5/15/2008

Are crises good for long term growth? The role of political institutions

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Abstract

This paper assigns an important role for political institutions in countries subject to financial crises, regardless of their level of economic development. We provide empirical evidence for the importance of institutions in determining the outcome of crises on long-term growth. We show that once unobserved country-specific effects and other sources of endogeneity are accounted for, political institutions affect growth through their interaction with crises. Our results suggest that only countries with strong democracies, low autocracies, high levels of political competition and external constraints on governments can potentially *learn* from crises and use them as opportunities to enhance long term output per capita and productivity growth.

JEL classification: O40; O43; F43

Keywords: financial crises, democracy, political institutions, economic growth

We thank Alberto Alesina, Philippe Aghion, Michael Bordo, Mariano Tommasi, Carlos Scartascini, Pelin Berkmen and seminar participants at Rutgers University for their comments.

Introduction

Are financial crises good or bad for long term growth? Broadly speaking there are two opposing views: while some authors believe that crises have adverse consequences for long run growth (Ramey and Ramey (1995); Hausmann and Gavin (1996) ; Cerra and Saxena (2007)), others believe that they are good for growth because they allow important reforms to take place (Drazen (2002), Aghion, Alesina, and Trebbi (2004)). This paper seeks to provide a unified answer to these seemingly contradictory views emphasizing the role of political institutions and societal learning in the aftermath of crises.

In general, the economic studies that find a negative effect of crises on growth underscore their short-run destabilizing effects on macroeconomic variables and link these to the adverse effects that output volatility has on long-term growth. This point of view is straightforward: crises reduce output, increase uncertainty, drive away investments and produce social tensions that hurt growth (see for example, Easterly, Islam, and Stiglitz (2001)).

Other authors support the view that crises generate opportunities for *good* reforms to take place and therefore have the potential of improving long run growth performance. Drazen (2002) argues that the hypothesis that crises help facilitate policy change, called the "crisis hypothesis", has become the new orthodoxy in the literature. In the words of Bordo (2007), crises can be "cathartic" when the forces in favor of good economic reforms win over those of the incumbents. This view tends to see crises as a natural and potentially desirable phenomenon in the process of development. Much like teenagers, countries may use –and need- crises as opportunities to learn, reform and improve their economic and political institutions.[1]

Our view is that economic crises do not occur in an institutional vacuum. Crises are, in essence, periods in time when important decisions are made. Whether these will be instrumental for long-term growth or not could depend, among other things, on the type of political institutions prevailing at the time of a crisis, and on the kind of political compromises that this institutional set up delivers. In particular, irrespective of the

[1] A related strand of the literature find that crises can also be good for long term growth if they are side-effects of growth-enhancing policies like financial liberalization. According to this view, as long as crises remain rare, countries that pursue financial liberalizations may end up better off in the long run. For example, (Ranciere, Tornell, and Westermann 2005) show that crises can have beneficial long term effects in credit constrained countries with medium levels of property rights and bailouts for creditors.

causes that lead to a crisis (i.e., bad policy, bad advice or bad luck), policy responses will be shaped by the incentives and constraints faced by the key political actors during the time of crisis.[2] Our conjecture is that some political systems will be more prone than others to deliver good policy responses that help to correct past policy mistakes, *learn* from the crises, and improve long run growth[3].

Our view is, in essence, very similar to Tomassi (2004). He argues that even though crises might facilitate the introduction of some policy reforms, in general, the quality of the implementation of those policies, and thus their effectiveness in correcting past mistakes, is conditioned by the overall institutional environment of the country. In particular, he argues that whether first-best policies emerge depends on whether the political institutions underlying the policy process lead to cooperative behavior. One important contribution of our paper is to empirically investigate which are these "good institutions".

What specific political institutions can help during crises is a contentious topic. On one hand, democracy could help during crises by ensuring that all voices are heard and that constraints (checks-and-balances) exist on arbitrary decisions that might impose unduly long-run costs to some sectors over others.[4] On the other hand, more democracy and public debate could mean that governments are unable to decide at all, prolonging the duration and negative consequences of crises. A strong autocratic government, with fewer constraints on decisions, may well turn out to be desirable during crises by speeding up the decision-making process.[5] However, more decisiveness does not guarantee that *good* reforms are implemented. If *bad* reforms are chosen, then the outcome could be worse than under democracy.

Although there is extensive research on the determinants of crises, on how to prevent them, and what policies could help with speedy recovery,[6] there is, to the best of our knowledge, little empirical research on the role of political institutions in shaping the

[2] See Inter-American Development Bank (2006)
[3] After all, economists have made steady progress in identifying the kinds of policies that help in recovery from crises. See Desai (2003). An interesting question is why politicians many times fail to implement them.
[4] See for example Rodrik (2000), who argues that democracy facilitates intertemporal cooperation through deliberation and rules that that prevent excessive redistribution of income
[5] For example, Aghion, Alesina, and Trebbi (2004) study the optimal level of *insulation* (less constraints on governments) in a model of endogenous political institutions and argue that during times of crises one should observe more insulation (i.e. a stronger, less constrained government). Their implication, however, rest on the assumption that reforms are ex-ante good for the country.
[6] See for example, Calvo, Izquierdo and Mejia (2004), Cavallo and Frankel (2007), Edwards (2004), Guidotti et al, (2004).

long term outcomes of crises. Our main contribution is to employ a dynamic panel growth regression model to assess how various political institutions affect the impact of financial crises on long term growth.

This paper does not deal with the question of whether crises facilitate policy reform or not (Drazen, 2002). Nor we seek to characterize or measure specific types of policy reforms as in Lora and Olivera (2004). Instead, we take for granted that some form of reform or policy change will follow a crisis. The question we explore is how political institutions affect whether these reforms are ultimately conducive to long term growth or not.[7]

Our results provide evidence that, overall, stronger democratic institutions can greatly mitigate the negative effects of crises on growth. Moreover, autocratic governments typically amplify the negative outcome of crises on long term growth. These results seem closely linked to how decisions are made during times of crises, as evidenced by the fact that higher levels of government constraints (that limit discretionary policy decisions typically linked to vested short-term interests) also have a positive impact on growth thought the interaction with crises. Additionally, we find that more regulated political participation, which provides a more structured political discussion during times of crises, has similar beneficial effects.

In short, we find that the aforementioned "good institutions" for crises are those associated to participatory politics and higher constraints on governments. This is consistent with Rodrik (2000) who argues that democracy yields better policy outcomes because it facilitates intertemporal cooperation between agents through deliberation, rules that that prevent excessive redistribution of income, and procedural rules that facilitate policy compromises. Therefore, although democratic political regimes might not produce the most immediate policy responses, the empirical evidence shows that on average they deliver better reforms during crises and increase long-run growth.

Our main policy implication is straightforward: countries with solid democratic institutions and stronger checks-and-balances may welcome crises as opportunities to improve, but countries with weak political institutions should try to avoid them.[8] A

[7] For our purposes, even if no policy change happens in the aftermath of a crisis, we are still interested in exploring what is the effect of the "no-reform" outcome on long run growth.
[8] In the present international context, this means that the current financial troubles in the US could be ultimately good for its long-term growth, as the financial sector corrects some of its past mistakes. At the same time, it also makes sense for a country like China to be extremely careful with the pace of its economic reforms, so as not to increase the frequency of crises before improving its democratic institutions.

more subtle but equally important implication is that the commonly held moral-hazard view that maintains that countries should suffer crises to learn from their mistakes might be a misleading policy prescription if the role of the political institutions is ignored. [9] One corollary of the results reported in this paper is that the right lessons from a crisis can be learnt only by those who want to learn them.

The structure of the paper is as follows: In section 2 we compare our results to the literature. In Section 3 we present the data and estimation methodology. In Section 4 we present our main empirical results and some robustness tests. In Section 5 we discuss issues of endogeneity. Finally, section 6 provides some conclusions and suggestions for future research.

2. Literature Review

How do these results change our understanding of the relationship between political institutions and growth? An extensive literature studies how democracy and better political institutions can impact growth. Acemoglu et al.(2003) argue that underlying institutional problems are the main cause of poor economic performance. Their view is that bad political institutions lead to distortionary policies, which ultimately reduce growth and increase volatility. Our results are supportive of this view, but we place the focus on the interaction of institutions with crises, which are moments in time where key decisions are made[10]. In that sense, our results are also in line with those of Rodrik (1999), who maintains that domestic social conflicts (which are presumably exacerbated during crises) are key to understand poor growth performance in many countries.

