Political Institutions and the Bond Market in Brazil, 1829-1889

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Abstract: Imperial Brazil's remarkable access to capital markets, and especially the growth of its long-term domestic borrowing, was underpinned by political institutions that created a strong penalty for default. Although institutions that credibly committed the state to repay underpinned sovereign borrowing, Brazil's bonds nonetheless exhibited persistent and variable risk premia. Changes in the default premium had various sources. I argue that the main political source of default risk in Imperial Brazil was, for institutional and historical reasons, the executive branch. This paper focuses on the relative bargaining power of the cabinet, and the majority in the lower house of parliament, as a determinant of default risk. It attends to the main changes in Brazil's risk premium irrespective of source, while testing the hypothesis that political-institutional factors were determinants of default risk. The principal findings are: (1) the evolution of default risk on Brazil's domestic bond can be characterized by four structural breaks, all of which happened in 1852 or before; (2) a key constitutional authority that gave the emperor the power to select and dismiss the cabinet, and to dissolve the lower house of parliament, actually enhanced the bargaining power of the legislative majority; (3) a cluster of political-institutional variables indicating the relative bargaining strength of the legislative majority and the cabinet significantly impacted Brazil's default risk. These variables include the size of electoral districts, the voting rule used in multi-member districts, and composition of the cabinet. Even after accounting for major events that registered large impacts on the risk premium, political-institutional factors that strengthened the legislative majority vis-à-vis the cabinet were seen by bond investors as mattering for the creditworthiness of the Imperial state.

Imperial Brazil's record of borrowing and debt repayment was exceptional by the standards of nineteenth-century emerging markets. It was nothing short of the most reliable sovereign borrower in Latin American in the nineteenth century.[2] Not only did the Brazilian government borrow abroad, it also accessed credit at home to establish a long-term funded domestic debt. Investors in Brazil's bonds never once failed to receive their dividends during the Empire (1822-1889).

The Brazilian government was able to borrow because the political penalty for default was high. This penalty was embedded in the Empire's political institutions: the constitution of 1824 established the parliament as a veto player, with control over government finance. This gave constituents who were state creditors influence over policy outcomes, through their elected representatives. The constitution further defined debt repayment as a political right of the state's creditors. The parliament created by the constitution wasted little time in taking two actions. The first was passing a national debt law. This law established a committee of the state's leading creditors charged with monitoring the Treasury's compliance with debt obligations, and providing advice on credit matters to the minister of finance. The second measure was to strip the emperor and the executive branch of their traditional financial expedient, the first Banco do Brasil. The formal establishment of parliament as a veto player over questions of taxes, spending, borrowing, and debt service, was effective. In 1831, a proposal by the finance minister to default was soundly defeated in the lower house of parliament (the chamber of deputies). Holders of Brazilian bonds, both at home and overseas, always received their dividends through the fall of the Empire in 1889.

What proved, ex post, to be a perfect record of interest payments was not, ex ante, viewed as a sure thing. Institution-based credible commitments to honor sovereign debt had salutary effects on both the volume of Brazil's borrowing, and its cost of capital, but such effects were in no way irreversible. Despite Brazil's ability and willingness to repay its debts, investors in bonds both in London and Rio charged a premium for the risk of Brazilian default. This default premium varied greatly over the nineteenth century. Sustaining credibility, and thereby permitting the government to enjoy regular access to low-cost, long-term credit, depended on events and government actions. Debt markets constantly reassessed the government's willingness to repay. Events and political changes could alter the sovereign's credit risk (for the better or for the worse) long after initial credibility had been established.

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[2] Recent studies that focus on sovereign debt and credible commitment for specific cases in Latin America during the nineteenth century include Richard Salvucci, *Politics, Markets, and Mexico's 'London Debt': 1823-1887* (Cambridge UK: 2009).; Sebastian M. Saiegh, "Credible Commitments and Public Borrowing in Nineteenth-Century Argentina," (2007).; Catalina Vizcarra, "Guano, Credible Commitments, and State Finance in Nineteenth-Century Peru," *Journal of Economic History* (2006).; and William R. Summerhill, *Inglorious Revolution: Political Institutions, Sovereign Debt, and Financial Underdevelopment in Imperial Brazil* (New Haven: forthcoming).

The determinants of sovereign default risk occupy a growing literature in economic history and historical social science. The list of factors found to impact the risk premium has grown with the literature. Reputational mechanisms have long been prominent in the theoretical literature on sovereign borrowing and default, and recent historical work has found that reputation may well matter in determining the level of risk premia governments have to pay to borrow.[3] The state's ability to command the resources required to service debt can impact risk premia as well.[4] War, and importantly its outcome, shifts the level of default risk.[5] Changes in the external penalty for default can alter sovereign creditworthiness to a dramatic extent.[6] Empire membership has been found to reduce the default premium for borrowing colonies.[7] Institutional changes that alter the political penalty for default can result in large changes in the risk premium.[8] Finally, partisan politics can impact the risk of default considerably.[9]

Hefty risk premia demanded by bond markets may have obvious sources: a weak state in the debtor nation, recurrent fiscal crises, or a record of repeated default are examples. What is more puzzling is why the bonds of a country that had relatively few such problems consistently exhibited a risk premium, and why this risk premium varied over time. This paper takes up the question of the determinants of default risk in Imperial

[3] Carmen M. Reinhart, Kenneth S. Rogoff, and Miguel A. Savastano, "Debt Intolerance," *Brookings Papers on Economic Activity* 2003, no. 1 (2003), Michael Tomz, *Reputation and International Cooperation: Sovereign Debt across Three Centuries* (Princeton: 2007).

[4] Mark Dincecco, *Political Transformations and Public Finances: Europe, 1650-1913* (Cambridge, UK: forthcoming).

[5] Nathan Sussman and Yishay Yafeh, "Institutional Reforms, Financial Development, and Sovereign Debt: Britain, 1690-1780," *Journal of Economic History* 66, no. 4 (2006).

[6] Kris James Mitchener and Marc Weidenmier, "Supersanctions and Sovereign Debt Repayment," in *NBER Working Papers* (2005).

[7] Niall Ferguson and Moritz Schularick, "The Empire Effect: The Determinants of Country Risk in the First Age of Globalization, 1880-1913," *Journal of Economic History* 66, no. 2 (2006).

[8] Douglass C. North and Barry R. Weingast, "Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England," *Journal of Economic History* 49, no. 4 (1989), Kenneth Schultz and Barry R. Weingast, "The Democratic Advantage: Institutional Foundations of Financial Power in International Competition," *International Organization* 57 (2003), Barry R. Weingast, "The Political Foundations of Limited Government: Parliament and Sovereign Debt in 17th and 18th-Century England," in *The Frontiers of the New Institutional Economics*, ed. John N. Drobak and John V. C. Nye (New York: 1997).

[9] Rose Razaghian, "Establishing Financial Credibility in the United States, 1789-1860: The Impact of Institutions," (2001), David Stasavage, "Credible Commitment in Early Modern Europe: North and Weingast Revisited," *Journal of Law, Economics, and Organization* 18, no. 1 (2002), David Stasavage, "Partisan Politics and Public Debt: The Importance of the 'Whig Supremacy' for Britain's Financial Revolution," *European Review of Economic History* 11 (2007).

Brazil. It assesses the political-institutional component of default risk on the Imperial government's domestic bonds in Rio de Janeiro. The argument and findings run along the following lines. The executive branch was traditionally seen as the most likely source of any attempt to default. Political-institutional factors that strengthened the relative bargaining position of the majority in the lower house of parliament reduced the risk of sovereign default. Three factors in particular emerge as important: the incentives for party cohesion rooted in the electoral system, the use of the limited vote, and the composition the cabinet. These factors had an impact beyond that of other determinants of the level of the risk premium, such as wars and revolts.

