

The effect of transparency on output volatility

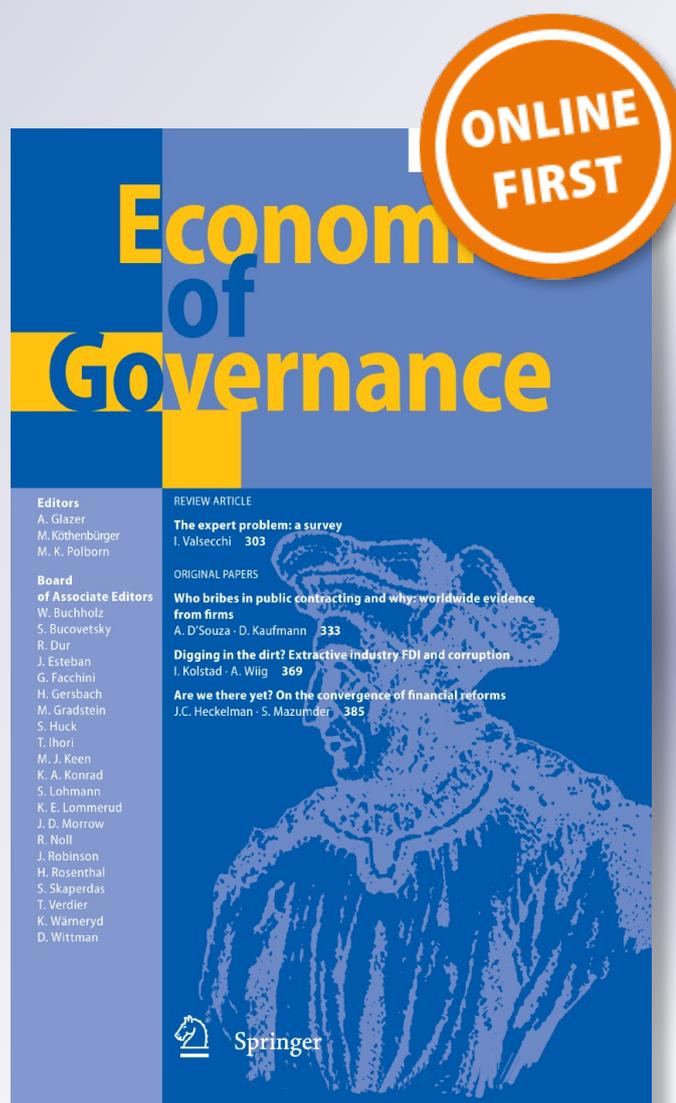
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Abstract Previous research has shown that democracies, on average, produce more stable output than non-democracies. In this paper, I argue that it is the political and economic transparency that arises out of democracies that leads to this relative stability in output growth, because the ability of a country to adjust and adapt to shocks, be they internal or external, is more pronounced in countries where the flows of information are better. Using data from 1980–2009, I show that once transparency is incorporated into the analysis democracy actually appears to increase volatility, whilst transparency is seen to have a significant dampening effect on volatility. This result is remarkably robust to the inclusion of many additional variables, alternative definitions of democracy and model specifications.

Keywords Transparency · Output volatility · Democracy · Institutions

JEL Classification H11 · O17 · O43

1 Introduction

The relationship between democracy and long-term economic growth has been extensively studied over the years by economists and political scientists. Although the results have been decidedly mixed (see, for example, [Persson and Tabellini 2006](#)), a

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reasonable amount of evidence suggests that, even if democracies may not grow more quickly than non-democracies, they at least have more *stable* growth (Mobarak 2005).

The purpose of this paper is to examine what it is about democracies that may lead to this relative stability. Specifically, it will be argued here that it is the greater level of political and economic transparency that accompanies democracies that is the key transmission mechanism at work. Using two existing measures of political and economic transparency, I show that, across a broad range of specifications, and controlling for an extensive range of plausible alternative explanations, transparency is a consistently important determinant of growth stability. Moreover, this strong effect continues even with the introduction of other institutional-type variables, which suggests that the lower volatility arising from greater transparency does not occur just because the greater transparency is associated with the better institutional framework of the country. Rather, it suggests that it is the informational advantages of greater transparency that help reduce volatility.

The paper is organised as follows. Section 2 gives a brief overview of the existing political economy literature on growth volatility. Section 3 discusses the measures of transparency used in the empirical examination in Sect. 4. Section 5 offers some concluding comments.

2 The institutional determinants of volatility

The role of institutions in helping to reduce output volatility has received increasing attention in the literature, particularly over the past decade. Acemoglu et al. (2003), for example, show that better institutions lead to better macroeconomic policies, which in turn help reduce volatility. Other research has focussed more explicitly on the institutional capabilities that accompany democracies (for example, Acemoglu et al. 2002, Fogli 2003; Thaicharoen 2002). The essential finding of this research is that a country with weak institutional arrangements is more vulnerable and less able to cope with adverse shocks. Others focus more specifically on the effect of poor institutional outcomes, such as high corruption and weak rule of law (Evrensel 2010).

Mobarak (2005) put democratic institutions at the heart of his analysis. Democracies may, on average, grow somewhat slower, but they tend to avoid large swings in output. The existing literature has put forward a number of plausible alternatives as to why this might be so. Quinn and Woolley (2001) conjectured that democracies follow more risk-averse macroeconomic policies that match the risk-aversion of its citizens. Rodrik (1999, 2000) has argued that democracies are better able to deal with any social conflicts that might arise from an economic shock. A similar point was made by Yang (2008) and Jones and Olken (2008), who find that growth collapses are strongly associated in some cases with the outbreak of civil war. Cuberes and Jerzmanowski (2009) look at the issue of democracy and growth reversals in more depth and observe that non-democracies are less likely to have a risky sector pay off but when this occurs their growth may be higher than in democracies. Others, such as Yang (2010), look at economic, rather than political, liberalisations. Countries that open up their economies to international trade and/or financial flows subsequently experience less volatility. Political liberalisations, on the other hand, do not appear to lower volatility.

Klomp and Haan (2009) take a step back from looking specifically at democracy, and instead concentrate on the interaction between political institutions and growth volatility. They identify three dimensions of a political regime that may influence economic volatility: firstly they look at the type of regime, secondly the stability of the regime, and lastly they focus on policy uncertainty. They document that fiscal and monetary policy uncertainty increase volatility and that there exists a negative relationship between democracy and volatility.

Overall then, previous research has highlighted two broad themes with respect to democracies and output volatility: democracy better reflects the collective decision-making of society, and their risk-averse preference for stability; secondly, democracy entails a number of different constraining mechanisms that prevent (or at least reduce the risk of) governments undertaking policies that could exacerbate internal or external shocks.

This paper will focus on an aspect of this second issue that has to date received little empirical attention in the literature—the role of transparency in reducing volatility. Sen (1983) and Sen and Dreze (1989) make the point that, whilst India may have had a slower growth rate than China, its democratic institutions (such as a free press) meant that it suffered no major famines. A similar point was made by Besley and Burgess (2001). The political economy literature has tended to focus more on the relationship between transparency and democracy, and the circumstances under which a government could be induced to ‘offer’ more transparency. These often come under the ‘career-concern’ models (for example, see Persson and Tabellini 2000; Prat 2005), or a principal-agent framework (such as Barro 1973; Ferejohn 1986). At a political level, greater transparency can help reduce the capture of economic rents by government officials (such as foreign aid or natural resource rents). These rents may instead be channelled into areas that may help ameliorate an economic shock (for example, through counter-cyclical fiscal policy). Greater political transparency may also reduce the chances of a government engaging in spending that reflects the political cycle, rather than the business cycle, because citizens are better able to monitor the type and quantity of this spending.¹

Greater transparency, aside from its monitoring role in improving accountability, may also reduce informational asymmetries within the private sector economy. This may make it easier for firms to re-allocate resources more efficiently when an internal or external shock occurs. (Lack of) information can also play a significant role in sectoral co-movement, which leads to volatility being magnified. Veldkamp (2006) for example, looks at ‘media frenzies’, and notes that, in countries where information may be ‘thin’, small pieces of aggregate information that are available to all may result in higher volatility (at least in financial markets). In other words, access to more information may reduce this co-movement, because firms have, for example, more sector-specific information, and consequently are not relying solely on the same aggregate information that everyone else has.² As a counterpoint to this, there is a line of research, closely associated with the work of Morris and Shin (2002) and Morris

¹ For example, see Shi and Svensson (2006), with respect to business cycles and ‘informed voters’.