Drazen (2002) provides a review of the mechanisms discussed in the literature by which crises help facilitate policy change (the "crisis hypothesis"). These are: (1) reshuffling of interest groups which might weaken anti-reform groups, (2) perception of the need of change by policymakers, (3) a sufficiently large deterioration of the status quo; (4) suspension of selfish interest. Lora and Olivera (2004) provide empirical evidence that is consistent with the "crisis hypothesis" by showing that crises lead to

[9] For example, Meltzer (1998) argues that *"Capitalism without failure is like religion without sin. It doesn't work. Bankruptcies and losses, even the threat of bankruptcy, concentrate the mind on prudent behavior.*

[10] We also use a different methodology to control for the endogeneity of political institutions. Acemoglu et al (2003) use colonial origins as instruments, while we use internal instruments in a System GMM setting.

policy reforms (for example, trade and labor marker reform). Building on this literature, our work explores how different political institutions may affect the quality of these policies and, ultimately, their outcome. Our departing point from this strand of the literature is that we do not assume that all reforms brought about by crises are necessarily good for growth (or equivalently that the "status quo" policies are necessarily bad).

This paper builds on the growth methodology first used by Levine, Loayza, and Beck (2000), who provide evidence of long term growth enhancing effects of financial development and showed that differences in legal and accounting systems can, in turn, influence financial development. Loayza and Ranciere (2004) extend these to account for short-run and long-run differences and argue that although financial liberalization may be bad in the short run (because it triggers crises) but ultimately good for growth in the long run. Ranciere, Tornell, and Westermann (2005) have a similar story of crises as a rare side-effect of growth enhancing reforms. Compared to these results, our paper provides evidence that a financial liberalization implemented under the wrong political institutions may end up having negative long-run effects through the strong negative effects of crises.

Aghion, Alesina, and Trebbi (2004) study the optimal level of *insulation* (less constraints on governments) in a model of endogenous political institutions. Our results are consistent with this model as long as financial crises increase the probability and/or costs of expropriation. Aghion, Alesina, and Trebbi (2007) examine the impact of political institutions on long-run growth through the effect of firm entry. They conclude that democratic institutions are important for countries or sectors close to the technological frontier. Our research shows that democracy can additionally have an important effect in countries that undergo crises, regardless of their distance to the technological frontier.

3. Data and Methodology

We use a panel of 78 countries with data for the years 1970-2004. As is now standard in the literature, we transform the variables in our database into 5-year averages to eliminate business cycle fluctuations and focus on long-term growth. Thus, the subscript t designates one of these five-year averages.

Our approach follows the growth methodologies used by Levine, Loayza, and Beck (2000) and Aghion et al. (2006), among others. We examine the direct effect of crises on growth and look at their interaction with several political variables. We use two alternative dependent variables commonly found in the growth literature, gdp per capita and gdp per worker.

We apply the System GMM estimator developed in Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). This estimator allows us to address the joint endogeneity of all explanatory variables in a dynamic formulation, and explicitly controls for potential biases arising from country specific effects. All our regressions include the small sample correction proposed by Windmeijer (2005) in order to obtain robust two-step standard errors.

Specifically, we want to estimate the following equation:

$$y_{i,t} - y_{i,t-1} = (\alpha - 1) y_{i,t-1} + \beta_1 Crisis_{i,t} + \beta_2 Crisis_{i,t} * Pol_{i,t} + \beta_3 Pol_{i,t} + \gamma' Z_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (1)$$

Where $y_{i,t}$ is the logarithm of output per capita or worker; $Crisis_{i,t}$ is a measure of crisis (to be defined below), $Pol_{i,t}$ is a qualitative measure of political institutions, $Z_{i,t}$ is a set of control variables which are common in the growth literature, μ_t is a time-specific effect; η_i is a country-specific time-invariant effect; and $\varepsilon_{i,t}$ is the idiosyncratic error term.

Our hypothesis is that $\beta_1 < 0$ and $\beta_2 > 0$ so that the direct impact of crises is negative on growth, but the overall effect becomes less negative –and potentially positive- with higher quality of political institutions.

Note that equation (1) is equivalent to

$$y_{i,t} = \alpha y_{i,t-1} + \beta_1 Crisis_{i,t} + \beta_2 Crisis_{i,t} * Pol_{i,t} + \beta_3 Pol_{i,t} + \gamma' Z_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (2)$$

This is the equation we estimate. It is a dynamic panel specification with potentially endogenous independent variables. Several sources of endogeneity need to be accounted for, in particular omitted variables and simultaneity biases. A key complication is the possible correlation between the independent variables and the unobserved country-specific effect η_i.

The System GMM approach uses a first-difference transformation of (2) to eliminate the unobserved country-specific effect η_i, and internal lagged *level* instruments to replace the endogenous variables in the transformed difference equation. These lagged instruments are valid under the assumption that the independent variables are weakly exogenous. This means that they may be correlated with present and past error terms but not with future errors.[11] This is a reasonable assumption for the crisis and political measures because it means they are uncorrelated to unanticipated shocks even though expected future dynamics may affect them. However, lagged variables are weak instruments in the presence of serial correlation.[12] This is particularly problematic in the case of political variables which typically show a lot of persistence. In order to address this problem, system GMM additionally estimates the level equation using lagged *differences* as instruments for the contemporaneous *level* explanatory variables.[13] The inclusion of two equations, one in differences and another one in levels, gives the "System" GMM estimator its name. A more detailed explanation on the System GMM approach is included in the Appendix.

We use several measures for both $Crisis_{i,t}$ and political institutions $Pol_{i,t}$. Next we provide some more detail on these key variables.

Crisis Variables

[11] So that using a lagged variable as instrument is valid because *past* variables are not correlated to *present* error terms.
[12] A very persistent variable would mean that lags are not correlated with the differenced variable we are trying to instrument. See the Appendix for more.
[13] This last step rests on the assumption that even though crises and political institutions may be correlated to η_i, *changes* in these variables are not correlated to η_i after controlling for all other included independent variables. Note that since η_i is time-invariant, our assumption means that an unobserved country characteristic that *does not change over time* is assumed not correlated with the *change* of crises, political institutions and other variables that occurs over time.

Broadly speaking, the crisis literature distinguishes between crises with external origin and crises with domestic origin. Within each of these categories, there is a wide array of definitions. A popular kinf of external crisis is based on the concept of "current account reversal" (Milesi-Ferreti and Razin 1998, 2000 and Edwards 2004a, 2004b), which is typically defined as a reduction in the current account deficit of a certain percentage of GDP in one year. A somewhat related concept is the definition of "sudden stops" in capital flows, popularized by Calvo (1998), which is typically defined as an unexpected reduction in net capital inflows. [14] Sudden stops or current account reversals could trigger a currency crisis. There is no single unambiguous definition of currency crisis in the literature. One widely-used measure comes from the work of Frankel and Rose (1996), updated in Frankel and Wei (2004). They define crisis episodes based on an index of the percentage fall in reserves plus the percentage fall in the foreign exchange value of the currency. The idea of this "foreign market pressure" index is that it measures the fall in demand for the country's currency; it is then up to the monetary authorities to determine whether to accommodate, by letting the money supply fall, or to depreciate the value of the currency.[15]

Examples of crises with domestic origin include hyperinflations or balance of payment crises triggered by domestic fiscal imbalances (i.e., Krugman 1979). Other forms of crises, such as "debt crises" are harder to characterize based on their origin, as there might be debt crises triggered by external shocks (i.e., sudden stops), or debt crises triggered by fiscal policy mismanagement. Empirically, one useful definition of "debt crisis" is provided by Manasse, Schimmelpfennig, and Roubini (2003). A country is defined to be in a "debt crisis if it is classified as being in default by Standard & Poor's or if it receives a large non-concessional IMF loan defined as access in excess of 100 percent quota".

[14] Guidotti, Sturzenegger and Villar (2004) distinguish between sudden stops that lead to current account reversals and those that do not. When sudden stops are not accompanied by current account reversals, then presumably the country found an alternative source of financing, namely reserve depletion or exceptional funding from an international financial institution. Reserve depletion is feasible only when the Central Bank has sufficient international reserves to spend and is willing to use them. If the sudden stop is persistent (i.e., if capital inflows are not restored promptly), then the strategy of reserve depletion could lead to a *currency crisis*.

[15] A related definition, also from Frankel and Rose (1996) updated in Frankel (2005) are *currency crashes*. A currency crash is simply a large fall in the value of the currency (the devaluation must be at least 25% on a cumulative 12-month basis), and one that also represents an acceleration over preceding years (the devaluation must represent an acceleration of at least 10 percentage points, relative to the rate of depreciation in the 12 months before that). Finally, a currency crash must have been at least three years since the last crisis.

While most of these concepts are closely related, these varieties do not always overlap.[16] We want to use a crisis variable that is more closely correlated with many possible varieties discussed above. In particular, we do not want to limit the analysis to crises of domestic origin because, even when the origin of a crisis is outside the direct control of domestic authorities, there are policies that a country can follow to reduce the vulnerability to, and the incidence of, these events.[17] As a first approximation, we could build a consensus crisis indicator[18], but the different time frames available for the various crisis definitions would severely limit the sample. Thus, we follow a different approach. We use banking crisis, which is a variable that is more closely associated to all the other forms of crises, and show robustness with other crisis indicators.[19] Due to the risky nature of its activity, the banking sector is very vulnerable to a multiplicity of shocks. Thus, banking crises typically encompass a wide variety of events, some with external origin and some with domestic origin.