The rest of this paper proceeds in six sections. The first provides background to Brazil's experience with government debt, with particular attention to the domestic debt. To generate hypotheses about the impact of legislative-executive policy making institutions on the risk premium, the second section presents a bargaining model. The third section constructs an original high-frequency (weekly) indicator of default risk from 1829 (when the domestic debt was first regularly quoted in secondary markets) through 1891. The fourth section looks at the impact of political variables on the risk premium, and identifies structural breaks in Brazil's risk premium—persistent shifts in the level of risk that reflected changing assessments of the likelihood of default. The fifth section presents tests of the hypothesis that the political variables explain changes in Brazil's risk premium beyond the explanatory power of the structural breaks. The final section concludes.

Background to Brazil's Domestic Borrowing

Brazil's debt pre-dated independence in 1822. Much of what was owed stemmed from two sources: the Portuguese royal loan of 1796, a forced loan that targeted Brazilian subjects in particular; and the operations of the first Banco do Brasil, established shortly after the arrival of the Portuguese court in 1808. The bank had been little more than a lending agency for the royal Treasury since its founding. By 1822 the service on the inherited debts from the colonial era, together with current expenditures, already outweighed the anticipated revenues of the government in Rio de Janeiro. On the eve of independence the Prince Regent Pedro I took out a "National Loan" in anticipation of Portuguese armed intervention in Brazil.[10] The loan offered investors a six-percent annual dividend, with the principal scheduled to be repaid over ten years, and the government pledging the customs revenues in Rio to the service of the loan. To better motivate local participation the Treasury Secretary emphasized the importance of participating in the loan as a patriotic measure.[11] The loan was ultimately

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[10] Neill Macaulay, *Dom Pedro: The Struggle for Liberty in Brazil and Portugal, 1798-1834* (Durham, N.C.: 1986)., pp. 135-145; Roderick J. Barman, *Brazil: The Forging of a Nation, 1798-1852* (Stanford: 1988)., p. 95; Decreto, 30 July 1822.

[11] *Falla Que o Illmo. e Exmo. Ministro e Secretária de Estado dos Negócios da Fazenda e Presidente do Thesouro Público Dirigiu Aos Negociantes e Capitalistas Desta Praça Relativa Ao Empréstimo de 400:000$000*, (Rio de Janeiro: 1822).

oversubscribed. The strong response from the Rio creditors, however, depended partly on the fact that the loan was an arm-twister. English merchants in Rio noted that "it is called a loan but we may think it may be called a forced loan being made in the name of the Prince."[12]

The shift from largely involuntary debt to voluntary, funded, and long-term debt had three sources: the liberal constitution of 1824, the ministerial responsibility law of 1827, and the national debt law of 1827. The 1827 legislation creating the national debt, included provisions for future borrowing. Brazil's long-term funded domestic debt grew out this law. This debt was domestic not as a result of the nationality of the creditors, but by virtue of having been issued originally in Brazil, denominated mainly in "inconvertible" domestic currency, and in most cases held within the country.[13] Government bonds, known as *apólices*, became the largest single category of securities in the domestic market soon after their creation in 1828, and certainly were the most liquid security for the entire Imperial era. The national debt law dictated the funding requirement, by declaring that laws authorizing new borrowing via the issue of apólices had to specify sources of income sufficient to service the additional increment to the national debt. Just like Brazil's London borrowing, the resources routinely pledged to service apólices were customs revenues, though later the resources of the Empire more generally (in effect, the full faith and credit of the state) were cited as the source of funds for debt service. Not only was the new domestic debt funded, its management was transparent, monitored by committee of lenders established under the law as the *Junta Administrativa da Caixa de Amortização*. Funding, and monitoring, conferred additional credibility on the state's promise to repay its creditors. While the law further specified an amortization rate of one percent per year of the original apólices placed in the market, by 1839 the any pretense of regularly retiring a portion of the existing apólices had been formally suspended.[14] Apólices became, in effect, perpetual annuities subject to occasional retirement at the discretion of the Finance Minister.

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[12] Rothschild Archive (RAL) XI/38/215 A80, Samuel, Phillips & Co. to Nathan M. Rothschild, Rio de Janeiro, 19 August 1822. there is no indication that shares of the loan ever encountered a secondary market Rio de Janeiro's *Semanário Mercantil* and *Folha Mercantil*, for example, regularly published commodity prices and quotations of the exchange rate from at least the middle of 1823 onward as part of its prices current section. However, no quotation for the shares of the loan of 1822 ever appeared in these periodicals

[13] The principal exceptions were the National Loans of 1868 and 1879. Though floated in Rio de Janeiro, their fixed-exchange rate clauses made them especially attractive outside of Brazil, and they ultimately traded mainly on securities exchanges in Europe.

[14] Law 91, 23 October 1839; Law 158, 19 September 1840. The suspension of amortization was a persistent sentiment. In 1845 Finance Minister Manoel Alves Branco, author of the new tariff schedule applied in 1844, stated that the government "should not amortize the internal and external debt while there are not sufficient balances for other expenditures." *RMF* 1845A, p. 13; *RMF* 1845B, p. 12.

Borrowing drew mainly on the funds of the merchant and financial community in Rio de Janeiro. Slave traders figured prominently among the early state creditors. Merchants in general served as broker-dealers for new issues of bonds until mid century, when the growing commercial banking sector of Rio took on that role. The 1827 debt law provided for an initial issue of six million milréis worth of apólices to consolidate floating debts and expected future deficits, with another six million milréis in apólices issued specifically to retire from circulation paper money from the first Banco do Brasil.[15] In response to the Treasury's call for offers on the first issue of apólices, an ad hoc syndicate of "capitalists" comprised of Francisco José da Rocha, Lourenço Antonio do Rego, and José Francisco de Mesquita formed to bid on the issue, and invited participation from any individuals interested in investing in the operation.[16] Rego was a "national merchant," while Mesquita (later barão de Bomfim) was already an important state creditor and slave trader. He would go on to become one of the first debt commissioners on the Junta, which was established by the parliament to monitor the Treasury's performance on debt service.[17] Rocha (later the second barão de Itamaraty) was a young merchant from a wealthy slave-trading family, and would become a major state creditor, joining the Junta more than three decades later. The group was successful in its bid to take the first issue of apólices, and quickly informed their "shareholders" that they had acquired the bonds at 65% of par.[18] Foreign-born merchants based in Rio were another important early source of funds. For example, in late 1828 the Minister of Finance presided over the issue of another 1.2 million milréis worth of apólices. Three parties appeared at the Treasury Board and tendered offers.[19] One was the Rocha-Rego-Mesquita partnership; another was José Buschental, a Rio-based financier from Strasbourg.[20] The winning bid came from March Irmãos & Cia., and Naylor Irmãos & Cia., international merchants based in Rio.[21]

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[15] Law of 15 November 1827, Título IV; Cândido Baptista Oliveira, *Systema Financial do Brasil* (S. Petersburgo: 1842)., p. 157.

[16] Jornal do Comércio, 17 March 1828; Jornal do Comércio, 24 March 1828.

[17] *Almanach do Rio de Janeiro*, (Rio de Janeiro: 1827)., p. 164.

[18] Jornal do Comércio, 17 April 1828.

[19] Joaquim Teixeira de Macedo, *Tratado do Cavalleiro Hennet, Sobre a Theoria do Credito Publico, Traduzido do Frances; Argumentado de Notas, e Seguido da Demonstração dos Emprestimos Contraidos N'esta Corte* (Rio de Janeiro: 1829)., pp. 142-44. A representative of Samuel, Phillips & Company was present as well, but no bid from the firm was recorded, and in their correspondence to Nathan Rothschild they simply reported that "the Government sold the 1200 Contos of Bonds," without hinting at any attempt to participate; RAL XI/38/215 B 19, 21 October 1828, Samuel, Phillips & Co. to Nathan M. Rothschild.

[20] Of the Rio brokerage firm Bueschantal [sic] & Duval; *Almanach do Rio...1827*., p. 170.

