

Resource Windfalls and Emerging Market Sovereign Bond Spreads: The Role of Political Institutions

*Rabah Arezki and Markus Brückner**

We examine the effect that revenue windfalls from international commodity price booms have on sovereign bond spreads using panel data for 38 emerging market economies during the period 1997-2007. Our main finding is that commodity price booms lead to a significant reduction in the sovereign bond spread in democracies, but to a significant increase in the spread in autocracies. To explain our finding we show that, consistent with the political economy literature on the resource curse, revenue windfalls from international commodity price booms significantly increased real per capita GDP growth in democracies, while in autocracies GDP per capita growth decreased. JEL codes: C33, D73, D74, D72, H21.

I. INTRODUCTION

Some researchers have argued that international commodity price booms may spawn an over-accumulation of external debt in commodity exporting countries that increases the risk of external debt default (e.g. [Krueger, 1987](#); [Berg and Sachs, 1988](#)).¹ We examine this hypothesis empirically by analyzing how the spread on sovereign bonds reacted in these countries to the booms and slumps of the export-relevant commodity prices. Changes in the spread on sovereign bonds reflect changes in investors' beliefs of the risk that a country

* International Monetary Fund (Arezki, corresponding author) and University of Adelaide (Brückner). Contact e-mails: rarezki@imf.org; markus.bruckner@adelaide.edu.au. We thank three anonymous referees, the editor Elisabeth Sadoulet, and members of the editorial board for helpful comments and suggestions. We are grateful to Amine Mati for providing us with his dataset on sovereign bond spreads and to Daniel Lederman for providing us with his dataset on export diversification. The views in this paper are those of the authors alone and do not necessarily represent those of the IMF or IMF policy. All remaining errors are our own. Brückner gratefully acknowledges the financial support of the Spanish Ministry of Science and Technology provided by CICYTECO2008-04997.

1. The recent concern that Dubai may default on its external debt is an example par excellence that higher commodity prices may be associated with a higher risk of external debt default. Further examples are, among others, Russia and Nigeria.

THE WORLD BANK ECONOMIC REVIEW, VOL. 26, NO. 1, pp. 78–99
Advance Access Publication May 18, 2011

doi:10.1093/wber/lhr015

© The Author 2011. Published by Oxford University Press on behalf of the International Bank for Reconstruction and Development / THE WORLD BANK. All rights reserved. For permissions, please e-mail: journals.permissions@oup.com

defaults on its external debt. An increase in the spread on sovereign bonds is in turn a cost for the bond issuing country that may trigger in a self-fulfilling way the default on its external debt. Both for investors and policy makers, it is therefore important to have knowledge about how international commodity price shocks, which induce large upturns and downturns in foreign currency revenues in emerging market economies, affect the spread on sovereign bonds.

We find that increases in international commodity prices for exported commodity goods are associated with a significant reduction in sovereign bond spreads on average. However, the reduction in the spread on sovereign bonds is particularly large in countries with sound democratic institutions and strong political checks and balances. In autocratic regimes and countries where the political rule is characterized by weak checks and balances, windfalls from international commodity prices lead to a significant increase in the spread on sovereign bonds.

The heterogeneous response of sovereign bond spreads to international commodity price shocks sheds new light on the resource curse literature, that has argued for the importance of political institutions in determining whether windfalls from natural resources are a curse or a blessing for the economic development of resource exporting countries (e.g. [Mehlum et al., 2006](#); [Robinson et al., 2006](#)).² We provide further evidence in this direction by showing that, consistent with the political economy model developed in [Mehlum et al. \(2006\)](#), international commodity price booms significantly increased real per capita GDP growth in countries with sound democratic institutions. In countries with autocratic institutions, revenue windfalls from international commodity price booms led to a significant decrease in output growth. Hence, while our empirical results are consistent with general equilibrium models that predict a countercyclical relationship between sovereign bond spreads and the business cycle in emerging market economies (e.g. [Arellano, 2008](#)), our results highlight the importance of political economy factors in shaping the relationship between commodity price shocks and sovereign bond spreads in these countries.

The remainder of our paper is organized as follows. Section II describes the data. Section III discusses the estimation strategy. Section IV presents the main results. Section V concludes.

II. DATA

COMMODITY REVENUE WINDFALLS. We construct a country-specific international commodity export price index that captures revenue windfalls from

2. See also [Van der Ploeg \(2010\)](#) for a review and overview of the resource curse literature.

international commodity prices as:

$$ComPI_{i,t} = \prod_{c \in C} ComPrice_{c,t}^{\theta_{i,c}}$$

where $ComPrice_{c,t}$ is the international price of commodity c in year t , and $\theta_{i,c}$ is the average (time-invariant) value of exports of commodity c in the GDP of country i .³ We obtain data on annual international commodity prices from UNCTAD Commodity Statistics and our data on the value of commodity exports are from the NBER-United Nations Trade Database. The commodities included in our index are aluminum, beef, coffee, cocoa, copper, cotton, gold, iron, maize, oil, rice, rubber, sugar, tea, tobacco, wheat, and wood. In case there were multiple prices listed for the same commodity we used a simple average of all the relevant prices.

We note that even though some of the countries in our sample are net resource importers (in sum, across all commodities) our commodity export price index captures that there may still be some commodities for which the country is an exporter. For example, according to [Lederman and Maloney \(2008\)](#) Egypt is a net natural resource importer. However, Egypt also exports a significant amount of crude oil. When the international price of oil increases Egypt experiences a positive revenue windfall, and this is captured by our export price index. On the other hand, when the international prices of other commodities increase Egypt experiences a negative terms of trade shock but not necessarily a negative revenue shock (which depends among other things on the structure of ad valorem import duties). We therefore follow the resource curse literature (e.g. [Sachs and Warner, 1995, 2001](#)) and focus on a gross export price index as our measure for resource windfalls. As a robustness check we will present estimates that are restricted to the sample of countries that are net natural resource exporters.

SOVEREIGN BOND SPREADS. Our data on the spread on sovereign bonds are from the Emerging Markets Bond Index Global (EMBI Global). The bond spreads are measured against a comparable US government bond and are period averages for the whole year.