² On this, see Brockman et al. (2010), Veldkamp and Wolfers (2007) as well as Jaimovich and Rebelo (2009) for a theoretical treatment.

et al. (2006), where more public information may actually exacerbate volatility and be welfare-reducing, because this public information is given a weight by the private sector it shouldn't have.³ However, it is clear from these papers that the situation they have in mind is that of a developed country central bank, where every uttering by the head of the central bank is dissected for greater meaning, which may increase confusion and hence volatility. But this is not the argument made here, because that line of research takes its starting point that information (public or private) is already widespread, and is unconstrained by the prevailing political circumstances. That is, a position that is already well up on the 'information production function' (for want of a better term), and so the marginal productivity of this information may be quite low, or even negative. Here I take the position that the country-specific quantity of information available to citizens varies considerably between countries, and so, where little information exists, the marginal addition of information may have a relatively high payoff with respect to reducing volatility.⁴

Of course, the general literature on output volatility is long and extensive, and there are many competing hypotheses that undoubtedly may also be important factors. Čorić (2012) outlines in detail the fact that the 'Great Moderation' during the 1990s and 2000s was not simply a feature of high income developed countries. Given this period of reduced volatility occurred across a range of countries, both geographically and in terms of income, it is unsurprising there are competing (though not necessarily mutually exclusive) claims. In brief, these hypotheses can be put into four categories (for an excellent review of some of these, see Čorić 2011):

1. External factors (the 'good luck' hypothesis), such as terms of trade shocks (see for example Raddatz 2007; Stock and Watson 2002; Ahmed et al. 2004);
2. Internal domestic shocks (Koren and Tenreyro 2007; Aizenman and Marion 1999; Cecchetti et al. 2006)
3. Policy-related factors. In general, we might classify these as (a) *fiscal policy* (Cabanillas and Ruscher 2008; Buti et al. 2002); (b) *monetary policy*, including monetary authorities' independence (see Clarida et al. 2000); and (c) *trade and financial sector policies* (see, for example, Giovanni and Levchenko 2008; Kose et al. 2005, 2010).

3 Measuring political and economic transparency

Although there is no universally accepted measure of transparency, there are a small number of potential candidates that could be used in an empirical analysis of this issue. Dincer and Eichengreen (2007) construct an index of central bank transparency across five dimensions (based on methodology discussed by Eijffinger and Geraats

³ See also Angeletos and Werning (2006), Angeletos and Pavan (2004) and Angeletos (2010).

⁴ In many respects, this is the argument put forward by Svensson (2006) in his published comment on the original Morris and Shin paper, in that any welfare-reducing effect of greater public information would only occur under certain specific conditions. Under other plausible conditions, public information would still be welfare-enhancing.

2006): political, economic, procedural, policy and operational. Either as an aggregate, or separately, this index has been used by Siklos (2011) and Mazhar (2013).⁵

On a broader level, Bellver and Kaufmann (2005) construct two indicators of transparency using a methodology very similar to that used for the well-known Governance Indicators produced by the World Bank. Using a number of different sources, they divide transparency into what they call 'Economic/Institutional transparency', and 'Political transparency'. The former is based on the concept that information produced by governments has value in itself, as it helps both public and private decision-making processes, whilst the latter is based more on political accountability, in that institutions such as a free press act as a constraint on rent-seeking behaviour. Within these two broad measures, there are individual measures that have previously been employed as indicators of transparency. Probably the most common is the Freedom of the Press, produced annually since 1980 by Freedom House. Between 1980–1993, these scores consisted of countries being assigned as either 'free', partly free' or 'not free'. Since 1994 they have also published a more comprehensive index, with countries being given a score between 0 and 100. Figure 1 shows that there is a significant difference between the growth volatility of countries that (on average) have been rated as free, partly free and not free between 1980–2005. Of course, at this stage, it is unclear whether this is due specifically to the degree of press freedom itself, or whether it is simply proxying for the fact that more democratic countries also have freer presses, or the fact that corruption is lower in countries that have a free press (see Brunetti and Weder 2003).

As mentioned previously, transparency can also be thought of as having an informational context, rather than a purely 'checks and balances' context. In order to incorporate this element into the measure of transparency, the Release of Information index, compiled by Williams (2009) may be a useful proxy here. This index gives each country a score between 0 and 1 based on the proportional amount of data that appears in the *World Development Indicators*, and the *International Financial Statistics*. Although countries (to varying degrees) release a lot of economic, social and financial information through their national statistics offices that won't appear in either of these databases, it provides a degree of comparability across countries (and time) that should give at least a general sense of the quantity of the information government's produce.⁶ As Fig. 1 shows, there is also a negative relationship observed here as well—countries that have had more volatile growth also released less information.

In terms of this current analysis, both the political aspect of transparency (Freedom of the Press) and the economic aspect of transparency (the Release of Information

⁵ Originally this only contained annual data between 1998–2005, subsequently expanded by Siklos (2011) through to 2009.

⁶ For more details in the derivation of this index, see Williams (2009). For our purposes here though, a couple of clarifications are required. The first is that only information that has come directly from the domestic government is included in the calculations. For example, statistics gathered by NGOs have not been included, as that does not go towards the amount of public information produced by governments. The second issue relates to the quality of the data released. In many of the papers mentioned previously, attention was paid not only to the amount of information, but the quality of it. The greater the quality, the greater the precision, and the more useful it is. Unfortunately, this is not something that can adequately be addressed here. Lastly, this index has subsequently been updated through to 2010.

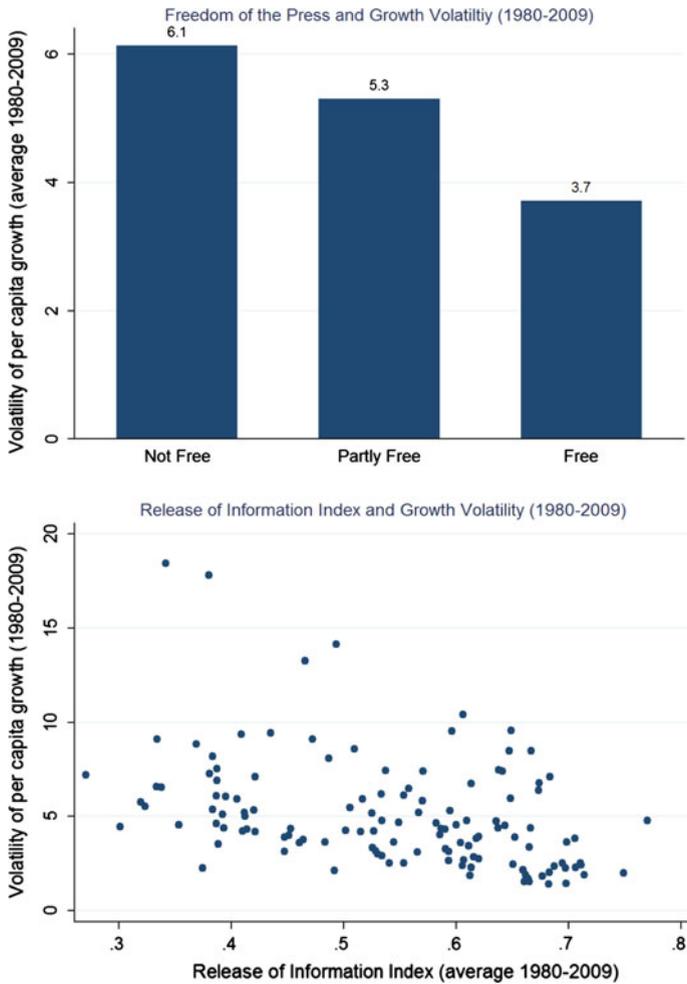


Fig. 1 Volatility, Freedom of the Press and the release of information

index) are likely to be important determinants of volatility. Therefore, for the empirical analysis that follows, the two have been combined into one overall indicator of transparency. Because each has different ranges (Freedom of the Press discrete scores of 1, 2 or 3, and the RI index a proportional measure between 0 and 1), each is standardised in each year, and then a simple average is taken of these two standardised scores. In the cross-sectional analysis that follows, this variable is then averaged over the 1980–2009 period.⁷