[21] March Brothers was a Rio-based firm; Ibid., p. 169, as was Naylor Brothers, which was headed in Rio by Jorge [George] Naylor, and was active in local commerce and finance from the 1820s through at least the early 1840s; *Almanak dos Negociantes do Império do Brasil*, (Rio de Janeiro: 1827)., p. 193; Emilio Seignot-Plancher, *Almanak Nacional do Commércio do Império do Brasil* (Rio de Janeiro: 1832)., p. 49; Viuva Ogier e Filho,

That the Brazilian government could borrow in a primary market of merchants and financiers who competed to take the loans, rather than through forced loans or "donations," demonstrated just how far the state's credit had advanced since the National Loan of 1822. Most strikingly, by the 1850s more than half of the government's long-term funded debt was domestic in origin. Yet the single largest increase in the domestic funded debt, however, came during the war with Paraguay in the late 1860s, and its immediate aftermath. War borrowing accounted for more than forty percent of all of six-percent apólices issued during the Imperial era.[22] The funds raised from apólices were used for varied purposes, mainly to cover deficits, but also for the redemption of Treasury bills, some infrastructure investments, a few bailouts of companies, and even dowries for the daughters of the royal family. In 1886, thanks to lower interest rates in the Brazilian market, the government switched to the issue of five-percent apólices exclusively, as a prelude to the conversion of the existing six percents. Most of the five-percents appeared with a single issue in 1886, which was used to redeem Treasury bills and retire paper currency in circulation. By the fall of the Empire in 1889 more than 380 million milréis of apólices had been issued. The size of this domestic funded debt was substantial, exceeding the total amount of paid-in equity of all firms listed on Rio de Janeiro's stock exchange in 1888.

Beyond apólices there was one other noteworthy category of internal funded debt. In 1868 and 1879 the government issued "National Loans. Like apólices the National Loans were denominated in milréis, and raised in the domestic capital market. Unlike apólices, the loans had a fixed maturity. Moreover, the loans had exchange clauses, promising interest and redemption at a fixed rate of foreign exchange. They paid interest in both Brazil and in Europe, and the bonds circulated freely outside of Brazil. Though the primary market for the loans was Brazil, given their pegged values to external currencies they were far more similar to Brazil's foreign sterling loans in their attributes.[23] By early 1880 shares of the 1879 loan were already being used for remittances to Europe, and "the whole amount is said to have been subscribed for at Rio, with a view, no doubt, on the part of many of the holders to its eventual transfer to the European market."[24] Since the bulk of the domestic debt issued during the Empire took the form of apólices that traded in secondary markets from 1829, and carried a six-percent annual coupon rate, the six percents are the focus of the empirical analysis below.

Folhinha Commercial, Ou Pequeno Almanak do Rio de Janeiro (Rio de Janeiro: 1842)., p. 97.

[22] The government raised money from all sources—Treasury bills, currency issues, foreign borrowing in London, and long-term borrowing in Brazil--between 1865 and 1870. A significant increment of money issued early during the war with Paraguay stemmed from the forced sale of gold reserves to the government by the Banco do Brazil.

[23] Though both loans were issued in their entirety in Rio de Janeiro, the 1879 loan was listed on the London exchange. Contemporary reports indicated that most of the 1879 loan, and a good portion of the 1868 loan, were held outside of Brazil by the early 1880s; _RCJC_ 1883, p. 34; _RCJC_ 1884, p. 35.

[24] _Times_ 21 May 1880.

Cabinet-Legislative Policymaking

The starting premise that the parliament, and in particular the elected lower house, represented the interests of the state's creditors, in opposition to the executive, is supported both by key institutional features of policymaking, as well as the actual interactions of the chamber of deputies and the cabinet in the first decade after independence. It was the 1826 chamber of deputies that pressed for and established mechanisms for issuing and funding the debt; for monitoring the Treasury's adherence to debt service requirements; and that created the requirement that the Minister of Finance meet with, and take consultative votes from, a committee of the leading Brazilian bondholders every two weeks. Importantly, it was the majority in the chamber that defeated the cabinet's proposal in 1831 to default on the external debt. The principal threat to the state's creditors came less from any particular group or party within the chamber, than it did from the cabinet. This inherent conflict was rooted in the cabinet's relative independence from the chamber. Despite the ministerial responsibility law of 1827, which created criminal penalties for malfeasance that provided a basis for political penalties over policy disagreement, the cabinet remained constitutionally responsible to the emperor. It was not elected, being hand-selected by the emperor; could only be dismissed by the emperor; had the authority to propose (if not implement) a partial or complete default, via the requirement that the annual budget originate with the cabinet; and could blandish deputies with offers of patronage of various kinds in pursuing its objectives. In these respects, the problem of committing to repay the debt in Brazil was strikingly similar to problem as originally formulated by North and Weingast for seventeenth-century Britain. The political threat to undermine the state's commitment to repay debt originated with the executive branch and the crown, which was checked only by a legislature with both the authority to veto any default, and the political strength to stick to that position.

The emphasis in the model is thus not on which party controlled the legislature, or which group of deputies might have been more influenced by state creditors. It is instead on factors that determined the strength of whichever party that made up the chamber majority, and on factors that determined the cabinet's bargaining position. The baseline version of the model analyzes policymaking under a stylized set of arrangements called a "classic parliamentary system." A variant of the model incorporates particular institutional features of the Imperial Brazilian polity. Outcomes under Brazil's policy-making institutions are compared with those under the classic parliamentary system to generate testable hypotheses regarding the political-institutional determinants of the risk premium on Brazil's domestic bonds.

A. Classic Parliamentary System: Bargaining between the cabinet and the legislative majority is modeled using by modifying Huber's approach to policy making under a confidence vote procedure.[25] Four principal assumptions underpin the model. First,

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[25] See John D. Huber, "The Vote of Confidence in Parliamentary Democracies," *The American Political Science Review* 90, no. 2 (1996).

policy is decided along a single dimension, through a sequence of proposals between two agents: the cabinet, or "government" (G), and the legislative majority in the chamber of deputies (M). Second, the preferences of G and M are single-peaked, so that there is a unique point x for each agent that is strictly preferred to all other points. Third, the existing policy (for example, the previous year's budget) defines a reversion point in case a proposal by G fails to command the support of M and results in a censure vote under the procedure detailed below. Finally, the stylized status quo policy is located between G and M's ideal points. Since the status quo is within the Pareto set, any move from the point will make one of the two agents worse off. G and M's interests are thus diametrically opposed.

While stylized for the purpose of the model, these assumptions can be defended in the following terms. The uni-dimensional policy space offers analytical and expository tractability. Yet under majority rule voting, and an open rule for amendments, a policy space is multi-dimensional in the absence of other institutional features.[26] This results in disequilibria, and even policy outcomes outside the Pareto set. Legislatures may have rules that keep the policy space uni-dimensional, and avoid cycling. Such rules can induce equilibria, and reduce policy outcomes to the combination of issue-by-issue outcomes.[27] Stable issue-by-issue outcomes in Brazil's chamber of deputies were supported by the chamber's internal rules of procedure. Among other features, these rules required that each section of a multi-part proposal deal with only one issue (Article 121), that sections within bills be deliberated separately (Article 143), restricted opportunities for amendments (Articles 143 and 148), required germaneness of amendments (i.e., barring amendments to parts of the bill unrelated to the topic of the that part; Article 145); required that amendments be voted against the original sections of the bill; and required that the (amended) bill be voted against the status quo (Article 149).[28] Finally, the very nature of the confidence vote procedure detailed below (if invoked by the cabinet), which requires an up-or-down vote on the cabinet's proposal, eliminates the opportunity for cycling among proposals.

Modeling the majority as a single player implies that M is either the leader of a disciplined majority, or the median voter. Bargaining within the chamber as a whole, or within the majority, is not explicitly modeled. Several features of Brazilian political institutions support the stylized assumption of a unitary M with which the cabinet will

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[26] Richard McKelvey, "Intransitivities in Multidimensional Voting Models and Some Implications for Agenda Control," *Journal of Economic Theory* 12 (1976).