POLITICAL INSTITUTIONS. Our two main measures of political institutions are the average (time-invariant) Polity2 score from the Polity IV database ([Marshall and Jaggers, 2009](#)) and the average (time-invariant) checks and balance score from the Database of Political Institutions ([Beck et al., 2001](#)). The Polity2 score is based on the constraints placed on the chief executive, the competitiveness of political participation, and the openness and competitiveness of executive recruitment. The Polity2 score ranges from -10 to $+10$, with higher values

3. This functional form of the commodity export price index follows common practice in the literature. See for example [Collier and Goderis \(2007\)](#) and the references cited therein.

indicating stronger democratic institutions. The checks and balance score is based on the number of veto players in the political system, their respective party affiliations, and the electoral rules. The checks and balance score ranges between 1 to 6, with higher values indicating stronger checks and balances. Following Persson and Tabellini (2003, 2006) and the Polity IV project we also construct an autocracy indicator variable that takes on the value of unity in countries with negative (average) Polity2 scores. The main purpose of this autocracy indicator variable is to facilitate the interpretation of the results from the regression analysis. Note that we use countries' average polity and checks and balance scores because we want to capture long-run and thus more fundamental differences in countries' political institutions. Countries' political institutions are also highly persistent as about three-fourths of the countries in our sample did not experience changes in their political institutions score.

OTHER CONTROL VARIABLES. Data on real per capita GDP are from the Penn World Table, version 6.3 (Heston et al., 2009). Data on corruption are from Political Risk Service (2010). Data on ethnic fractionalization are from Alesina et al. (2003). Data on the Herfindahl index of export diversification are from Lederman and Xu (2010). Data on the Gini coefficient are from the World Development Indicators (2010). Data on British colonial origin, French colonial origin, and historical settler mortality are from Acemoglu et al. (2001). Descriptive statistics of these variables are provided in Data Appendix Table 1. A list of countries included in the sample is provided in Data Appendix Table 2.

III. ESTIMATION STRATEGY

To examine the effects that revenue windfalls from international commodity price booms have on sovereign bond spreads, we estimate the following econometric model:

$$\Delta \log(\text{Spread}_{i,t}) = \alpha_i + \beta_t + \eta \Delta \log(\text{ComPI}_{i,t}) + u_{i,t}$$

where α_i are country fixed effects and β_t are year fixed effects. $u_{i,t}$ is an error term that is clustered at the country level. As a baseline regression, we estimate the average marginal effect η that commodity price booms have on sovereign bond spreads. We then examine how this marginal effect varies as a function of countries' political institutions by estimating:

$$\Delta \log(\text{Spread}_{i,t}) = a_i + b_t + c \Delta \log(\text{ComPI}_{i,t}) + d \Delta \log(\text{ComPI}_{i,t}) * \text{Pol}_i + e_{i,t}$$

where Pol_i is a measure of cross-country differences in political institutions. In order for the estimate on the parameter c to reflect the average marginal effect we compute Pol_i for the Polity2 score as the Polity2 score of country i minus the Polity2 sample average. Formally: $\text{Pol}_i = \text{Polity2}_i - \text{Avg.}(\text{Polity2})$. We do the same for the checks and balance score. This rescaling does not affect the

parameter estimate d but it is useful for interpretation purposes as it ensures that the parameter estimate c reflects the average marginal effect (i.e. the effect for the “average” country).

Note that our measures of political institutions Pol_i are time-invariant and therefore we do not need to control for them in the fixed effects regression (the reason is that the direct effect of these variables on the sovereign bond spread is already accounted for by the country fixed effects a_i). We estimate both static and dynamic panel data models. For the dynamic panel data model we report system-GMM estimates (Blundell and Bond, 1998) as the presence of country fixed effects leads the fixed effects estimator to produce inconsistent estimates.⁴

We address the important issue of political institutions being correlated with other cross-sectional variables that could possibly affect the relationship between commodity price booms and sovereign bond spreads by including additional interaction terms in the regression. In particular, we include in all regressions an additional interaction term between $\Delta ComPI$ and cross-country differences in GDP per capita. In addition, we use instrumental variables techniques to further address endogeneity biases. In particular, we build on the seminal work of Acemoglu et al. (2001) and instrument the political institutions interaction term $Pol * \Delta ComPI$ with the interaction between $\Delta ComPI$ and indicator variables for colonial origin and historical settler mortality. We test the validity of these instrumental variables using the Hansen test.

IV. MAIN RESULTS

Table 1, column (1) presents our estimates of the average marginal effect that resource windfalls from international commodity price booms have on sovereign bond spreads in the largest possible sample of 38 emerging market economies during the period 1997-2007. The main finding is that commodity windfalls lead on average to a significant reduction in sovereign bond spreads. Panel A presents panel data estimates that control for country fixed effects and Panel B presents panel data estimates that control in addition to the country fixed effects for year fixed effects. The panel data estimates reported in column (1) imply that an increase in the commodity export price index of size 1 standard deviation would significantly reduce the spread on sovereign bonds on average by over 0.1 standard deviations.

Column (2) of Table 1 shows that the marginal effect of international commodity price booms on the spread on sovereign bonds significantly varies across countries as a function of cross-country differences in political

4. In the system-GMM estimation we use the first and second lags as instruments for the lagged dependent variable to reduce the concern that too many moment conditions are used (for further discussion on this issue see e.g. Roodman, 2009). We note that the dynamic panel data bias associated with the fixed effects estimator is bounded of order T^{-1} , where T is the time-series dimension of the panel (see Nickell, 1981). For comparison purposes we also report estimates from the fixed effects estimator.

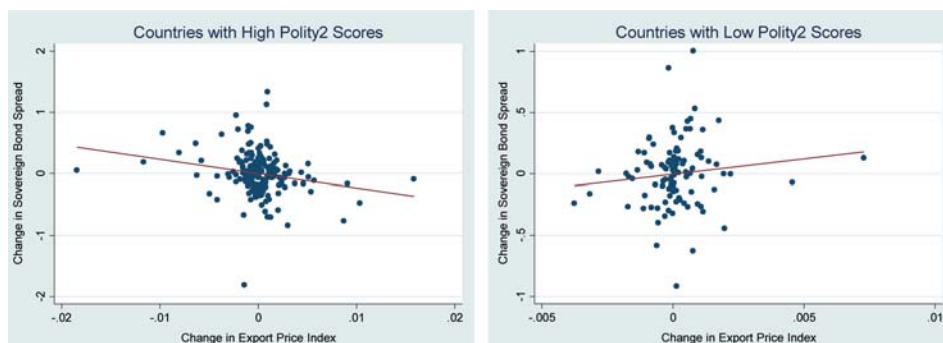
TABLE 1. Commodity Windfalls, Political Institutions, and the Spread on Sovereign Bonds

