OPENNESS, STATE CAPACITY, AND THE SIZE OF GOVERNMENT

María Franco (Inter-American Development Bank)
Carlos Scartascini (Inter-American Development Bank)
Mariano Tommasi (Universidad de San Andrés)*

Abstract

A positive relationship between a country’s level of openness to international trade and the size of its government has been established in the literature. The predominant explanation, the compensation hypothesis, argues that government spending plays a risk-reducing role in economies exposed to external risk. This paper argues that there are a number of macroeconomic, fiscal, industrial, and social policies that can mitigate trade-induced risks, many of which do not have the necessary implication of increasing public spending. Yet, many such policies require governmental capabilities not available to any country. For that reason, the relationship between openness and the size of government might be mediated by the quality of its public sector. While countries with weak government capabilities will tend to rely on spending expansions to deal with trade-induced volatility, countries with stronger governmental capabilities might address such challenges by more efficient and less costly means. Using the quality of the bureaucracy as a proxy for government capabilities, we show that the conditional effect of openness on the size of government is only positive and significant for low levels of government quality. As bureaucratic quality increases, the effect of openness on government’s size decreases and it even dissipates. Therefore, our results indicate that the effect of openness on government consumption is mediated by the quality of government institutions.

JEL classification: D73; F19; H11; O16; O19; P16

Keywords: Openness, Government, Political Institutions, Government Capabilities

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1. INTRODUCTION

The issue of how globalization influences public policies has been widely and vividly debated for various decades. One of the most salient intuitions within that discussion is the so-called compensation hypothesis, according to which, governments attempt to compensate for the risks of increased exposure to international trade by a variety of government programs and policies, which results in a positive correlation between trade openness and the size of the public sector. The empirical pattern relating trade openness with larger governments was first unveiled by Cameron (1978) for 18 OECD countries and extended to a broader international sample by Rodrik (1998). The logic of the compensation hypothesis is that government spending can provide insurance against external risk, i.e., a higher level of openness brings increased exposure to external risk and, therefore, expanding the role of the government in the economy helps reduce the level of exposure. The mechanisms suggested by Rodrik and other authors include welfare programs, public employment, and the overall macroeconomic stabilization role of public spending.

Those insights have spurred a rich and varied literature, not without debates, as many authors have questioned aspects of the theoretical reasoning, as well as the empirical generality of the results – Section 2 provides a glimpse to those discussions. But, by and large, the compensation hypothesis has been quite accepted within the literature in international political economy, and the potential positive correlation between openness and government spending has become a staple consideration in exercises exploring the determinants of the size of government.

In this paper we argue that there are a variety of different policy responses to the additional economic volatility induced by trade openness, not all of which imply increasing public spending. Some of these policies are likely to be more sophisticated and more efficient to deal with this potential economic insecurity. In this larger menu of policy options at the disposal of (some) government authorities, only some lead to a larger government size. While almost any government can reduce volatility by increasing its size through hiring more people, more suitable macro, fiscal, micro, and social policies are more demanding in terms of government
capabilities. As such, countries with stronger governmental capabilities might address such challenges by more efficient and less costly means.

Using the quality of the bureaucracy as a proxy for government capabilities, we show that the marginal effect of openness on the size of government is only positive and significant for low levels of government quality. As bureaucratic quality increases, and hence the set of policy options at the disposal of authorities increases, the effect of openness on government’s size decreases and it even dissipates. Therefore, our results indicate that the effect of openness on government consumption is mediated by the quality of government institutions.

This finding constitutes another step in an agenda attempting to build bridges between the study of institutions and policymaking in contexts of both high and low institutionalization, as well as contexts of high and low government capabilities.¹

The paper proceeds as follows. The next section briefly discusses the literature, highlighting the original argument, as well as the extensions, clarifications, and criticisms it has received. Section 3 argues about the relationship between government capabilities (or state capacity) and the vector of risk-reducing policies that each type of country can access. The concept, measures, and related literature on state capacity are presented in section 4. Section 5 presents the empirical analysis and discusses the results. Conclusions follow.

2. MORE OPEN ECONOMIES AND BIGGER GOVERNMENTS

Following Cameron (1978) and Katzenstein’s (1985) work, the compensation hypothesis has arisen as an important benchmark for the analysis of the effects of trade openness on domestic policy. Cameron was the first to observe that trade openness was one of the most important determinants of government size in OECD countries. Katzenstein argued that small European states such as Sweden, Austria, and the Netherlands complemented their international liberalization with strategic domestic compensation aimed at countering its harmful effects (i.e.

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¹ See for instance Scartascini and Tommasi (2012) for a model along those lines, and Caruso et al (2013) for an empirical study arguing that standard results of the effects of political constitutions on fiscal outcomes apply only for countries with high levels of institutionalization of their political institutions.
instabilities in investment and employment). Policies of compensation included support for employment, special tax legislation favoring enterprises that were affected by fluctuations in the business cycle, wage control, and public expenditures (Balcells, 2006).

The empirical pattern relating trade openness with larger governments first unveiled by Cameron (1978) for 18 OECD countries was extended to a broader international sample by Rodrik (1998). In Rodrik’s analysis, the positive association was not limited to the cross section; on average international trade and public sectors had tended to grow together.

Alesina and Wacziarg (1998) confirm the correlation using government transfers as the dependent variable but argue that country size is a mediating factor: the fact that smaller countries have larger shares of government consumption on GDP and tend to be more open to trade, may explain why more open economies have larger governments. However, Ram (2009) revisits this idea using a panel data setting, and concludes that “the estimates are consistent with the possibility of a direct link between openness and government size along the lines suggested by Rodrik (1998).”

Ardserà and Boix (2002) propose a model where the level of openness and government consumption are simultaneously chosen by politicians according to the political regime in place. They estimate a pooled cross-sectional time-series model where they include a measure of democratic institutions both individually and interacted with openness. Although their results confirm the compensation hypothesis, they find democracy to be an important intermediary: as openness to international trade increases, the size of the public sector increases in democratic regimes.

Some authors have reversed the causal arrow, claiming that the political sustainability of globalization in open societies requires a thick, compensating welfare state or, at least, government-sponsored efforts to redistribute (Adserà and Boix 2002; Hays, Ehrlich, and Peinhardt 2005; Scheve and Slaughter 2007; Martin and Steiner 2013). This “reverse compensation hypothesis” argues that that once a country has a large welfare state, trade liberalization becomes more likely.

Epifani and Gancia (2009) also find that the correlation between government size and openness is robust to the inclusion of country size.
The discussion on the relationship between trade openness and the size of the public sector is embedded in a broader discussion about the effects of “globalization”, including financial openness and integration. The core issue is whether governments respond to the challenges of globalization with policy choices that are oriented more towards cutting costs (efficiency hypothesis) or protecting people's welfare (compensation hypothesis) (Avelino and Vargas, 2001). In the context of that discussion there are related efforts looking at the effects of financial openness, often thought to limit the scope of government, as postulated by the “efficiency hypothesis”.3

Various studies have delved deeper into the microfoundations of the demand and supply of “compensation”, looking at a more disaggregated level of policies, (including varieties of welfare states) and different politics. For instance, studies such as Rehm (2009), Baker (2008), and Walter (2010) study individual level demand for redistribution in the context of open economies. Burgoon (2001) looks the level of specific government programs and argues that each one can be a more or less significant source of compensation and hence is subject to different politics. Mares (2004 and 2005) argues that the individual demand for different types of social policy depends on relative risk exposure across sectors, as well as on deeper political economy considerations.