[27] For classic treatments see Joseph B. Kadane, "On Division of the Question," *Public Choice* 13 (1972).; G.H. Kramer, "Sophisticated Voting over Multidimensional Choice Spaces," *Journal of Mathematical Sociology* 2 (1972).; and Kenneth A. Shepsle, "Institutional Arrangements and Equilibrium in Multidimensional Voting Models," *American Journal of Political Science* 23, no. 1 (1979)..

[28] See, for example, Brazil. Câmara dos Deputados., *Regimento Interno da Camara dos Deputados* (Rio de Janeiro: 1857).; Brazil. Câmara dos Deputados, *Regimento Interno da Camara dos Deputados* (Rio de Janeiro: 1871), Brazil. Câmara dos Deputados., *Regimento Interno da Camara dos Deputados* (Rio de Janeiro: 1875).

bargain. Electoral systems possess features that can result in disciplined and strong parties. This assumption is converted into a testable hypothesis in the next section.

The game has four stages, as sketched in Figure 1. In the first stage, G proposes a bill under an open rule. In the second stage M can amend, or accept the bill as is and the game ends. If M makes an amendment, there is a third stage, in which G either finds M's amendment acceptable, or it can "defend" its original proposal (or even make a new one) under a confidence vote procedure. Making the cabinet's proposal a question of confidence puts the bill on the floor under what is effectively a closed rule. In the fourth stage there is a floor vote on G's final proposal, and implicitly, on confidence in G. If M votes to censure G, by rejecting G's confidence proposal, the status quo policy prevails, and new elections are called, potentially returning a new majority, and resulting in a different cabinet. Censure in effect leaves both G and M out of office, or expending resources to regain office.

Note that G's initial proposal has little to no bearing on the outcome, unless G invokes a question of confidence. If G has a position-taking incentive, it will simply propose its ideal point, because doing otherwise creates a political cost. In the amendment stage (Stage 2), M can make an amendment, but proposing a policy away from M's (induced) ideal point entails a positioning cost. The positioning cost increases with the distance between M's ideal point and the point it proposes as an amendment.

The cabinet's invocation of question of confidence is different from merely making a new proposal. In particular, a confidence vote procedure involves a political cost to the cabinet that is independent from its censure costs. Any action by M in response to the cabinet's invocation of confidence other than a vote of approval is a vote to censure the cabinet. The result of a vote to censure is that the status quo policy remains in effect, the legislature dissolves with new elections, and the cabinet falls, to be reconstituted after the election.

Since the status quo is inside the Pareto set, neither side would like the new policy to move further from the status quo, and each side would like the new policy closer to its own ideal point. Because of the costs of invoking a question of confidence and from censure, G and M may prefer to agree on a policy, even if one party is disadvantaged by the move away from the status quo, rather than invoke confidence or move to censure.

Utility for each player is scaled by the distance between the final outcome and each player's ideal point. Specific actions also create additional costs at each stage. If M votes to censure G in the final stage, by rejecting G's proposal under the confidence vote procedure, both M and G pay a censure cost. If during the third stage the cabinet makes its proposal a question of confidence (proposing its best obtainable policy), it pays a political cost, E, for using the confidence vote procedure. In the second stage M has position-taking incentives, such that if it proposes an amendment other than its ideal point, it pays a cost that is the product of a parameter measuring the salience of the position-taking incentive, and the distance between its amendment and its ideal point.

Utility functions for M and G are single peaked, with payoffs based on available actions and outcomes:

$$U_M(x) \begin{cases} = K_M - b|x - x_M| \text{ if M accepts a proposal without amendment} \\ = K_M - b|x_0 - x_M| - C_M, \text{ if M censures G} \\ = K_M - b|a - x_M| - d|a - x_M|, \text{ if M amends and G accepts} \end{cases}$$

$$U_G(x) \begin{cases} = K_G - f|x - x_G|, \text{ if G accepts M's amendment} \\ = K_G - f|x' - x_G| - E \text{ if G makes its proposal a question of confidence and proposes } x' \\ = K_G - f|x_o - x_G| - E - C_G \text{ if G makes its proposal a question of confidence and suffers a censure vote} \end{cases}$$

The utility functions (inclusive of stage-specific costs), along with the location of the status quo policy, define three sets of interest:

Set A = $\{x : U_M(x) \geq U_M(x_o) - C_M\}$, all policies that M prefers to censuring G in the voting stage, paying a censure cost, and receiving the status-quo utility, $U_M(x_0)$.

Set B = $\{x : U_G(x) \geq U_G(x') - E\}$, all policies that G would accept in the amendment stage before it would propose x' as a question of confidence.

Set C = $\{x : U_M(x') \leq K_M - b|a - x_M| - d|a - x_M|\}$, all amendments, a, that are acceptable to G in the amendment stage, and that M prefers to propose instead of provoking a question of confidence and receiving $U_M(x')$.

Figure 2 portrays the situation with M and G and a centrally located status quo policy. M's censure cost, given by line C_{M2}, along with the status quo policy, x_0, define the set A. The left limit of set A is x^1, which is the best policy that G can obtain by invoking a question of confidence. G's cost from invoking confidence, E, along with the status quo point, define the set B, which is the set of amendments that, if made by M, G prefers to invoking confidence. Sets A and B always intersect; here the right limit of the intersection is the point a_1. If M has no position-taking incentives, a_1 is the point that M uses as an amendment, and G will accept it. With position-taking incentives (indicated by the line passing through points Q and R), the set C contains the points that M prefers to propose as an amendment instead of provoking a confidence vote procedure. In the figure, Q is the point at which M is just indifferent between making the amendment a_1 (and bearing a positioning cost), and provoking a confidence vote procedure and having

G propose point x_1. In the case illustrated, M will provoke a CVP by proposing his ideal point anytime B∩C is empty. If B∩C≠Ø, there is an amendment that both M and G prefer to the CVP.

The model is solved by backward induction. Strategies are the best responses for each player at the stages where they take actions:

$$\text{Voting Stage: } S_M(x) = \begin{cases} \text{censure if } x \notin A \\ \text{accept if } x \in A \end{cases}$$

$$\text{Procedural Stage: } S_G(a) = \begin{cases} \text{accept if } a \in B \\ \text{confidence procedure if } a \notin B \end{cases}$$

$$\text{Amendment Stage: } S_M(x) = \begin{cases} a = \arg\max k_M - B|a - x_M| - d|a - x_M| \text{ if } C \neq Ø \\ x_M \text{ if } C = Ø \end{cases}$$

$$\text{Policy Stage: } S_G(x_0) = x_G$$

Note that censure costs do not matter to G's choice to invoke a question of confidence, given of the sequence of proposals.

B. Imperial Brazil: The key difference in bargaining between this "classic parliamentary system," and bargaining under the actual political institutions of Imperial Brazil, was the role played by the fourth branch of government defined by the constitution of 1824. This branch was the "moderating power" (o poder moderador). Unlike a classic parliamentary system, where cabinets emerged from the parliamentary majority, the moderating power gave the emperor the authority to freely select and dismiss cabinets, and to dissolve the lower house of parliament before the end of its four-year term and call new elections. Under the moderating power, the cabinet's loss of a confidence vote did not automatically result in the resignation of the cabinet and new elections for the chamber. The loss of a vote of confidence instead shifted the entire matter to the emperor, who either selected a new cabinet while maintaining the existing chamber of deputies, or instead could maintain the existing cabinet and dissolve the chamber of deputies.