All our crisis variables are computed as the ratio of crisis years to total available years in the period, and range from 0 to 1. For example, if the country had a crisis that lasted 2 years, then our crisis measure is 0.4 for the 5-year period. We choose to construct it this way in order to incorporate the duration aspect of crises, which can impact the crisis outcome considerably. [20]

Our main crisis variable is calculated using the "banking crisis" dummy of Caprio and Klingebiel (2003). Additionally, as robustness checks, we construct similar crisis measures using a systemic banking crisis dummy from the same source, several sudden stop variables from Cavallo and Frankel (2007), currency crisis from Frankel and Wei (2004) and a debt crisis indicator from Manasse, Schimmelpfennig, and Roubini (2003).

[16] More likely than not, a sudden stop, particularly a large and persistent one, will eventually lead to a current account reversal if there are no alternative sources of financing. Whether it also entails a currency crisis depends on whether reserves become depleted, and on the exchange rate regime in place before the shock. Milesi-Ferreti and Razin (1998, 2000) study the relation between currency crises and current account reversals. They conclude that they are only tenuously related. Similarly, Cavallo and Frankel (2007) find only weak correlation between sudden stops and currency crises in their sample.

[17] For example, de-dollarization in Calvo et al. 2004, or openness to trade in Cavallo and Frankel 2007).

[18] See for example(Ranciere, Tornell, and Westermann 2005))

[19] We find that, in our sample, banking crisis is more than twice more correlated with the rest of the crisis definitions, than any of the other variables. Thus, while the average correlation of banking crisis with the rest of the definitions is 0.25, the average correlation between sudden stops and the other crisis variables is 0.12, and for debt crisis the correlation is only 0.10.

[20] It also allows us to avoid having a binary indicator which could invalidate the use of lags as instruments. However, our results are robust to the use of other calculation mechanism or the use of simple dummies.

Political Variables

For the political variable $Pol_{i,t}$, we use indexes of democracy and institutional quality that are common in the political economy literature. Our main variable is the aggregate indicator of democracy from the Polity IV database (polity2). This index ranges from -10 to 10 (where -10 is high autocracy and 10 is high democracy) and is constructed as the difference between the sub-indexes for democracy (democ2) and autocracy (autoc2). It provides a qualitative measure of *democratic institutions*, defined by the existence of a high level of political participation, civil liberties and institutionalized constraints on the exercise of power by the executive.[21] We also use pure measures of external constraints on the government (exconst2) and political competition (polcomp2) from the same database. Additionally, we perform robustness checks using indicators from the Freedom House database of civil liberties and political rights, and the Polcon database from Henisz (2000).

Other Control Variables

As control variables $Z_{i,t}$ we follow the standard growth literature and include: openness to trade (measured as the ratio of exports plus imports over GDP), government burden (government expenditure over GDP), education (years of secondary schooling for the population above 15 years of age) and inflation. It is worth emphasizing that all these regressors are treated as endogenous variables. Finally, all our regressions include time fixed effects to control for period-specific events that may affect several countries at the same time.[22]

[21] See the Appendix for more details.
[22] Also, the methodology employed assumes no correlation across countries in the idiosyncratic disturbances. Time dummies make this assumption more likely to hold. (see Roodman 2007)

4. Estimation results: How political variables condition the growth outcome of crises

Table 1 shows the impact of crises on long term growth, both directly and via the interaction with political variables. The first two regressions estimate the effects on output per capita growth, while the next two repeat the analysis for output per worker (labor productivity). Among each set, the first regression estimates the independent effects of crises and political institutions, while the second regression adds an interaction term.[23]

[23] Table 1 also presents the Hansen over-identification test, where the null hypothesis is that the instrumental variables (internal instruments) are uncorrelated with the residuals (also known as the exclusion restrictions), and the 2nd order serial correlation test, where the null hypothesis is that the errors in the differenced equation exhibit no second order correlation (more on these tests below).

Table 1: Growth effects of Crises and Interaction with Political Institutions

Estimation: 2-step system GMM with Windmeijer (2004) small sample robust standard error correction and time effects

Dependent Variable	Log GDP per capita		Log GDP per worker	
	(1.1)	(1.2)	(1.3)	(1.4)
Crisis [Systemic BC]	-0.131*** [0.032]	-0.179*** [0.036]	-0.136*** [0.030]	-0.165*** [0.037]
Crisis * Polity2		0.013** [0.005]		0.009** [0.004]
Polity2	0.004 [0.003]	-0.000 [0.003]	0.001 [0.003]	-0.002 [0.003]
Control Variables				
Initial GDP per capita [log]	0.984***a [0.023]	0.986*** [0.020]		
Initial GDP per worker [log]			0.955*** [0.035]	0.954*** [0.032]
Trade openness [X+M/GDP, log]	0.106* [0.060]	0.076 [0.057]	0.058 [0.059]	0.034 [0.048]
Government Burden [Government consumption/GDP, log]	-0.154** [0.064]	-0.145** [0.070]	-0.075 [0.063]	-0.071 [0.053]
Inflation [log [1+inflation]]	-0.054** [0.025]	-0.050** [0.022]	-0.061*** [0.020]	-0.061*** [0.019]
Education [Secondary Enrollment, log]	0.007*** [0.002]	0.005*** [0.002]	0.005*** [0.002]	0.005*** [0.002]
Constant	0.240 [0.357]	0.363 [0.344]	0.587 [0.372]	0.704** [0.315]
Hansen p-value	0.23	0.47	0.19	0.51
AR1 test	0.00	0.00	0.00	0.00
AR2 test	0.08	0.26	0.19	0.26
Observations	419	419	424	424
Number of Countries	78	78	77	77
Number of instruments	75	83	75	83

Time dummies are included in all regressions [coefficients not shown]
Standard errors in brackets
*Significant at 10%; ** significant at 5%; *** significant at 1%
a : Note that we are estimating equation (2) in the text, so that the effect on gdp growth for this particular coefficient has to be calculated by subtracting 1.

Regression (1.1) shows that crises generally have a negative impact on long-term growth. This is a robust result across all our specifications and is consistent with most results in the financial crises literature. [24] The coefficients are economically significant:

[24] See Bordo and Meissner (2006)

for example, a country that has two year of banking crises in a 5 year period (i..e, crisis=0.4) grows 5.24% less (over the 5-year period) than a country that suffered no crises. [25] Whether this is small or large effect is debatable, but the fit of the estimation is quite good. In particular, note that the regression satisfies the specification and serial correlation tests. More interesting perhaps, is that political institutions per se (in this case measured by the combined democracy index, polity2) do not appear to be significant for growth. This is consistent with results by Acemoglu, Johnson, Robinson and Yared (2005), who show that the positive correlation between income and democracy disappears once they control for unobserved fixed effects.[26] The problem with regression (1.1) is that the linear specification could be misleading. Political institutions variables have limited time variation. Thus, they might enter as insignificant in regressions like (1.1) because their effect is absorbed by the fixed-effect.[27] This does not mean that they do not matter. One way around this identification problem is to find particular situations where the quality of the institutions might matter most. We believe that one such situation is during times of crises. During these times, authorities choose policy responses that can either improve on the status quo and set-up the stage for recovery, or simply redistribute gains and loses without taking corrective actions.

Our hypothesis is that authorities, just like any other economic agent, respond to incentives and that their incentives structure is, in turn, determined by the nature of the political institutions and by the availability of checks and balances.[28] In strong democracies policymakers are ultimately accountable to the voters, while in less democratic regimes special interests have more power. Therefore, it is more likely that the correct policy choices during crises are going to be made in more open and democratic societies. For example, Rodrik (2000) emphasizes three channels whereby democracy fosters better public policies: (1) deliberation; (2) rules that prevent excessive redistribution; and 3) cooperation induced by repeated interaction among political

[25] This number comes from multiplying the corresponding coefficient by 0.4. (i.e., -0.131*0.4=0.0524).
[26] They look at the causality from growth to democratization, while we are doing the opposite. However, their results point to the fact that unobserved fixed effects determine a common development path where both democracy and growth are intertwined. So once this path is controlled for, there is no positive correlation between democracy and growth. What determines this path? They consider historical factors that may condition the quality of institutions, on top of which we believe that the interaction with crises plays a pivotal role.
[27] While we do not explicitly have fixed-effects in the regression, our estimation methodology deals with them by first-differencing.
[28] For a comprehensive study on how political institutions affect the policymaking process, and this, in turn, the quality of public policies, see Inter-American Development Bank (2006).

groups. We try to capture these effects of political institutions during times of crisis through the use of interaction terms in our regressions.