⁷ These two measures have been preferred over the other transparency indicators already mentioned for two reasons: firstly, because they give a reasonable approximation of the two dimensions of transparency I want to address, and secondly, because they are the only two that have a relatively long temporal component (for example, the Bellver and Kaufmann indicators are taken from towards the end of the period being studied here, and have been compiled to date only once). In order to get a sense of any causal inferences, a

Table 1 Summary statistics

	Mean	SD
Growth volatility	5.04	2.92
<i>Observations</i>	130	130
Per capita GDP (log)	8.47	1.27
<i>Observations</i>	130	130
Democracy (political rights)	0.58	0.31
<i>Observations</i>	130	130
Transparency index	0.24	0.70
<i>Observations</i>	130	130
Domestic volatility	0.26	0.17
<i>Observations</i>	130	130
Commodity ToT volatility	0.03	0.04
<i>Observations</i>	130	130
Trade openness	68.79	31.81
<i>Observations</i>	130	130
Financial openness (KAOPEN)	0.15	1.27
<i>Observations</i>	130	130
Monetary policy (inflation)	0.22	0.36
<i>Observations</i>	130	130
Fiscal policy volatility (SD of Govt spending)	0.18	0.11
<i>Observations</i>	130	130

4 Empirical analysis

4.1 Cross-sectional regressions

In order to examine empirically the role of transparency in output volatility, I start with a simple OLS cross-country framework, where, unless otherwise stated, variables are averaged over the period 1980–2009.⁸ Summary statistics can be found in Table 1. The core specification used in the following section is:

$$\sigma_{growth_i} = \alpha + \beta_0 LNRGDPPC_i + \beta_1 DEM_i + \beta_2 TRANS_i + \beta_k Z_i + u_i \quad (1)$$

where:

Footnote 7 continued

panel data estimation is employed in a later section, which required the transparency measure to have this temporal variation.

⁸ Ideally, a 2SLS estimation would also be used. However, it is not clear to me what appropriate instruments could be employed for this analysis, particularly with respect to the political rights and transparency variables. That is, whilst separately it may be possible to find an instrument which affects volatility only through political rights *or* transparency (for example, see Mobarak 2005), when used in the same regression it would be extremely difficult to find a distinct instrument for each of them. Section 4.3 below, however, will attempt to deal with issues of causality and endogeneity using panel data.

- σ_{growth_i} growth volatility, measured as the standard deviation of the per capita real growth rate. The growth data comes from the PENN tables 7.1⁹;
- $LNRGDPPC_i$ the natural log of real per capita GDP (again using the PENN Tables);
- DEM_i democracy. Because the choice of the democracy variable may be open to criticism (irrespective of which one is chosen), I have initially included separately four relatively well-known political variables (full details and sources can be found in the “Appendix”): (i) Political rights (Freedom House); (ii) Democracy index from the *POLITY IV* database; (iii) Executive Constraints (also from the *POLITY* database); (iv) Political Constraints, from [Henisz \(2000\)](#).¹⁰
- $TRANS_i$ transparency (the averaged combined Freedom of the Press and Release of Information scores);
- Z_i additional economic, social and fixed factors. As noted above, there are many other hypotheses about the factors leading to volatility, and so it is important to try to control for as many of these as possible. A full list of the specific measures employed can be found below and in the Appendix, along with their sources, however, in brief these cover the following issues:
- Domestic policy volatility: (1) *Investment volatility*: measured by the standard deviation of investment, from PENN7.1; (2) *Monetary policy*: $\ln(1+\text{inflation})$, taken from the WDI (2013); (3) *Fiscal policy*: the standard deviation of government spending (KG), taken from PENN 7.1;
 - *External volatility*: the standard deviation of the commodity terms of trade, taken from [Spatafora and Tytell \(2009\)](#);
 - *Trade openness*: the sum of exports and imports as a percentage of GDP ($OPENK$ from PENN 7.1);
 - *Financial openness*: the [Chinn and Ito \(2006\)](#) measure of capital openness ($KAOPEN$)¹¹;
 - Fixed factors. These include: (1) *Geographic* (distance from the equator and whether a country is landlocked); (2) *Historical/cultural* (ethno-linguistic fractionalisation); (3) An *oil-exporting dummy*; and (4) *Regional dummies* (Sub-Saharan Africa, Latin America and Caribbean, and East Asia and Pacific). All fixed factor data is taken from the *Global Development Network Growth Database (2006)*.

⁹ Because there is undoubtedly measurement error in these figures, Sect. 4.2 will re-examine this issue with respect to other calculations of GDP data, from the World Bank, and the Maddison historical GDP dataset.

¹⁰ The first three are subjective measures that rely to a large extent on country experts to formulate a score for each country. This subjectivity is potentially a problem, as there may be ‘halo’ effects at play. This is particularly true for the Political Rights index, because it is compiled by the same group that compile the Press Freedom indicator. The last measure, however, is objective, in that it essentially counts the number of veto players within a political system. The more potential veto players, the greater the constraints on the executive. It is not, however, strictly a measure of ‘democracy’.

¹¹ $KAOPEN$ is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF’s *Annual Report on Exchange Arrangements and Exchange Restrictions*. See [Chinn and Ito \(2006, 2008\)](#) for more details.

Given the objective of this paper, the first step is to have a look at some simple regressions that focus specifically on the links between democracy and transparency with respect to volatility. Table 2 presents an extremely parsimonious analysis, using the standard deviation of per capita growth as the dependent variable, and controlling only for per capita income (averaged over the period). Democracy and transparency variables are then successively added. The different political variables used are noted at the top of each column.

In order to try and get as much comparability as possible, each of the political variables has been re-scaled from 0 to 1, and the largest common sample of countries is used (130). The results, albeit simplistic, are remarkably consistent. Each political variable, when run only with levels of per capita incomes, are negative and highly significant—as found in a number of previous studies, democracy lowers volatility. However, as soon as the transparency variable is included, the political variable actually changes sign and is now positive (and significantly positive for three of the four political variables), whereas the transparency variable is always negative, and highly significant. Although each of the political variables is measuring a slightly different issue, these results all say effectively the same thing—the dampening effect of democracy on growth volatility appears to be because they are more transparent, and not because they are democracies per se. Once the degree of transparency is controlled for, greater democracy is actually associated with greater volatility.

Table 3 incorporates the additional variables that cover the other economic, social and geography-related issues mentioned above. In terms of which political variable to use, I have opted to conserve space and use only the Political Rights variable from Freedom House (however, as Table 4 will show, when regressions are run with the alternative political variables the results are very similar). Column 1 includes the Political Rights variable along with the time-varying additional variables from above, but without the transparency variable. The political variable remains negative (with a p value of 0.14), which suggests that, even after taking into consideration the effect of domestic economic policies, democracy is still having some dampening effect on volatility. Of the other variables, the openness of trade is positively associated with growth volatility, as are the volatility of monetary and fiscal policies. In column 2, the addition of the transparency variable again causes the coefficient on the political variable to change signs (and is marginally significant), but has little effect on the other coefficients. Although the coefficient on the transparency index is smaller than those found in Table 2, it is nevertheless still negative, and highly significant. Column 3 adds in the fixed factors, however, these add little to nothing to the results. In other words, any effects arising from geography, ethnic fractionalisation or region operate almost exclusively through the channels already controlled for.

It might be that the significant results seen with respect to the transparency index may only be due to the inclusion of the rich, democratic and transparent (largely) Western countries. However, removing these 28 high income OECD countries from the sample (column 4) has virtually no effect on the transparency variable coefficient.