The moderating power was targeted by contemporary critics as a holdover from absolutism.[29] The emperor's use of the moderating power resulted in the early

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[29] Contemporary analyses of the fourth branch of government are found in Zacarias de Goes e Vasconcellos, *Da Natureza e Limites do Poder Moderador* (Brasília: 1978 (reprint)).; Braz Florentino Henriques de Souza, *Do Poder Moderador : Ensaio de Direito Constitucional Contendo a Análise do Título V, Capítulo I, da Constituição Política do Brasil* (Brasília: 1978 (reprint)).

dissolution of the chamber of deputies on eleven occasions.[30] It even more frequently led to changes in the cabinet. The average "life" of a cabinet under emperor Pedro II was only about 11 months.[31] Yet because the emperor could dismiss a chamber that had commanded a majority of votes from the enfranchised citizenry, historians have emphasized that the moderating power left the elected house of parliament relatively weak. Here I show that, in terms of policy bargaining, the chief implication of the moderating power was the opposite of this view. In comparison with the classic parliamentary system modeled above, the Brazilian system reduced the cost of censure to the majority, and enhanced its ability to shift policy in its preferred direction. Under the moderating power there was a positive probability that censure would not result in dissolution. This difference has implications for the power of the majority in policymaking.

Figure 3 portrays the sequence of decisions once the moderating power is included, in extensive form. Under the classic parliamentary system, the voting stage (the second decision node for M) would be the end of the game. In the moderating power system, when M votes to censure, there is an additional stage: the emperor either replaces the cabinet, or dissolves the chamber. To capture the uncertainty attached to the outcome of a censure vote, the emperor's choice is treated as a move by Nature (N), and probabilities are attached to each option, where α is the probability that the emperor favors G dissolves the chamber of deputies following a censure vote, and 1-α is the probability the emperor favors M dismisses the cabinet after censure vote (with $0 \leq a \leq 1$). Since censure costs never enter in into G's choice to invoke a question of confidence, this last-stage uncertainty figures only into M's choice.

For the cabinet the main difference between a moderating power system and the classic parliamentary system in making policy is the cost of invoking a question of confidence in the third stage. Because the emperor could freely choose each cabinet, there was no requirement that the head of the cabinet be a member of the lower house, nor was chamber membership a requirement for any other cabinet member. The ministries of war and the navy were naturally often led by military officers. Other positions in the cabinet were on occasion held by non-office holders. Cabinets almost always included men who were senators, or members of the emperor's council of state. Both were lifetime appointments. Such men did not depend on the lower house of parliament for their future political prospects. Senators had only one way to advance, and that was to the council of

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[30] Visconde de Souza Carvalho, *A História das Dissoluções da Camara dos Deputados* (Rio de Janeiro: 1885).; Assembléa Geral Brasil, Senado and Braz Carneiro Nogueira da Costa e Gama Baependy, *Regimento Interno do Senado : Acompanhado do Regimento Commum ; dos Quadros Demonstrativos da Abertura e Encerramento da Assembléa Geral Legislativa, e das Prorogações, Convocações Extraordinarias, Adiamentos da Assembléa Geral ; Bem Como da Dissolução da Camara dos Deputados ; e do Quadro dos Senadores do Imperio do Brazil, Desde o Anno de 1826 Até 1883* (1883).

[31] Not all cabinets met their demise by being dismissed by the emperor after losing a confidence vote in the chamber. Some resigned due to policy disputes with the emperor, others collapsed in internal dissent, and some still simply stepped down due to fatigue.

state, and councilors had no position to move on to. For a cabinet that was made up of men who were not deputies, the costs of invoking a question of confidence would be lower than for a cabinet consisting solely of deputies. A cabinet that was made up of deputies would be more sensitive to the costs of invoking a confidence vote.

In light of these changes to the costs to both G and M of a confidence vote procedure, the utility functions in the classic parliamentary game are modified in the following way:

$$U_M(x) = K_M - b|x_0 - x_M| - aC_M \quad \text{if M censures G in the final voting stage.}$$

$$U_G(x) = K_G - b|x_0 - x_G| - gE - (1-a)C_G \quad \text{if G makes its proposal a question of}$$
confidence and suffers a censure vote

Sets A and B are modified accordingly:

$$\text{Set } A' = \{x : U_M(x) \geq K_M - b|x_0 - x_M| - aC_{M2}\}$$

$$\text{Set } B' = \{x : U_G(x) \geq U_G(x') - gE\}$$

while set C remains as above.

Strategies for each player at each stage change only insofar as the locations of the sets A' and B' change from A and B, along with the implications of these for whether B'∩C=Ø.

C. Comparing the Policymaking Institutions: The classic parliamentary system above can be seen as a special case of the model for Imperial Brazil, one in which α = γ = 1. Differences between the two appear when one or more of these parameters is less than one. Under Brazil's moderating power arrangements, so long as α is less than 1, set A' is smaller than set A. This can be seen in Figure 2, where M's censure cost is now given by line $C_{M1} = \alpha C_{M2}$. The best policy that G can secure with a confidence vote procedure will be closer to M's ideal point. Moreover, since x' also anchors the set B of policies that G prefers to accept rather than invoking a question of confidence in the procedural stage, if there is an amendment that M can propose and get G to accept and refrain from imposing x' under a confidence procedure, it will be closer to x_M now as well. This can be seen in the locations of x_2 and a_2. Point R here is analogous to point Q above, and is where M is just indifferent between proposing a_2 and provoking a confidence vote procedure and accepting x_2. If B'∩C≠Ø, M is able to make an amendment acceptable to G that is better than what M would be able to make in the classic parliamentary setting, and which improves on the status quo for M. If B'∩C is empty, M will propose as an amendment his ideal point, just as above, to avoid a positioning cost in Stage 2, but in this case the resulting confidence vote procedure results in a policy at x_2. While this point is to the left of the status quo (weakening the pre-existing commitment to debt service), it is less so than in the classic parliamentary setting, and leaves M comparatively better off.

The upshot is that so long as the probability of M being dismissed following censure is less than one, M is actually *favored* in policy bargaining under the moderating power, in comparison with the classic parliamentary system. This result is counterintuitive, given that cabinet responsibility to the chamber of deputies is "weak" under the moderating power, and that contemporaries and historians have stressed the emperor's power to dissolve the chamber. But the fact that censure in Imperial Brazil did not necessarily require new elections, as it would have in a classic parliamentary system, means that the both the best policy that M can obtain if G invokes confidence, and the best policy it can obtain with an amendment and avoid the confidence vote procedure, are both better than they would be in the classic parliamentary system.

D. Hypotheses: Returning to the premise that creditor interests are represented by the chamber majority, and the executive has a stronger preference for default, the model directs attention to several factors that can affect the bargaining positions of the chamber majority and the cabinet. For the majority, changes in α and C_{M2} will change its bargaining position. For example, whenever the emperor is less likely to dissolve the chamber of deputies after a censure vote, policy can be shifted further in the direction of M's preferred point. A reduction in the baseline censure cost to M works in the same direction. There are a number of possibilities here. One is party strength, since a cohesive majority is more likely to be able to defend creditor interests. When M is particularly strong (where strength is party cohesion, rather than size), the emperor might be more reluctant to dissolve the lower house.[32] Similarly, the baseline cost of dismissal may be reduced when the party is strong, if party leaders are more confident that the party will remain intact (if not an outright majority) following the elections.

Electoral rules matter for party strength and cohesion. If creditors are represented mainly by the chamber majority, then electoral rules that strengthen parties should reduce the chances that the cabinet can shift policy away from honoring the debt. Parties are stronger when deputies' incentives to cultivate a personal vote are low. Carey and Shugart show that single-member districts (without full party control of the ballot) are associated with a low incentive to cultivate a personal vote.[33] The personalization of the vote then rises with district magnitude. The first prediction is that an electoral system with single-member districts (SMD) will strengthen parties, with the observable implication that default risk should be lower. Default risk should be higher when elections are conducted on the basis of multi-member districts (MMD), because majority party cohesion will on average be weaker..

