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# Sovereign debt, political stability and bargaining efficiency

by

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Abstract:

I offer a new theory of sovereign debt in which repayment depends on a collective decision by office-holders who may own debt and face varying opportunity costs of repaying it. Even if bond-holders can impose an exogenous penalty on defaulting polities, this does not ensure repayment. Rather, a country's credit-worthiness depends on the probability of shocks that destroy the political will to repay debts; and how efficiently and favorably the polity's actors renegotiate the terms of sovereign loans after such shocks. My model suggests a new explanation for the democratic advantage in borrowing, which I test using credit ratings for 65 countries over the period 1987-2003.

## Sovereign debt, political stability and bargaining efficiency

In conventional models of sovereign debt (e.g., Eaton and Gersovitz 1981; Bulow and Rogoff 1989; Kletzer and Wright 2000), each polity is a unitary actor; and a central debate concerns when the threat of a retaliatory credit boycott or other punishment can deter default. In this paper, I consider a non-unitary polity and ask when individual self-interest can deter default.

Market participants recognize that elections, revolutions and other events may replace office-holders who support bond repayment with those who do not. After a shock to the power structure occurs, the new office-holders and current bond-holders may seek to re-negotiate the terms of the loan. The office-holders can threaten to repudiate the debt entirely but the bond-holders can threaten a retaliatory credit boycott or other penalty. Bargaining may fail, leading to default and retaliation; or it may succeed, leading to a negotiated "haircut" of some size for the bond-holders. Thus, the initial price the polity can charge for its bonds must reflect market perceptions of the risk that political instability will lead either to inefficient bargaining and repudiation; or to efficient bargaining and the expected haircut.

In my model, lenders' ability to punish default is neither necessary nor sufficient to make bonds credible; and a "democratic advantage" in borrowing exists to the extent that democracies are better able to negotiate new bond support coalitions, when shocks to their political power structures occur. I contrast this rationale to previous arguments for a democratic advantage (North

and Weingast 1989; Schultz and Weingast 2003); and provide supporting evidence for the mechanism identified here.

The rest of the paper proceeds as follows. First, I review previous models in which the sovereign is not a unitary actor. Then I develop my own theory; and test it using data on credit ratings for 54 developing countries in the period 1987-2003.

## Previous Literature

I will not consider the extensive literature that investigates unitary sovereigns. For recent reviews, see Panizza, Sturzenegger and Zettelmeyer (2009) and Tomz and Wright (2011).

Relatively few works examine the process by which a sovereign polity decides to default on its bonds. In this section, I consider the extant models under three headings, depending on whether they highlight constitutional features, electoral competition, or secondary markets.

North and Weingast's (1989) "constitutional engineering" theory argues that, when the executive and legislative branches must both approve default, sovereign bonds will be more credible. Stasavage (2003, 2007) stresses that this conclusion follows only if the two branches actually differ in their attitudes to default.[1] In this line of argument, the credibility of a polity's sovereign debt is determined by the veto player most favorable to bond repayment.

In the "electoral competition" line of theories (Dixit and Londregan 2000; Guembel and Sussman 2009), actors purchase government bonds in order to

[1] Relatedly, Saiegh (2009) argues that coalition governments, in which each of several diverse partners wields a veto, favor bond-holder interests.

store wealth, anticipating the equilibrium default rate that will emerge from *two-party* competition. Under certain conditions, the median voter's preferences determine the default rate, and this can be anticipated when the bonds are first issued. Sovereign bonds are credible because "the majority of domestic agents hold bonds and thus draw some benefit from repayment" (Guembel and Sussman 2009, p. 1304).

Broner, Martin and Ventura (2010) highlight the role of secondary markets. In their model, bonds are issued by *private actors* but the government in each country decides whether to enforce repayment of bonds held by foreigners. Governments are benevolent, in the sense that they either maximize enforcement or maximize a weighted average of their own citizens' utilities. Foreigners purchase bonds because they can resell them and, once enough bonds are held by domestic agents, the benevolent government will honor them.

In my model, I follow North and Weingast (1989) in focusing on constitutional structure—in particular, the rules by which a polity determines whether it will honor or repudiate its debts. I consider an array of possible rules, all those corresponding to proper simple voting games.

As do Broner, Martin and Ventura (2010), I include bond markets as key elements in the story. However, the bonds in my model are truly sovereign bonds, issued by the government rather than private citizens, and the government is not a benevolent unitary actor but rather a collection of self-interested actors.

## Who honors or repudiates sovereign debt?

Empirically, who can default on sovereign debt varies from polity to polity. In a few countries, default requires statutory authorization. In most cases, it appears the Finance Minister individually, or the cabinet collectively, has authority to default.[2]

That said, sometimes it is not clear who can do what to repay or reschedule a nation's debt. For example, in January 2010, President Cristina Fernandez de Kirchner of Argentina fired her nation's central bank chief after he refused to release $6.6 billion in foreign reserves to service the nation's foreign debt. Reinstated by a court ruling, the bank chief then resigned. Later, in March, Kirchner issued a decree to transfer some $4.4 billion in reserves to the Treasury, but was thwarted by a federal judge's ruling that ordered the Economy Ministry not to use the money "in any way" until Congress had reviewed the decree. By the end of the month, however, other court rulings cleared the way for the transfers to take effect. In April, Kirchner managed to secure Senate approval of her new central bank chief and proceed with her plan.

This brief and incomplete Argentine vignette, although unusual in various ways, illustrates a general point: to pay off sovereign debts, one must lay one's hands on some money. Thus, the fight over honoring or rescheduling debt involves figuring out exactly what funds, with exactly what opportunity costs to the various actors, will be used to repay the debt.

I shall consider J risk-neutral actors—whether individuals or groups—partitioned into three classes: foreigners, non-office-holding domestic actors,

[2] Interview with David Levey, managing director of Moody's sovereign debt unit 1986-2004.

and office-holders. The polity—i.e., the union of the last two classes—has rules dictating which combinations of office-holders can disburse funds (from its "general fund") and for what purposes. I model these rules as setting up a proper simple voting game that determines default, with decisive coalitions ***D*** and blocking coalitions ***B***.[3] I focus on the special case in which bonds are funded by earmarked tax flows sufficient to pay them off. In this case, to repudiate sovereign debt requires an active decision by a decisive coalition; and to ensure repayment requires only the support of a blocking coalition.[4]

For concreteness, I consider the case in which any coalition capable of enacting an ordinary statute is decisive and thus able to repudiate debt (by preventing disbursement of monies from the general fund).[5] Depending on whether the polity is bicameral, has judicial or constitutional review, and so on, decisive coalitions might consist of actors from all three branches of government and multiple chambers of the legislature.