The data has so far assumed a linear relationship between democracy, transparency, and growth volatility, but it may be the case that democracy has a non-linear effect on volatility. For example, it is plausible to think of volatility having an ‘inverted U-shape’ relationship with democracy. That is, low in either highly authoritarian countries,

Table 2 Volatility, democracy and transparency

	Democracy variable employed: political rights (freedom house)		Democracy variable employed: democracy (POLITY)		Democracy variable employed: executive constraints (POLITY)		Democracy variable employed: political constraints (Henisz)	
	1	1A	2	2A	3	3A	4	4A
Per capita GDP (log)	0.0736	0.4747	-0.1468	0.6264	-0.1878	0.5611	-0.1000	0.4199
	<i>0.2742</i>	<i>0.3002</i>	<i>0.2333</i>	<i>0.3387*</i>	<i>0.2575</i>	<i>0.2965*</i>	<i>0.2903</i>	<i>0.2958</i>
Democracy variable ^a	-4.0497	3.2803	-3.2310	3.8342	-2.9350	5.9873	-3.2255	3.8381
	<i>1.2392***</i>	<i>1.6935*</i>	<i>1.0412***</i>	<i>2.3610</i>	<i>1.3687**</i>	<i>2.9822**</i>	<i>1.3692**</i>	<i>1.6358**</i>
Transparency index		-3.8906		-4.2019		-4.6806		-3.8168
		<i>0.9007***</i>		<i>1.3103***</i>		<i>1.3418***</i>		<i>0.8128***</i>
<i>Tests (p values)</i>								
R ²	0.17	0.25	0.14	0.26	0.10	0.29	0.11	0.26
Countries	130	130	130	130	130	130	130	130

OLS regression, robust to heteroscedasticity. Numbers in italics are standard errors. GDP data is from PENN 7.1 (RGDPL2 measure). Constant included but not reported
 , *, and *** Significance at the 10, 5 and 1% levels, respectively

^a The democracy variable used in each column is the one listed at the head of each column. For example, the regressions run in columns 1 and 1A uses the Freedom House Political Rights indicator, and so on. The dependent variable in each regression is the standard deviation of per capita growth

Table 3 OLS with other economic, social and fixed factors

	Dependent variable: → SD of per capita growth					
	(1)	(2)	(3)	(4)	(5)	(6)
Per capita GDP (log)	-0.154	0.272	-0.066	0.327	-0.079	-0.078
	<i>0.239</i>	<i>0.270</i>	<i>0.386</i>	<i>0.412</i>	<i>0.423</i>	<i>0.418</i>
Democracy (political rights)	-1.983	2.295	2.127	3.064	7.058	2.109
	<i>1.348</i>	<i>1.373*</i>	<i>1.566</i>	<i>1.609**</i>	<i>3.871*</i>	<i>1.660</i>
Democracy ²					-4.948	
					3.342	
Transparency index		-2.531	-2.458	-2.508	-2.609	-2.530
		<i>0.905***</i>	<i>0.903***</i>	<i>0.913***</i>	<i>0.907***</i>	<i>1.141**</i>
Transparency index ²					0.898	
					0.782	
Interaction (political rights × transparency)						0.141
						<i>1.825</i>
<i>Economic factors</i>						
Domestic volatility	-0.294	-1.042	-0.927	-1.908	-1.137	-0.931
	<i>2.139</i>	<i>2.042</i>	<i>2.272</i>	<i>2.342</i>	<i>2.221</i>	<i>2.282</i>
Commodity ToT volatility	5.980	3.537	11.938	13.548	12.622	12.027
	<i>7.536</i>	<i>7.827</i>	<i>10.753</i>	<i>11.287</i>	<i>10.462</i>	<i>10.338</i>
Trade openness	0.013	0.011	0.008	-0.004	0.009	0.008
	<i>0.006**</i>	<i>0.006*</i>	<i>0.006</i>	<i>0.008</i>	<i>0.007</i>	<i>0.007</i>
Financial openness (KAOPEN)	0.121	0.086	0.102	0.321	0.071	0.097
	<i>0.219</i>	<i>0.212</i>	<i>0.237</i>	<i>0.277</i>	<i>0.243</i>	<i>0.244</i>

Table 3 continued

	Dependent variable: → SD of per capita growth					
	(1)	(2)	(3)	(4)	(5)	(6)
Monetary policy (Inflation)	1.675	1.840	1.468	0.909	1.480	1.478
Fiscal policy volatility (SD Govt spending)	0.593***	0.578***	0.632**	0.739**	0.652**	0.658**
	11.387	10.790	10.316	10.158	10.038	10.325
<i>Fixed factors</i>	4.063***	3.831***	3.975**	4.056**	3.950**	3.982**
Distance from equator			0.033	0.052	0.034	0.033
			0.031	0.036	0.032	0.031
Landlock			0.417	0.737	0.356	0.412
			0.664	0.827	0.638	0.632
Ethnic fractionalisation			-0.428	-1.032	-0.593	-0.407
			1.565	1.896	1.521	1.467
Oil exporting dummy			-0.664	-0.994	-0.682	-0.675
			1.713	1.661	1.707	1.684
Sub-Saharan Africa dummy			0.159	1.023	0.044	0.136
			0.616	0.688	0.659	0.629
Latin America and Caribbean dummy			0.410	0.065	0.330	0.415
			0.680	0.818	0.693	0.669
East Asia and Pacific dummy			0.083	0.605	-0.024	0.075
			0.660	0.843	0.722	0.699
R ²	0.42	0.45	0.47	0.42	0.48	0.47
Countries	130	130	130	102	130	130

OLS regression, robust to heteroscedacity. Numbers in italics are standard errors. GDP data is from PENN 7.1 (RGDPL2 measure)

*. ** and *** Significance at the 10, 5 and 1 % levels, respectively

Table 4 OLS with alternative variables

Original variable	Alternative variable used	Transparency coefficient	Sample size	R ²	Alternative variable significant?
Base coefficient (column 3 of Table 3)	...	-2.458***	130	0.47	...
SD of per capita growth (PENN 7.1)	SD of per capita growth (WDI) ^a	-1.800**	127	0.36	...
	SD of per capita growth (Maddison) ^b	-3.065**	124	0.48	...
Political rights	Democracy (POLITY)	-2.277**	130	0.47	No
	Executive constraints (POLITY)	-2.858**	130	0.49	No
	Political constraints (Hemisiz)	-2.565***	130	0.48	Yes (+), 5%
Transparency	Average of RSF (2005) and Islam	-1.904*	130	0.47	...
	Central Bank Transparency Index (Siklos 2011)	-0.248*	92	0.51	...
	Bellver and Kaufmann (2005)	-1.363*	130	0.47	...
Investment volatility	Consumption volatility (PENN)	-1.597**	130	0.60	Yes (+), 1%
Commodity terms of trade	Terms of trade (WDI)	-2.555***	130	0.48	No
Trade	Sachs-Warner Index	-1.506*	116	0.50	No
	Oil rents (% GDP)	-3.126***	112	0.56	No
Financial openness	Capital flows (log)	-1.824**	127	0.46	No
	International financial integration volatility	-2.928**	121	0.50	No
	Private credit (% GDP), log	-2.255**	129	0.48	No
Monetary policy	M2 volatility	-2.171**	130	0.45	No
Fiscal policy	Revenue volatility, 1980–2000	-2.189*	101	0.47	Yes (+), 5%
	Tax revenue (% GDP), 1990–2009	-3.242**	122	0.41	No
	Budget balance (% GDP), 1990–2009	-3.369***	119	0.42	Yes (-), 10%

All regressions based on column 3 of Table 3, including all other variables

^a To maintain comparability, other variables were also changed in these regressions: average per capita income (PENN) replaced with per capita income from WDI; investment (PENN) replaced with gross fixed capital formation (WDI); trade openness (PENN) replaced by trade openness from WDI; government spending (PENN) replaced with government consumption variable from WDI

^b For the regressions with the Maddison GDP data, have used the WDI measures of investment, trade and government spending. Data for Maddison only up to 2008