When electoral rules specify multi-member districts, there are other differences, in particular the number of votes any single voter was allowed to cast. MMD with bloc voting lets each voter choose cast as many votes as there were seats to fill. MMD with a limited vote set the number of votes that could be cast to be less than the number of seats

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[32] This is not the same as saying that the chamber would not be dissolved; of 17 chambers elected during the Second Reign (1840-1889), only six completed the full four-year term.
[33] Though Brazilian political parties worked hard to influence voting through legitimate and other means, parties did not possess the authority to formally set the ballot.

to fill. Limited voting was not the same as proportional representation, but it did mean that no single party could easily sweep the elections. The implication of limited voting for party strength depended entirely on the number of candidates each party fielded. If a party supported candidates beyond the maximum number of votes that a voter could cast, it pitted members of its party against each other in trying to obtain a seat. If a party limited its support and endorsements to a smaller number of candidates, it could strengthen cohesion, since candidates had little incentive to run under a personal label.

Other characteristics of the electoral system may have mattered. Before 1881 Brazil elected deputies using an electoral college. This two-tiered system meant that votantes selected eleitores locally, who then went on to cast votes for deputies. The electoral reform in 1881 eliminated the lower tier. Table 1 shows the evolution of Brazil's electoral system along these three criteria.

Finally, a dummy variable for weeks that the chamber was in session is included as a control, although the prediction on its sign is ambiguous. Under the assumption that it was the chamber that safeguarded the state's creditors, being in session should reduce default risk. On the other hand, for a cabinet that sought to default constitutionally, such a proposal could only be made while the chamber was in session, so that being in session could bring with it higher risk of default.

With respect to the cabinet's bargaining position, changes in γ and E matter to M's bargaining position. I deal with them as a single term rather than separately, and implicitly take E as constant on average. The source of variation comes through the cabinet's sensitivity to the cost of using the confidence procedure, γ. The greater this sensitivity, the most costly it is to the cabinet to use the confidence vote procedure, and the more favorable the bargaining position of the chamber majority. Sensitivity is taken as a direct function of the composition of the cabinet, and γ is computed as the ratio of the number of deputies in the cabinet to the number of positions in the cabinet.[34] The result is an index ranging from zero to one, by week, that scales the cost to the cabinet of using a confidence vote procedure. Figure 5 presents the evolution of the index over time.   The hypothesis is that, the larger the share of deputies in a cabinet, the higher the cost of invoking confidence on a policy proposal. The higher this cost, the greater the leeway the chamber majority has to shift policy in its preferred direction, which should be associated with a lower risk premium.

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[34] The composition of each cabinet, on a weekly basis, is developed from the information in Luiz Aleixo Boulanger, *Demonstração das Mudanças de Ministros e Secretarios de Estado do Imperio do Brasil de 1822-1863* (Rio de Janeiro: 1864). and Jorge João [Barão de Javari] Dodsworth, *Organizações e Programas Ministeriais: Regime Parlamentar no Império*, 2. ed. (Rio de Janeiro: 1962).. Dodsworth was also the principal source of information on whether a cabinet member was a sitting deputy at the time they were in the cabinet, though it suffers from a number of errors. I checked and corrected these on the basis of Octaciano Nogueira and João Sereno Firmo, *Parlamentares do Império* (Brasília: 1973).

Government Bond Yields and Risk Premia in Rio de Janeiro

Though apólices were first issued in Rio de Janeiro 1828, the first reported secondary market quotes of their price appeared only in the second half of 1829, in Rio's *Jornal do Commércio*.[35] Thereafter apólices traded nearly continuously in Rio. Before 1850, the exchange was an informal and self-governed affair. Bond trading was mixed in with the foreign exchange market, exporting and importing, and even slave trading. With the commercial code of 1850 the exchange was more structured and regulated. From 1829 through the beginning of 1850, apólice prices come from the *Jornal do Commércio* and a few other newspapers, which reported them along with exchange rates, shipping rates, and wholesale prices. From early 1850 onward apólice prices were recorded in the official transactions of the Rio stock exchange, which is the source for the series after from 1850 on.[36] Apólices were quoted only when there were transactions, or at least offers. As a result, of the 3231 weeks spanned by the period considered, there were 2,823 observations of apólice prices. Some 12.6% of the observations are missing. Values for these were interpolated from a cubic spline function. The basic statistical properties of the original and interpolated series are quite similar, as seen in the first two lines of Table 2.

Quotations of the bonds' prices, and the coupon rate, provide the basis for calculating the yield. Because the apólice became a perpetual, without a fixed date of redemption, the current yield is identical to the yield to maturity. Since dividends were paid twice each year, one adjustment is warranted for the frequency of payment. With semester payouts, the annual yield is given by:

$$r_a = \left(\left(1 + \frac{1}{2} currentyield \right)^2 - 1 \right)$$

To the extent that there were fixed-income investment alternatives available in the Rio market, the apólice was likely the least risky, especially when focusing on longer maturing assets. The apólice yield was, for example, always less than the rate on mortgages in Rio, and less than the bank rate on discounted commercial paper.[37] For banking institutions, international merchants, and especially wealthy investors, the less risky alternative to holding apólices was British consols. Though some of Rio's investors and primary dealers could have purchased consols through overseas merchant houses and correspondents, for many it would have been costly to do so. A case can be made for focusing on apólice yields alone, a point that is addressed in the empirical section below.

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[35] Brazil's sterling denominated bonds that were issued in London with fixed maturities were never listed or quoted on the Rio exchange. While some individuals and banking organizations owned them, they found no active market in Brazil.

[36] Arquivo Nacional do Rio de Janeiro (ANRJ), Serie Bolsa de Valores do Rio de Janeiro.

[37] Rates on Treasury bills were no doubt lower. Coupon rates, which is all we have for these, were usually less than the yield on apólices, but their maturity was always one year or less, undermining comparison; Ryan and Summerhill, "Costs of Capital in Nineteenth-Century Brazil," ms., 2009.

While both apólices and consols had very long maturities, they differed in the currency in which they paid dividends, and hence exhibited different inflation risk. Changes in the risk premium thus reflected the market's appraisal of changes in the likelihood that the Brazilian state would fail to pay interest due, and/or allow inflation to erode the value of the dividends.

The risk premium series is constructed in three steps. First, weekly consol yields are derived from consol prices, adjusting for the frequency of coupon payment. Weekly prices for consols in London from 1829 to 1891 are taken from three sources: the *Times* of London, the *Course of the Exchange*, and the *Economist* magazine. Until April of 1881 the data are for 3% consols, paying dividends twice yearly. In April of 1881 the market value of the three-percents exceeded par for the first time, increasing the likelihood that they would be called. This makes them unsuitable as a measure of the long-run rate of interest from that point on. From April 1881 until 1884 the consol yields are based on" New Gladstones," 2.5% consols first issued in 1853. The yield is calculated as:

$$ra = \left(\left(1 + \frac{1}{2} currentyie\ ld \right)^2 - 1 \right)$$

Beginning in 1884 the reference consols are "New Childers," first issued that year, as justified by Klovland.[38] Other than the different coupon rate, the key change in this period was the frequency of the dividend payment. The introduction of the New (Childers) 2.5% stocks in April 1884 shifted the dividend payment from a semester to a quarterly basis. This required a slightly different calculation of the annual equivalent yield:

$$ra = \left(\left(1 + \frac{1}{4} currentyie\ ld \right)^4 - 1 \right)$$

The frequency of the consol observations, like that for the Brazilian apólice prices, was weekly, with one difference. Until 1862 the Exchequer's books were closed on consol trades in the weeks between the announcement of the ex-dividend date, and the actually payment of the dividend. The *Course of the Exchange* did not normally report consol prices during the weeks when the books were closed. Other sources, however, sometimes did report forward prices. These were used when available. Where gaps persisted, the last consol price available was used until a new quote appeared. The third and final step involved subtracting the consol yield from the yield to maturity on the Brazilian apólices. The resulting risk premium series is presented in Figure 4.