(Static Panel Regression)				
ΔSpread				
Panel A: Controlling for Country Fixed Effects				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
ΔComPI	-10.950*** (-3.03)	-7.417** (-2.26)	-29.694*** (-4.27)	-8.072*** (-2.83)
ΔComPI*		-2.610*** (-2.81)		
Avg. Polity2 Score				
ΔComPI*			55.815*** (4.15)	
Autocracy Indicator				
ΔComPI*				-16.939*** (-3.35)
Avg. Checks & Balance Score				
ΔComPI*		0.001** (1.98)	0.004*** (4.21)	0.002*** (-2.63)
Avg. GDP Per Capita				
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	No	No	No	No
Observations	291	291	291	291
Panel B: Controlling for Country and Year Fixed Effects				
	(1)	(2)	(3)	(4)
	LS	LS	LS	LS
ΔComPI	-6.127* (-1.72)	-1.644 (-0.37)	-20.727*** (-3.46)	-3.108 (-0.74)
ΔComPI*		-2.121** (-2.33)		
Avg. Polity2 Score				
ΔComPI*			45.676*** (3.57)	
Autocracy Indicator				
ΔComPI*				-11.420** (-2.17)
Avg. Checks & Balance Score				
ΔComPI*		0.002** (2.13)	0.004*** (3.88)	0.002** (2.09)
Avg. GDP Per Capita				
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	291	291	291	291

Note: The method of estimation is least squares. t-values (in brackets) are based on Huber robust standard errors that are clustered at the country level. The dependent variable is the log-change in the spread on sovereign bonds. ΔComPI stands for the log-change in the international commodity export price index (see page 3 in the paper for a detailed explanation of how this variable is constructed). The cross-section (average time-series) dimension of the panel is 38 (7.7). *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

institutions. The estimated interaction effect between revenue windfalls from international commodity price booms and the Polity2 score is negative and statistically significant at the 5% level. The point estimate on the interaction term implies that at the sample maximum Polity2 score (democracies), an increase in the commodity export price index of size 1 standard deviation

FIGURE 1. Commodity Windfalls, Political Institutions, and the Spread on Sovereign Bonds



Note: The left-hand side figure shows the relationship between changes in countries' commodity export price index and the spread on their sovereign bonds for countries that had on average a strictly positive Polity2 score. The right-hand side figure shows the relationship between changes in countries' commodity export price index and the spread on their sovereign bonds for countries that had on average a negative Polity2 score.

would significantly reduce the spread on sovereign bonds by over 0.3 standard deviations. On the other hand, at the sample minimum Polity2 score (autocracies), a shock of similar magnitude would be associated with a significant increase in the spread on sovereign bonds by 0.2 standard deviations.

Column (3) of Table 1 shows that we obtain similar heterogeneity in the marginal effect of international commodity price booms on sovereign bond spreads when we discretize the Polity2 score into an autocracy indicator variable that is unity for negative Polity2 scores and zero otherwise. The significant positive coefficient on the autocracy interaction term implies that in autocracies revenue windfalls from commodity price booms significantly increased the spread on sovereign bonds, while in democracies sovereign bond spreads significantly decreased. Figure 1 illustrates this nonlinear relationship graphically. We show in column (4) of Table 1 as a robustness check on our measure of political institutions, that windfalls from international commodity price booms significantly decreased sovereign bond spreads in countries with strong checks and balances, while in countries with weak checks and balances the sovereign bond spreads significantly increased.⁵

Table 2 shows that our results are robust to controlling for lagged changes in the sovereign bond spread. Columns (1) to (3) present the least squares

5. We document in Appendix Table 1 that the results in Table 1 are robust to outliers. In particular, we report in columns (1)-(3) of Appendix Table 1 median (quantile) estimates, and in columns (4)-(6) least-squares estimates that exclude observations which fall in the top/bottom 1 percentile of the distribution of the change in the commodity export price index.

TABLE 2. Commodity Windfalls, Political Institutions, and the Spread on Sovereign Bonds

	ΔSpread					
	(1)	(2)	(3)	(4)	(5)	(6)
	LS	LS	LS	GMM	GMM	GMM
ΔComPI	4.123 (0.85)	-16.369*** (-2.76)	1.984 (0.41)	-0.032 (-0.01)	-14.994*** (-2.78)	-2.224 (-0.56)
ΔComPI* Avg. Polity2 Score	-2.305** (-2.34)			-1.685** (-2.43)		
ΔComPI* Autocracy Indicator		49.324*** (3.37)			33.101*** (2.68)	
ΔComPI* Avg. Checks & Balance Score			-10.407** (-2.02)			-8.086** (-2.17)
ΔComPI* Avg. GDP Per Capita	0.003*** (2.87)	0.005*** (4.00)	0.002** (2.56)	0.002*** (2.53)	0.003*** (2.89)	0.001* (1.91)
L.ΔSpread	0.183*** (3.73)	0.182*** (3.65)	0.180*** (3.58)	0.241*** (5.06)	0.231*** (5.22)	0.232*** (4.84)
Hansen J, p-value	.	.	.	0.232	0.220	0.259
AR(2) test, p-value	.	.	.	0.125	0.151	0.134
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	253	253	253	253	253	253

Note: The method of estimation in columns (1)-(3) is least squares; columns (4)-(6) system-GMM (Blundell and Bond, 1998) with two-step Windmeijer (2005) small sample correction. t-values (in brackets) are based on Huber robust standard errors that are clustered at the country level. The dependent variable is the log-change in the spread on sovereign bonds. ΔComPI stands for the log-change in the international commodity export price index (see page 3 in the paper for a detailed explanation of how this variable is constructed). The cross-section (average time-series) dimension of the panel is 37 (6.8). *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

estimates and columns (4) to (6) present the system-GMM estimates. The dynamic panel data estimates reveal a significant positive autocorrelation in the log-change of the sovereign bond spreads. Importantly, they show that the interaction between changes in the commodity export price index and political institutions remains statistically significant at the 5% level when we allow for dynamics in the dependent variable.