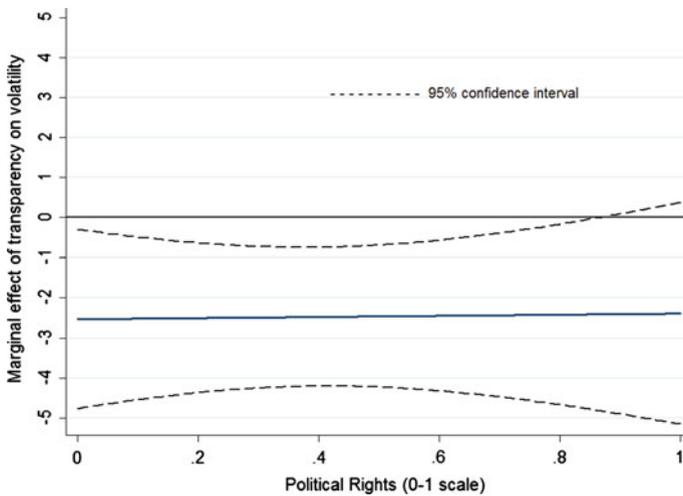


Fig. 2 The marginal effect of transparency on output volatility, conditional on the degree of political rights

or highly democratic countries, but higher otherwise. However, as column 5 shows, there is no evidence of non-linearities for either democracy, or transparency. The final column looks at the possible interaction between democracy and transparency. That is, it asks whether transparency reduces volatility by more in democratic countries. That is, in:

$$\sigma_{growth} = \beta_1 TRANS + \beta_2 DEM + \beta_3 (TRANS \times DEM) + \dots + \epsilon \quad (2)$$

We want to look at the conditional effect that transparency has on volatility, given the degree of democracy:

$$\frac{\partial \sigma_{growth}}{\partial TRANS} = \beta_1 + (\beta_3 \times DEM) \quad (3)$$

In this dataset, the political rights variable has been normalised, and is bounded between 0 and 1. As Fig. 2 demonstrates, the marginal effect of transparency on output volatility, conditional on the degree of political rights, is always negative across the entire range (see Brambor et al. 2006 for further details on this methodology).¹²

4.2 Sensitivity and robustness checks

Although I have already looked briefly at alternative definitions of democracy in Table 2, there are other variables being used here that might also be open to question. For example, there are a number of different ways to measure fiscal or monetary policies other than the two employed to date. Indeed, the choice of the dependent

¹² I thank one of the reviewers for this suggestion.

variable itself may be open to criticism, because GDP data can vary between databases (for example, due to the choice of the price deflator, or the methodology used to convert data into US dollars). As Fig. 3 below shows, the volatility data from three databases (the PENN World Tables, World Development Indicators and the Maddison historical data) are not identical. As the size of the volatility rises, the results start to deviate more and more away from the 45° line.¹³ It is not the intention here to argue over which of these is 'better'. Nevertheless, it is important to see whether the results obtained so far are due only to the fact that the PENN World Tables are being used for GDP, investment, trade and fiscal policy data.

Therefore, Table 4 systematically replaces each of the time-varying variables from Table 3 with plausible alternatives. The first column lists the category of variables from Table 3, whilst the next column lists the alternative being used in each regression.¹⁴ As can be seen from this table, transparency is significantly associated with lower volatility for all three GDP measures (although the coefficient does vary, from -1.8 using the WDI GDP per capita figures, up to -3.1 for the Maddison data). Nor does the choice of the political variable matter—as in Table 2, the transparency variable is still negative and significant (and the political variable positive).

Although there are few alternative transparency measures available, I have employed the same methodology in putting together a transparency index based on a measure developed by Islam (2006), which looks at the timeliness of economic information given to the World Bank for their *World Development Indicators*, and the measure of Press Freedom by *Reporteurs Sans Frontieres* (these are both taken from early 2000s, as they are unavailable over the full period examined here). As an additional check, I have also used the Bellver and Kaufmann (2005) measures of economic/institutional transparency, and political transparency, combined to give an overall measure of transparency. Despite the fact that different sources are being used, transparency remains negative and statistically significant (albeit only at the 10 % level of significance now). Finally, I also used the Central Bank Transparency Index first developed by Dincer and Eichengreen (2007), using data updated by Siklos (2011). Although this is a narrower definition of transparency than that adopted here, it is still nevertheless negatively related to volatility.¹⁵

Of the other alternative variables employed, none dramatically alter the original conclusion that more transparent governments have, on average, lower volatility. The choice of variable does, however, occasionally affect the conclusions from the previ-

¹³ On the issue of data quality and the presence of measurement errors both within the PENN tables, and between the PENN tables and other databases, see Dawson et al. (2001) and Ponomareva and Katayama (2010).

¹⁴ Note that in each regression, all of the other variables bar the one being replaced are the same as in the original regression. The only exception to this is when using the WDI and Maddison GDP data, where I have used comparative variables for investment (Gross Fixed Capital Formation), trade openness (imports plus exports) and government consumption spending from the World Development Indicators, rather than their counterparts from the PENN tables.

¹⁵ Further to this point, when I ran the Transparency Index used here with the Central Bank index in the same regression, the Central Bank transparency index ceased to be a significant factor. This suggests that it is the broader issue of information that is more important to volatility, rather than the narrower issue of central bank transparency.

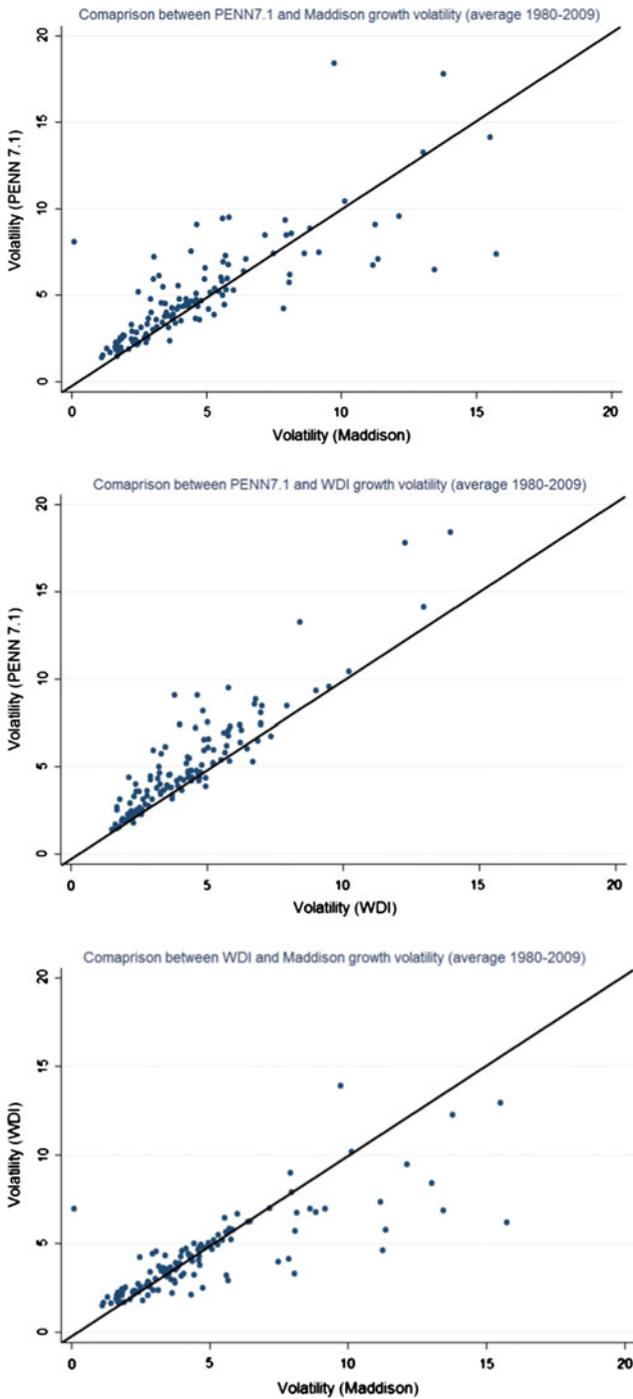


Fig. 3 Comparison of volatility between the PENN World Tables, World Development Indicators and Maddison historical datasets