Despite all these rich and nuanced considerations, at the macro level, the correlation between trade openness and government size has become fairly established, to the point that important studies exploring the determinants of the size of government commonly include openness as a control. Such works include Milesi-Ferreti et al (2002), Persson and Tabellini (2003), Mueller (2003), Blume et al. (2009), and Rockey (2012), among many others.

3 Some of the works that have incorporated the impact of financial openness into the analysis include, Garrett (2001), Avelino et al. (2005), Kittel and Winner (2005), Garret and Nickerson (2005), Liberati (2007), Kimakova (2009), and Erauskin (2011). Similarly, Gremell et al (2008) have tried to explore the effects of globalization by focusing on FDI, as opposed to trade openness.
3. OPENNESS, STATE CAPACITY, AND THE SIZE OF GOVERNMENT

As argued in the previous section, in spite of vibrant controversies and fine grained discussion at the level of micro political economy, the big picture of the compensation hypothesis connecting openness to government size still stands. For concreteness, we focus here on the compensation hypothesis as stated by Rodrik (1998), in order to anchor our argument about alternative policies to deal with trade-induced economic insecurity and about the conditional effect of state capacity on the ability to implement such policies.

Having identified a robust correlation between openness to trade and the size of the public sector, Rodrik postulates that the main reason for that connection is a “compensation” for higher risk exposure. In his view, more open economies have a greater exposure to risk from the turbulence of world markets, and government spending plays an insulation function. He considers the government sector as the “safe” sector of the economy, especially compared to tradables; hence the government can mitigate the shocks from international markets by taking command of a larger share of the economy’s resources.

Rodrik postulates a simple framework with three sectors: private tradables, private nontradables, and the government. Assuming that a representative household owns streams of income from all sectors, a higher share of (permanent) government consumption can provide some ex ante insurance to external risk. Rodrik asks when (i.e. under what conditions) “will it be optimal for the government to reduce risk in this fashion?” (p. 1011). Reducing risk by enlarging the government is optimal in the stylized set up presented by Rodrik; a key assumption there is that the decision on how many resources to allocate to the public and to the private sectors is taken before the realization of the terms of trade shocks. Given standard assumptions on production and utility functions and the fact that the government is the “safe asset”, in such a set-up it is optimal to allocate more resources to the government, the higher the (trade-induced) risk in the private sector. In this way, the model generates the correlation between openness and spending -- or more generally, the correlation between external risk (openness times terms of trade volatility) and spending.

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4 He observes not only that there is a positive and robust partial correlation between openness and the scope of government, but also that the relationship between openness and government size is strongest when terms-of-trade risk is higher.
The set of policy instruments available in Rodrik’s framework is a rather restrictive one. Taking a broader look, there is a large set of potential macro, micro, and social policies that might mitigate or alleviate the effects of external shocks, and many of them do not have obvious budgetary implications. In terms of Rodrik’s model, some of those policy instruments might be equivalent to allowing part of the adjustment to take place after the realization of the shock to terms of trade, others equivalent to finding cheaper ways to insure ex ante. Some operate at the stage of softening the macroeconomic implication of those shocks, others at the level of permitting more efficient and less costly microeconomic adjustment, and yet others at providing more efficient and less costly social protection. Many of the potential policies might be relatively demanding in terms of government capabilities, and hence not equally available to all polities. We list below some of those possible policies and their connection to having a more capable public sector, in particular a high-quality bureaucracy.

A number of different macroeconomic policies have been discussed and tried as ways to cope with various sources of macroeconomic volatility. One set of policies particularly relevant with regards to external shocks are exchange rate policies. It is often argued that flexible exchange rates might provide better insulation to trade shocks than fixed exchange rates. For instance, Broda and Tille (2003) find, in a sample of 75 developing countries, that countries with a flexible exchange rate tend to experience much milder contractions in output than their counterparts with fixed exchange rate regimes. Since exchange rate choices do not map very easily into the size of the public sector, they constitute one example of non-budgetary insulation. Also, it is possible that instrumenting a flexible exchange rate regime in the real world requires some form of administration that might be institutionally more demanding than a fixed one. This relates to the tendency of countries with weak institutions to choose fixed exchange rate regimes as way of pumping up their scarce credibility (Canavan and Tommasi 1997, Herrendorf 1999, Keefer and Stasavage 2003).

Different types of fiscal policies might also help mitigate the exposure to the risks associated with international economic integration. For instance, well-designed fiscal rules may

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5 Another macroeconomic example in which government capabilities permit better adjustment to terms of trade shocks is provided by Gelos and Ustrygova (2012), who show that countries with more independent central banks and higher governance scores seem to have contained the impact of commodity price shocks better.

6 See Carmignani et al. (2008) for a dissenting view.
alleviate the effects of terms of trade volatility by contributing to reduce procyclical fiscal policies and related “Dutch Disease” problems (UNCTAD 2011). But the ability to properly implement adequate fiscal policies is not so readily available. Various studies have documented differences in the quality of fiscal policy across countries (Gavin and Perotti 1997, Lopez, Thomas and Wang 2010, Cespedes and Velasco 2013). Furthermore, several studies have established that the ability to implement proper fiscal policies (and in particular, policies that facilitate coping with shocks) is dependent upon institutional capabilities. Calderon et al. (2012) find that fiscal and monetary policies tend to be significantly procyclical in countries with weaker policymaking capabilities. Filc and Scartascini (2012) find that countries with better implementation capabilities are able to design better fiscal frameworks. Cespedes and Velasco (2013) find that improvements in institutional quality have led commodity-rich countries to be more able to respond adequately to commodity price shocks. Notice that the type of fiscal policy required is one that adjusts better to shocks, i.e., a form of ex post “insurance”, as opposed to blindly increasing spending as a form of ex ante insurance.

In addition to the fiscal policy framework, the depth of financial markets can significantly influence the way in which economies react to terms of trade volatility. In particular, higher financial development can help mitigate the effect of terms of trade volatility on consumption volatility (Andrews and Rees, 2009), and broader access to financing allows firms to better manage macroeconomic volatility (Cavallo et al., 2010). In this context, higher government capacities play an important role as they can provide deeper financial markets: Becerra et al. (2012) show that financial development is higher in countries with enhanced government capabilities as, among other channels, they tend to abuse less the financial system in order to finance government operations.