So far we only controlled in our regressions for an interaction term between changes in the commodity export price index and cross-country differences in GDP per capita. The GDP per capita interaction control is important because there exists a large literature that has argued for a positive effect of cross-country per capita income differences on political institutions (see for example Barro, 1999, or Przeworski et al., 2000). To demonstrate that the interaction between political institutions and commodity price windfalls is robust to additional interaction controls we report in Table 3 estimates when controlling for an interaction between changes in the commodity export price index and ethnic fractionalization, an interaction between changes in the commodity export price index and the Gini coefficient, an interaction between changes in the commodity export price index and a Herfindahl index of export diversification, and an interaction between changes in the commodity export price index and an indicator variable that is unity if the country is a net natural resource importer. Some of these additional interaction controls are indeed statistically significant. But nevertheless, the inclusion of these additional interaction controls on the right-hand side of the estimating equation continues to produce a significant interaction effect between commodity price booms and political institutions.

Table 4 shows that we obtain similar results to our baseline estimates if we restrict the sample to the natural resource net-exporting countries. The natural resource net-exporting countries are strongly affected by the booms and slumps in the international commodity prices. It is thus reassuring from the standpoint of identification that in this restricted sample our results continue to hold.

We can go even further and examine the relationship between commodity price windfalls, political institutions and sovereign bond spreads using instrumental variables techniques that correct for possible endogeneity bias of the estimated interaction effect. Building on the seminal work by Acemoglu et al. (2001), we use historical settler mortality data and indicator variables of countries' colonial origin as instrumental variables for political institutions. Table 5 reports our two-stage least squares estimates where the political institutions interaction term is instrumented by the interaction between changes in the commodity export price index and the Acemoglu et al. instruments for institutions. The main result is that the political institutions interaction continues to be significant in the instrumental variables regression. Also, with the exception of the autocracy interaction term the Hausman test does not indicate a significant difference between the least squares and instrumental variables estimates. We also note that the quality of the instrumental variables is good as

TABLE 3. Commodity Windfalls, Political Institutions, and the Spread on Sovereign Bonds

(Robustness to Additional Interaction Control Variables)

	ΔSpread					
	(1)	(2)	(3)	(4)	(5)	(6)
	LS	LS	LS	GMM	GMM	GMM
ΔComPI	-16.203**	-24.292***	-19.010**	-17.839*	-24.920**	-20.853**
	(-2.06)	(-2.70)	(-2.00)	(-1.92)	(-2.24)	(-2.16)
ΔComPI*	-2.572***			-2.305**		
Avg. Polity2 Score	(-3.74)			(-2.56)		
ΔComPI*		31.557***			27.595**	
Autocracy Indicator		(2.97)			(2.35)	
ΔComPI*			-8.884*			-9.517**
Avg. Checks & Balance Score			(-1.87)			(-2.10)
ΔComPI*	0.007***	0.006***	0.006***	0.006***	0.006***	0.005***
Avg. GDP Per Capita	(5.95)	(5.81)	(4.67)	(5.11)	(4.82)	(4.48)
ΔComPI*	12.794	9.712	22.785	-10.773	7.279	20.443
Ethnic Fractionalization	(0.86)	(0.59)	(1.25)	(0.63)	(0.43)	(1.02)
ΔComPI*	-1.755***	-1.479**	-2.264***	-1.497***	-1.280**	-1.885***
Avg. Gini Coefficient	(-3.40)	(-2.22)	(-4.02)	(-2.93)	(-2.08)	(-4.41)
ΔComPI*	56.488***	35.402**	42.894***	50.247***	32.609**	38.955***
Avg. Export Diversification	(3.28)	(2.24)	(2.65)	(3.60)	(2.24)	(2.87)
ΔComPI*	0.631	2.646	1.482	1.079	2.362	0.286
Nat. Res. Importer Indicator	(0.02)	(0.08)	(0.04)	(0.05)	(0.11)	(0.01)
L.ΔSpread	0.194***	0.193***	0.195***	0.246***	0.245***	0.246***
	(3.49)	(3.56)	(3.58)	(3.73)	(3.79)	(3.75)
Hansen J, p-value	.	.	.	0.376	0.367	0.377
AR(2) test, p-value	.	.	.	0.192	0.190	0.197
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	247	247	247	247	247	247

Note: The method of estimation in columns (1)-(3) is least squares; columns (4)-(6) system-GMM (Blundell and Bond, 1998) with two-step Windmeijer (2005) small sample correction. t-values (in brackets) are based on Huber robust standard errors that are clustered at the country level. The dependent variable is the log-change in the spread on sovereign bonds. ΔComPI stands for the log-change in the international commodity export price index (see page 3 in the paper for a detailed explanation of how this variable is constructed). The cross-section (average time-series) dimension of the panel is 35 (7.1). *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

TABLE 4. Commodity Windfalls, Political Institutions, and the Spread on Sovereign Bonds

(Robustness to Restricting the Sample to Natural Resource Exporting Countries)

	ΔSpread					
	(1)	(2)	(3)	(4)	(5)	(6)
	LS	LS	LS	GMM	GMM	GMM
ΔComPI	10.729*	-10.365	7.876	5.774	-13.272**	3.766***
	(1.64)	(-1.42)	(1.23)	(1.04)	(-2.32)	(3.69)
ΔComPI*	-2.274***			-2.039**		
Avg. Polity2 Score	(-3.31)			(-2.15)		
ΔComPI*		45.230***			41.569***	
Autocracy Indicator		(3.02)			(3.00)	
ΔComPI*			-9.329			-10.762**
Avg. Checks & Balance Score			(-2.07)			(-2.23)
ΔComPI*	0.003***	0.005***	0.002***	0.002**	0.004***	0.002**
Avg. GDP Per Capita	(3.11)	(3.78)	(2.83)	(2.38)	(3.26)	(2.11)
L.ΔSpread	0.205***	0.217***	0.202***	0.198***	0.206***	0.189***
	(3.00)	(3.38)	(2.90)	(3.24)	(3.58)	(3.00)
Hansen J, p-value	.	.	.	0.281	0.359	0.301
AR(2) test, p-value	.	.	.	1.000	1.000	0.999
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	125	125	125	125	125	125

Note: The method of estimation in columns (1)-(3) is least squares; columns (4)-(6) system-GMM (Blundell and Bond, 1998) with two-step Windmeijer (2005) small sample correction. t-values (in brackets) are based on Huber robust standard errors that are clustered at the country level. The dependent variable is the log-change in the spread on sovereign bonds. ΔComPI stands for the log-change in the international commodity export price index (see page 3 in the paper for a detailed explanation of how this variable is constructed). The cross-section (average time-series) dimension of the panel is 17 (7.4). *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