Regression (1.2) adds the interaction between crises and political institutions and shows that this is both economically and statistically significant. The positive coefficient of the interaction indicates that more democratic political institutions can mitigate the negative effect of crises on growth. Note that the coefficient of the crisis variable itself remains negative and significant, while the coefficient for polity2 is still insignificant. The magnitude of the coefficients shows the interaction effect is also economically significant. A very strong democracy like the US, with a polity score of 10, can completely neutralize the negative effects of crises. [29] Instead, in a country with particularly poor democratic institutions like Egypt, with an average polity score of -6 for recent years, the overall negative effect of a crisis is magnified by over 40% compared to a country with a neutral political score of 0, or 424% compared to a country like the US.[30]

This means that political institutions play a key role during times of crises. The importance of our results is strengthened when looking at the case of China, a country that has not suffered big financial crises in recent decades, presumably due to the closedness of the capital account and the underdevelopment of the financial system, but may well face some in the near future as they continue to grow and loosen-up restrictions. China's combined polity score is currently averaging -7, which according to our results, means that China could have hard time *learning* from a financial crisis if it strikes. Therefore, it would make sense for them to be extremely careful in avoiding reforms that can increase the incidence of crises without first improving democratic institutions. In other words, the sequence of reforms is key, with democratic institutions preceding financial deepening in order to improve the chances of success.[31]

The last two regressions in Table 1, in columns (1.3) and (1.4), show that our results are robust when we use productivity growth as the dependent variable. This provides evidence that the identified interaction between crises and political institutions

[29] For example, if the US suffers one year of crisis during a five-year period (our crisis measure is equal to 0.2), then the overall effect on growth is only -0.0098 or -0.98% [-0.179*0.2+(0.013*0.2*10],

[30] These numbers are computed as follows: -0.0514=-0.179*(0.2)+(0.013*(0.2)*(-6)) vs only -0.0358 if it had a polity score of 0. If compared to the results of -0.0098 for a country like the US, with a polity score of 10, then the effect of crises is being magnified by a factor of 5.24 (an increase of 424%).

[31] Note that this debate is akin to an old debate in the economic literature on the right sequencing of structural reform. See, for example, Edwards (1990).

must work through a mechanism that enhances labor productivity. [32] For concreteness, throughout the rest of the paper we use gdp per capita growth as the dependent variable, but we show in the Appendix that all our results apply to productivity growth as well.

In an attempt to pin down the kind of political institutions that can help to mitigate the negative effects of crises , in Table 2 we decompose the Polity index into the sub-indexes for democracy (democ2), autocracy (autoc2), external constraints on the government (extconst2) and political competition (polcomp2). All these regressions are variations of regression (1.2), with a different political sub-index.

[32] We can safely reject mechanisms that affect only the labor participation rate (workers/population). For example, it can be argued that more democratic institutions facilitate emigration of previously unemployed people who loose all hope of finding a job after a crisis.

Table 2: GDP per capita growth effects of Crises and Interaction with Democracy, Autocracy, External Constraints and Political Competition.
Estimation: 2-step system GMM with Windmeijer (2004) small sample robust standard error correction and time effects

Dependent Variable	Log GDP per capita			
	(2.1)	(2.2)	(2.3)	(2.4)
Crisis	-0.248***	-0.077*	-0.359***	-0.295***
[BC]	[0.053]	[0.040]	[0.093]	[0.084]
Crisis * Democracy	0.020**			
	[0.008]			
Democracy	-0.000			
[democ2]	[0.007]			
Crisis * Autocracy		-0.028**		
		[0.011]		
Autocracy		-0.001		
[autoc2]		[0.007]		
Crisis * External Constraints			0.044**	
			[0.017]	
External Constraints			-0.004	
[exconst2]			[0.009]	
Crisis * Political Competition				0.023**
				[0.010]
Political Competition				0.002
[Polcomp2]				[0.008]
Control Variables				
Initial GDP per capita	0.984***	0.992***	0.985***	0.978***
[log]	[0.027]	[0.022]	[0.018]	[0.024]
Trade openness	0.077	0.087	0.086	0.063
[X+M/GDP, log]	[0.058]	[0.059]	[0.063]	[0.056]
Government Burden	-0.145**	-0.167**	-0.155**	-0.146**
[Government consumption/GDP, log]	[0.068]	[0.067]	[0.071]	[0.068]
Inflation	-0.039	-0.053***	-0.036*	-0.049**
[log [1+inflation]]	[0.025]	[0.017]	[0.021]	[0.020]
Education	0.006**	0.005**	0.006***	0.006***
[Secondary Enrollment, log]	[0.002]	[0.002]	[0.002]	[0.002]
Constant	0.316	0.352	0.290	0.451
	[0.346]	[0.326]	[0.401]	[0.306]
Observations	419	419	419	419
Number of Countries	78	78	78	78
Number of instruments	83	83	83	83
Hansen p-value	0.39	0.50	0.53	0.34
AR1 test p-value	0.00	0.00	0.00	0.00
AR2 test p-value	0.24	0.23	0.23	0.21

Time dummies are included in all regressions [coefficients not shown]
Standard errors in brackets
*Significant at 10%; ** significant at 5%; *** significant at 1%

Regression (2.1) uses democracy (democ2) as the political variable and shows that, as expected, higher levels of democratic institutions mitigate the negative effects of crises. In the Polity IV database, democ2 is a qualitative sub-index constructed on the basis of three interdependent elements: i) the presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders, ii) the existence of institutionalized constraints on the exercise of power by the executive and iii) the guarantee of civil liberties to all citizens. Other aspects of plural democracy, such as the rule of law, systems of checks and balances, freedom of the press, and so on, are specific manifestations of these general principles.

Similarly, regression (2.2) uses autocracy (autoc2) as the political variable and shows that having a autocratic government makes crises worse for growth. In the PolityIV database, the autoc2 sub-index is operationally defined as a government that sharply restricts or suppresses competitive political participation, with a chief executive that is chosen by a political elite and exercises power with few institutional constraints. This regression is important because it shows that the two components of polity2, democracy and autocracy, work in opposite directions in terms of their interaction effect with crises.

Furthermore, regression (2.2) provides evidence against the view that an authoritarian government, able to make rapid and strong decisions, is better to deal with the chaotic environment of crises. Less autocratic countries that go into a crisis might well take longer to recuperate because of deliberative politics and the time-consuming policy-making process of democratic regimes, but the resulting policy responses are probably going to be better equipped to resolve the vulnerabilities that led to the crisis, instrument appropriate reforms, and avoid future crises (i.e., reduce growth volatility).[33]

Both democ2 and autoc2 are in turn constructed from other more specific indicators. The first indicator, external constraints on governments (xconst2.), is a measure of the level of checks and balances in the political system. Operationally, it measures the extent of institutionalized constraints on the decision making powers of chief executives, whether individuals or collectivities. Regression (2.3) shows that more checks-and-balances play a positive role, once again, via their interaction with crises, and supports our view that political institutions affect the decision process in times of crises.

[33] The fact that democracy helps to lower growth volatility has already been documented in the literature. Mobarak (2005) studies the interrelationship between democracy, volatility and growth. He explores the determinants of average growth and its volatility in a two-equation system, finding that higher levels of democracy lower volatility, while volatility itself reduces growth.

The second indicator, political competition (polcomp2), has the same beneficial effect. This variable measures the extent to which alternative preferences for policy can be pursued in the political arena, and the extent to which there are binding rules on when, whether, and how, political preferences are expressed. Both one-party states and western democracies may score highly in this index. The former, by channeling participation through only one party, with limited diversity of opinions. The latter, by allowing relatively stable groups to compete nonviolently for political influence. A low value reflects unregulated participation, an environment where there are no enduring political organizations or controls on political activity. The results in regression (2.4) can be interpreted as follows: unregulated participation increases the chances of expropriation during times of crises. In states with unregulated participation –with a low polcomp2 score-, those with more to lose in a crisis might find it profitable to devote more resources to lobby (i.e., bribe the government) and obtain policies that might help them but may hinder long term growth. This effect is limited if there is a stable competitive environment in which all voices are heard, like in modern western democracies. Furthermore, it will also be limited in the case of one-party states, where the party ideology may not always coincide with these short-term interests.

Other political variables

Table 3 shows that our main results are robust to the use of different sources for the political variables, like the Polcon database obtained from Henisz (2000) and the Freedom House database, "Freedom in the World" (2007).