I should stress that dummy players—those with no political power—exist.[6] I shall talk of the "politically powerful," meaning those who hold offices, and the "politically powerless," meaning the foreign and domestic dummy players who do not.

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[3] A simple voting game is characterized by a set ***D*** of decisive coalitions satisfying monotonicity: if $C \in \boldsymbol{D}$ and C is a subset of C', then $C' \in \boldsymbol{D}$. The game is proper if $C,C' \in \boldsymbol{D}$ implies $C \cap C' \neq \varnothing$. If $\{1,\ldots,J\} \backslash C$ is not decisive, then C is a blocking coalition.

[4] Another tractable model assumes that debt will be repudiated unless a decisive coalition supports repayment. This plays out similarly to the case considered here.

[5] This means, for example, that a polity is not able to write statutes that simultaneously authorize the sale of bonds and provide that repudiation of such bonds requires a different and higher standard of political support than needed for ordinary statutes.

[6] Formally, j is a dummy player if and only if for all C, $C \in \boldsymbol{D}$ implies $C \backslash \{j\} \in \boldsymbol{D}$; and $C \in \boldsymbol{B}$ implies $C \backslash \{j\} \in \boldsymbol{B}$.

## The costs and benefits of honoring sovereign debt

*The value of repudiating debt*

If a polity repudiates a particular debt, it thereby frees up the earmarked funds that would otherwise have been used to repay it. The value of freeing up these funds depends on which actors can then use them and for what purposes. Let $\alpha_j \geq 0$ denote the value to actor j of an additional dollar in the general fund; and assume that $\alpha_j = 0$ for foreign j, and $\alpha_j \in [0,1]$ for domestic j. That $\alpha_j \leq 1$ implies that j never strictly prefers an additional dollar in the general fund to an additional dollar in j's own bank account. Since it reflects actor j's ability to control how monies in the general fund are spent, I shall refer to $\alpha_j$ as the fiscal control parameter.

*The cost of repudiating debt*

I assume an exogenous penalty $\rho \geq 0$ can be imposed on any defaulting polity. Perhaps, for example, lenders can interfere with a country's current trade, as in Sachs and Cohen (1982) or Bulow and Rogoff (1989); can mete out military punishments, as discussed by Tomz (2007); or have pre-existing agreements enabling them to trigger a credit boycott of some duration after each default.

In standard models, an exogenous penalty ensures the credibility of sovereign debt, because the sovereign is unitary and fully internalizes the penalty. Here, however, one must ask how each actor with decision-making authority evaluates the penalty. I let $\rho_j$ denote j's evaluation of the penalty; and assume that $\rho_j = \alpha_j\rho$. Thus, each actor views the penalty as equivalent to a reduction of revenue in the general fund; and cares about that loss of funds in proportion to its fiscal control.

*The net benefit of honoring debt*

Suppose a polity has sold a total of G bonds each returning 1+i and that actor j owns $g_j$ of them. If the polity repudiates its debt, agent j will value the revenue gained by repudiation at $\alpha_j G(1+i)$ and will value the cost of repudiation at $\alpha_j \rho$. If the polity honors its debt, agent j will gain $g_j(1+i)$ from the bonds j owns. Thus, j will support honoring the debt if and only if $g_j(1+i) \geq \alpha_j G(1+i) - \alpha_j \rho$ or, equivalently,

$$G(1+i) \leq \rho + \frac{g_j}{\alpha_j}(1+i) \qquad (1)$$

If we assume that agent 1 is unilaterally decisive, has full fiscal control ($\alpha_1 = 1$), and does not own any bonds ($g_1 = 0$), then inequality (1) leads to a condition for bond repayment familiar from the literature positing unitary sovereigns: $G(1+i) \leq \rho$. No dictator (or unitary polity) can credibly promise to repay more than the penalty for repudiation.

A problem with this standard formulation is that the penalties lenders can impose are much too small to explain the total amount of debt sovereigns incur. Arellano and Heathcote (2008) show that even a credible threat of *permanent* exclusion from credit markets yields maximum sustainable debt levels at least ten times smaller than those observed in the real world. Other penalties, including trade interruption and military intervention, also appear much too small to explain observed levels of debt (cf. Tomz 2007).

More generally, bonds will be repaid whenever all members of at least one blocking coalition wish to repay them. Put formally, bonds will be repaid if and only if

$$G(1+i) \leq \rho + A(g), \qquad (2)$$

where $A(g) \equiv \max_{C \in \boldsymbol{B}} \min_{j \in C} \frac{g_j}{\alpha_j}(1+i)$.[7]

According to inequality (2), the maximum loan repayment a polity will be trusted to make increases both with the penalty that lenders can impose (ρ); and with bond ownership by members of blocking coalitions (A(g)). Thus, a polity subject to a small or even nil penalty can still borrow, if it demonstrates the political will to do so by ensuring that powerful actors own bonds.[8] One might call the term A(g) the *internal assurance* of repayment (in contrast to the *external assurance*, ρ).

Note that a polity's access to credit is determined by the blocking coalition most favorable to repayment, just as access to credit in the veto-player model is determined by the veto player most favorable to repayment.[9] Note also that each blocking coalition's support for repayment is determined by whichever of its members owns the least bonds, in proportion to his or her share of fiscal control.

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[7] If we consider the case in which bonds are repaid if and only if some decisive coalition supports repayment, then the formula for A(g) changes slightly. In particular, one needs to replace "***B***" with "***D***".

[8] The beneficial effects of bond ownership by the powerful occur only if the market believes that the polity can commit to treating all bond-holders equally. Historically, achieving equal treatment of bond-holders was an important accomplishment. See, e.g., Braddick 1996, pp. 37-41.

[9] One searches for the largest value of $\min_{j \in C} \frac{g_j}{\alpha_j}(1+i)$, among all the blocking coalitions C; and it is this largest (most favorable) value that helps determine the maximum repayment with which the polity will be trusted.

Thus, ensuring that all members of some blocking coalition own the same fraction of bonds relative to their respective shares of fiscal control, and sliding this common bond-holding share upward, is one way to increase a polity's access to credit.