Table 5 OLS with additional variables

Additional variable	Additional variable coefficient	Transparency coefficient	Sample size	R ²
Corruption—KKZ	-0.769*	-2.509***	130	0.49
Rule of Law—KKZ	-1.117**	-2.442***	130	0.49
Regulatory quality—KKZ	-1.021	-2.265**	130	0.49
Government effectiveness—KKZ	-1.099*	-2.302***	130	0.49
Bureaucratic quality—ICRG	-0.994**	-2.255**	115	0.58
Corruption—ICRG	-1.028***	-2.734**	115	0.61
Rule of Law—ICRG	-0.216	-2.580**	115	0.56
Economic Freedom Index	-0.064	-2.259**	130	0.48
Overvaluation index	-0.042	-1.817**	93	0.49
Legal origin (UK)	-0.632	-2.379***	130	0.48
Protestant population	-0.004	-2.473***	129	0.48
Muslim population	-0.008	-2.406***	130	0.48
Population within 100km of water	0.001	-2.456**	123	0.47
War casualties	236.067**	-1.998***	130	0.52
Primary school enrolments (ave, 1980–2005)	0.014	-2.505***	130	0.48
Secondary school enrolments (ave, 1980–2005)	0.009	-2.572***	130	0.48
Years of schooling (Barro–Lee)	0.113	-2.270***	119	0.45
Log population (average 1980–2010)	-0.218	-1.997**	130	0.48
Urbanisation (2010)	-0.020	-2.360***	130	0.48
Export concentration (1995–2008)	-0.059	-2.468**	127	0.47
Data quality dummies (Group A omitted)				
B	1.102*			
C	2.706***	-2.606***	130	0.52
D	1.930			

All OLS regressions run with the variables in column (3) of Table 3, plus the addition of each variable above (separately)

ous table with respect to that particular issue. For example the alternative monetary policy variable (M2) is not significant here, whilst the measure of revenue volatility is positively associated with growth volatility, and the budget balance variable negatively associated with volatility (that is, countries that run budget surpluses, or smaller deficits, have lower volatility). Finally, volatility in consumption is also associated with higher overall growth volatility.

There are also a number of additional factors that might be at work here that have been omitted from the analysis entirely so far. To that end, Table 5 summarises the results when additional variables are included. In terms of the relationship between transparency and volatility, probably the most significant potential omission relates to other institutional factors. That is, the relationship observed to date may only be reflecting the more general hypothesis that better institutional quality should result in less volatility. Indeed, it is quite plausible that greater transparency reduces corruption and improves the rule of law within a country, and it is this that ultimately results

in lower volatility, rather than greater transparency. However, as Table 5 shows, the inclusion of a range of commonly used institutional measures does not support this claim. Of the seven institutional-type variables added to the original core specification, five of these variables are themselves significant, however, these do not seem to affect the role of transparency, as the coefficient on transparency remains highly significant. In other words, whilst there is some evidence that better institutional quality helps in lowering volatility, it is not purely because transparency has improved these institutions, which consequently lowers volatility.

The rest of Table 5 includes a number of other variables of potential interest, from fixed factors such as legal origin, and the proportion of the population that is Catholic or Muslim, though to other potentially important policy-related variables (Economic Freedom, and real exchange rate overvaluation indices), the incidence of war, education, population, urban concentration, and export concentration. Of all these additional variables, only the incidence of war (proxied by the log of war casualties over the period) has a significant (positive) effect on volatility. But again, the transparency variable remains a significant factor for volatility. The final additional variable is related to the use of alternative GDP data from the previous table. It is possible that the volatility recorded in these databases is actually a function of the relatively poor quality of the data collected by governments in the first place. Therefore, volatility is observed not because of actual volatility, but because of the existence of much larger degrees of measurement errors in poorly-constructed data. There is, unfortunately, no definitive way to know this in the absence of the 'true' figures, however, dummy variables are included based on the data quality categories given for the PENN Tables (with A being the best quality data, and D being the worst).¹⁶ Using category A as the omitted category, one can see that, although volatility is indeed higher for countries ranked B–D (with lower quality data), this does not materially affect the fact that transparency has a significant effect on volatility.

Based on the results to date, it appears as though transparency has both a significant statistical and economic effect on volatility. A one standard deviation increase in transparency results in a decrease in volatility over the period of around 2–2.5 points, which is quite large, given that the average volatility across the countries in this sample was 5.04. Put differently, if a country such as Malawi increased its level of transparency to roughly that of Chile (around 2 standard deviations), it would have reduced its volatility to the average of many developed countries, such as Australia and the UK. Although this is obviously only illustrative, it nevertheless highlights the effect greater transparency can potentially have.

¹⁶ Specifically, the grades A–D are based on the following criteria: 1. Variance of Price Level Estimates: This measure looks at the difference between short-cut estimates, extrapolated benchmark estimates, and current 1996 benchmark consumption price level estimates. If there is only one estimate, the variance is zero, and hence the country is ranked 0 for no information; otherwise, a country is ranked 1 for high variances up to 5 for low variances between the estimates; 2. Number of Benchmarks: 0 for never-benchmark, 1 for one benchmark or quasi-benchmark, and 2 for more than one benchmark. Quasi benchmark estimates refer to China, Laos, Puerto Rico and Taiwan; 3. Quality of Statistics or Data Rank: It is assumed with much anecdotal support that the resources countries devote to collecting economic statistics increases with income. We have put countries into 6 income groups, assigning a score of 1–6 from less to more affluent (taken from PENN v6.1).

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Table 6 Panel data

	(1)	(2)	(3)	(4)
Per capita GDP (log)	-0.099 <i>0.138</i>	0.644 <i>0.812</i>	-0.214 <i>0.832</i>	-0.520 <i>0.879</i>
Democracy (political rights)	-2.947 <i>0.531***</i>	0.899 <i>1.079</i>	0.020 <i>0.821</i>	-0.243 <i>0.853</i>
Transparency index		-1.782 <i>0.541***</i>	-1.260 <i>0.477***</i>	-1.138 <i>0.552**</i>
Domestic volatility			4.636 <i>1.285***</i>	4.271 <i>1.307***</i>
Commodity ToT volatility			28.841 <i>11.519**</i>	26.513 <i>11.918**</i>
Trade openness			0.032 <i>0.016**</i>	0.033 <i>0.018*</i>
Financial openness (KAOPEN)			0.455 <i>0.150***</i>	0.529 <i>0.189***</i>
Monetary policy (Inflation)			1.385 <i>0.643**</i>	1.345 <i>0.671**</i>
Fiscal policy volatility (SD of Govt spending)			6.916 <i>3.407**</i>	6.792 <i>3.480*</i>
Countries	130	130	130	102
Observations	727	727	691	541
Time dummies?	Yes	Yes	Yes	Yes
R ² (overall)	0.09	0.10	0.20	0.14

The dependent variable is the standard deviation of per capita growth over 5-year periods (1980–2009). All regressions employ fixed effects, with time dummies included. Column 4 has removed all high income OECD countries. Numbers in italics are robust standard errors

***, ** and * Significant at the 1, 5, and 10% levels, respectively

4.3 Panel data analysis

The availability of many of these variables over time also allows us to add a temporal dimension to this analysis. The purely cross-sectional analysis presented to date, whilst useful, cannot capture the effect of these variables on volatility over time. Therefore, Table 6 presents some evidence using panel data.

I am using a panel with 5-year non-overlapping periods, from 1980–2009, and using the same time-varying variables from the original regressions in Table 3 (all variables have been averaged over each 5-year period, whilst the dependent variable is the standard deviation of per capita growth for each 5-year period).

To try to account for the time invariant country-specific factors, a fixed effects panel model is employed in Table 6. Going from column 1 to column 2 again highlights the effect of including transparency on the democracy coefficient, as it goes from being significantly negative to again positive. Adding in the other variables in column 3 also gives similar results to those previously, in that transparency has a significant

negative effect on volatility. The only substantive difference now is that all of the other explanatory variables are also significantly associated with volatility. Column 4 again removes the 28 high income OECD countries from the sample, but as with the cross-sectional analysis, the results are quantitatively the same—the relationship between volatility and transparency is not being driven solely by the transparent, relatively low-volatility OECD countries.