Table 3: GDP per capita growth effects of Crises and Interaction with Polcon and Freedom House indicators
Estimation: 2-step system GMM with Windmeijer (2004) small sample robust standard error correction and time effects

Dependent Variable	Log GDP per capita				
	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)
Crisis	-0.254***	-0.250***	-0.185***	-0.163***	-0.156***
[BC]	[0.061]	[0.062]	[0.043]	[0.033]	[0.041]
Crisis * PolconIII	0.411**				
	[0.159]				
PolconIII	-0.004				
	[0.083]				
Crisis * PolconV		0.265**			
		[0.107]			
PolconV		0.028			
		[0.083]			
Crisis * FH			0.011*		
			[0.006]		
FH			0.002		
			[0.006]		
Crisis * FH Political Rights				0.008*	
				[0.005]	
FH Political Rights				0.005	
				[0.004]	
Crisis * FH Civil Liberties					0.009
					[0.006]
FH Civil Liberties					-0.002
					[0.005]
Control Variables					
Initial GDP per capita	0.995***	0.982***	0.972***	0.961***	0.982***
[log]	[0.018]	[0.024]	[0.023]	[0.025]	[0.022]
Trade openness	0.040	0.051	0.055	0.061	0.051
[X+M/GDP, log]	[0.036]	[0.037]	[0.055]	[0.046]	[0.059]
Government Burden	-0.194***	-0.179***	-0.159**	-0.144*	-0.156***
[Government consumption/GDP, log]	[0.060]	[0.068]	[0.063]	[0.079]	[0.056]
Inflation	-0.065**	-0.042	-0.042	-0.050*	-0.049**
[log [1+inflation]]	[0.025]	[0.027]	[0.026]	[0.027]	[0.023]
Education	0.005***	0.005**	0.006***	0.006***	0.006***
[Secondary Enrollment, log]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Constant	0.669***	0.560**	0.539	0.583*	0.509
	[0.245]	[0.267]	[0.344]	[0.304]	[0.362]
Observations	413	413	419	419	419
Number of Countries	77	77	78	78	78
Number of instruments	83	83	83	83	83
Hansen p-value	0.75	0.54	0.35	0.39	0.37
AR1 test p-value	0.00	0.00	0.00	0.00	0.00
AR2 test p-value	0.00	0.01	0.24	0.20	0.20

Time dummies are included in all regressions [coefficients not shown. Standard errors in brackets. *Significant at 10%; ** significant at 5%; *** significant at 1%

Henisz (2000) provides an alternate measure of political institutions. The Political Constraint Index (POLCON) measures the possibility of a change in policy given the structure of a country's political institutions (number of veto points) and the preferences of the political actors in these institutions (partisan alignment and homogeneity of preferences within each branch). The scale ranges from 0 to 1. There are two versions, PolconIII and PolconV, which are constructed in a similar way, but PolconV includes two additional veto points: the judiciary and sub federal entities. Regressions (3.1) and (3.2) show that these alternative measures of political constraints are also important explanatory variables. A low Polcon score means that there are fewer constraints on sudden changes in policies, and therefore more chances that governments could arbitrarily benefit special interest groups, an idea consistent with our previous results.

In regressions (3.3) to (3.5) we use the Freedom in the World database, compiled annually by Freedom House based on an assessment of political rights and civil liberties. The original indexes have a scale from 1 to 7, where 1 is the freest country and 7 the least free. In order to make it comparable to the PolityIV series, we reverse the scale and standardize the combined index to a scale that varies from -10 to 10, where 10 is the freest rating. We do the same with the sub-indexes of political rights and civil liberties.[34]

Regression (3.3) shows that having a higher rating of "freedom" during crises is good for growth. This is consistent with our previous results. More interesting perhaps, is the decomposition between political rights and civil liberties. Political rights are defined in this index as "the right to elect representatives who have a decisive impact on public policies and are accountable to the electorate", while civil liberties emphasize "the freedoms of expression and belief". Regression (3.4) shows that political rights are driving the main results. The right to elect people who will impact policies and the accountability of the government play a key role during times of crises. By contrast regression (3.5) shows that whether people can freely express their opinions or not, as measured by civil liberties and regardless of their impact on actual decisions, is not equally important.

Other crisis dummies

Table 4 shows that results are also robust to the use of different crisis proxies.

[34] Data is available from 1972, so we compute the first five-year average using only 3 years.

Table 4: GDP per capita growth effects of Crises and Interaction with Polity2
Robustness: Additional crisis indicators
Estimation: 2-step system GMM with Windmeijer (2004) small sample robust standard error correction and time effects

Dependent Variable	Log GDP per Capita				
	(4.1)	(4.2)	(4.3)	(4.4)	(4.5)
SBC Crisis	-0.176***				
	[0.045]				
SBC Crisis * Polity2	0.015**				
	[0.006]				
SS1		-0.378			
		[0.258]			
SS1 * Polity2		0.083**			
		[0.041]			
SS4			-0.143		
			[0.238]		
SS4 * Polity2			0.050		
			[0.034]		
SS5				-0.498	
				[0.333]	
SS5 * Polity2				0.095*	
				[0.051]	
Debt Crisis					-0.237**
					[0.116]
Debt Crisis * Polity2					0.013*
					[0.008]
Polity2	0.000	0.001	0.001	0.002	-0.008*
	[0.003]	[0.003]	[0.003]	[0.003]	[0.004]
Control Variables					
Initial GDP per capita [log]	0.989***	1.005***	1.008***	0.987***	0.973***
	[0.019]	[0.026]	[0.022]	[0.025]	[0.056]
Trade openness [X+M/GDP, log]	0.060	0.101*	0.093*	0.072	-0.004
	[0.045]	[0.053]	[0.053]	[0.048]	[0.103]
Government Burden [Government consumption/GDP, log]	-0.163***	-0.183***	-0.192***	-0.126**	-0.190
	[0.059]	[0.068]	[0.072]	[0.053]	[0.162]
Inflation [log [1+inflation]]	-0.051**	-0.068***	0.006***	-0.078***	-0.033
	[0.023]	[0.024]	[0.023]	[0.017]	[0.085]
Education [Secondary Enrollment, log]	0.006***	0.005***	0.006***	0.005**	0.005
	[0.002]	[0.002]	[0.002]	[0.002]	[0.003]
Constant	0.438	0.238	0.252	0.401	0.836
	[0.270]	[0.378]	[0.350]	[0.299]	[0.734]
Observations	419	401	401	396	183
Number of Countries	78	78	78	78	33
Number of Instruments	83	82	82	82	85
Hansen p-value	0.54	0.59	0.49	0.52	1.00
AR1 test p-value	0.01	0.01	0.01	0.00	0.19
AR2 test p-value	0.05	0.87	0.30	0.10	0.95

Time dummies are included in all regressions [coefficients not shown. Standard errors in brackets. *Significant at 10%; ** significant at 5%; *** significant at 1%

In regression (4.1), we replace the banking crisis variable from Caprio and Klingebiel (2003) with the systemic banking crisis variable. The difference is that while

the latter includes borderline and smaller banking crisis, the former only includes episodes when much or all of bank capital has been exhausted. Thus, systemic banking crisis is a much more restrictive definition of crisis. Despite the change in the definition, the results reported in (4.1) remain unchanged.

In regressions (4.2)-(4.4), we change the crisis variable to sudden stops, a form of crisis with external origin. Cavallo and Frankel (2007) define different variants of sudden stops that, in turn, they adapt from earlier work of Calvo et al (2004). The preferred definition is SS1. This algorithm classifies as a sudden stop a situation in which at a year t, the financial account surplus of country i (prevailing at year t-1) has fallen at least two standard deviations below the sample mean for that country; the current account deficit falls by any amount either in t or in t+1; and GDP per capita falls by any amount either in t or in t+1. SS5 is equivalent to SS1 but uses the criterion that the sudden stop be accompanied by a loss of reserves rather than a fall in output. SS4 is, instead, equivalent to SS1 but is less restrictive in that classifies as sudden stops events that do not necessarily trigger recessions or a fall in reserves. The results reported in (4.2)-(4.4) are broadly consistent with the previous results. In particular, the interaction between crisis and political institutions is always positive and statistically significant in two of the cases. Interestingly, it is not significant only in the case of SS4. This is reasonable since this is the one variant that, by not conditioning by fall in output or in international reserves, is more likely to identify events that are not really crises.[35] Also, note that the main difference with the previous results is that while the crisis dummy itself remains negative, it is rarely statistically significant in the regressions. This is probably due to the fact that sudden stops are, by definition, very rare events in the sample.[36] Despite this, the fact that the interaction between crisis and political institutions is usually statistically significant with the correct sign, is reassuring evidence in favor of the main hypothesis.

Finally, in regression (4.5) we change the crisis variable to the debt crisis indicator of Manasse, Schimmelpfennig, and Roubini (2003). Once again, we find that debt crisis have a negative effect on long term growth, but that effect is mitigated when crisis occur in countries with more democratic institutions.