Compared to previous models with non-unitary sovereigns, the account just given of when bonds will be repaid focuses more on key decision-makers and less on ordinary citizens. Dixit and Londregan (2000) and Guembel and Sussman (2009) argue that bonds will be repaid when enough voters own enough bonds, because the polity caters to the median voter's interests. Broner, Martin and Ventura (2010) argue that bonds will be repaid when enough citizens own enough bonds, because the polity maximizes social welfare. Here, bonds will be repaid when a blocking coalition of office-holders own enough bonds, because such coalitions have the constitutional power to ensure repayment. The difference in focus lessens when one considers "office-holders" not as the individual occupants of various offices but rather as the factions or parties sustaining those individuals in office.

In each of the models just mentioned, one must ask how bonds can be sold to begin with, if the market believes they will be repaid only if a powerful enough coalition owns enough bonds at maturity. The answer in each case is essentially that transactions on the secondary market ensure the right people own enough bonds.[10] In contrast to previous models, however, my account of the secondary market highlights the possibility of bargaining failure and bias.

[10] In their one-shot versions, all these models predict that bonds will be honored only if enough powerful people—variously defined—*actually* own them at maturity. However, with multiple, over-

## A model of sovereign debt

If blocking power (***B***), fiscal control ($\alpha = (\alpha_1,\ldots,\alpha_J)$), and bond ownership (g) were all constant, then the credibility of bonds at issuance could be calculated from inequality (2). In practice, however, events can change the identity of those wielding blocking power and fiscal control; and bonds can be traded. In this section, I consider a three-stage game in which sovereign debt is first purchased; then traded after Nature shocks the power structure; and finally redeemed or repudiated in accord with inequality (2).

*Stage 1: The initial sale of bonds*

In the first stage, a representative office-holder—the Finance Minister, say—seeks to finance an attractive investment opportunity. Raising taxes would take too long and/or impose unacceptable deadweight costs. Thus, the Finance Minister resorts to debt financing. In particular, she chooses a number of bonds to sell (G) and an interest rate that the bonds will offer (i). Each of the G bonds will mature in one period and, if honored, return 1+i. If repudiated, each bond returns nothing.

Having chosen (G,i), the Finance Minister seeks to "make a market" by proposing a vector $g_1 = (g_{11},\ldots,g_{1J})$ of purchases and a per-bond price $b_1$. Her goal in choosing $(G,i,g_1,b_1)$ is to maximize her own end-of-game utility but, as I show in the appendix, this boils down to maximizing the revenues gained from the initial sale of the bonds.

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lapping bond issues and a strict rule requiring payment of debts in the order incurred, the requirement of actual ownership by the powerful at maturity can be substantially weakened.

If each actor j agrees to purchase $g_{1j}$ bonds at the proposed price $b_1$, then the bonds are issued and sold as agreed. Otherwise, the bond issue fails and the game ends. If the bonds are sold, the Finance Minister invests the proceeds, $Gb_1$, in a project that returns $V(Gb_1)$ in one period. I assume there is a minimum investment T before the project becomes worthwhile.[11]

In choosing $(G,i,g_1,b_1)$, the Finance Minister faces three constraints:

(1) Feasibility. Each actor must have enough money to purchase the bonds offered. If $Y_j$ denotes j's (exogenous) investment budget, then $g_{1j}b_1 \leq Y_j$ for all j. And of course $\sum_j g_{1j} = G$.

(2) Individual rationality. Each actor j must weakly prefer buying $g_{1j}$ bonds at the price $b_1$ to investing his or her available funds ($Y_j$) elsewhere. Actors decide whether to purchase the bonds they are offered, knowing the current power structure $\Delta^1 = (\boldsymbol{D^1},\boldsymbol{B^1},\alpha^1)$ and the exogenous penalty ρ. Any money that actors do not use to purchase bonds, they invest in a riskless asset with rate of return $i_1$. Letting $R_1(g_1)$ denote the fraction of face value that bond-holders expect to receive, individual rationality requires that the expected return from investing $b_1$ in bonds, $-b_1 + (1+i)R_1(g_1)$, weakly exceeds the expected return from investing $b_1$ in the riskless asset, $-b_1 + (1+i_1)b_1$. Equivalently, $b_1 \leq (1+i)R_1(g_1)/(1+i_1)$.

(3) Initial bond credibility. The Finance Minister's proposal must be initially credible in the sense that inequality (2) is satisfied given the pattern of bond ownership at issuance ($g_1$). This assumption simplifies the analysis, makes

[11] In particular, letting $i_1$ denote the rate of return on a riskless private investment, $V(x) < (1+i_1)x$ for $x < T$; $V(T) = (1+i_1)T$; $V'(T) > 1+i_1$; and $V'(x) > 0$, $V''(x) < 0$ for $x \geq T$.

sense to the extent that the sale price of initially non-credible bonds is low, and can in any event be relaxed.

Note that, given the second constraint, the largest price that the Minister can charge, for a given (G,i), is $b_1 = (1+i)R_1(g_1)/(1+i_1)$. Thus, maximizing loan revenues, for a given (G,i), requires choosing g in order to maximize $R_1(g_1)$. Intuitively, the more credible repayment can be made to appear at issuance, the higher the initial price per bond will be, and hence the greater the revenue garnered from selling the bonds (G,i) will be.

*Nature's move*

After the first stage, Nature leaves the political power structure intact at $\Delta^1$ with probability s. With probability 1-s, however, Nature alters the political power structure to $\Delta^2(g_1) = (\boldsymbol{D^2}(g_1),\boldsymbol{B^2}(g_1),\alpha^2(g_1))$. $\Delta^2(g_1)$ is such that all politically powerful players own no bonds. I formulate Nature's move in this way to highlight the possibility that, after the bonds are sold, non-bond-holders may come to power in sufficient numbers to destroy the political support for repayment.[12]

Of course, if $G(1+i) \leq \rho$, then the bonds will be shock-proof. The penalty alone ensures that any new office-holders will honor the bonds. To make things interesting, I assume that the minimum investment T the polity needs for its investment is such that $T(1+i) > \rho$. In this case, in order to raise enough money the polity must arrange a pattern of bond ownership $g_1$ that increases $A(g_1)$ and thereby its access to credit.

[12] To ensure the possibility of non-bond-holders assuming all the offices, one can assume the number of powerless domestic actors exceeds G plus the number of offices.

This case—in which penalties alone do not ensure repayment—must be quite general. For, bond markets tremble when political parties hostile to repayment come to power (Stasavage 2003), which they would not do if lenders could rely on exogenous penalties to ensure repayment.