Looking at a slightly more disaggregated level, it is clear that the effects of terms of trade shocks operate differently through different sectors of the economy. Focusing at that level, it is clear that there are a number of horizontal and sectorial policies that have an impact on the performance of various economic sectors, both on average, as well as in terms of how well they respond to various shocks. Such industrial, financial, labor-market policies are also likely to demand important government and bureaucratic capabilities in order to be implemented properly.

7 This relates to the notion of “transformative capacity” (Weiss 1998) that we discuss in the next section.
For instance, Cornick (2013) provides a detailed analysis of the government capabilities necessary in order to implement various productive development policies. Scartascini and Tommasi (2010) show that higher government capabilities are positively correlated with policies that are associated with long term gains in productivity, such as less distortive tax systems and government subsidies, a larger formal sector, higher quality infrastructure, labor market flexibility, and ease of firm entry. The last two are described by Loayza and Raddatz (2007) as structural characteristics that can be policy driven and can dampen the impact of negative terms of trade shocks on aggregate output and magnify the positive ones.

Also, as argued by Mansfield and Reinhardt (2008), governments of open countries also try to insulate their economies from the exposure to global markets volatility through membership in international trade organizations, particularly the World Trade Organization (WTO) and preferential trading arrangements (PTAs). Using annual data on exports for all pairs of countries from 1951 through 2001 the authors find that PTAs and the WTO regime significantly reduce export volatility. Once again, the effective participation in such arrangements is not likely to induce large amounts of public spending, while playing such international games tends to be quite demanding in terms of having a capable bureaucracy (Bouzas 2004, Pasadilla 2005).

Most of the policies mentioned so far tend to operate between the external shock and the macro and micro economic consequences of the shock. After all of that is said and done, there will still be social consequences of the remaining effects of external shocks. And there, again, there are various policies to deal with that. Most of them will indeed have budgetary implications, but one might speculate that more effective governments will obtain a better bang for the buck, being able to mitigate the social costs of economic volatility more effectively and more efficiently (i.e., at a lower cost). In terms of a model with aggregate and idiosyncratic shocks, a more capable government will be better able to target its social policies at those times and to those individuals that need it the most. Programs that might have such characteristics include training programs (which also facilitate sectorial adjustment), unemployment insurance, targeted social programs, as well as a number of health and education policies (which also might matter for general productivity and for better microeconomic adjustment). Niles (2001) studies the incentives and capabilities of governments to implement targeted social spending during
economic adjustment. Cingolani et al. (2013) report how bureaucratic autonomy and state capacity allow governments to advance more rapidly in achieving development policy goals in social sector areas. Scartascini et al. (2008) report that health and education spending are more effective in countries with better policymaking capabilities; some of their results could be interpreted as indicating that policymaking capabilities might be more important than money to improve education outcomes at high levels of governmental capacity.

The examples above illustrate the fact that various policies which might allow to handle different effects of economic shocks could be quite demanding in terms of the capabilities of governments to implement them. Countries with low state capabilities might not be able to deliver in some of these more demanding policies, and hence might be forced to deal with increased volatility by blunt methods such as enlarging the state. On the other hand, countries with high capabilities will be able to deal effectively with a wider menu, and since some good policies not necessarily require much public spending, they might be able to cope with the extra volatility induced by trade without necessarily increasing public spending. For those reasons, in what follows we use a measure of governmental capabilities (the quality of the bureaucracy) as a conditioning variable in the empirical exercises relating openness and terms of trade volatility to the size of government.

4. STATE CAPACITY

The various policies that we discussed in the previous section are quite demanding in terms of technical and political capabilities. A country with strong state capabilities might be able to draw from the full menu and pick and successfully implement those policies that best suit the nature of the shocks the country faces as well as its economic and social fabric. Countries with lesser capabilities might have to deal with the risks induced by volatility in more blunt manners. For that reason, we need to look into the governmental capabilities of each case.

The issue of government capabilities or, more broadly, of state capacity is a complex one, and it has given rise to important analytical, measurement, and evaluation efforts, as well as
lively methodological debates.\textsuperscript{8} The concept of “state capacity” is very salient in studies of economic development, and its presence or absence has been associated with development successes and failures. It has many dimensions, such as coercive or military capacity, fiscal or extractive capacity, administrative or implementation capacity, and legal capacity.\textsuperscript{9} The emphasis on each of its dimensions depends on the issue at hand.

The type of economic and social policy implementation capabilities we are referring to, come closer to the notion of administrative or implementation capacity. This dimension, perhaps the most widely referred to in the literature (Cingolani 2013), is largely rooted in the Weberian tradition regarding the modern state and the existence of a professional and insulated bureaucracy. The bureaucratic/administrative dimension of state capacity has been emphasized by classic authors such as Huntington (1968) and Skocpol (1979). Weaver and Rockman (1993) conceive state capacities as policymaking capabilities, including the capacity to effectively implement policies. In Knutsen (2012) state capacity is understood as the successful implementation of public policies through and efficient rule-following bureaucracy.

The notion of capabilities we have in mind also relates to the idea of the “transformative” capacities of states, conceived as “the ability of a state to adapt to external shocks and pressures by generating ever-new means of governing the process of industrial change’ (Weiss 1998). This aspect is also present in the work of Evans (1989) and (1995) who refers to embedded autonomy, a combination of administrative insulation power and a certain level of state embeddedness in the productive structure. According to Rueschmeyer and Evans (1995), the effectiveness of state intervention in the economy depends upon a capable bureaucracy and good coordination and coherence among state organizations.

The question of where does state capacity come from has also received substantial attention. Cingolani (2013) provides a review of studies on the determinants of state capacity, from the historical accounts of state formation processes and its impact on subsequent types of administrative infrastructure, to the more recent emphasis on the incentives to invest in state capacity. A common theme among these various arguments and strands is that capacity is a

\textsuperscript{8} See for instance the debate in the journal Governance, around an article by Francis Fukuyama (2013): http://governancejournal.net/2013/03/04/fukuyama-asks-what-is-governance/.

\textsuperscript{9} See Cingolani (2013) for a very comprehensive recent survey of the concept and of its measurement.
multidimensional object that accumulates slowly over time, as a function of various investments.\textsuperscript{10}

Not surprisingly, the measures of state capacity found in the literature are quite varied, some of them aiming at capturing state capacity in a broad generic way, others acknowledging the existence of several aspects or dimensions, and trying to measure each of them. Among those attempting to measure bureaucratic/administrative/implementation capacity, for the purpose of this study where we need a large coverage in terms of countries and years, we rely on the indicator of quality of the bureaucracy from the International Country Risk Guide (ICRG). The variable “bureaucratic quality” (bureaucracy) reflects the institutional strength, quality, and expertise of the bureaucratic structure. It has been used to measure state capacity in articles particularly interested in administrative features of the State (Cingolani et al. 2013, Van de Walle 2005, Hanson and Sigman 2013), and in studies such as this one that attempt to capture how government capabilities affect the supply or demand of certain types of policies (see for example Becerra et al., 2012). This indicator of bureaucratic quality also correlates well with other dimensions of state capabilities that have been shown to relate to higher quality of policymaking in smaller country samples (within Latin America) – see for instance Scartascini and Tommasi (2010), Scartascini, Stein, and Tommasi (2013), and Franco Chuaire and Scartascini (2014).