[35] For example, a positive terms of trade shock might render a fall in net capital inflows and a current account reversal, but it is clearly not a crisis event.
[36] The total number of SS1 episodes captured using the methodology of Cavallo and Frankel (2007) is 86, which is 2.4 percent of total available country/year observations in the dataset

5. Endogeneity

Although our dynamic panel system GMM methodology is suited to control for the potential endogeneity of all independent variables, the validity of this estimation method depends on the assumption of weak exogeneity of the regressors. This means that they are assumed to be uncorrelated with future realization of the error term. To test this assumption we use the Hansen test of over-identifying restrictions and find in all regressions that the joint validity of our instruments cannot be rejected (p-values reported in all tables). There still remains the problem that a sub-set of instruments might be not valid. In particular, for the crisis indicators and interactions, it may be the case that lags (from t-2 back) are weak instruments. We therefore perform a difference-in-Hansen test for this subset (crisis and interactions) and find that it also cannot be rejected.[37] Moreover, a necessary condition of the System GMM estimator is that the difference error term is not serially correlated, something which we also confirm in all our regressions by rejecting the Arellano-Bond AR2 test (p-values reported in all tables).

Beyond our econometric methodology, the fact that we are focusing on the *interaction* between political variables and crises reduces the potential concerns about endogeneity. For example, if the source of endogeneity is the simultaneity of growth and the interaction of political institutions and crisis, causality could be questioned here by asking whether it is better political institutions when a crisis hits that leads to higher growth –as we maintain- or that higher growth improves political institutions only when there is a crisis? It is much harder to argue for this second explanation.[38]

Similarly, the potential omitted variables bias is typically lower in interactions than in levels. For example, if there is a variable we have omitted that is correlated with a crisis dummy and leads to growth effects not accounted by the other explanatory variables (in particular, not a country or time specific effect), then we may have an endogeneity bias in the *level* crisis coefficient. However, the bias will only arise in the coefficient of the *interaction* term if the correlation between the omitted variable and a crisis changes with the quality of political institutions. While this is still possible, it is much less likely.[39]

[37] The details are available from the authors upon request.
[38] Note that we say *only* because there is no direct relationship in our results between growth and institutions. If there were a positive correlation, then the question would be whether higher growth makes political institutions better *especially* when there is a crisis.
[39] See Aghion et al (2006) for a discussion of this issue.

6. Conclusion

The main message of this paper is that countries are more likely to take advantage of crises as long as their governments have the constraints to select the policies that are beneficial to society as a whole, and not just a particular subset of interest groups.

Our results provide evidence that democratic political institutions help to ameliorate the negative impact of economic crises on long term growth. We conjecture that this result arises because democracies tend to deliver better policy responses in the aftermath of shocks. This means that, while there might be examples of benevolent dictators that pursue good economic policies after a crisis, on average, autocratic regimes are unable to handle crises well and deliver long-term growth. In other words, *decisiveness* –an attribute oftentimes assigned to autocratic regimes—does not imply that *sound* policies are instrumented.

This paper has several important policy implications. First, if a country's democratic institutions are strong, it may welcome crises as opportunities to learn and improve the policy stance. On the other hand, if institutions are weak, crises may not be useful to promote growth-enhancing reforms. More likely than not, special interest might co-opt policy responses and crises will only end up hurting the poor at the expense of the connected elites. This is an important take-away for the proponents of the moral-hazard view who argue that countries should "suffer" crises to learn from their mistakes.

Furthermore, our results suggest that political reforms are important prerequisites of any economic reform that increases the likelihood of crises. For that reason, countries like China should be very caution with the pace of economic liberalizations, at least until more democratic institutions are introduced.

Finally, given that political institutions are so hard to change, policymakers and multinational organizations should insist on improving them *before* a crisis hits, instead of just expecting the crisis to facilitate reforms. If good political institutions are not in place at the time of the crisis, the resulting reforms are less likely to be conducive to long run growth.

A next step in our analysis would be to further identify precise mechanisms through with political institutions help during times of crises. Our belief is that they aide in the selection and implementation of better policies, those that are growth enhancing in the long run. This will be the main focus of our forthcoming research agenda.

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APPENDIX

Table A2: GDP per worker growth effects of Crises and Interaction with Democracy, Autocracy, External Constraints and Political Competition.
Estimation: 2-step system GMM with Windmeijer (2004) small sample robust standard error correction and time effects

Dependent Variable	Los GDP per worker			
	(A2.1)	(A2.2)	(A2.3)	(A.4)
Crisis	-0.210***	-0.078*	-0.281***	-0.240***
[Systemic BC]	[0.044]	[0.045]	[0.076]	[0.065]
Crisis * Democracy	0.015**			
	[0.006]			
Democracy	-0.001			
[democ2]	[0.005]			
Crisis * Autocracy		-0.024**		
		[0.009]		
Autocracy		0.007		
[autoc2]		[0.006]		
Crisis * External Constraints			0.031**	
			[0.014]	
External Constraints			-0.005	
[exconst2]			[0.009]	
Crisis * Political Competition				0.018**
				[0.009]
Political Competition				-0.005
[Polcomp2]				[0.006]
Control Variables				
Initial GDP per worker	0.951***	0.956***	0.955***	0.965***
[log]	[0.034]	[0.029]	[0.033]	[0.037]
Trade openness	0.040	0.032	0.056	0.031
[X+M/GDP, log]	[0.050]	[0.049]	[0.050]	[0.057]
Government Burden	-0.047	-0.096*	-0.089*	-0.086
[Government consumption/GDP, log]	[0.061]	[0.056]	[0.052]	[0.068]
Inflation	-0.062***	-0.059***	-0.053***	-0.062***
[log [1+inflation]]	[0.017]	[0.017]	[0.020]	[0.018]
Education	0.005***	0.005***	0.006***	0.005**
[Secondary Enrollment, log]	[0.001]	[0.002]	[0.002]	[0.002]
Constant	0.650*	0.724**	0.620**	0.697*
	[0.341]	[0.319]	[0.293]	[0.384]
Observations	424	424	424	424
Number of Countries	77	77	77	77
Number of instruments	83	83	83	83
Hansen p-value	0.69	0.47	0.47	0.47
AR1 test p-value	0.00	0.00	0.00	0.00
AR2 test p-value	0.22	0.31	0.22	0.22

Time dummies are included in all regressions [coefficients not shown]. Standard errors in brackets. *Significant at 10%; ** significant at 5%; *** significant at 1%

Table A3: GDP per worker growth effects of Crises and Interaction with **Polcon** and **Freedom House** indicators
Estimation: 2-step system GMM with Windmeijer (2004) small sample robust standard error correction and time effects

Dependent Variable	Log GDP per worker				
	(A3.1)	(A3.2)	(A3.3)	(A3.4)	(A3.5)
Crisis [BC]	-0.231*** [0.052]	-0.250*** [0.053]	-0.146*** [0.034]	-0.139*** [0.033]	-0.141*** [0.035]
Crisis * PolconIII	0.317* [0.162]				
PolconIII	0.005 [0.100]				
Crisis * PolconV		0.258*** [0.095]			
PolconV		-0.012 [0.062]			
Crisis * FH Standarized			0.007 [0.006]		
FH Standarized			-0.000 [0.004]		
Crisis * FH Political Rights				0.005 [0.004]	
FH Political Rights				0.002 [0.003]	
Crisis * FH Civil Liberties					0.005 [0.006]
FH Civil Liberties					-0.003 [0.004]
Control Variables					
Initial GDP per worker [log]	0.950*** [0.041]	0.933*** [0.031]	0.959*** [0.031]	0.939*** [0.032]	0.961*** [0.029]
Trade openness [X+M/GDP, log]	0.038 [0.040]	0.037 [0.038]	0.031 [0.043]	0.040 [0.041]	0.024 [0.043]
Government Burden [Government consumption/GDP, log]	-0.100 [0.077]	-0.074 [0.053]	-0.087 [0.056]	-0.064 [0.057]	-0.073 [0.057]
Inflation [log [1+inflation]]	-0.073*** [0.020]	-0.052** [0.020]	-0.066*** [0.025]	-0.061*** [0.018]	-0.064*** [0.023]
Education [Secondary Enrollment, log]	0.004*** [0.001]	0.005*** [0.002]	0.005*** [0.002]	0.005*** [0.001]	0.005*** [0.002]
Constant	0.876** [0.342]	0.858*** [0.299]	0.747** [0.310]	0.785** [0.335]	0.712** [0.296]
Observations	418	418	424	424	424
Number of Countries	76	76	77	77	77
Number of instruments	83	83	83	83	83
Hansen p-value	0.47	0.49	0.46	0.46	0.48
	0.00	0.00	0.00	0.00	0.00
AR2 test p-value	0.14	0.24	0.18	0.21	0.23

Time dummies are included in all regressions [coefficients not shown]. Standard errors in brackets. *Significant at 10%; ** significant at 5%; *** significant at 1%

Table A4: GDP per worker growth effects of Crises and Interaction with Polity2
Robustness: Additional crisis indicators
Estimation: 2-step system GMM with Windmeijer (2004) small sample robust standard error correction and time effects