Given that penalties alone do not ensure repayment, shocks to the power structure destroy the political support needed for repayment. After a shock, however, trading on the secondary market may restore the required support.

*Stage 2: Trading bonds (secondary market)*

If bonds were sold in the first stage, then they may be traded in the second stage. I model bond trading as the result of an abstract bargaining game, $\Gamma(g_1,\Delta)$, where $\Delta \in \{\Delta^1,\Delta^2(g_1)\}$.

The outcome of the bargaining is a pair $(g_2,b_2)$, where $g_2 = (g_{21},\ldots,g_{2J})$ denotes a vector of trades on the secondary bond market and $b_2$ denotes the price at which such transactions take place. If $g_{2j} < 0$, then j sells $|g_{2j}|$ bonds at price $b_2$. If $g_{2j} > 0$, then j buys $g_{2j}$ bonds at price $b_2$. Thus, after the secondary markets close, the agents' bond holdings are given by $g_1+g_2$.

Let the equilibrium outcomes $(g_2,b_2)$ of the bargaining game $\Gamma(g_1,\Delta)$ be distributed according to $F(\bullet;g_1,\Delta)$. With probability $e(g_1,\Delta)$, bargaining reaches an efficient outcome without delay. Let $\theta(g_1,\Delta)$ denote the expected value of face value that bond-holders receive, conditional on successful bargaining. With probability $1-e(g_1,\Delta)$, bargaining fails to reach an efficient outcome sans delay

and, for simplicity, I assume that in this case it fails utterly—in the sense that $g_2 = (0,\ldots,0)$.[13]

*Stage 3: Honoring or repudiating the debt*

At the beginning of the third stage, the bond holdings are $g = g_1+g_2$ and the power structure $\Delta = (\boldsymbol{D},\boldsymbol{B},\alpha)$ remains as Nature chose it: $\Delta \in \{\Delta^1,\Delta^2(g_1)\}$. Given knowledge of the bond holdings ($g_1+g_2$) and power structure ($\Delta$), the probability that the polity honors the debt, $P_3(g_1+g_2|\Delta)$, can be computed from inequality (2).

An important point to note is that $P_3(g_1+g_2|\Delta)$ can take only two values—0 or 1. Either all the members of some blocking coalition own enough bonds to ensure that they will support repayment ($P_3(g_1+g_2|\Delta) = 1$) or no blocking coalition exists all of whose members support repayment ($P_3(g_1+g_2|\Delta) = 0$).[14]

*Equilibria*

The fraction of face value that an initial purchaser of a bond will expect to receive, $R_1(g_1)$, can be calculated as follows. If the power structure remains stable (with probability s), then the bonds will be honored at full face value, because they are politically credible at issuance and no trades on the secondary market will destroy that credibility. If a shock brings non-bond-holders to power (with probability 1-s), then the probability of a bargain to save the bonds is

[13] The reasons for bargaining failure include asymmetric information and commitment problems (cf. Fearon 1995).

[14] I ignore the possibility that some individuals own enough bonds to render them exactly indifferent between honoring and repudiating them. Note that "no blocking coalition supports repayment" is equivalent to "some decisive coalition supports repudiation."

$e(g_1,\Delta^2(g_1))$ and the expected fraction of face value the initial bond-holders get, given successful bargaining, is $\theta(g_1,\Delta^2(g_1))$. Thus, as Theorem 1 in the appendix shows, $R_1(g_1) = s + (1-s)e(g_1,\Delta^2(g_1))\theta(g_1,\Delta^2(g_1))$.

Two immediate corollaries of this observation follow. In stating them, I simplify notation by writing e for $e(g_1,\Delta^2(g_1))$ and θ for $\theta(g_1,\Delta^2(g_1))$.

**Proposition 1**:
(a) For a fixed interest rate i, the initial price the polity can charge for its bonds (in equilibrium) increases in political stability (s), bargaining efficiency (e), and bargaining favorability (θ).

Proof: Let $b_1^*$ denote the optimal bond price for fixed $i \geq i_1$ and note that $b_1^* = \frac{(1+i)}{(1+i_1)}[s+(1-s)e\theta]$. QED.

(b) For a fixed bond price $b_1 \geq [s + (1-s)e\theta]/(1+i_1)$, the interest rate that the polity must offer on its bonds (in equilibrium) declines in political stability (s), bargaining efficiency (e), and bargaining favorability (θ).

Proof: Let i* denote the optimal interest rate for fixed $b_1 \geq [s + (1-s)e\theta]/(1+i_1)$ and note that $i^* = \frac{(1+i_1)b_1}{s+(1-s)e\theta} - 1$. QED.

Proposition 1a shows that the polity is subject to more severe credit rationing as it becomes less stable, and as its post-shock bargaining institutions become less efficient and less favorable to bond-holder interests. For example, if the polity always offers the risk-free interest rate ($i = i_1$), then the price per bond that it will be able to charge in equilibrium is $b_1^* = s + (1-s)e\theta$. The size of the loan

extended to the polity, $Gb_1^*$, shrinks as it becomes less stable, less efficient, and less favorable, reaching zero if $s = e\theta = 0$.

Proposition 1b conveys a similar message. Holding fixed the price that it charges per bond, the polity must offer higher interest rates in order to attract purchasers, as it becomes less stable, efficient and favorable.

Most of the previous literature depicts polities as defaulting on their sovereign bonds whenever their creditors are unable to deter them from doing so by credible threats of punishment. The argument here is quite different. Although a credible threat of punishment, $\rho$, exists by hypothesis, this penalty is neither necessary nor sufficient for access to credit.[15]

## Expected post-shock haircuts

Because I do not specify the game $\Gamma(g_1,\Delta^2(g_1))$, it remains unclear how the post-shock power structure, $\Delta^2(g_1)$, and the bond sales occurring in the first stage, $g_1$, affect bargaining efficiency (e) and bargaining favorability ($\theta$). In order to illuminate this issue, suppose that the efficiency with which the polity bargains with its bond-holders is unaffected by who initially owns the bonds ($g_1$)—as if impersonal legal processes govern the bargaining process between office-holders and bond-holders.