5. EMPIRICAL ANALYSIS

As stated earlier, for concreteness and easiness of the comparison, we take Rodrik’s empirical framework as the baseline, and we add the possibility that the quality of the bureaucracy may affect public policy. In particular, we evaluate the hypotheses of whether the connection between openness and public spending is conditional on the level of government capabilities. While governments with low bureaucratic capacities may have to deal with the effects of globalization in rudimentary ways, governments with higher capabilities may be able to access a set of policies that reduce the size of external shocks and ameliorate their consequences with a relatively low effect on public expenditures. We do not argue in this paper about the level of government

\textsuperscript{10} See for instance Besley and Persson (2009) and Enriquez and Centeno (2012).
expenditures, which depend upon a myriad of factors, but about the **conditionality** of the compensation hypothesis mechanism.

**SPECIFICATION**

The basic model we test is presented in Equation [1], which includes an additional term [in brackets] to Rodrik’s (1998) baseline regression.

\[
\log(g_j) = \beta_0 + \beta_1 \text{open}_j + \left[ \beta_2 \text{bureaucracy}_j + \beta_3 (\text{open}_j \times \text{bureaucracy}_j) \right] + \gamma X_j + \varepsilon_j
\]

(1)

Where \( g_j \) denotes real government consumption as a share of GDP for country \( j \) expressed in international prices and averaged over the period 2000-2004. The second main variable of interest is \( \text{open}_j \) which measures the degree of openness of economy \( j \) using the ratio of imports plus exports to GDP, averaged over the preceding decade (1990-1999). The main data source for these variables is the World Development Indicators from the World Bank. Bureaucratic Quality (bureaucracy), which comes from the International Country Risk Guide (ICRG), takes values between 0 (low) and 4 (high) and is averaged over the preceding decade (1990-1999).\(^{11}\) \( X_j \) represents a set of control variables that includes the log of per-capita GDP and the log of the dependency ratio in the population and urbanization rate from the World Bank data, and dummy variables for socialist countries, OECD members, and geographical regions such as East Asia, Sub-Saharan Africa, and Latin America.\(^{12}\) The set of variables is later expanded in the robustness section, as we move away from Rodrik’s original specifications.

Since we are interested in the conditional effect, we will usually concentrate the analysis on the marginal effect of openness on government size:

\(^{11}\) “High points are given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services. In these low-risk countries, the bureaucracy tends to be somewhat autonomous from political pressure and to have an established mechanism for recruitment and training. Countries that lack the cushioning effect of a strong bureaucracy receive low points because a change in government tends to be traumatic in terms of policy formulation and day-to-day administrative functions.” (ICRG).

\(^{12}\) All the control variables except for the dummy variables are also averaged over the 1990-1999 period. See all summary statistics in Table A1 of the Appendix.
Estimating the effect of having a higher exposure to external risk is more complex than looking only at openness. Equation (3) takes this into account by adding “risk” to the equation. Once more, the term in brackets reflects the novelty of this paper.

\[
\log(g_j) = \beta_0 + \beta_1 \text{open}_j + \beta_2 \text{risk}_j + \beta_3 (\text{open}_j \times \text{risk}_j) + \beta_4 \text{bureaucracy}_j + \\
\beta_5 (\text{open}_j \times \text{bureaucracy}_j) + \beta_6 (\text{risk}_j \times \text{bureaucracy}_j) + \beta_7 (\text{open}_j \times \text{risk}_j \times \text{bureaucracy}_j) + \gamma X_j + \varepsilon_j
\]

\[ (3) \]

\(\text{risk}_j\) is defined as the standard deviation of the log-differences in terms of trade for the period 1980-1999 and all the other variables have the same meaning as in the baseline regression. The interaction term between openness and terms of trade volatility aims to capture that more open economies are expected to be more exposed to terms of trade volatility risk.\(^{13}\)

In addition to the cross-sectional analysis, we also work with a panel for the period 1980-2004. Following the literature, we divide this period into seven sub-periods by collapsing the data into five-year averages, which allows us to remove business cycle variations.\(^{14}\) The panel regressions are run using both fixed effects and random effects, and including and excluding period dummies and additional controls. The core results are presented in the paper and the rest in the online appendix. The complete model specification is given by:

\[
\log(g_{jt}) = \alpha_0 + \alpha_1 \log(\text{open}_{jt-1}) + [\alpha_2 (\text{bureaucracy}_{jt-1}) + \alpha_3 (\text{open}_{jt-1} \times \\
\text{bureaucracy}_{jt-1})] + \delta X_{jt} + \theta_j + \eta_t + \varepsilon_{jt}
\]

\[ (4) \]

\(^{13}\) Note that openness is not in logarithms in this version of the benchmark, to allow for the inclusion of terms of trade volatility in levels both individually and in interacted with openness (Rodrik, 1998).

\(^{14}\) See for example Rodrik (1998), Andrews and Rees (2009), and Becerra et al. (2012).
\[
\log(g_{jt}) = \alpha_0 + \alpha_1 \log(\text{open}_{jt-1}) + \alpha_2 (\text{risk}_{jt-1}) + \alpha_3 (\text{open}_{jt-1} \times \text{risk}_{jt-1}) + \\
[\alpha_4 (\text{bureaucracy}_{jt-1}) + \alpha_5 (\text{open}_{jt-1} \times \text{bureaucracy}_{jt-1}) + \\
\alpha_6 (\text{risk}_j \times \text{bureaucracy}_{jt-1}) + \alpha_7 (\text{open}_{jt-1} \times \text{risk}_j \times \text{bureaucracy}_{jt-1})] + \delta X_{jt} + \vartheta_j + \\
\eta_t + \epsilon_{jt} \tag{5}
\]

The dependent variable is again the share of government consumption in GDP for country \( j \) averaged over the 5-year period \( t (g_{jt}) \). The regressors include a lagged measure of openness to international trade (\( \text{open}_{jt-1} \)) and bureaucratic quality (\( \text{bureaucracy}_{jt-1} \)), and the same controls as in the cross-country analysis. \( X_{jt} \) includes the regressors at the beginning of each period such as the log of real per capita GDP, log urbanization rate, and log dependency ratio, and dummy variables for OECD members and socialist countries. \( \vartheta_j \) and \( \eta_t \) denote country-specific and time-specific effects respectively. We run these exercises using both fixed and random effects and perform the respective Hausman tests to choose the appropriate model (the fixed effects models are included in the text and the random effects models in the online appendix).