Having established the relationship between transparency and volatility, the final issue to be addressed is whether it is democracy that is leading to this greater transparency. Certainly, the results to date suggest this is possibly the case, as the democracy variable repeatedly ceases to be a significant determinant of volatility once transparency is included. Nevertheless, it is important to examine this aspect in more detail. It could be, for example, that greater transparency leads to more democracy, which subsequently lowers volatility. To that end, Table 7 employs a form of Granger-causality to see whether democracy has any causal effect on transparency. Specifically:

$$TRANS_t = \alpha_0 + \beta TRANS_{t-1} + \delta DEM_{t-1} + \eta_k Z_{t-1} + \mu_t \quad (4)$$

$$DEM_t = \alpha_0 + \gamma TRANS_{t-1} + \kappa DEM_{t-1} + \lambda_k Z_{t-1} + \mu_t \quad (5)$$

That is, if, in the presence of prior values of transparency, the coefficient for democracy (δ) in (4) above is significant, then we can say that democracy ‘Granger-causes’ transparency. Similarly, with current democracy as the dependent variable (5), if the coefficient for transparency (γ) is significantly different from zero, then greater transparency ‘Granger-causes’ democracy (see Granger 1969). For completeness, lagged values of the other variables (denoted by Z_{t-1} above) have also been included in each regression.

There are likely to be substantive issues with the potential endogeneity between many of the explanatory variables, as well as the fact that there is now a lagged value of the dependent variable, both issues that can't be resolved using fixed effects. A common method to overcome this endogeneity is to instrument the variables concerned. Although there are a number of ways to do this, I have chosen the GMM-system estimator developed by Blundell and Bond (1998), which uses as instruments past levels of first-differenced variables, and past first differences as instruments of current levels.¹⁷

The first column attempts to show whether there is any causal relationship between volatility and these explanatory variables (including lagged volatility). As can be seen, in a statistical sense at least, transparency does seem to precede volatility, as it remains a significant factor. The other variables, however, are no longer significant.¹⁸ The second and third columns have, respectively, transparency and then democracy as the

¹⁷ Specifically, I have used orthogonal deviations, rather than first differences, because these are better at dealing with panels with gaps, as this panel does. Furthermore, in order to follow Roodman (2006) advice and have fewer instruments than countries, I have restricted the instruments to just $t - 2$ through to $t - 4$ in each regression.

¹⁸ This is probably to be expected. Many of the variables previously found to be significant on current volatility are often quite short-term in nature (for example, volatility in the terms of trade causing volatility in the current rate of economic growth). They do not necessarily, however, have any residual or lasting effect on volatility.

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Table 7 Panel data with lagged variables

Dependent variable	Volatility	Transparency	Political rights	Volatility	Transparency	Political rights
	(1)	(2)	(3)	non-OECD (4)	non-OECD (5)	non-OECD (6)
Growth volatility _{t-1}	0.244 <i>0.094**</i>	0.006 <i>0.005</i>	-0.001 <i>0.002</i>	0.250 <i>0.091***</i>	0.005 <i>0.005</i>	0.000 <i>0.003</i>
Per capita GDP (log) _{t-1}	0.113 <i>0.315</i>	0.040 <i>0.031</i>	-0.007 <i>0.014</i>	0.303 <i>0.370</i>	0.032 <i>0.035</i>	-0.026 <i>0.017</i>
Democracy _{t-1}	1.329 <i>1.183</i>	0.668 <i>0.122***</i>	0.904 <i>0.062***</i>	0.875 <i>1.061</i>	0.682 <i>0.130***</i>	0.862 <i>0.056***</i>
Transparency index _{t-1}	-1.523 <i>0.636**</i>	0.629 <i>0.076***</i>	0.004 <i>0.034</i>	-1.281 <i>0.671*</i>	0.650 <i>0.062***</i>	0.034 <i>0.029</i>
Domestic volatility ^a _{t-1}	-2.248 <i>1.404</i>	0.026 <i>0.133</i>	-0.024 <i>0.086</i>	-2.391 <i>1.330*</i>	0.086 <i>0.142</i>	-0.005 <i>0.072</i>
Commodity ToT volatility _{t-1}	4.843 <i>18.064</i>	-2.300 <i>0.951**</i>	-0.322 <i>0.530</i>	7.023 <i>16.515</i>	-2.044 <i>1.245</i>	0.045 <i>0.619</i>
Trade openness ^a _{t-1}	0.017 <i>0.010</i>	0.000 <i>0.001</i>	0.000 <i>0.000</i>	0.007 <i>0.012</i>	0.000 <i>0.001</i>	0.000 <i>0.000</i>
Financial openness _{t-1}	0.132 <i>0.243</i>	-0.013 <i>0.022</i>	0.006 <i>0.010</i>	0.271 <i>0.215</i>	0.015 <i>0.021</i>	0.009 <i>0.012</i>
Monetary policy _{t-1}	0.765 <i>0.797</i>	0.037 <i>0.050</i>	-0.047 <i>0.044</i>	0.478 <i>0.610</i>	0.032 <i>0.053</i>	-0.014 <i>0.042</i>
Fiscal policy volatility ^a _{t-1}	3.055 <i>3.654</i>	-0.104 <i>0.218</i>	-0.059 <i>0.103</i>	3.893 <i>3.194</i>	-0.102 <i>0.229</i>	-0.055 <i>0.114</i>
<i>Tests (p values)</i>						
Hansen test	0.154	0.281	0.218	0.798	0.697	0.885
Diff-Hansen	0.667	0.988	0.150	0.998	0.938	0.798
AR1	0.000	0.000	0.000	0.001	0.000	0.000
AR2	0.152	0.918	0.582	0.101	0.312	0.531
Instrument count	115	115	115	115	115	115
Countries	130	130	130	102	102	102
Observations	561	561	561	439	439	439
Time dummies?	Yes	Yes	Yes	Yes	Yes	Yes

All regressions based on the GMM-SYS estimation. For GMM-SYS, all variables are treated as potentially endogenous. All available instruments are employed. I have used the xtabond2 specification from Roodman (2006). Orthogonal deviations, rather than first differences, used in all regressions. Difference-in-Hansen test reports the p-values based on the null hypothesis that the instruments in the levels equation are exogenous. For more details, see Roodman (2006). Coefficients based on the two-step estimation, using the Windmeijer correction. Time dummies employed but not reported. Numbers in italics are robust standard errors ***, ** and * Significant at the 1, 5, and 10% levels, respectively

dependent variables, run against lagged values of our other variables. Of most interest is the fact that in column (2), we can see that democracy has a positive and highly significant causal effect on transparency. In column (3), transparency does not appear to have any effect on democracy. In other words, greater democracy leads to greater transparency, which subsequently leads to lower volatility. The final three columns examine the same regressions without the high income OECD countries. Democracy continues to have a significant causal effect on transparency, but the reverse is not necessarily true. This therefore provides evidence that the transmission mechanism runs from democracy, to greater transparency, and subsequently lower volatility.

5 Concluding comments

It would appear from the evidence presented here that one of democracy's greatest 'gifts' to macroeconomic stability may be the transparency of political and economic information it engenders. In many respects this is probably unsurprising. In countries where there is a greater flow of information, households, firms and government officials are able to adapt to changing economic conditions in a more timely and efficient manner. What is perhaps surprising is the strength of this relationship. Moreover, this is not simply because greater transparency promotes better institutions. Across the entire analysis, transparency had quite a direct effect on volatility, rather than purely indirectly through any other institutional channel, such as lower corruption, or better bureaucratic quality. Much of the previous research into transparency places its importance as more a means to an end (lower corruption), rather than an end in itself (for example, [Brunetti and Weder 2003](#)). The evidence presented here suggests that the greater degree of information associated with greater transparency has a component that adds value to an economy by reducing the volatility of output.

Nevertheless, it must be said the results here are quite broad, in the sense that the measures of transparency employed are quite crude. It is unclear, for example, exactly what *type* of information helps the most in lowering volatility (for example, whether economic or social information is of greater benefit than financial information, or whether it is the political type of transparency that is more important). Boring down into some narrower definitions of transparency may be a promising area of further research.

Appendix

See Appendix Tables 8 and 9.

