (1.71)	0.58 (3.18)	0.41 (1.91)	0.06 (0.66)	0.80 –
M3/GDP	0.08 (0.58) $_{l=4}$	0.11 (0.58)	−0.23 (2.26)	−0.02 (1.60)	0.04 (4.02)	0.55 (2.03)	0.30 (3.10)	−0.03 (1.00)	1.00 –
M1/GDP	−0.21 (2.78) $_{l=5}$	0.35 (1.89)	−0.28 (2.73)	−0.03 (2.07)	0.07 (4.93)	0.45 (2.03)	0.34 (3.27)	−0.04 (0.69)	0.80 –

Note: This table reports parameter estimates for the following model:

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

$h_t^{\frac{\delta}{2}} = \omega + \omega_1 D_{1t} + \omega_2 D_{2t} + \alpha \left|\varepsilon_{t-1}\right|^{\delta} + \beta h_{t-1}^{\frac{\delta}{2}} + \gamma y_{t-6}.$

θ (l is the order of the lag) and ζ capture the short- and long-run effects respectively.

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

The numbers in parentheses are absolute t statistics.

6 Conclusions

Within a power-ARCH framework using data for Argentina from 1896 to 2000, we find that: (a) informal political instability (assassinations, guerilla warfare, strikes) have a direct negative effect on economic growth, while formal instability (e.g., cabinet changes and size, and constitutional changes) have an indirect impact on growth (through its volatility); (b) financial development affects economic growth positively; (c) the informal instability effects are substantially larger in the short- than in the long-run; and (d) the financial development effects are negative in the short- but positive and substantially larger in the long-run.

These findings raise a number of new questions that we believe may be useful in motivating future research. Here we highlight two related suggestions: one on the role of finance and one on methodology. Regarding the role of finance in the process of economic development, our findings extend a large body of previous research in that we also show a strong, positive impact of financial development on growth in the long-run. However, the negative effects of political instability on growth might outweigh the positive influence of financial development. We find that different forms of political instability affect growth through different channels over different time windows, making up for a strong and rather resilient effect that seems very powerful vis-à-vis the benefits from financial development. Yet Argentina is unique: no other country in the world since the Industrial Revolution went from riches to rags. Put differently, Argentina is an outlier and further research should replicate our analysis using the historical experience of other countries (ideally in a panel setting). That is, future studies should focus on the relationship between political instability, financial development and economic growth in a panel of developing countries. Notice, however, that the data requirements are very heavy indeed, with most developing countries lacking historical data even on key figures, such as per capita GDP, going back to the beginning or middle of the XIXth century. This, of course, does not make this task less important. The second suggestion refers to a possible methodological improvement, namely the application of the bivariate PARCH model to the problem at hand (despite the relatively small number of observations). A joint estimation of the political instability-financial development-growth system in a panel of countries would clearly represent progress and is something we feel future research should try to address.

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