**REGRESSION RESULTS**

Table 1 presents the first set of results. The dependent variable is the average of the log of government consumption for the period 2000-2005. The independent variables use the averages over the previous decade.\(^{15}\) In column 1 we replicate Rodrik’s baseline cross-country regression

\(^{15}\) In all the exercises reported in the paper, we use the largest possible sample. In the online appendix, we include the results for a smaller sample, which includes those countries that are thought to belong to Rodrik’s sample according to the data sources used in his empirical analysis. Unfortunately, the final dataset used by the author is not available and given the amount of time that has passed since the paper was first published, some of the sources have been updated using new methodologies. Acquiring the actual data used to create the original dataset thus proved to be difficult. However, our results are qualitatively similar, i.e. the direction and statistical significance of the coefficients are close to those estimated and reported by Rodrik.

Similarly, while we have run the regressions in a recent sample, which was chosen according to the data availability, we have also performed the same exercises in Rodrik’s sample period (replicating the original dataset to
for openness and we include the new terms in column 2. As it can be observed in that column, the coefficients are statistically significant and they go in the direction that we expected. Absent any bureaucratic capacities, openness has a large, positive and significant effect on government consumption –similar in size to Rodrik’s findings. A 10 percentage points larger share of total trade in GDP is associated with a 5% larger share of government consumption in GDP.

Table 1. The Effects of Openness and External Risk on Government Size, accounting for Government Capabilities -- Cross Section

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Log Government Consumption (% of GDP) 2000-05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Openness (1990-99)</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
</tr>
<tr>
<td>Bureaucratic Quality (1990-99)</td>
<td>0.174***</td>
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<tr>
<td></td>
<td>(0.058)</td>
</tr>
<tr>
<td>Openness (1990-99) x Bureaucratic Quality (1990-99)</td>
<td>-0.002***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
</tr>
<tr>
<td>ToT Volatility (1980-99)</td>
<td>-1.840*</td>
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<tr>
<td></td>
<td>(1.095)</td>
</tr>
<tr>
<td>Openness (1990-99) x ToT Volatility (1980-99)</td>
<td>0.009</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
</tr>
<tr>
<td>Bureaucratic Quality (1990-99) x ToT Volatility (1980-99)</td>
<td>-1.456</td>
</tr>
<tr>
<td></td>
<td>(1.245)</td>
</tr>
<tr>
<td>Openness (1990-99) x Bureaucratic Quality (1990-99) x ToT Volatility (1980-99)</td>
<td>-0.005</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
</tr>
<tr>
<td>Observations</td>
<td>127</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.300</td>
</tr>
</tbody>
</table>

Note: Other controls not shown in the table: log GDP per capita (1990-99), log dependency ratio (1990-99), log urbanization rate (1990-99), and dummy variables for OECD, Sub-Saharan Africa, Latin America, East Asia, and Socialist countries. A constant term was included in all regressions. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

However, countries differ in their ability to pursue policies and how to respond to higher external risk, which is picked up in a negative (and significant) coefficient for the interaction

the best of our ability), finding the same qualitative results (even though Rodrik’s specification results tend to be stronger in the original sample period than in more recent periods).
term between openness and bureaucratic quality. That is, openness has a positive effect but this effect tends to be attenuated by higher levels of bureaucratic capacities.

The marginal effect of openness on government consumption at different levels of bureaucratic capacity is represented in Figure 1; the marginal effect of openness on government size is high for low levels of bureaucratic quality (mimicking Rodrik’s compensation hypotheses results) but it decreases as this capacities increase to the point of becoming insignificant. As it can be observed in the summary statistics, this effect takes place around the mean of the distribution. In other words, openness has a positive effect on government consumption for those countries with a bureaucratic quality score approximately below 2.2 (out of 4 points) (such as Sierra Leone and Paraguay) and no effect for countries on the higher end of the distribution (such as Canada and Germany).

**Figure 1. Marginal Effect of Trade Openness on Government Consumption along Bureaucratic Quality – Cross Section**

![Graph showing marginal effect of trade openness on government consumption along bureaucratic quality](image)

Note: The graph corresponds to the regression in column 2 of Table 1.

Column 3 incorporates the measure of external risk (terms of trade volatility, TOT). Similarly to Rodrik’s original results, the interaction term between openness and volatility is positive which implies that the key aspect is not necessarily the degree of openness of the economy but the actual increase of external risk measured by the combination of openness and TOT volatility. It is important to note, once more, that results are not as significant in this period as they were in the original sample period studied by Rodrik (which in part may be explained by higher...
sophistication in the part of countries in the way they react to external risks – more efficient ways for coping with external risk have become available over time for those with high capacities. Column 4 includes the additional interaction terms including bureaucratic quality. As expected, the triple interaction has a negative sign (even though not significant), which implies again that the effect of external risk on government consumption is decreasing on bureaucratic quality (the lower sample size may be affecting the significance of the coefficients). Figure 2 summarizes the marginal effects for openness evaluating TOT volatility at its 50th percentile. Corresponding figures at other values of the distribution are very similar.

**Figure 2. Marginal Effect of Trade Openness on Government Consumption along Bureaucratic Quality (taking ToT Volatility at 50th Percentile)**

![Marginal Effect Graph](image)

Note: The graph corresponds to the regression in column 4 of Table 1.

Table 2 presents the results for the panel data after including a full set of time and country fixed effects. Figure 3 summarizes the information in the Table. The left panel corresponds to the results in column 1 and the right panel to those in column 2 (once again, evaluated at TOT’s 50th percentile). Similar to the cross-section, the marginal effect of openness on the share of government consumption in GDP is decreasing with bureaucratic quality and positive and significant for weak bureaucracies.

16 We perform both fixed effects and random effects estimations. We then carry out a Hausman test that rejects the random effects model in favor of the fixed.
Table 2. The Effects of Openness and External Risk on Government Size, accounting for Government Capabilities – Panel Data

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Log Government Consumption (% of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td></td>
<td>(2)</td>
</tr>
<tr>
<td>Openness (t-1)</td>
<td>0.004**</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
</tr>
<tr>
<td>ToT Volatility (t-1)</td>
<td>0.093</td>
</tr>
<tr>
<td></td>
<td>(0.644)</td>
</tr>
<tr>
<td>Openness (t-1) x ToT Volatility (t-1)</td>
<td>-0.011</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
</tr>
<tr>
<td>Bureaucratic Quality (t-1)</td>
<td>0.075</td>
</tr>
<tr>
<td></td>
<td>(0.046)</td>
</tr>
<tr>
<td>Openness (t-1) x Bureaucratic Quality (t-1)</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
</tr>
<tr>
<td>Bureaucratic Quality (t-1) x ToT Volatility (t-1)</td>
<td>-0.193</td>
</tr>
<tr>
<td></td>
<td>(0.376)</td>
</tr>
<tr>
<td>Openness (t-1) x Bureaucratic Quality (t-1) x ToT Volatility (t-1)</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
</tr>
</tbody>
</table>

Prob>F                                              0.000                          0.000
Observations                                        246                            246
Number of countries                                  67                             67

Note: Regressions correspond to a Fixed Effects (within) model with time (period) dummies. Data are period averages for 1980-84, 1985-89, 1990-94, 1995-99, 2000-04 (except for the additional controls which belong to the beginning of each period).
Additional controls: log GDP per capita, log urbanization rate, and log dependency ratio all at the beginning of each period, and OECD and socialism dummies. A constant term was included in all regressions.
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Figure 3. Marginal Effect of Trade Openness on Government Consumption along Bureaucratic Quality – Panel Data

a. Column 1 of Table 2.
b. Column 2 of Table 2 (TOT Volatility 50th p.)
ROBUSTNESS CHECKS

So far we have evaluated our hypothesis in the context of Rodrik’s framework in order to facilitate comparisons. However, as surveyed in Section 2, Rodrik’s results have been widely revisited and concerns have been raised about the omission of relevant variables that may be affecting the discussed relationship between openness and government size such as population size and democratic institutions. Moreover, the broad literature on the size of the government acknowledges the effect of constitutional rules on economic policy and performance. In this sense, presidential systems have been found to present smaller governments while larger governments are favored by proportional representation systems compared to majoritarian systems. As a first robustness check we test our hypothesis in the context of an expanded set of controls to avoid omitted variable biases.