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[38] Jan Tore Klovland, "Pitfalls in the Estimation of the Yield on British Consols, 1850-1914," *Journal of Economic History* 54, no. 1 (1994).

Determinants of Changes in Brazil's Risk Premium

A common tack in estimating the impact of events and political factors is to use dichotomous variables. The problem with the approach in practice is that it assumes that the mean value of the dependent variable (here the risk premium) is unchanging over a long period, and fails to allow for other shifts due to factors unrelated to the variables of interest. This creates a potential pitfall, since an event can appear to be highly significant (both statistically and in terms of its impact), when in fact its start and end dates fall close to some other unmeasured event that truly accounts for the change in the dependent variable. The impact of the variable of interest may be spurious, with no actual bearing on the outcome.[39]

To address this challenge the estimation strategy here proceeds in six steps. The first is to ascertain the stationarity of the risk premium series. The second is to perform a naïve test of the impact of the political variables on the risk premium, under the assumption that the mean of the risk premium series is constant. Step three tests the null of a constant mean of the risk premium series against the alternative of one or more structural breaks. Step four estimates the size and location of any breaks, and attempts to relate them to the timing of changes in the political variables. The fifth step is a non-nested hypothesis test of the political variables, to see if they improve on the baseline model that uses only the structural breaks to explain the risk premium.

Results from conventional unit root tests, and a test for stationarity, do not rule out a unit root in the risk premium series. On the basis of an Augmented Dickey Fuller (ADF) test, the null hypothesis of a unit root could not be rejected at the 10% level, with lags selected using both the Schwarz information criterion and Akaike information criterion.[40] The ADF test has low power, and often fails to reject the null when there is no unit root present. Phillips-Perron tests also did not reject the null of a unit root in the risk premium series. A third approach involved the Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test for the stationarity of the series. The LM test statistic from the KPSS approach rejected the null of stationarity. The difficulty with all three tests is that they can suggest a unit root in the series, when in fact the series is stationary once structural breaks are taken into account. Allowing for two endogenously-selected structural breaks, using the Clemente-Montañés-Reyes unit root test, rejects the null of a unit root in the risk premium series.[41]

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[39] Tony Caporale and Kevin Grier, "How Smart Is My Dummy? Time Series Tests for the Influence of Politics," *Political Analysis* 13, no. 1 (2005).

[40] This was the case whether the equation was set to have a trend and intercept, an intercept alone, or no trend and intercept.

[41] The Zivot-Andrews test for a unit root in the presence of a single endogenously-selected structural break likewise did not reject the null of a unit root. Since the Zivot-Andrews procedure does not accommodate more than one break, the Clemente-Montañés-Reyes test was used.

Given that the series is break-stationary, the impact of political variables is estimated using Newey-West standard errors to deal with heteroskedasticity and autocorrelation (with the maximum number of lags set to 52). Column 2 of Table 3 presents the results. The constant shows that the average risk premium from 1829 to 1891 was around 4.55 percent, or 455 basis points on top of the consol yield in London. Three political variables are associated with lower risk premia. These are both statistically and economically significant. The use of single-member districts for chamber elections reduced the risk premium by more than 120 basis points, on average. This effect is consistent with the hypothesis that single-member districts made parties more cohesive, and thus stronger vis-à-vis the cabinet, and made bondholders more secure.[42] Periods in which elections were based on multi-member districts also saw reduced risk premia when limited voting was in effect. The limited vote is associated with an even greater decline in the risk premium than single-member districts, nearly 150 basis points. Though the link between limited voting and strong legislative parties is less clear, the result is consistent with parties supporting a reduced number of candidates in election, precisely to avoid creating incentives for personalistic voting that could weaken party cohesion in the chamber. The hypothesis that a larger share of deputies in the cabinet should strengthen the relative bargaining position of the chamber majority, and reduce the chance of default, is supported by the parameter estimate on the Deputy index variable Not only is the sign of the effect the predicted one, but the effect on the cost of capital is substantial. A cabinet consisting entirely of deputies is associated with a decrease in the risk premium of 146 basis points over a cabinet that excluded deputies.

The change from the electoral college voting system in 1881 has no statistically significant effect on the risk premium. The effect of the chamber being in session is also statistically indistinguishable from zero. However, the results on the other three variables of interest suggest potentially strong political-institutional effects on the risk premium in Rio. Column 3 re estimates the model, dropping the Electoral College and Chamber-in-Session variables. The predicted value of the risk premium from this specification is used below.

Given that the risk premium is break-stationary in the unit root test, the null of a constant mean in the series can already be discarded in favor of an alternative of multiple breaks. However, there may be more than two structural breaks. Various techniques distinguish multiple structural breaks from random variation and short-term fluctuations.[43] In

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[42] There is some limited direct evidence on the strength of parties, as indicated by cohesion in the chamber of deputies. For example, in a chamber elected using single-member districts, roll-call votes exhibited relatively high party cohesion from 1881 to 1884.

[43] Kristen L. Willard, Timothy W. Guinnane, and Harvey S. Rosen, "Turning Points in the Civil War: Views from the Greenback Market," *The American Economic Review* 86, no. 4 (1996).; Jushan Bai and Pierre Perron, "Estimating and Testing Linear Models with Multiple Structural Changes," *Econometrica* 66, no. 1 (1998).; Jushan Bai and Pierre Perron, "Computation and Analysis of Multiple Structural Change Models," *Journal of Applied Econometrics* 18 (2003). Of the two breaks identified by the Clemente-

particular, the procedure developed by Bai and Perron tests for both the existence of multiple breaks, and their location. Several different criteria are available under the Bai-Perron procedure to determine the number and locations of breaks. In historical work, the selection of the number of breaks and their location frequently relies on the Bayes Information Criteria (BIC). As Bai and Perron took care to point out that in the presence of serial correlation the BIC exaggerates the number of breaks in the series. The estimated breaks here are based on the sequential approach and the repartition procedure. I allow the selection only of breaks that "endure," in a statistical sense, for at least three years.

The structural-breaks are estimated on the risk premium in levels, and the parameter estimates for the breaks are readily interpretable in terms of basis points. The results, presented in Table 4, reveal four breaks in the risk premium series.[44] The risk premia "regimes" implied by these breaks are displayed in Figure 6. The spike that is so visible in 1831 in Figure 4 comes too early to register as a break, nor does it fall into the 95% confidence window of the nearest break. The four breaks come in November of 1834, January-February of 1838, August of 1847, and January of 1852. Surprisingly, and despite that fact that the data are weekly over a period of six decades, none of the breaks here is estimated with particularly high precision. The smallest confidence interval spans eighteen months, while the largest covers more than eight years.[45] The interpretation offered here in terms of events sticks close by the actual break dates.

The first two breaks fall in the decade of the regency (1831-1840), an era of sharp political shifts and growing turmoil. Two events stand out for their proximity to the first break. In August 1834 the parliament passed a set of constitutional amendments that created a new set of authorities for Brazil's provincial governments. The reform had long been the goal of a number of regional elites outside of Rio, and its passage can be seen as bringing an end to a stage of political tension dating from the 1820s. Additionally, in December 1834 news of the death of the ex-emperor Pedro I arrived.[46] This brought an

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Montañés-Reyes test, one is identical to the four breaks selected below using the Bai-Perron procedure. Given that the principal purpose of the test is to test the null of a unit root, and it is limited to only two breaks, I do not rely on it for the locations of breaks in the series.

[44] The UD max and WD max tests reject the null of no break against an alternative of at least one break. The BIC indicates nine breaks, the maximum obtainable using the Bai-Perron procedure; this result is likely influenced by the strong serial correlation in the series. The supF test, the sequential procedure at the 1% level, and repartition procedure at the 1% level all indicate four breaks in the series. The locations of the four breaks under the sequential and repartition procedures are identical.