TABLE 5. Commodity Windfalls, Political Institutions, and the Spread on Sovereign Bonds

(Robustness to Instrumental Variables Estimation)

	(1)	(2)	(3)	(4)	(5)	(6)
	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Panel A: Second Stage (Dependent Variable is Δ Spread)						
Δ ComPI	-8.497 (-1.01)	-23.636*** (-2.92)	-16.827* (-1.66)	-10.780* (-1.64)	-26.276*** (-3.54)	-20.367** (-2.43)
Δ ComPI * Avg. Polity2 Score	-3.019*** (-5.54)			-3.141*** (-6.60)		
Δ ComPI* Autocracy Indicator		46.731*** (4.67)			48.514*** (5.38)	
Δ ComPI* Avg. Checks & Balance Score			-14.079*** (-3.50)			-15.197*** (-4.19)
Δ ComPI* Avg. GDP Per Capita	0.006*** (5.80)	0.006*** (6.55)	0.005*** (4.42)	0.007*** (8.71)	0.008*** (9.22)	0.007*** (7.36)
Δ ComPI* Ethnic Fractionalization	2.511 (0.21)	4.035 (0.32)	24.284 (1.44)	25.202* (1.66)	26.442* (1.68)	49.703** (2.52)
Δ ComPI* Avg. Gini Coefficient	-0.877 (-1.19)	-0.162 (-0.18)	-1.321 (-1.87)	-1.626** (-2.10)	-0.877 (-0.98)	-2.049*** (-2.73)
Δ ComPI* Avg. Export Diversification	47.443** (2.36)	18.220 (0.80)	30.884 (1.50)	43.143** (2.24)	12.781 (0.58)	25.692 (1.31)
L. Δ Spread				0.233*** (3.41)	0.232*** (3.41)	0.233*** (3.40)
Hansen J, p-value	0.336	0.467	0.319	0.221	0.399	0.218
Hausman test, p-value	0.776	0.028	0.967	0.724	0.083	0.645
Panel B: First Stage (Dependent Variable is Δ ComPI*Polity Variable)						
Δ ComPI* Log Settler Mortality	-4.184*** (-4.94)	0.407** (2.11)	-0.870*** (-8.58)	-4.139*** (-4.76)	0.411** (2.11)	-0.859*** (-8.15)
Δ ComPI* British Colony	-4.081*** (-3.56)	0.078 (0.30)	-0.570*** (-4.30)	-4.169*** (-3.52)	0.070 (0.26)	-0.590*** (-4.29)

(Continued)

TABLE 5. Continued

(Robustness to Instrumental Variables Estimation)						
ΔComPI^*	-7.171***	0.335*	-1.812***	-7.275***	0.362*	-1.814***
French Colony	(-8.34)	(1.77)	(-18.25)	(-8.63)	(1.88)	(-18.82)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	148	148	148	128	128	128

Note: The method of estimation is two-stage least squares. t-values (in brackets) are based on Huber robust standard errors that are clustered at the country level. Panel A shows the second-stage estimates and Panel B shows the first-stage estimates. The dependent variable in Panel A is the log-change in the spread on sovereign bonds. The dependent variable in Panel B, columns (1) and (4) is the interaction between ΔComPI and countries' average Polity2 score; in columns (2) and (5) of Panel B the dependent variable is the interaction between ΔComPI and countries' autocracy indicator; in columns (3) and (6) of Panel B the dependent variable is the interaction between ΔComPI and countries' average checks and balance score. ΔComPI stands for the log-change in the international commodity export price index (see page 3 in the paper for a detailed explanation of how this variable is constructed). The cross-section (average time-series) dimension in columns (1)-(3) of the panel is 19 (7.8); columns (4)-(6) 18 (7.1). *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

the first-stage F-statistic easily exceeds the [Stock and Yogo \(2005\)](#) critical values for instruments to be declared weak and the Hansen test does not reject that the instruments are uncorrelated with the second-stage error term.

As an intermediate step to explain the heterogeneity in the marginal effect that international commodity price booms have on sovereign bond spreads, we report in [Table 6](#) the effect that international commodity price booms have on countries' real per capita GDP growth. We find that higher international prices for exported commodity goods are associated with a significant increase in real per capita GDP growth in democracies. But in countries with deeply autocratic regimes, windfalls from international commodity prices are associated with a significant decrease in real per capita GDP growth. Taking for example the estimates in column (5) of [Table 6](#), a one standard deviation increase in the export price index growth rate was associated with a significant increase in real per capita GDP growth in the democracy sample by about 0.29 standard deviations while in the autocracy sample it was associated with a significant reduction in GDP per capita growth by about 0.16 standard deviations. Similarly, columns (4) and (6) show that the marginal effect of commodity price booms on GDP per capita growth is significantly increasing in countries' Polity2 and checks and balances scores. So much so, that at sample maximum Polity2 and checks and balances scores a commodity windfall was associated with a significant increase in GDP per capita growth while at sample minimum Polity2 and checks and balances scores a commodity windfall was associated with a significant decrease in GDP per capita growth. The estimates in [Table 6](#) therefore show that while in countries with strong political institutions a plausibly exogenous windfall from international commodity price booms was associated with a significant increase in GDP per capita growth, in countries with weak political institutions it was associated with a significant decrease.

The political economy model developed in [Mehlum et al. \(2006\)](#) can provide an explanation for this heterogeneous response in real per capita GDP growth: in countries with grabber friendly political institutions, revenue windfalls from international commodity price booms increase rent-seeking activity and lead to a crowding out of production activity. Democratic institutions, in particular, stronger checks and balances constrain politicians in their policy space. Relative to an autocratic regime, politicians are also held more accountable to the public. Hence, in a more democratic regime the expected returns to rent-seeking activities are lower. This in turn means that production activity will remain strong in the democratic regime despite the high rents that are realized in the commodity exporting sector when international commodity prices are booming. In the autocratic regime, on the other hand, where there are relatively high gains from specializing in grabbing activities, production activity will be crowded out in the presence of a revenue windfall. Thus, revenue windfalls from international commodity prices may be associated with lower per capita GDP growth in more autocratic regimes.