Furthermore, the inclusion of our variable of interest, namely bureaucratic quality, may raise a potential concern regarding causation and biases due to endogeneity. Could causality be running from government size to quality of the bureaucracy? Even though it is not immediately clear why this would be generating the previous set of results, we use an instrumental variables approach in order to reduce this concern.

Expanded Controls

Table 3 presents the same exercises as in Table 1 using a set of expanded controls that includes population size, the freedom house score (GASTIL) on political rights and civil liberties, a dummy variable equal to 1 when the form of government is presidential (pres) and 0 otherwise, and a dummy variable that is equal to 1 when the electoral rule for the lower or only house is majoritarian (maj). As it can be observed in the Table, adding additional controls does not change the direction of the results. Again, the marginal effect of openness (or exposure to

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18 We also run the same exercises including a dummy variable for countries with a federal structure. However, this variable presents several problems such as the reduction of our sample size. After including it, the marginal effect of openness on government size remains decreasing with bureaucratic quality and positive for low scores of the latter. However, the results are not as significant as before.
external risk) on government consumption seems to be lower for countries with higher bureaucratic capacities. Figure 4 presents this information graphically showing that the positive effect of openness seems to be relevant only for low levels of capacities (when the quality of bureaucracy is approximately below 2 out of 4 points). Similar results are found when we look at the three-way interaction term even though these results are less precise because of sample issues (adding additional controls reduces the sample size substantially).

Table 3. Accounting for Government Capabilities and Terms of Trade Volatility – Expanded Set of Controls

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Log Government Consumption (% of GDP) 2000-05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Openness (1990-99)</td>
<td>0.007*** (0.003)</td>
</tr>
<tr>
<td>Bureaucratic Quality (1990-99)</td>
<td>0.222*** (0.074)</td>
</tr>
<tr>
<td>Openness (1990-99) x Bureaucratic Quality (1990-99)</td>
<td>-0.002*** (0.001)</td>
</tr>
<tr>
<td>ToT Volatility (1980-99)</td>
<td>2.066 (4.267)</td>
</tr>
<tr>
<td>Openness (1990-99) x ToT Volatility (1980-99)</td>
<td>-0.063 (0.069)</td>
</tr>
<tr>
<td>Bureaucratic Quality (1990-99) x ToT Volatility (1980-99)</td>
<td>1.736 (1.909)</td>
</tr>
<tr>
<td>Openness (1990-99) x Bureaucratic Quality (1990-99) x ToT Volatility (1980-99)</td>
<td>-0.025 (0.027)</td>
</tr>
<tr>
<td>Observations</td>
<td>77</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.517</td>
</tr>
</tbody>
</table>

Note: Other controls not shown in the table: log GDP per capita (1990-99), log dependency ratio (1990-99), log urbanization rate (1990-99), log population (00), pres, maj, GASTIL, and dummy variables for OECD, Sub-Saharan Africa, Latin America, East Asia, and Socialist countries. A constant term was included in all regressions. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Figure 4. Marginal Effect of Trade Openness on Government Consumption along Bureaucratic Quality – Expanded Set of Controls

Note: The graph corresponds to the regression in column 1 of Table 3.

**Instrumenting for Bureaucratic Quality**

To address potential reverse causality problems between bureaucratic quality and size of the government, we use an instrumental variables approach. Finding good instruments for bureaucratic quality is not an easy task as the process of institutionalization of the bureaucracy has not been an issue that has received much attention—most of the literature has concentrated instead on the consequences of having professional and independent bureaucracies, and on the legal framework that would seem to favor it. Given that bureaucratic capacity is not a feature that can be built overnight but it depends on a series of investments done by the polity over time on a third-party that would help to enforce commitments and long-standing rules, it seems natural to use variables that proxy for the stability of the political system and democratic heritage.¹⁹ Among those, the variables that have been used by other authors in regressions that have size of the government as a dependent variable seem to be the safer bet for complying with the exclusion restriction.

The first set of potential instrumental variables is the one used by Persson and Tabellini and Rockey (2012): age of democracy (*age*) and its square, and a dummy variable for former colonies (*ex-colony*). The idea behind these instruments is that they allow isolating institutional

decisions that may be more conducive to investing in the bureaucracy from those that may influence investments and consumption at the same time (e.g., preferences). Constitutional reforms are often adopted during political regime transitions, as well the timing of constitutional adoption, which there is little reason to expect to have a systematic effect on fiscal performance (Persson and Tabellini 2003, 130). Colonized countries were likely to inherit similar institutions to those of their colonial rulers; therefore, these institutional choices are not endogenous to national preferences that may drive expenditures at the same time. Rockey (2012, 315). Including $age^2$ as well as $age$ provides a parsimonious way to capture any non-linearities in the history of constitutional fashion (Rockey 2012, p. 314). Rockey (2012) has improved upon the proxy for age of democracy by constructing two additional measures: the date of first democratic elections ($me$) and the date of first democratic constitutions ($mc$). In particular, they help differentiate formal democracies from working democracies and are designed to capture key issues in both new and old democracies.

The measures of age of democracy have an additional potential (and probably more relevant) channel, which is that they would allow the polity to invest on the development of institutions overtime that continuous political regime change would weaken. A measure of political stability could be another proxy for this ability to invest in the institutionalization of the bureaucracy which should not be related to the size of the government. Finally, we use, as many before us have done, the measure of European settler mortality during colonization by Acemoglu et al. (2001), as a source of exogenous variation in state capacity. Acemoglu et al. (2001) argue that the colonization strategies, which relied on different types of institutions, were influenced by the feasibility of settlements. In places where disease was more likely, European powers set up more extractive states that favored a weaker system of check and balances and protection for private property.