In this case, one can show (see appendix) that the maximum possible expected return to the initial bond-holders, conditional on successful post-shock

[15] To see that penalties are not necessary for access to credit, consider a polity with $\rho = 0$, $s = 1$, and $A(g_1) > 0$. To see that penalties are not sufficient for access to credit, consider a polity with $\rho > 0$ and $s = e\theta = 0$.

bargaining, is $\theta_{max} = 1 - \alpha_{min}(1-\frac{\rho}{G(1+i)})$, where $\alpha_{min} = \min_{C \in \boldsymbol{B}} \sum_{j \in C} \alpha_j$ is the aggregate fiscal control wielded by the fiscally weakest blocking coalition. Intuitively, after a shock the bond-holders must "bribe" a blocking coalition, by selling its members bonds at a discount. They thus search for the "cheapest" such coalition, which is the one whose members collectively exert the least fiscal control and thus benefit the least from repudiation.

With this result, the maximum initial bond price (for the $i = i_1$ case) is $b_1^* = s + (1-s)e(1 - \alpha_{min}(1-\frac{\rho}{G(1+i)}))$. Thus, a polity's access to credit (when it can commit to the most favorable possible bargaining protocol for bond-holders) increases directly with its stability and efficiency; and inversely with the fiscal control of its fiscally weakest blocking coalition.

One can also show that the minimum possible expected return to the initial bond-holders, conditional on successful post-shock bargaining, is $\theta_{min} = 0$. The scenario here is that the new office-holders are able to make a single take-it-or-leave-it offer to the now-powerless bond-holders. They accordingly offer to buy all the bonds at a vanishingly small price. The initial bond-holders prefer accepting this severe haircut to rejecting it and imposing the penalty (which nets them nothing).

## The democratic advantage

North and Weingast (1989) argued that governments whose chief executives are subject to constitutional checks and balances can more credibly commit to repaying their debts, because their chief executives cannot unilaterally

repudiate them. Limited governments thus have better access to credit and can offer lower interest rates than their more absolutist counterparts.

Schultz and Weingast (2003) identified another avenue by which more democratic institutions might enhance the credibility of sovereign debt. Democratic office-holders may fear electoral reprisals if they default on debt, while their authoritarian counterparts typically have no such worries. The threat of electoral reprisals may thus give democracies an advantage over autocracies.

In my model, three key features affect the credibility of a polity's debt: the probability of "large" shocks to the political power structure; the probability that the political elite can bargain successfully in the aftermath of such shocks; and the pro-government or pro-bond-holder bias of such bargaining (which in turn depends on the aggregate fiscal control of the fiscally weakest blocking coalition). This suggests another formulation of the democratic advantage: Actors in democracies can bargain more efficiently and with less pro-government bias, in the aftermath of leadership turnover, than can actors in autocracies. The market's perception of this advantage in bargaining efficiency and bias drives the democratic advantage.

Consider two anecdotes that illustrate the argument. First, when the Bolsheviks ousted the Tsar in the Russian Revolution, they repudiated his debts. Why did they not buy Tsarist bonds at bargain basement prices and then support repayment (to themselves) at face value? The Bolsheviks were busy trying to kill the previous regime's supporters, many of whom were major bond-holders. Thus, any offer to purchase *their* bonds would have been problematic. For, if the

Bolsheviks could find the bonds, then they might find (and kill) the bond-holders. While intermediaries could in principle have been used, the Bolsheviks did not wish to do anything that strengthened their foes. Thus, unless they could purchase all bonds held by the Tsar's supporters at virtually nil prices, they were reluctant to purchase any. The polity's reputation was collateral damage of the inefficient bargaining between the in-coming and out-going regimes.

A very different outcome occurred in 1710, when the notoriously anti-debt Tories won a majority in Britain's parliamentary elections and ousted the pro-debt Whigs (Stasavage 2003). Rather than suffer an inefficient loss of reputation, the Tories eventually renegotiated the terms of debt. Just as the owners of a business may maintain its reputation so they can sell it for a better price (Kreps 1990), so the rulers of a polity may maintain its reputation so they can run it at the lower cost implied by better access to loans (and hence tax-smoothing).

Suppose now that more democratic institutions *generally* improve the efficiency of bargaining and reduce pro-government bias. These democratic advantages should manifest themselves in at least two ways: better access to mass, anonymous markets; and less sensitivity of bond prices to leadership turnover. Let's consider each point in turn.

### *The efficiency-anonymity connection*

In my model, the credibility of sovereign bonds potentially depends on who holds them. In some historical cases, the identity of bond-holders was indeed common knowledge and seemingly essential to bond credibility. For example, Epstein (2000, p. 26) describes a system used in Castile in which lenders were

given the rights to collect specific streams of tax revenue. It thus became credible that the taxes earmarked for repayment of the loan would be used for that purpose, because the creditors themselves collected the taxes. Other schemes that tied sovereign debt to tax farming, and in the process ensured that creditors had fiscally powerful allies (namely, themselves), were common in medieval times.

My interpretation of such schemes is that medieval polities often had very low bargaining efficiency. Indeed, they typically lacked secondary markets entirely. Thus, the identity of the initial purchasers of debt was very important. If the initial purchasers were not sure that collectively they had the political clout to ensure repayment, then no voluntary loan should have been forthcoming.

At the opposite end of the theoretical scale, when a polity is perfectly efficient ($e = 1$) and favorable ($\theta = 1$), it does not matter who purchases the bonds at their initial flotation; nor does anyone need to know who buys them. All that matters is that the right people hold them in the right amounts when it comes time to redeem them—and this will happen "automatically." This resonates with the main point made by Broner, Martin and Ventura (2010).[16]

In the baseline model exposited above, I assumed for convenience that any bonds offered would be initially credible. Suppose, however, that it is costly to float bonds in such a way as to ensure common knowledge of all purchases; and much cheaper to sell them anonymously. In this case, a sufficiently stable,

[16] They assume perfectly efficient secondary markets (corresponding to $e = 1$) and ensure perfect favorability (corresponding to $\theta = 1$) by arguing that domestic purchasers of bonds held by foreigners compete away any price mark-down. In my model, $\theta$ can approach unity only if some blocking coalition's aggregate fiscal control approaches zero or the external penalty approaches $G(1+i)$.

efficient and favorable polity will prefer to sell its bonds on an anonymous mass market, rather than via a "subscription" or other system that publicizes who buys bonds.

If autocracies are generally less efficient bargainers, then they should have difficulty accessing large anonymous markets. Their sovereign debt will more likely take the form of bank loans; or be an exercise in passing the hat around to regime insiders; or both. In contrast, democracies (efficient bargainers) can sell bonds anonymously and rely on secondary markets to ensure credibility. Summarizing,

> Hypothesis 1: Democracies will have better access to anonymous mass markets for debt than autocracies.