TABLE 6. Commodity Windfalls, Political Institutions, and Economic Growth

ΔGDP						
	(1)	(2)	(3)	(4)	(5)	(6)
	LS	LS	LS	GMM	GMM	GMM
ΔComPI	0.164 (0.24)	2.890*** (3.61)	0.610 (0.83)	0.470 (0.96)	2.100*** (5.66)	0.732 (1.40)
ΔComPI*	0.375*** (2.65)			0.219*** (2.85)		
ΔComPI*		−5.623*** (−3.94)			−3.328*** (−4.40)	
ΔComPI*			1.417** (2.25)			0.948*** (2.71)
ΔComPI*	−0.001* (−1.69)	−0.001*** (−3.28)	−0.001 (−1.28)	−0.001** (−2.24)	−0.001*** (−3.36)	−0.001* (−1.76)
L.ΔGDP	0.020 (0.30)	0.014 (0.21)	0.017 (0.24)	0.172 (1.60)	0.172 (1.60)	0.170 (1.16)
Hansen J, p-value	.	.	.	0.815	0.833	0.822
AR(2) test, p-value	.	.	.	0.887	0.877	0.968
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	253	253	253	253	253	253

Note: The method of estimation in columns (1)-(3) is least squares; columns (4)-(6) system-GMM (Blundell and Bond, 1998) with two-step Windmeijer (2005) small sample correction. t-values (in brackets) are based on Huber robust standard errors that are clustered at the country level. The dependent variable is the log-change in real GDP per capita. ΔComPI stands for the log-change in the international commodity export price index (see page 3 in the paper for a detailed explanation of how this variable is constructed). The cross-section (average time-series) dimension of the panel is 37 (6.8). *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Table 7 provides further evidence on this political economy channel by documenting that political institutions played a key role in shaping the relationship between commodity windfalls and corruption. The significant positive autocracy interaction term in the corruption equation implies that in autocracies commodity windfalls are associated with a significant increase in corruption. On the other hand, in democracies and countries with strong checks and balances commodity windfalls did not lead to a significant increase in corruption. This result is consistent with the political economy literature that has highlighted the importance of political institutions in shaping political leaders' incentive constraints and thus economic outcomes (e.g. North, 1990; Acemoglu et al., 2001).

The growth results in Table 6 are in line with the political economy model developed in Mehlum et al. (2006). However, an open and conceptually interesting question is whether beyond their effect on GDP per capita growth commodity price booms exhibit significant effects on sovereign bond spreads. The business-cycle literature on the link between GDP per capita growth and sovereign bond spreads has argued for a countercyclical average relationship between economic growth and sovereign bond spreads (see e.g. Neumeier and Perri, 2005; Aguiar and Gopinath, 2006; or Arellano, 2008). Given this literature which does not emphasize the role of political institutions but instead argues for a countercyclical relationship between economic growth and sovereign bond spreads in an environment where financial markets are incomplete, it is interesting to explore whether beyond their effects on economic growth the interaction between commodity price booms and political institutions still matters for sovereign bond spreads.

To explore the above issue Table 8 reports estimates of the effects that commodity price booms have on sovereign bond spreads when GDP per capita growth is included as a right-hand-side regressor in the sovereign bond spreads estimating equation. Because we condition in this regression on GDP per capita growth the estimates should be interpreted as capturing the effects that commodity price booms (and the interaction between commodity price booms and political institutions) have on sovereign bond spreads beyond the effects that these variables have on GDP per capita growth. We report in Table 8 both least squares and system-GMM estimation. To address possible reverse effects of changes in the sovereign bond spreads on GDP per capita growth we instrument GDP per capita growth with the lagged first differences. The main result in Table 8 is that, conditional on GDP per capita growth, the interaction effect between commodity price booms and political institutions are quantitatively smaller, but still statistically significant for the majority of the specifications. Hence, while the effect on aggregate output is clearly of first-order importance, we find that commodity price booms and political institutions exhibit additional effects that go beyond aggregate output. This result highlights the importance of political institutions in shaping the relationship between resource windfalls and the spreads on sovereign bonds; it is also consistent with our

TABLE 7. Commodity Windfalls, Political Institutions, and Corruption

Corruption	(1)	(2)	(3)	(4)	(5)	(6)
	LS	LS	LS	GMM	GMM	GMM
Δ ComPI	-15.920 (-0.93)	-32.482 (-1.57)	-17.700 (-1.02)	-7.077 (-0.38)	-20.706 (-0.87)	-5.011 (-0.26)
Δ ComPI*	-3.593** (-2.35)			-2.671* (-1.88)		
Avg. Polity2 Score						
Δ ComPI*		59.695*** (2.94)			45.972** (2.07)	
Autocracy Indicator						
Δ ComPI*			-16.864** (-2.19)			-9.179 (-1.07)
Avg. Checks & Balance Score						
Δ ComPI*	0.005** (2.32)	0.008*** (2.97)	0.005*** (2.64)	0.003 (1.55)	0.005* (1.92)	0.002 (1.15)
Avg. GDP Per Capita						
L.Corruption	0.439*** (6.04)	0.437*** (6.14)	0.441*** (6.06)	0.515*** (4.35)	0.512*** (4.30)	0.518*** (4.39)
Hansen J, p-value	.	.	.	0.833	0.789	0.837
AR(2) test, p-value	.	.	.	0.366	0.440	0.331
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	242	242	242	242	242	242

Note: The method of estimation in columns (1)-(3) is least squares; columns (4)-(6) system-GMM (Blundell and Bond, 1998) with two-step Windmeijer (2005) small sample correction. t-values (in brackets) are based on Huber robust standard errors that are clustered at the country level. The dependent variable is the corruption score from Political Risk Service. The corruption score is rescaled so that higher values indicate more political corruption. Δ ComPI stands for the log-change in the international commodity export price index (see page 3 in the paper for a detailed explanation of how this variable is constructed). The cross-section (average time-series) dimension of the panel is 35 (6.9). *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

TABLE 8. Commodity Windfalls, Political Institutions, and Sovereign Spread

(Effect Beyond GDP Per Capita Growth)