Finding a strong instrument for the quality of the bureaucracy has proven to be difficult. The instrument that performs better in the first stage among those mentioned above is Rockey's $me$, which records the number of months since the inception of democracy as measured by the date of first democratic elections. We use both $me$ and $me$ squared. We also follow Rockey

---

20 Palanza et al. (2014) finds a positive correlation between age of democracy and the institutionalization of Congress, which provides additional support for using these variables in this fashion.
(2012) and use Fuller’s modified limited-information maximum likelihood estimator, which performs better than 2SLS in the presence of weak instruments and has good finite sample properties. Table 4 presents the second stage results of the instrumental variables approach, and Figure 5 plots the marginal effect of interest for different levels of bureaucratic quality. Again, the marginal effect of openness on government size turns out to be positive and significant for low levels of quality of policymaking but decreasing as the latter increases. The results do not change across specifications.

Table 4. Instrumental Variables (Second Stage) – Fuller Estimator

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Log Government Consumption (% of GDP) 2000-05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Openness (1990-99)</td>
<td>0.007*</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
</tr>
<tr>
<td>Bureaucratic Quality (1990-99)</td>
<td>0.128</td>
</tr>
<tr>
<td></td>
<td>(0.110)</td>
</tr>
<tr>
<td>Openness (1990-99) x Bureaucratic Quality (1990-99)</td>
<td>-0.002***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
</tr>
<tr>
<td>Expanded Controls</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

21 See Table A2 in the appendix for the first-stage results. In the online appendix, we also present the first and second stage results when the other instruments are used (Table 6 and 5 respectively).
6. CONCLUDING REMARKS

A well know hypothesis in international political economy argues that government spending acts as a cushion against external risk volatility for countries with high exposures to international trade. We argue that the ability of different countries to properly deal with various risks and uncertainties introduced by the volatility of international markets is conditioned by their governmental capabilities. Some countries might develop more effective ways to cope with economic volatility in ways that do not necessarily increase public spending. In this paper we revisit the results connecting openness to international trade to the size of public spending, and find that there is a positive connection only for countries with weak government capabilities.

This finding constitutes another step in an agenda attempting to build bridges between the study of institutions and policymaking in contexts of both high and low institutionalization, as well as contexts of high and low government capabilities.
REFERENCES


Cornick, Jorge (2013) Public Sector Capabilities and Organization for Successful PDPs. Mimeographed. Inter-American Development Bank. September,


Pasadilla, Gloria (2005) Strengthening Trade Research Capacity for Policymaking and Negotiations. ARNeT Policy Brief 2, August.


**APPENDIX**

**Table A1**  
Summary Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Units</th>
<th>Source</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. deviation</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cross section analysis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government consumption (1985-89)</td>
<td>% of GDP</td>
<td>WDI</td>
<td>115</td>
<td>16.610</td>
<td>6.624</td>
<td>4.282</td>
<td>34.930</td>
</tr>
<tr>
<td>Government consumption (1990-92)</td>
<td>% of GDP</td>
<td>WDI</td>
<td>118</td>
<td>16.284</td>
<td>7.503</td>
<td>3.144</td>
<td>56.840</td>
</tr>
<tr>
<td>Government consumption (2000-05)</td>
<td>% of GDP</td>
<td>WDI</td>
<td>122</td>
<td>15.363</td>
<td>5.119</td>
<td>5.082</td>
<td>28.523</td>
</tr>
<tr>
<td>Openness (1975-84)</td>
<td>% of GDP</td>
<td>WDI</td>
<td>116</td>
<td>65.777</td>
<td>34.849</td>
<td>13.888</td>
<td>156.739</td>
</tr>
<tr>
<td>Openness (1980-89)</td>
<td>% of GDP</td>
<td>WDI</td>
<td>119</td>
<td>64.669</td>
<td>33.453</td>
<td>13.967</td>
<td>163.867</td>
</tr>
<tr>
<td>Openness (1990-99)</td>
<td>% of GDP</td>
<td>WDI</td>
<td>127</td>
<td>76.350</td>
<td>46.770</td>
<td>17.218</td>
<td>329.366</td>
</tr>
<tr>
<td><strong>Terms of Trade (ToT) Volatility (1980-99)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Standard deviation of the log-differences in terms of trade for the period 1980-99</td>
<td></td>
<td></td>
<td>67</td>
<td>0.118</td>
<td>0.060</td>
<td>0.018</td>
<td>0.262</td>
</tr>
<tr>
<td><strong>Bureaucratic Quality Index (1990-99)</strong></td>
<td>0-4</td>
<td>ICRG</td>
<td>127</td>
<td>2.217</td>
<td>1.096</td>
<td>0</td>
<td>4</td>
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<td><strong>Instrumental variables</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of democracy (age)</td>
<td></td>
<td>Persson and Tabellini (2003)</td>
<td>64</td>
<td>2.181</td>
<td>2.433</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>First democratic constitution (mc)</td>
<td></td>
<td>Rockey (2012)</td>
<td>86</td>
<td>1.049</td>
<td>1.054</td>
<td>0.163</td>
<td>4.819</td>
</tr>
<tr>
<td>First democratic elections (me)</td>
<td></td>
<td>Rockey (2012)</td>
<td>86</td>
<td>1.064</td>
<td>1.049</td>
<td>0.054</td>
<td>4.499</td>
</tr>
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<td>Ex-colony</td>
<td>Dummy variable</td>
<td>Persson and Tabellini (2003)</td>
<td>77</td>
<td>0.766</td>
<td>0.426</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Historical political stability (Pol. Stab)</td>
<td>0-1</td>
<td>Besley and Persson (2009)</td>
<td>122</td>
<td>0.310</td>
<td>0.248</td>
<td>0</td>
<td>1</td>
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<tr>
<td>European Settler mortality (log) (Settler mort.)</td>
<td>log total</td>
<td>Acemoglu et al. (2001)</td>
<td>62</td>
<td>4.594</td>
<td>1.213</td>
<td>2.146</td>
<td>7.986</td>
</tr>
<tr>
<td><strong>Control variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real GDP per capita, PPP (log) (1975-84)</td>
<td>log total</td>
<td>WDI</td>
<td>116</td>
<td>8.309</td>
<td>1.280</td>
<td>5.959</td>
<td>11.589</td>
</tr>
<tr>
<td>Real GDP per capita, PPP (log) (1980-89)</td>
<td>log total</td>
<td>WDI</td>
<td>119</td>
<td>8.296</td>
<td>1.287</td>
<td>5.911</td>
<td>11.398</td>
</tr>
<tr>
<td>Real GDP per capita, PPP (log) (1990-99)</td>
<td>log total</td>
<td>WDI</td>
<td>127</td>
<td>8.602</td>
<td>1.267</td>
<td>5.660</td>
<td>10.796</td>
</tr>
<tr>
<td>Dependency ratio (log) (1975-84)</td>
<td>% of working-age population</td>
<td>WDI</td>
<td>126</td>
<td>4.366</td>
<td>0.235</td>
<td>3.775</td>
<td>4.724</td>
</tr>
<tr>
<td>Dependency ratio (log) (1980-89)</td>
<td>% of working-age population</td>
<td>WDI</td>
<td>127</td>
<td>4.336</td>
<td>0.255</td>
<td>3.830</td>
<td>4.750</td>
</tr>
<tr>
<td>Dependency ratio (log) (1990-99)</td>
<td>% of working-age population</td>
<td>WDI</td>
<td>127</td>
<td>4.181</td>
<td>0.262</td>
<td>3.670</td>
<td>4.605</td>
</tr>
<tr>
<td>Urbanization Rate (log) (1975-84)</td>
<td>% of total</td>
<td>WDI</td>
<td>126</td>
<td>3.639</td>
<td>0.657</td>
<td>1.617</td>
<td>4.575</td>
</tr>
<tr>
<td>Urbanization Rate (log) (1980-89)</td>
<td>% of total</td>
<td>WDI</td>
<td>126</td>
<td>3.563</td>
<td>0.695</td>
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<td>4.556</td>
</tr>
<tr>
<td>Urbanization Rate (log) (1990-99)</td>
<td>% of total</td>
<td>WDI</td>
<td>127</td>
<td>3.919</td>
<td>0.522</td>
<td>2.252</td>
<td>4.605</td>
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<td>pres</td>
<td>Dummy variable</td>
<td>Persson and Tabellini (2003)</td>
<td>126</td>
<td>0.563</td>
<td>0.498</td>
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<td>maj</td>
<td>Dummy variable</td>
<td>Persson and Tabellini (2003)</td>
<td>123</td>
<td>0.635</td>
<td>0.464</td>
<td>0</td>
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<td>GASTIL</td>
<td>1-7</td>
<td>Freedom House</td>
<td>77</td>
<td>2.437</td>
<td>1.214</td>
<td>1.000</td>
<td>4.889</td>
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<td>federal</td>
<td>Dummy variable</td>
<td>Persson and Tabellini (2003)</td>
<td>75</td>
<td>0.173</td>
<td>0.381</td>
<td>0</td>
<td>1</td>
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<td>OECD members</td>
<td>Dummy variable</td>
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<td>127</td>
<td>0.189</td>
<td>0.393</td>
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<td>1</td>
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<td>Sub-Saharan Africa</td>
<td>Dummy variable</td>
<td></td>
<td>127</td>
<td>0.220</td>
<td>0.416</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Latin America</td>
<td>Dummy variable</td>
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<td>127</td>
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<td><strong>(5-year averages 1980-2004)</strong></td>
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<tr>
<td>Government consumption</td>
<td>% of GDP</td>
<td>WDI</td>
<td>246</td>
<td>12.996</td>
<td>5.067</td>
<td>4.080</td>
<td>40.655</td>
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<tr>
<td>Openness</td>
<td>% of GDP</td>
<td>WDI</td>
<td>246</td>
<td>69.207</td>
<td>54.131</td>
<td>13.423</td>
<td>378.825</td>
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<td>Bureaucratic Quality</td>
<td>0-4</td>
<td>ICRG</td>
<td>246</td>
<td>1.788</td>
<td>0.967</td>
<td>0</td>
<td>4</td>
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<tr>
<td><strong>Terms of Trade (ToT) Volatility</strong></td>
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<tr>
<td>Standard deviation of the log-differences in terms of trade for each period</td>
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<td>WDI</td>
<td>245</td>
<td>0.098</td>
<td>0.084</td>
<td>0.000</td>
<td>0.493</td>
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<td><strong>Beginning of the period</strong></td>
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<tr>
<td>Real GDP per capita, PPP (log)</td>
<td>log total</td>
<td>WDI</td>
<td>246</td>
<td>7.997</td>
<td>1.077</td>
<td>5.562</td>
<td>10.586</td>
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<td>Dependency ratio (log)</td>
<td>% of working-age population</td>
<td>WDI</td>
<td>246</td>
<td>3.726</td>
<td>0.551</td>
<td>2.140</td>
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<td>Urbanization Rate (log)</td>
<td>% of total</td>
<td>WDI</td>
<td>246</td>
<td>4.331</td>
<td>0.239</td>
<td>3.614</td>
<td>4.717</td>
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Table A2. First Stage Results – Instrumental Variables - *me*