This prediction certainly fits contemporary facts. An important and robust regularity is that post-war autocracies have had much poorer access to international bond markets than have democracies (cf. Beaulieu, Cox and Saiegh 2011 for a recent statement of evidence).

*The efficiency-price dynamics connection*

Note that the price of a bond (with $i = i_1$) will be $s + (1-s)e\theta$ at initial flotation, and $e\theta$, after a shock. Thus, after a shock to the power structure, bond prices will fall by an amount $s(1-e\theta)$. Assuming that shocks are not less common in democracies than autocracies ($s_{DEM} \leq s_{AUT}$) but that the former are more efficient ($e_{DEM} > e_{AUT}$) and exhibit less pro-government bias ($\theta_{DEM} > \theta_{AUT}$), a second hypothesis follows.

Hypothesis 2: Bond prices should tumble more after shocks to power in autocracies than in democracies.

## How the bond market reacts to transfers of political power

To test Hypothesis 2, I use credit ratings issued by Standard and Poor's, denoted $SP_{jt}$ for country j in year t, as the dependent variable.[17] Favorable credit ratings are associated with lower interest rates and transaction costs for loans (Sinclair 2005) and can proxy for bond prices.

Some feel for the data can be obtained by focusing on the 109 country-years in which a leader exited power and the country had previously secured a rating from Standard and Poor's during the study period 1945-2003.[18] Regressing the change in rating ($SP_{jt} - SP_{j,t-1}$) on the democracy indicator used by Przeworski et al. (2000), one finds that autocracies show a statistically significant decline in their ratings, corresponding to as much as 7 points on a 0-16 scale, when their leaders exit office. In contrast, democracies show a discernibly smaller decline in ratings of about 2 points on the 0-16 scale.[19]

Table 1 displays regressions of $SP_{jt}$ on country fixed effects, a standard battery of economic determinants of credit ratings, and indicators of leadership exit (including interactions with regime type). As complete information on the economic variables is available only from the mid-1980s on, the analysis focuses

[17] Following standard practice, I convert the letter rankings issued by Standard and Poor's to a number r between 0 and 16 inclusive; linearly transform r to r' = $\frac{1}{16} + \frac{255}{256} r$ ; and then take the natural logarithm: ln(r').

[18] In practice, very few countries had ratings before the 1980s and so the vast bulk of the observations come from the years 1985-2003.

[19] More precisely, in a hypothetical country with the highest rating (16) and whose leader exited, the rating would drop on average to 9, if the country were autocratic, but to 14, if the country were democratic. The difference in drops is statistically discernible and substantively significant.

on 1987-2003. The regressors of primary interest are: $REXIT_{jt}$, equal to 1 when a leader exits *regularly* in country-year jt; $IRREXIT_{jt}$, equal to 1 when a leader exits office *irregularly* in country-year jt; and the interactions of these exit indicators with two widely used measures of democracy—a dichotomous indicator developed by Przeworski et al. (2000); and the continuous Polity2 score.[20]

The results (see Table 1) show the following patterns. First, in both Model 1 (using the dichotomous indicator of democracy) and Model 2 (using the continuous measure), the economic control variables generally have the expected sign and several are statistically and substantively significant.

Table 1 about here.

Second, both models suggest that democracy has a negative within-country effect on ratings, albeit not one that is statistically robust. More precisely, ratings declined on average in the seven countries that democratized (according to Przeworski et al.'s criteria) after securing ratings from Standard and Poor's (Indonesia, Mexico, Nigeria, Paraguay, Peru, Taiwan, Thailand). Similarly, ratings and Polity2 scores correlated negatively (albeit insignificantly) within those countries that had ratings.[21]

[20] The exit variables are from the Archigos dataset, version 2.9, which contains information on political leaders and transitions; see Goemans et al. (2009). It is available at www.prio.no. The Polity2 score is from the Polity IV project; see Marshall and Jaggers (2005).

[21] Beaulieu, Cox and Saiegh (2011) argue that single-equation methods are not attractive ways to measure the impact of regime type on credit ratings, since selection bias is severe: it appears that many autocracies have chosen not to enter the international bond markets, anticipating that they would not secure sufficiently good ratings. Given that, if primary interest centers on the regime type effect, one would be better off with a method such as that suggested by Beaulieu, Cox and Saiegh (2011), rather than a single-equation method.

Third, and most important for current purposes, *exits by leaders depress bond ratings more in autocracies than in democracies*. In Model 1 (using a dichotomous measure of democracy), the difference is statistically significant only for irregular exits. In Model 2 (using a continuous measure of democracy), the differences between regimes are statistically discernible both for regular and irregular exits. For example, when a leader exits irregularly in a country with a Polity2 score of 0—the midpoint of a scale running from -10 to +10—that country's bond rating drops by as much as 13 points on a 0-16 point scale. In contrast, the corresponding effect for a country with a Polity2 score of 7—often used as the threshold defining "full democracy"—is nil. Similarly, a regular exit in a country with a Polity2 score of -1 is estimated to reduce that country's bond rating by as much as 11 points on a 0-16 point scale (and this effect is statistically significant).[22] In contrast, the corresponding effect for a country with a Polity2 score of 10 is nil.

Can one rule out the possibility that economic tough times drive both leadership exits and declines in ratings? Note that autocrats often survive quite horrible economic times for their people. In other words, the correlation between tough times and leadership exit is relatively weak in authoritarian regimes. More importantly, the regression in Table 1 controls for several factors—such as current account balance, growth in GDP per capita, inflation and so on—that should help identify when economic times are tough. Thus, the correlation I

[22] Testing whether the linear combination REXIT – POLITY SCORE*REXIT equals zero, for the case in which POLITY SCORE = -1, allows one to reject the null at the .05 level.

document between leadership exits and rating declines already controls for how tough the times are.[23]

## Conclusion

Conventional theories of sovereign debt (e.g., Eaton and Gersovitz 1981; Bulow and Rogoff 1989; Kletzer and Wright 2000) assume unitary sovereigns and argue that the credibility of debt hinges on bond-holders' ability to penalize default. Here, I consider a polity composed of multiple self-interested actors who collectively decide whether to default, in light of their varying costs and benefits of repayment and repudiation.