	ΔSpread					
	(1)	(2)	(3)	(4)	(5)	(6)
	LS	LS	LS	GMM	GMM	GMM
ΔComPI	5.789*	-5.272	5.390	3.450	-8.975	2.184
	(1.74)	(-0.70)	(1.61)	(1.10)	(-1.51)	(0.64)
ΔComPI*	-0.777			-1.327*		
Avg. Polity2 Score	(-0.96)			(-1.67)		
ΔComPI*		27.461*			28.059**	
Autocracy Indicator		(1.80)			(2.22)	
ΔComPI*			-4.673			-7.751*
Avg. Checks & Balance Score			(-1.02)			(-1.72)
ΔComPI*	0.002***	0.004***	0.002***	0.001***	0.003***	0.002**
Avg. GDP Per Capita	(3.66)	(2.95)	(3.26)	(2.99)	(2.94)	(2.48)
ΔGDP	-4.073***	-3.892***	-4.089***	-3.471***	-3.430***	-3.509***
	(-3.91)	(-3.80)	(-3.98)	(-3.68)	(-3.71)	(-3.69)
L.ΔSpread	0.148***	0.148***	0.146***	0.209***	0.205***	0.201***
	(2.82)	(2.89)	(2.76)	(4.56)	(4.59)	(4.34)
Hansen J, p-value (ΔGDP)	.	.	.	0.199	0.184	0.194
Hansen J, p-value (L.ΔSpread)	.	.	.	0.197	0.199	0.227
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	253	253	253	253	253	253

Note: The method of estimation in columns (1)-(3) is least squares; columns (4)-(6) system-GMM (Blundell and Bond, 1998) with two-step Windmeijer (2005) small sample correction. t-values (in brackets) are based on Huber robust standard errors that are clustered at the country level. The dependent variable is the log-change in the spread on sovereign bonds. ΔComPI stands for the log-change in the international commodity export price index (see page 3 in the paper for a detailed explanation of how this variable is constructed). The cross-section (average time-series) dimension of the panel is 37 (6.8). *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

finding that political institutions significantly affect the relationship between resource windfalls and corruption.

V. CONCLUSION

We investigated in this paper the effects that international commodity price booms have on sovereign bond spreads using panel data for 38 emerging market economies during the period 1997-2007. Our main finding is that revenue windfalls from international commodity price booms lead to a significant reduction in sovereign bond spreads in emerging market economies with sound democratic institutions. In countries with more autocratic institutions revenue windfalls lead on the other hand to a significant increase in the sovereign bond spreads.

To explain this heterogeneity in the marginal effect that international commodity price booms have on sovereign bond spreads, we showed that revenue windfalls from international commodity price booms lead to a significant increase in real per capita GDP growth in countries with sound democratic institutions. In countries with deeply autocratic regimes, revenue windfalls lead to a decrease in real per capita GDP growth. Our empirical results are consistent therefore with general equilibrium models that predict a countercyclical relationship between sovereign bond spreads and the business cycle in debtor countries (e.g. [Arellano, 2008](#)). However, our empirical results also highlight the importance of political economy factors in shaping the relationship between commodity price booms and sovereign bond spreads. Further research, in particular, theoretical contributions along the lines of [Cuadra and Saprinza \(2008\)](#) may therefore be of interest in advancing our understanding of the relationship between revenue windfalls from international commodity price booms, economic growth, and the spread on sovereign bonds in emerging market economies.

We conclude on a cautious note that our empirical analysis is based on a relatively short time period. Ideally, an empirical analysis of the effects of commodity price booms on sovereign bond spreads should include also the 70s and 80s. [Manzano and Rigobon \(2007\)](#) argued that the commodity boom of the 70s led many of the developing (in particular, Latin American countries) to overborrow. When commodity prices collapsed in the 80s, these countries had large debt to GDP ratios and were unable to service their debt, leading to a debt crisis. There exist, unfortunately, no panel data on sovereign bond spreads for the 70s and 80s. This means that we are unable to cover in our analysis the 70s and 80s. We thus end on a note that interestingly, and in line with our results, many of the developing countries were much less democratic in the 70s and 80s than they are today.

REFERENCES

- Acemoglu, D., S. Johnson, and J. Robinson (2001). "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review* 91: 1369–1401.
- Aguiar, M., and G. Gopinath (2006). "Defaultable Debt, Interest Rates, and the Current Account." *Journal of International Economics* 69: 64–83.
- Alesina, A., A. Devleeschauwer, W. Easterly, S. Kurlat, and R. Wacziarg (2003). "Fractionalization." *Journal of Economic Growth* 8: 155–194.
- Arellano, C. (2008). "Default Risk and Income Fluctuations in Emerging Markets." *American Economic Review* 98: 690–712.
- Barro, R. (1999). "Determinants of Democracy." *Journal of Political Economy* 107: 158–183.
- Beck, T., G. Clarke, A. Groff, P. Keefer, and P. Walsh (2001). "New Tools in Comparative Political Economy: The Database of Political Institutions." *World Bank Economic Review* 15: 165–176.
- Berg, A., and J. Sachs (1988). "The Debt Crisis: Structural Explanations of Country Performance." *Journal of Development Economics* 29: 271–306.
- Blundell, R., and S. Bond (1998). "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics* 87: 115–43.
- Collier, P., and B. Goderis (2007). "Commodity Prices, Growth, and the Natural Resource Curse: Reconciling a Conundrum." CSAE Working Paper 2007–15.
- Cuadra, G., and H. Sapriza (2008). "Sovereign Default, Interest Rates, and Political Uncertainty in Emerging Markets." *Journal of International Economics* 76: 78–88.
- Heston, A., R. Summers, and B. Aten (2009). "Penn World Table Version 6.3", Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, August 2009.
- Krueger, A. (1987). "Origins of the Developing Countries' Debt Crisis, 1970 to 1982." *Journal of Development Economics* 27: 141–163.
- Lederman, D., and W. Maloney (2008). "In Search of the Missing Research Curse." World Bank Policy Research Paper 4766.
- Lederman, D., and L. Xu (2010). "Commodities and Structural Volatility." World Bank, mimeo.
- Manzano, O., and R. Rigobon (2007). "Resource Curse or Debt Overhang?" in *Natural Resources and Development: Neither Curse nor Destiny*. Editors: D. Lederman, and W. Maloney, Stanford Press.
- Marshall, M., and K. Jagers (2009). *Polity IV Project: Dataset Users' Manual*. Center for Global Policy, George Mason University (www.cidcm.umd.edu/polity). [Polity IV Data Computer File, Version p4v2004. College Park, MD: Center for International Development and Conflict Management, University of Maryland.]
- Mehlum, H., K. Moene, and R. Torvik (2006). "Institutions and the Resource Curse." *Economic Journal* 116: 1–20.
- Nickell, S. (1981). "Biases in Dynamic Models with Fixed Effects." *Econometrica* 49: 1417–1426.
- Neumeyer, P., and F. Perri (2005). "Business Cycles in Emerging Economies: The Role of Interest Rates." *Journal of Monetary Economics* (2): 345–380.
- North, D. (1990). *Institutions, Institutional Change, and Economic Performance*. New York: Cambridge University Press.
- Persson, T., and G. Tabellini (2003). *The Economic Effects of Constitutions*. MIT Press, Cambridge.
- (2006). "Democracy and Development. The Devil in Detail." *American Economic Review Papers and Proceedings* 96 (2): 319–324.
- Political Risk Service (2010). *International Country Risk Guide*. Online Database.
- Przeworski, A., M. Alvarez, J. Cheibub, and F. Limongi (2000). *Democracy and Development: Political Institutions and the Well-Being of the World, 1950-1990*. Cambridge, UK: Cambridge University Press.