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<tbody>
<tr>
<td>me</td>
<td>0.313***</td>
<td>-31.439***</td>
<td>1.133**</td>
<td>-110.276*</td>
<td>0.266**</td>
<td>-19.844*</td>
<td>0.925*</td>
<td>-88.947*</td>
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<td>(0.110)</td>
<td>(10.771)</td>
<td>(0.514)</td>
<td>(64.821)</td>
<td>(0.111)</td>
<td>(10.313)</td>
<td>(0.517)</td>
<td>(53.220)</td>
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<tr>
<td>me x Openness (1990-99)</td>
<td>-0.001</td>
<td>0.637***</td>
<td>-0.005</td>
<td>2.013**</td>
<td>-0.001</td>
<td>0.384***</td>
<td>-0.005</td>
<td>1.404**</td>
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<tr>
<td></td>
<td>(0.001)</td>
<td>(0.146)</td>
<td>(0.005)</td>
<td>(0.789)</td>
<td>(0.001)</td>
<td>(0.106)</td>
<td>(0.005)</td>
<td>(0.652)</td>
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<td>me^2</td>
<td>-0.221*</td>
<td>20.092</td>
<td>-0.176</td>
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<td>(0.118)</td>
<td>(15.914)</td>
<td>(0.121)</td>
<td>(12.867)</td>
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<tr>
<td>me^2 x Openness (1990-99)</td>
<td>0.001</td>
<td>-0.335*</td>
<td>0.001</td>
<td>-0.239</td>
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<tr>
<td></td>
<td>(0.001)</td>
<td>(0.188)</td>
<td>(0.001)</td>
<td>(0.152)</td>
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</tbody>
</table>

### Expanded Controls

- No
- Yes

### Excluded Instruments

- me, me*openness
- me, me*openness, me^2, me^2*openness
- me, me*openness, me^2, me^2*openness
- me, me*openness, me^2, me^2*openness
- me, me*openness, me^2, me^2*openness
- me, me*openness, me^2, me^2*openness

### Observations

- 86
- 86
- 86
- 77
- 77
- 77
- 77

### Adjusted R-squared

- 0.746
- 0.895
- 0.754
- 0.907
- 0.759
- 0.921
- 0.760
- 0.924

### F

- 5.030
- 9.920
- 3.440
- 8.840
- 3.140
- 7.030
- 2.060
- 5.020

### Prob>F

- 0.009
- 0.000
- 0.012
- 0.000
- 0.050
- 0.002
- 0.097
- 0.002

### A-P F test of weak excluded instruments

- 9.960
- 19.770
- 4.590
- 11.740
- 6.240
- 13.970
- 2.730
- 6.410

### Prob>F

- 0.002
- 0.000
- 0.005
- 0.000
- 0.015
- 0.000
- 0.051
- 0.001

Note: Other controls not shown in the table: log GDP per capita (1990-99), log dependency ratio (1990-99), log urbanization rate (1990-99) and dummy variables for OECD, Sub-Saharan Africa, Latin America, East Asia, and Socialist countries. Expanded set of controls: log population (00), GASTIL, pres, and maj. A constant term was included in all regressions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1