Dependent Variable	Log GDP per worker				
	(4.1)	(4.2)	(4.3)	(4.4)	(4.5)
SBC Crisis	-0.155***				
	[0.034]				
SBC Crisis * Polity2	0.012***				
	[0.005]				
SS1		-0.149			
		[0.180]			
SS1 * Polity2		0.055**			
		[0.027]			
SS4			-0.204		
			[0.335]		
SS4 * Polity2			0.063**		
			[0.030]		
SS5				-0.538	
				[0.374]	
SS5 * Polity2				0.091	
				[0.056]	
Debt Crisis					-0.188**
					[0.082]
Debt Crisis * Polity2					0.008
					[0.007]
Polity2	-0.003	-0.001	-0.001	-0.001	-0.006
	[0.003]	[0.002]	[0.003]	[0.003]	[0.004]
Control Variables					
Initial GDP per capita	0.984***	0.964***	0.964***	0.936***	0.950***
[log]	[0.037]	[0.038]	[0.049]	[0.037]	[0.068]
Trade openness	0.040	0.033	0.041	0.013	-0.004
[X+M/GDP, log]	[0.050]	[0.053]	[0.052]	[0.054]	[0.088]
Government Burden	-0.103*	-0.124*	-0.107	-0.037	-0.134
[Government consumption/GDP, log]	[0.061]	[0.068]	[0.085]	[0.065]	[0.149]
Inflation	-0.060***	-0.085***	-0.085***	-0.096***	-0.044
[log [1+inflation]]	[0.016]	[0.023]	[0.020]	[0.017]	[0.055]
Education	0.004***	0.005**	0.005***	0.004**	0.004
[Secondary Enrollment, log]	[0.001]	[0.002]	[0.002]	[0.002]	[0.003]
Constant	0.499	0.832*	0.741	1.023**	1.004
	[0.385]	[0.445]	[0.460]	[0.391]	[0.620]
Observations	424	406	406	401	184
Number of Countries	77	77	77	77	33
Number of Instruments	83	82	82	82	85
Hansen p-value	0.56	0.36	0.43	0.49	1.00
AR1 test p-value	0.00	0.00	0.00	0.00	0.19
AR2 test p-value	0.10	0.24	0.20	0.57	0.95

Time dummies are included in all regressions [coefficients not shown. Standard errors in brackets. *Significant at 10%; ** significant at 5%; *** significant at 1%

Countries used in sample: 78

country	ifscode
Algeria	612
Argentina	213
Australia	193
Bangladesh	513
Benin	638
Bolivia	218
Botswana	616
Brazil	223
Cameroon	622
Canada	156
Central African Republic	626
Chile	228
China	924
Colombia	233
Congo, Rep.	634
Costa Rica	238
Denmark	128
Ecuador	248
Egypt, Arab Rep.	469
El Salvador	253
Finland	172
France	132
Gambia, The	648
Germany	134
Ghana	652
Greece	174
Guatemala	258
Hungary	944
India	534
Indonesia	536
Israel	436
Italy	136
Jamaica	343
Japan	158
Jordan	439
Kenya	664
Korea, Rep.	542
Kuwait	443
Lesotho	666
Liberia	668
Malaysia	548
Mali	678
Mauritius	684
Mexico	273
Mozambique	688
Nepal	558
New Zealand	196
Nicaragua	278
Niger	692
Norway	142
Pakistan	564
Panama	283
Paraguay	288
Peru	293
Philippines	566
Poland	964
Rwanda	714
Senegal	722
Sierra Leone	724
Singapore	576
South Africa	199
Spain	184
Sri Lanka	524
Swaziland	734
Sweden	144
Tanzania	738
Thailand	578
Togo	742
Trinidad and Tobago	369
Tunisia	744
Turkey	186
Uganda	746
United Kingdom	112
United States	111
Uruguay	298
Venezuela, RB	299
Zambia	754
Zimbabwe	698

Notes on variables used:

Crisis variables:

Debt crisis: From Manasse, Schimmelpfennig, and Roubini (2003). A country is defined to be in a "debt crisis if it is classified as being in default by Standard & Poor's or if it receives a large nonconcessional IMF loan defined as access in excess of 100 percent quota". They have data for 47 countries, from 1970 to 2002. 33 countries overlap with our sample: Algeria, Argentina, Bolivia, Brazil, Chile, China, Colombia, CostaRica, Ecuador, El Salvador, Guatemala, India, Indonesia, Israel, Jamaica, Jordan, Korea, Rep., Malaysia, Mexico, Pakistan, Panama, Paraguay, Peru, Philippines, South Africa, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uruguay, Venezuela

For other crisis variables definitions used, see referenced papers.

Political variables:

PolityIV

The PolityIV database contains qualitative measures of political insitutions, constructed in the following way:

- Polity2 = democ2-autoc2
- democ2: Institutionalized Democracy.

Democracy is conceived as three essential, interdependent elements:

1. Presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders.
2. Existence of institutionalized constraints on the exercise of power by the executive.
3. Guarantee of civil liberties to all citizens in their daily lives and in acts of political participation.

Other aspects of plural democracy, such as the rule of law, systems of checks and balances, freedom of the press, and so on are means to, or specific manifestations of, these general principles.

- Autoc2: Institutionalized Autocracy

Operationally defined in terms of the presence of a distinctive set of political characteristics:

1. Sharply restrict or suppress competitive political participation

2. Their chief executives are chosen in a regularized process of selection within the political elite
3. Once in office they exercise power with few institutional constraints.

- Exconst2: Executive Constraints

This variable measures the checks and balances between the various parts of the decision-making process. Operationally, it refers to the extent of institutionalized constraints on the decision- making powers of chief executives, either individuals or collectivities. Such limitations may be imposed by any "accountability group". In Western democracies these are usually legislatures. Other kinds of accountability groups are the ruling party in a one-party state; councils of nobles or powerful advisors in monarchies; the military in coup-prone polities; and in many states a strong, independent judiciary.

- Polcomp2: Political Competition

Combined from:

1. The competitiveness of participation. The extent to which alternative preferences for policy and leadership can be pursued in the political arena

2. Regulation of Participation: Participation is regulated to the extent that there are binding rules on when, whether, and how political preferences are expressed. One-party states and Western democracies both regulate participation but they do so in different ways, the former by channeling participation through a single party structure, with sharp limits on diversity of opinion; the latter by allowing relatively stable and enduring groups to compete nonviolently for political influence. The polar opposite is unregulated participation, in which there are no enduring national political organizations and no effective regime controls on political activity.

Freedom House "Freedom in the World" database

This is an extract from the description in Freedom House's website[40] "The Freedom in the World survey provides an annual evaluation of the state of global freedom as experienced by individuals. The survey measures freedom—the opportunity to act spontaneously in a variety of fields outside the control of the government and other centers of potential domination—according to two broad categories: political rights and civil liberties. Political rights enable people to participate freely in the political process,

[40] http://www.freedomhouse.org/template.cfm?page=351&ana˙page=333&year=2007

including the right to vote freely for distinct alternatives in legitimate elections, compete for public office, join political parties and organizations, and elect representatives who have a decisive impact on public policies and are accountable to the electorate. Civil liberties allow for the freedoms of expression and belief, associational and organizational rights, rule of law, and personal autonomy without interference from the state."

Polcon

Extract from "Measures of Political Risk", by Henisz and Zelner (2005). "Henisz (2000) provides an alternate measure of political institutions. The Political Constraint Index political constraint index (POLCON) directly measures the feasibility of a change in policy given the structure of a nation's political institutions (the number of veto points) and the preferences of the actors that inhabit them (the partisan alignment of various veto points and the heterogeneity or homogeneity of the preferences within each branch" Both PolconIII and PolconV are constructed in a similar way, but PolconV includes two additional veto points: the judiciary and sub-federal entities.

Other control variables used in regressions

$Z_{i,t}$ is a set of control variables which are common in the literature:

- Educational attainment = years of secondary schooling for population above 15 years of age.
- Government consumption / gdp: the assumption is that it measures expenditures not affecting productivity directly, but may create distortions of private decisions. These distortions may arise from government measures themselves or from the public finance associated with them.
- Openness: This variable reflects the effect of policies on international trade, such as tariffs and trade restrictions.

The use of these policy variables does not invalidate our intention to capture how political institutions may affect growth during periods of crisis, quite possibly through subsequent government policies. Our results show that if the effect of institutions during crises happens because of policy selection, this effect goes beyond just spending, openness and inflationary policies.