- Robinson, J., R. Torvik, and T. Verdier (2006). "Political Foundations of the Resource Curse." *Journal of Development Economics* 2: 447–468.
- Roodman, D. (2009). "A Note on the Theme of Too Many Instruments." *Oxford Bulletin of Economics and Statistics* 71: 135–158.
- Sachs, J., and A. Warner (1995). "Natural Resource Abundance and Economic Growth." NBER Working Paper 5398.
- (2001). "The Curse of Natural Resources." *European Economic Review* 45: 827–838.
- Stock, J., and M. Yogo (2005). "Testing for Weak Instruments in Linear IV Regression." In *Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg*, ed. D. Andrews, and J. Stock, 80–108. Cambridge: Cambridge University Press.
- Van der Ploeg, F. (2010). "Natural resources: curse or blessing?" *Journal of Economic Literature*, forthcoming.
- WDI (2010). World Development Indicators. Online Database.
- Windmeijer, F. (2005). "A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM." *Journal of Econometrics* 126: 25–51.

Appendix Table 1. Robustness to Outliers

	Δ Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
	Median Regression	Median Regression	Median Regression	Excluding Max/Min 1%	Excluding Max/Min 1%	Excluding Max/Min 1%
Δ ComPI	-0.478 (-0.12)	-16.023*** (-2.91)	-0.310 (-0.07)	-5.858 (-0.77)	-30.213*** (-4.28)	-7.860 (-1.19)
Δ ComPI* Avg. Polity2 Score	-1.879** (-2.39)			-3.371** (-2.42)		
Δ ComPI* Autocracy Indicator		29.437** (2.42)			55.051*** (4.26)	
Δ ComPI* Avg. Checks & Balance Score			-7.734 (-1.43)			-16.651** (-2.54)
Δ ComPI* Avg. GDP Per Capita	0.002** (2.08)	0.003** (2.40)	0.002* (1.75)	0.001 (0.12)	0.004*** (3.13)	0.001 (1.18)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	291	291	291	284	284	284

Note: The method of estimation in columns (1)-(3) is maximum likelihood; columns (4)-(6) least-squares. The least-squares regressions in columns (4)-(6) exclude observations where the change in the commodity export price index is in the top/bottom 1 percentile. The dependent variable is the log-change in the spread on sovereign bonds. Δ ComPI stands for the log-change in the international commodity export price index (see page 3 in the paper for a detailed explanation of how this variable is constructed). The cross-section (average time-series) dimension of the panel is 38 (7.7). *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Data Appendix Table 1. Descriptive Statistics

	Mean	Std. Dev.	Min	Max	Obs.
Δ Log Sovereign Bond Spread (Δ Spread)	-0.11	0.39	-2.02	1.32	291
Δ Log Export Price Index (Δ ComPI)	0.002	0.006	-0.02	0.04	291
Polity2 Score	4.98	5.35	-7	10	291
Checks and Balance Score	3.20	1.43	1	6	291
GDP Per Capita	9189	5085	1236	21331	291
Ethnic Fractionalization	0.42	0.23	0.002	0.85	289
Export Concentration	0.11	0.19	0.006	0.98	282
Gini	43.16	9.16	27	60.4	291
Corruption	2.41	0.96	1	5	278
Settler Mortality	206.5	486.6	17.7	2004	148

Data Appendix Table 2. List of Countries

Country	Observations	Spread	Polity2	GDP	GINI	Ethnic Frac
Algeria	4	748.88	-3	5432	0.35	0.34
Argentina	10	2135.98	7.9	12956	0.5	0.26
Brazil	10	684.82	8	8666	0.58	0.54
Bulgaria	10	420.05	8.7	7303	0.3	0.4
Chile	8	132.52	9.2	15765	0.55	0.19
China	10	102.81	-7	5209	0.42	0.15
Colombia	10	446.4	7	6919	0.58	0.6
Croatia	9	2288.7	0.7	11209	0.29	0.82
Cuba	7	305.35	-7	7706	0.27	0.37
Dominican Republic	6	539.44	8	8194	0.51	0.43
Ecuador	10	1271.83	6.6	5351	0.56	0.66
Egypt	6	195.49	-4.5	5102	0.32	0.18
El Salvador	5	259.21	7	5325	0.51	0.2
Greece	2	89.99	10	19117	0.34	0.16
Hungary	8	69.66	10	14881	0.27	0.15
Indonesia	3	249.39	8	4944	0.39	0.74
Korea, Republic of	7	255.87	8	18806	0.32	0
Lebanon	9	400.77	7	7679	0.6	0.13
Malaysia	10	197.84	3	14952	0.43	0.59
Mexico	10	315.8	7.6	10226	0.49	0.54
Morocco	9	379.89	-6	4855	0.4	0.48
Nigeria	10	908.19	3.5	1664	0.45	0.85
Pakistan	6	492.48	-3.8	3112	0.31	0.71
Panama	10	346.38	9	7464	0.55	0.55
Peru	10	434.95	7	5339	0.51	0.66
Philippines	10	414.73	8	3918	0.45	0.24
Poland	10	155.88	9.6	11568	0.33	0.12
Russia	10	972.75	5.2	9718	0.39	0.25
South Africa	10	234.17	9	9223	0.35	0.75
Thailand	9	170.31	7.4	7713	0.43	0.63
Tunisia	5	148.6	-4	9034	0.41	0.04
Turkey	10	488.33	7	6569	0.42	0.32
Ukraine	7	677.71	6.2	7696	0.3	0.47
Uruguay	6	508.43	10	10962	0.45	0.25
Venezuela	10	715.42	6.2	10689	0.48	0.5
Vietnam	2	158.72	-7	3492	0.38	0.24