When the sovereign is non-unitary and the identity of powerful agents may change due to elections, revolutions or other processes, lenders' ability to penalize default is neither necessary nor sufficient to ensure repayment. After a shock to political power, the new office-holders may have insufficient incentive to repay the bonds issued by their predecessors. In this situation, penalties provide some bargaining leverage for the bond-holders but (a) bargaining may fail, leading to default; or (b) bargaining may succeed but entail a more or less severe haircut for the bond-holders (and a corresponding windfall for the new office-holders). Thus, the credibility of sovereign bonds at issuance depends on market perceptions of: the likelihood of "large" shocks to power (political stability); the

[23] My analysis does not separate regular (and irregular) leadership exits into those that plausibly threaten repayment and those that do not. In principle, one might use country experts to identify which parties and actors were pro- and anti-repayment at various times, and code exits as bond-threatening or not. My results suggest that either the proportion of bond-threatening exits is higher in autocracies, or that the average threat entailed in a bond-threatening exit is higher in autocracies, or both.

likelihood of successful bargaining post-shock (bargaining efficiency); and the expected division of the gains from successful bargaining (bargaining bias).

My theory provides a new explanation of the democratic advantage in borrowing (North and Weingast 1989; Schultz and Weingast 2003). Democracies are generally more efficient bargainers whose institutions sustain less pro-government bias; the market rewards them with better access to credit and lower interest rates.

Consistent with this argument, autocracies have much poorer access to international bond markets; and markets react more negatively to leadership shocks in autocracies than in democracies. In particular, credit ratings issued to sovereign borrowers by Standard and Poor's in the period 1987-2003 drop more in response to exits of autocrats than to exits of democrats, especially when those exits are irregular.

The current model contains only *political* shocks, which put non-bond-holders in power and thereby reduce the benefit of repayment to office-holders. *Economic* shocks, which increase the opportunity cost of repayment to office-holders, also set up a bargaining problem potentially resolvable with trades on the secondary market; and can be analyzed with similar techniques.

# Appendix

*(1) Statement and proof of Theorem 1.*

Theorem 1: If $P_3(g_1|\Delta^1) = 1$, then $R_1(g_1) = s + (1-s)e(g_1,\Delta^2(g_1))\theta(g_1,\Delta^2(g_1))$.

To begin, let $P_2(g_1|\Delta)$ be the probability, calculated at the beginning of stage 2 (before bargaining commences), that the bonds will be paid in full in stage 3, given the current bond holdings $g_1$ and power structure $\Delta$. Let $e(g_1,\Delta) \equiv Pr[P_3(g_1+g_2|\Delta) = 1 \mid P_3(g_1|\Delta) = 0]$ denote the bargaining efficiency of the polity, for given power structure $\Delta \in \{\Delta^1,\Delta^2(g_1)\}$.

Lemma 1: $P_2(g_1|\Delta^1) = P_3(g_1|\Delta^1) + [1-P_3(g_1|\Delta^1)]e(g_1,\Delta^1)$.

Proof: Note first that $P_2(g_1|\Delta^1) = P_3(g_1|\Delta^1)E[P_3(g_1+g_2|\Delta^1)|\ P_3(g_1|\Delta^1)=1] + [1-P_3(g_1|\Delta^1)]E[P_3(g_1+g_2|\Delta^1)|\ P_3(g_1|\Delta^1)=0]$.

Note next that $E[P_3(g_1+g_2|\Delta^1)|\ P_3(g_1|\Delta^1)=1] = 1$. For, if the current bond holdings ensure bond repayment, then no trade can occur that ensures bond repudiation, because the purchaser(s) would have no reason to buy.

Note third that $E[P_3(g_1+g_2|\Delta^1)|\ P_3(g_1|\Delta^1)=0] = e(g_1,\Delta^1) \equiv Pr[P_3(g_1+g_2|\Delta^1) = 1 \mid P_3(g_1|\Delta^1) = 0]$. Thus, $P_2(g_1|\Delta^1) = P_3(g_1|\Delta^1) + [1-P_3(g_1|\Delta^1)]e(g_1,\Delta^1)$. QED.

Let $R_t(x|\Delta)$ be the expected fraction of face value the bonds will yield their owners at the beginning of stage t, given the current bond holdings x and power structure $\Delta$. Let $\theta(g_1,\Delta^2(g)) \equiv E[R_2(g_1|\ \Delta^2(g_1))|\ \Delta^2(g_1), P_3(g_1|\ \Delta^2(g_1)) = 0, P_3(g_1+g_2|\ \Delta^2(g_1)) = 1]$ denote how favorable the bargaining outcome is expected to be for the bond-holders, conditional on bargaining success in $\Gamma(g_1,\Delta^2(g_1))$.

Proof of Theorem 1: $R_1(g_1) = sR_2(g_1|\Delta^1) + (1-s)R_2(g_1|\Delta^2(g_1))$. From the hypothesis that $P_3(g_1|\Delta^1) = 1$ and Lemma 1, we have $R_2(g_1|\Delta^1) = 1$. Note that $R_2(g_1|\Delta^2(g_1)) = e(g_1,\Delta^2(g_1))\theta(g_1|\Delta^2(g_1))$. Thus, $R_1(g_1) = s + (1-s)e(g_1,\Delta^2(g_1))\theta(g_1|\Delta^2(g_1))$. QED.

*(2) The Finance Minister's maximand*

Now consider the Finance Minister's maximand in stage 1. For any (G,i), the Minister will choose $g_1$ in order to maximize her expected end-of-game utility, derived from (a) control of the money in the general fund; (b) payments for any bonds owned, and (c) private investments, subject to the three constraints described in the text.

Table A.1 describes the payments to initial bond owners, as a function of political stability and bargaining efficiency. It can be explained as follows.

First suppose Nature leaves the power structure intact. If bargaining fails, the political support for repayment constructed at issuance remains intact. If bargaining succeeds, then it will preserve the political support needed for repayment (as no one will purchase bonds destined for repudiation). Thus, given

political stability, the bonds will enter the third period with the political support needed for repayment, regardless of bargaining success or failure.

Table A.1: Per-bond payoffs to initial bond-holders

| Stable? | Efficient bargain reached? | Probability | Per-bond payoff to initial bond-holders at end of game |
|---|---|---|---|
| Yes | Yes | $se(g_1,\Delta^1)$ | 1+i |
| Yes | No | $s(1-e(g_1,\Delta^1))$ | 1+i |
| No | Yes | $(1-s)e(g_1,\Delta^2(g_1))$ | $\theta(g_1,\Delta^2(g_1))(1+i)$ |
| No | No | $(1-s)(1-e(g_1,\Delta^2(g_1)))$ | 0 |

Next suppose Nature brings non-bond-holders to power. In this case, $\Gamma(g_1,\Delta^2(g_1))$ is a bargaining game in which the office-holders and bond-holders negotiate the size of the "haircut" the latter will endure (as well as the division of gains among the office-holders). If bargaining fails, then the bonds will lack the political support needed for repayment and will be repudiated. If bargaining succeeds, the size of the bond-holders' haircut will depend on the bargaining protocol and other factors that I put under the rubric of "bias."