Table 8 Countries (and income group) used in cross-section and panel regressions

Country	Income group	Country	Income group	Country	Income group
Albania	Upper middle income	Germany	High income: OECD	Pakistan	Lower middle income
Algeria	Upper middle income	Ghana	Lower middle income	Panama	Upper middle income
Argentina	Upper middle income	Greece	High income: OECD	Papua New Guinea	Lower middle income
Armenia	Lower middle income	Guatemala	Lower middle income	Paraguay	Lower middle income
Australia	High income: OECD	Guyana	Lower middle income	Peru	Upper middle income
Austria	High income: OECD	Honduras	Lower middle income	Philippines	Lower middle income
Azerbaijan	Upper middle income	Hungary	Upper middle income	Poland	High income: OECD
Bahrain	High income: nonOECD	India	Lower middle income	Portugal	High income: OECD
Bangladesh	Low income	Indonesia	Lower middle income	Qatar	High income: nonOECD
Belarus	Upper middle income	Iran, Islamic Rep.	Upper middle income	Romania	Upper middle income
Belgium	High income: OECD	Ireland	High income: OECD	Russian Federation	High income: nonOECD
Benin	Low income	Israel	High income: OECD	Rwanda	Low income
Bhutan	Lower middle income	Italy	High income: OECD	Saudi Arabia	High income: nonOECD
Bolivia	Lower middle income	Jamaica	Upper middle income	Senegal	Lower middle income
Botswana	Upper middle income	Japan	High income: OECD	Sierra Leone	Low income
Brazil	Upper middle income	Jordan	Upper middle income	Slovak Republic	High income: OECD
Bulgaria	Upper middle income	Kazakhstan	Upper middle income	Slovenia	High income: OECD
Burkina Faso	Low income	Kenya	Low income	South Africa	Upper middle income
Burundi	Low income	Korea, Rep.	High income: OECD	Spain	High income: OECD
Cambodia	Low income	Kuwait	High income: nonOECD	Sri Lanka	Lower middle income
Cameroon	Lower middle income	Kyrgyz Republic	Low income	Sudan	Lower middle income
Canada	High income: OECD	Latvia	High income: nonOECD	Swaziland	Lower middle income
Central Afr. Rep	Low income	Lebanon	Upper middle income	Sweden	High income: OECD
Chile	High income: nonOECD	Lesotho	Lower middle income	Switzerland	High income: OECD

Table 8 continued

Country	Income group	Country	Income group	Country	Income group
China	Upper middle income	Lithuania	High income: nonOECD	Syrian Arab Republic	Lower middle income
Colombia	Upper middle income	Macedonia, FYR	Upper middle income	Tanzania	Low income
Congo, Rep.	Lower middle income	Madagascar	Low income	Thailand	Upper middle income
Costa Rica	Upper middle income	Malawi	Low income	Togo	Low income
Cote d'Ivoire	Lower middle income	Malaysia	Upper middle income	Trinidad and Tobago	High income: nonOECD
Croatia	High income: nonOECD	Mali	Low income	Tunisia	Upper middle income
Cyprus	High income: nonOECD	Mauritania	Lower middle income	Turkey	Upper middle income
Czech Republic	High income: OECD	Mauritius	Upper middle income	Uganda	Low income
Denmark	High income: OECD	Mexico	Upper middle income	Ukraine	Lower middle income
Dominican Republic	Upper middle income	Moldova	Lower middle income	UK	High income: OECD
Ecuador	Upper middle income	Morocco	Lower middle income	United States	High income: OECD
Egypt, Arab Rep.	Lower middle income	Mozambique	Low income	Uruguay	High income: nonOECD
El Salvador	Lower middle income	Namibia	Upper middle income	Venezuela	Upper middle income
Estonia	High income: OECD	Nepal	Low income	Vietnam	Lower middle income
Ethiopia	Low income	Netherlands	High income: OECD	Zambia	Lower middle income
Fiji	Upper middle income	New Zealand	High income: OECD	Zimbabwe	Low income
Finland	High income: OECD	Nicaragua	Lower middle income		
France	High income: OECD	Niger	Low income		
Gabon	Upper middle income	Nigeria	Lower middle income		
Gambia, The	Low income	Norway	High income: OECD		
Georgia	Lower middle income	Oman	High income: nonOECD		

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Table 9 Data and sources used

Indicators	Variable employed	Source
<i>Transparency variables</i>		
Political information	Freedom of the Press	Freedom House (2009)
	Reporteurs Sans Frontieres	Reporteurs Sans Frontieres (2011)
	Political transparency	Bellver and Kaufmann (2005)
Economic/financial information	Release of Information Index	Williams (2009), World Development Indicators (World Bank 2013), IFS (2013)
	Transparency	Islam (2006)
	Economic/institutional transparency	Bellver and Kaufmann (2005)
<i>Economic indicators</i>		
Per capita income/SD of growth in per capita incomes	Log (GDP per capita)/SD of per capita economic growth	PENN 7.1 (Heston et al. 2013)
	Log (GDP per capita)/SD of per capita economic growth	World Development Indicators (World Bank 2013)
	Log (GDP per capita)/SD of per capita economic growth	Maddison historical GDP data (Maddison 2005)
Data quality	Groups A–D	PENN 7.1 (Heston et al. 2013)
Trade openness	Sum of exports and imports (% GDP)	PENN 7.1 (Heston et al. 2013), World Development Indicators (World Bank 2013)
	Sachs–Warner openness	Wacziarg and Welch (2008)
	Oil rents (% GDP)	World Development Indicators (World Bank 2013)
	Export concentration (1995–2005)	UNCTAD (2008)
Commodity ToT volatility	Boombust dataset	Spatafora and Tytell (2009)
	Terms of trade	World Development Indicators (World Bank 2013)
Financial openness	Capital openness (<i>KAOPEN</i>)	Chinn and Ito (2006)
	International Financial Integration (<i>IFI</i>)	Lane and Milesi-Ferretti (2007)
	Private Credit (% GDP)	Beck et al. (1999) (updated 2009)
Domestic volatility	SD of investment (<i>KI</i>)	PENN 7.1 (Heston et al. 2013)
	SD of gross fixed capital formation	World Development Indicators (World Bank 2013)
	SD of consumption	PENN 7.1 (Heston et al. 2013)
<i>Economic policy</i>		
Monetary policy volatility	ln(1+inflation)	World Development Indicators (World Bank 2013)

Table 9 continued

Indicators	Variable employed	Source
Fiscal policy volatility	SD of M2	IFS (2013)
	SD of government spending	PENN 7.1 (Heston et al. 2013)
	St dev of government revenue	Government Finance Statistics (2013)
	Tax revenue (% GDP)	Government Finance Statistics (2013)
	Budget balance (% GDP)	Government Finance Statistics (2013)
Exchange rates	Overvaluation index	Global Development Network (2006)
<i>Fixed factors</i>	Distance from equator	Global Development Network (2006)
	Landlock	Global Development Network (2006)
	Ethno-linguistic fractionalisation	Global Development Network (2006)
	Regional dummies (SSA, LAC, EAP)	Global Development Network (2006)
	Oil exporting dummy	Global Development Network (2006)
	Legal origin—UK	Global Development Network (2006)
	Protestant population (% total population)	Easterly and Levine (2003)
	Muslim population (% total population)	Easterly and Levine (2003)
	Population <100 km from major water	Gallup et al. (1999)
	<i>Education</i>	Primary school enrolments (% gross)
Secondary school enrolments (% gross)		Global Development Network (2006)
Years of schooling		Barro–Lee dataset (Barro and Lee 2013)
<i>Population</i>	Log of population	World Development Indicators (World Bank 2013)
	Urbansiation	World Development Indicators (World Bank 2013)
<i>Political/institutional</i>		
Democracy	Political rights (PR)	Freedom House
	POLITY IV	POLITY IV (Marshall and Jaggers 2002)
	Executive constraints (<i>XCONST</i>)	POLITY IV (Marshall and Jaggers 2002)
	Political constraints (<i>POLCON</i>)	Henisz (2000)
Conflict	PR volatility (SD political rights)	Freedom House
	Fraction of population killed in civil or international war, average 1960–1995.	Singer and Small (1994) as updated by Collier, Hoeffler and Sambanis (various)

Table 9 continued

Indicators	Variable employed	Source
Institutional quality	ICRG corruption	Political Risk Services (Political Risk Services 2012)
	ICRG bureaucratic quality	Political Risk Services (Political Risk Services 2012)
	ICRG rule of law	Political Risk Services (Political Risk Services 2012)
	Corruption	World Development Indicators (World Bank 2012)
	Rule of law	World Development Indicators (World Bank 2012)
	Regulatory quality	World Development Indicators (World Bank 2012)
	Government effectiveness	World Development Indicators (World Bank 2012)
	Economic Freedom Index	Gwartney et al. (2004)

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