Variable Description, Sources and Summary Statistics

Variable Name	*Description*	*Souce*	*Obs*	*Mean*	*St Dev*	*Min*	*Max*
gdppccteus	GDP per capita (constant 2000 US$)	WDI (2007)	528.00	5411.15	7782.89	44.64	41356.83
rgdpwok	Real output per worker	PWT 6.2	538.00	16865.10	17370.59	486.74	196172.60
Control Variables							
opetrade˙r	Openness to trade, X+M/GDP	WDI (2007)	502.00	0.61	0.34	0.08	2.29
infcpia˙r	Inflation, consumer prices	WDI (2007)	482.00	0.86	7.38	-0.02	117.50
ggfcepgdp˙r	General government final consumption expenditur	WDI (2007)	501.00	0.15	0.06	0.03	0.43
sec˙bl	Secondary attainment as % of population above 1	Barro-Lee Extended C	541.00	24.46	15.99	0.10	72.30
Political Variables							
polity2	Combined indicator: democ2-autoc2	Polity4	538.00	1.75	7.37	-10.00	10.00
democ2	Institutionalized Democracy	Polity4	527.00	4.78	4.21	0.00	10.00
autoc2	Institutionalized Autocracy	Polity4	527.00	2.98	3.39	0.00	10.00
exconst2	Executive Constraints Concept	Polity4	527.00	4.39	2.33	1.00	7.00
polcomp2	Political Competition Concept	Polity4	527.00	5.80	3.73	1.00	10.00
polconiii	Polcon III	Henisz (2000)	529.00	0.25	0.22	0.00	0.68
poconv	Polcon V	Henisz (2000)	528.00	0.38	0.33	0.00	0.87
fh	Freedom House Standarized	Freedom House	465.00	2.49	5.25	-7.14	9.99
fh˙pr	Freedom House Political Rights	Freedom House	465.00	1.43	6.93	-10.00	10.00
fh˙cl	Freedom House Civil Liberties	Freedom House	465.00	1.07	5.64	-10.00	10.00
Crisis Variables							
SS1	Sudden Stop		386.00	0.02	0.12	0.00	1.00
SS4	SS1 without gdp drop		386.00	0.03	0.16	0.00	1.00
SS5	SS1 with fall in reserves		381.00	0.01	0.11	0.00	1.00
bc	Banking crises	Caprio and Klingebie	381.00	0.32	0.47	0.00	1.00
sbc	Systemic banking crises	Caprio and Klingebie	382.00	0.23	0.42	0.00	1.00
debt	Debt Crisis	Manasse, Schimmel	221.00	0.23	0.42	0.00	1.00

Econometric Methodology: System GMM

We want to estimate an equation of the form:

$$y_{i,t} - y_{i,t-1} = (\alpha - 1)y_{i,t-1} + \beta' x_{i,t} + \eta_i + \varepsilon_{i,t}$$

This can be transformed to

$$y_{i,t} = \alpha y_{i,t-1} + \beta' x_{i,t} + \eta_i + \varepsilon_{i,t} \quad (1)$$

Simple OLS provides biased coefficients because $\eta_{i,t}$ (unobserved) is included in the error term. In particular, we need to allow for the fact that

- $y_{i,t-1}$ and $x_{i,t}$ may be correlated to $\eta_{i,t}$
- $y_{i,t-1}$ and $x_{i,t}$ are not strictly exogenous (i.e. they are not uncorrelated to past, present and future error terms)

One possibility is to used the Fixed Effects (within-groups) transformation, which eliminates $\eta_{i,t}$. Unfortunately, this is biased for small samples because the new transformed (differenced) variables are correlated to the error term (see Bond 2002).

A better alternative is to first-difference equation (1) to remove the fixed effect $\eta_{i,t}$

$$y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta'(x_{i,t} - x_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1})$$

$$\Delta y_{i,t} = \alpha \Delta y_{i,t-1} + \beta' \Delta x_{i,t} + \Delta \varepsilon_{i,t} \quad (2)$$

Even though this eliminates the fixed effect, we still need to use instruments because:

- $\Delta y_{i,t-1}$ is correlated to $\Delta \varepsilon_{i,t}$, since $y_{i,t-1}$ is correlated to $\varepsilon_{i,t-1}$
- $\Delta x_{i,t}$ is correlated to $\Delta \varepsilon_{i,t}$, since $x_{i,t}$ is correlated to both $\varepsilon_{i,t}$ and $\varepsilon_{i,t-1}$

Our estimation procedure follows a simple idea: first a transformation is used to eliminate the unobserved fixed effect, then instruments are chosen for the endogenous variables in the transformed equation.

We can use internal lagged instruments if we make the assumption that even though the independent variables are not "strictly exogenous", they are "weakly exogenous". This means that even though they may be correlated with past or current error terms, they are uncorrelated with *future* error terms.

In particular,

- $y_{i,t-1}$ is "predetermined" = correlated to past $\varepsilon_{i,t-s}$, but uncorrelated to current $\varepsilon_{i,t}$ and future $\varepsilon_{i,t+s}$ for $s \geqslant 1$
- $x_{i,t}$ is "endogenous" = correlated to past $\varepsilon_{i,t-s}$ and current $\varepsilon_{i,t}$, but uncorrelated to future $\varepsilon_{i,t+s}$ for $s \geqslant 1$

This means that predetermined and endogenous variables are uncorrelated to unanticipated shocks (future error terms), even though expected future dynamics may affect them[41].

Given these assumptions, one possible set of instruments is to use lagged values of level variables like $y_{i,t-2}$ to instrument for $\Delta y_{i,t-1}$, and $x_{i,t-2}$ to instrument for $\Delta x_{i,t}$

These are good instruments because:

- $y_{i,t-2}$ is correlated to $\Delta y_{i,t-1} = y_{i,t-1} - y_{i,t-2}$, but uncorrelated to $\Delta \varepsilon_{i,t} = \varepsilon_{i,t} - \varepsilon_{i,t-1}$ given our assumption of weak exogeneity.
- $x_{i,t-2}$ is correlated to $\Delta x_{i,t} = x_{i,t} - x_{i,t-1}$, but uncorrelated to $\Delta \varepsilon_{i,t} = \varepsilon_{i,t} - \varepsilon_{i,t-1}$ given our assumption of weak exogeneity. Note that here there has to be 2 lags at least, because $x_{i,t-1}$ may be correlated to $\varepsilon_{i,t-1.}$

In fact, we could potentially use as many lags as we want for $t \geq 3$.

[41] Another way to interpret the assumption of weak exogeneity is that after the contemporaneous crisis and other variables have been accounted, a crisis in the past does not have an *independent* impact on growth. If true, then we can use a *lagged* value of the crisis variable as an instrument for the contemporaneous crisis, because we do not need to use it as an instrument of itself. Otherwise it would be playing two roles, first as its own instrument to capture the lagged effect and then as an instrument of the contemporaneous endogenous crisis variable.

However, these lagged variables could be invalid if there is high persistence in the series. For example, if a persistent increase in $y_{i,t-2}$ leads to a similar increase in $y_{i,t-1}$, we would have $\Delta y_{i,t-1} \approx 0$, which is uncorrelated to $y_{i,t-2}$. This is particularly true for variables like political institutions, which have very small time-series variation.

This leads to System GMM, which incorporates more instruments. Here, we need to make one further assumption:

- Even though $x_{i,t}$ may be correlated to $\eta_{i,t}$, $\Delta x_{i,t}$ is not correlated to $\eta_{i,t}$.

This allows us to use an extra set of moment conditions and use $\Delta x_{i,t-1}$ as instruments for $x_{i,t}$ in the original level regression. This is a "stationarity assumption", basically saying that deviations from long term trends $(\Delta x_{i,t})$ are not correlated to country *fixed* effects. If we are willing to accept this assumption, we can estimate a System GMM, with both the level and difference equations.

- In the level equation (1) we use $\Delta x_{i,t-1}$ as instruments for $x_{i,t}$ (same for $y_{i,t-1}$), which is possible since it is not correlated to $\eta_{i,t}$
- In the difference equation (2) we use $x_{i,t-2}$ to instrument for $\Delta x_{i,t}$ (as explained above)

Note that we need to verify that $\Delta \varepsilon_{i,t}$ is not 2nd order serially correlated, meaning $\Delta \varepsilon_{i,t}$ is uncorrelated to $\Delta \varepsilon_{i,t-2}$, which happens only if $\varepsilon_{i,t}$ is serially uncorrelated. (By construction, $\Delta \varepsilon_{i,t} = \varepsilon_{i,t} - \varepsilon_{i,t-1}$ will be negatively serially correlated to $\Delta \varepsilon_{i,t-1} = \varepsilon_{i,t-1} - \varepsilon_{i,t-2}$). For this purpose we use the Arellano-Bond 2nd order correlation test

Finally, another important specification test is the Hansen[42] test of overidentifying restrictions. The Hansen test has a null hypothesis of overidentifying restrictions (a difference-in-Sargan test is basically a Hansen test for a subset of instruments). Given that the validity of the instruments (moment conditions) is needed for the assumption of weak exogeneity, then the Hansen test is also a test of this assumption. It is important

[42] Equivalent to the Sargan test, but under heteroskedasticity.

to note that if there are too many instruments, the Hansen test may have weak power and p-value for this test will be close to 1. It is not an issue in our regressions, since we limit the number of lags used as instruments.

For further reference on this estimators see Bond (2002), David Roodman (2006), David Roodman (2007), Christopher F Baum, Mark E. Schaffer, and Steven Stillman (2002)