For example, if an agent of the office-holders can make a single take-it-or-leave-it offer to the powerless bond-holders, then the latter will be offered a price of zero (or ε) and all the bonds will transfer to the powerful. In this case, the haircut is a shave and the windfall is almost G(1+i). In contrast, if an agent of the bond-holders can make a single take-it-or-leave-it offer to the powerful, then that offer will give each member of the cheapest-to-buy blocking coalition just enough bonds, at just large enough a price discount, to ensure support for repayment. In this case, the haircut (and the windfall) will be the smallest consistent with bond repayment (see next section of appendix). In between these extremes, various more plausible bargaining protocols exist and imply intermediate haircuts and windfalls. I let $\theta(g_1,\Delta^2(g_1))$ denote the expected fraction of face value that bond-holders receive, conditional on successful bargaining in $\Gamma(g_1,\Delta^2(g_1))$; and henceforth write θ for $\theta(g_1,\Delta^2(g_1))$ and e for $e(g_1,\Delta^2(g_1))$.

The Minister's maximand can be written as follows:

$$\max_{g} \quad s[\alpha^1_{FM} V(Gb_1) - \alpha^1_{FM} G(1+i) + g_{1,FM}(1+i)] + (1-s)[e\theta g_{1,FM}(1+i)] + (Y_{FM} - g_{1,FM} b_1)(1+i_1)$$

Her choice is subject to the feasibility, individual rationality and initial bond credibility constraints.

Note that, when Nature shocks the power structure, the incumbent Finance Minister is tossed out of power and ends the game with no fiscal control ($\alpha^2_{FM}(g_1)$ = 0). Thus, her only payoff after a shock comes from any bonds she holds and from the riskless private investment. This is the main simplification achieved by focusing on the purely distributive case.

Noting that $s\alpha_{FM}^{1}$ G(1+i) and $Y_{FM}(1+i_1)$ are both invariant with respect to $g_1$, and substituting using $b_1 = (1+i)R_1(g_1)/(1+i_1)$, the Minister's maximand is equivalent to:

$$\max_{g_1} \quad s\alpha_{FM}V(G(1+i)R_1(g_1)/(1+i_1)) + g_{1,FM}(1+i)[s+(1-s)e\theta - R_1(g_1)]$$

But $R_1(g_1) = s+(1-s)e\theta$ from Theorem 1, and so her maximand reduces to

$$\max_{g_1} \quad R_1(g_1).$$

In equilibrium, the Minister is indifferent between all the possible allocations of $Y_{FM}$ across the private investment and the bonds, because the price discount equates the two investments' expected returns and all agents are risk-neutral. Thus, she seeks to maximize the expected amount of money in the general fund at the end of the game, which requires maximizing $R_1(g_1)$.

*(3) The maximum θ*

After a shock, the best possible transactions $(g_2,b_2)$ for bond-holders minimize their haircut, subject to the constraint of attracting the support of a blocking coalition. Assuming that all bond-holders must contribute proportionally to any settlement, $\theta = (1-\frac{\sum g_{2j}}{G}) + \frac{\sum g_{2j}}{G}\beta_2$, where $b_2 = (1+i)\beta_2$. That is, every bond-holder contributes a proportion $\frac{\sum g_{2j}}{G}$ of their bonds, and these are sold at a fraction $\beta_2$ of their face value to the members of a target blocking coalition, C. The transferred bonds will buy the support of each member of the blocking coalition only if $g_{2j}(1-\beta_2)(1+i) - \alpha_j G(1+i) + \alpha_j\rho \geq 0$ for all $j \in C$ (condition a).

For any given $\beta_2$, the cheapest way to buy political support is to offer "just enough" bonds to C. This entails choosing $g_2$ in order to minimize the number of bonds sold, subject to satisfying condition a. The minimum number of bonds needed, from condition a, is $\sum g_{2j} = \alpha_C[G - \frac{\rho}{1+i}](1-\beta_2)^{-1}$. Plugging this into the formula for θ above and re-arranging, one finds $\theta_{max} = 1 - \alpha_{min}(1-\frac{\rho}{G(1+i)})$, where $\alpha_{min} = \min_{C\in\boldsymbol{B}} \sum_{j\in C} \alpha_j$ .

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## Table 1: How leaders' exits affected sovereign bond ratings, 1945-2003

| Independent variable | Model 1 | Model 2 |
|---|---|---|
| DEMOCRACY | -.99 (.57) * | - |
| POLITY SCORE | - | -.08 (.05) |
| IRREXIT | -2.44 (.92) ** | -1.61 (.41) *** |
| DEMOCRACY*IRREXIT | 2.75 (1.14) ** | - |
| POLITY SCORE*IRREXIT | - | .25 (.07) *** |
| REXIT | -.48 (.58) | -1.08 (.61) * |
| DEMOCRACY*REXIT | .30 (.55) | - |
| POLITY SCORE*REXIT | - | .11 (.066) |
| CURRENT ACCOUNT LAG | -.02 (.009) ** | -.02 (.009) ** |
| GDP PER CAP GROWTH LAG | .04 (.01) ** | .04 (.01) ** |
| GDP LAG | 2.1e-13 (3.6e-13) | 7e-13 (5e-13) |
| INFLATION | -.0001 (.00004) ** | -.0001 (.00004)** |
| TRADE LAG | .21 (.22) | .15 (.21) |
| RESOURCE LAG | -.005 (.01) | -.006 (.01) |
| CONSTANT | 2.48 (.49) *** | 2.13 (.41) *** |
| | | |
| Number of observations | 551 (65 clusters) | 526 (62 clusters) |
| $R^2$ | .73 | .75 |

* p value < .10
** p value < .05
*** p value < .01
Both models include country fixed effects. Standard errors, clustered by country, are given in parentheses. In Model 1, DEMOCRACY is the dummy variable utilized by Przeworski et al. (2000). In Model 2, POLITY SCORE is the Polity2 score from Polity IV.