[45] The breaks are estimating using the most general specification for the error structure to accommodate serial correlation in the errors and nonconstant error variances inside and across segments, by computing Andrews HAC standard errors. Note that confidence intervals on the breaks selected using the sequential method are appreciably wider than those for the breaks selected by BIC.

[46] Barman, *Brazil*., p. 178.

end to concern that Brazil could erupt in conflict between restorationists and the nativists who had pressed Pedro to abdicate. The second break, in early 1838, saw in increase in Brazil's risk premium, and came in the midst of a violent and costly months-long revolt in Bahia, with another long-running regional revolt in the far south as a back drop.

The third break in August of 1847 has a confidence interval that accommodates "Brazil's 1848." Liberals in Pernambuco revolted against changes implemented locally after a Conservative cabinet was appointed in Rio de Janeiro. Known as the *praieira*, it was the last major regional revolt of the Imperial era, and was put down in reasonably short order.

The final break in January of 1852 saw the average default premia fall to its lowest level to that point in time, less than three percent above consol yields. The turning point comes just before the military defeat of the Argentine leader Rosas in the battle of Monte Caseros, and only a little more than a month after Brazil formally joined with Uruguay and several Argentine provinces in the effort to defeat Rosas' forces. The Brazilian government had invested considerable diplomatic resources in building this coalition, and although the size of the force was not large, the only regular troops in the field were Brazilian.   Rosas' loss brought about the end of a potentially long-term and costly conflict for Brazil in the Rio de la Plata region.   The confidence interval on the estimate, however, runs all the way back to late 1843. Even ignoring events before, say, 1848, a role for several other nearly coeval events cannot be ruled out in accounting for the break.[47]

Evaluating the Significance of the Political-Institutional Variables: Results and Extensions

As the description of events surrounding the structural breaks suggests, political-institutional factors need not be the main determinant of shifts in the risk premium series. They may nonetheless still play an important explanatory role. To assess the impact of factors beyond the structural breaks, Caporale and Grier propose a non-nested hypothesis test of whether the mean-shift model using dummy variables improve on the pure break-

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[47] A variety of other events fall within this generously broad window (including the entire confidence interval for the third break).   Staying close to the break date, in 1849 the Brazilian cabinet began to earnestly suppress the contraband trade in slaves from Africa, under growing British naval pressure. The major facilities for offloading and auctions slaves along the *fluminense* coastline were shut down by the police in 1850, virtually eliminating the possibility of stronger British intervention. Between November 1851 and March 1852 the Imperial government resumed the regular amortization of its London bonds for the first time in more than twenty years. This had nothing directly to with *apólices*, but signaled the markets that Brazil was serious about its debt service obligations. In 1852 Brazil arranged to borrow through the London Rothschild house for the first time since 1829. All of these measures could have bolstered confidence in Brazil as a borrower more generally.

point model.[48] For the present purpose this approach tests the hypothesis that a model that includes the political-institutional variables dominates one without them, by adding the predicted (fitted) value of the risk premium, derived from the political model, as an additional variable in the break point model. If the fitted political risk premium is significant, the pure break model can be rejected in favor of the model incorporating the political factors. Given the optimal break points, the significance of the political-institutional variables can be assessed directly in terms of the statistical significance of the added variable.

The first column of Table 3 presents the results of the pure structural break model, with each segment between break points serving as a dummy variable. The model is estimate with Newey-West standard errors, and a maximum of 52 lags. Table 5 presents the results of the non-nested test of the political-institutional model, using the "B" version of Table 3 to predict the risk premium.[49] The political-institutional variables indeed provide incremental explanatory power. Although a strict focus on BIC would actually point to the structural breaks model as the better model, the political-institutional model rejects the pure-breaks model, since the coefficient on the predicted risk premium is statistically significant in Table 5. In sum, the evolution of the risk premium on domestic bonds in the Rio de Janeiro market was significantly influenced by changes in the electoral system, and by changes in the share of the cabinet that was made up of members of the chamber of deputies. The structural breaks in the series are readily interpretable in terms of domestic political conflict and events. Yet additional information is embedded in the political factors that structured the relative bargaining positions of the chamber majority and the cabinet. Political-institutional factors bearing on the bargaining power of the chamber majority had predicted effects on the risk premium, even after structural breaks are accounted for.

Several alternatives and extensions are worth considering. First is the definition of the outcome variable. The estimates reported are those for the risk premium. Under the assumption that the apólice yield was effectively the risk-free rate for the Rio capital market (since the ability to invest in consols was limited for most of the market by cost and distance), the yield itself, rather than the spread, would be preferable, an absolute indicator of the state's creditworthiness. The political-shift model using the yield gives quantitatively and qualitatively similar results. The pure-breaks model for the yield returns only two structural breaks instead of the four present in the risk premium series. However, the upshot of the non-nested hypothesis test is the same as in Table 5. Including the yield predicted from the political-institutional variables provided incremental explanatory power over the pure-breaks model.

A second alternative would involve different independent variables, particularly those that involve the ability to repay. Ability to repay may have both economic and distinctly political-fiscal underpinnings. Indeed, one view is that fiscal "strength," rather than

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[48] The test is a partial application of Davidson and McKinnon's J-test method for non-nested hypothesis testing.

[49] The results in Table 5 are unchanged if the "A" version is used instead.

credible commitment, was the key determinant of risk premia.[50] The political cost of raising taxes to service debt is undoubtedly important; indeed, it is a central factor in whether default penalties are strong enough to deter default, particularly under fiscal stress, and accordingly figures into the risk premium. The importance of ability-to-repay variables is an empirical question that cannot be addressed for Brazil with high-frequency data. Results in two different frameworks, using annual data and reported elsewhere revealed only weak effects on Brazil's borrowing costs and secondary market yields from changes in its ability to repay.

Third, the political-institutional variables assessed here, and their implications for cabinet-legislative bargaining, were unlikely to have been the only way in which politics systematically mattered to the credibility of the state's commitment to service its domestic debt. One can readily imagine other political factors might figure into the risk premium. The emphasis thus far has been on the strength of the chamber majority relative to the cabinet, for institutional and historical reasons. Partisan control of the government might also be an important factor in determining default risk. If, as Stasavage found for eighteenth-century England, one party or identifiable faction was particularly influenced by state creditors, one would expect the risk premium to fall when that group held power. For Imperial Brasil, however, there is little to no partisan effect on domestic bond yields and risk premia. This result is perhaps unsurprising, since there is no hint in the historiography that either Liberals or Conservatives represented a "moneyed interest." Before 1840 no clearly identifiable parties existed. For the post 1840-period, based on results not reported here, there was no party effect from the majority in the chamber of deputies. Focusing on the party of the cabinet, the only significant (and negative) effect on bond yields comes from the *bi-partisan* governments of the mid-century political *conciliação*.

Fourth, yet another way of assessing the importance of particular political coalitions in terms of their implications for default risk would be to simplify the approach, and treat each cabinet as distinct, rather than as an instance of one party or another in charge of the government. The relationship between each cabinet and the chamber majority it confronted could then be left unspecified. Empirical tests along those lines, and analogous in approach to those performed here, reveal similar results: the risk premium from a political-intercept shift model, based on cabinet-specific dummy variables, is statistically significant when added in the pure break model. Predicting the risk premium on the basis of cabinet dummies provides incremental explanatory power over the structural breaks alone, and carves out a role for politics in explaining shifts in Brazil's risk premium.   The result points to the importance of cabinets, but without providing insights on what characteristics of cabinets mattered more generally, and how they

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[50] S.R. Epstein, *Freedom and Growth: The Rise of States and Markets in Europe, 1300-1750* (London and New York: 2000).; Patrick K. O'Brien, "Fiscal Exceptionalism: Great Britain and Its European Rivals, from Civil War to Triumph at Trafalgar and Waterloo," in *London School of Economics Economic History Working Paper* (2001).   For a detailed analysis that combines the two views, see Dincecco, *Political Transformations and Public Finances: Europe, 1650-1913*.

figured into bargaining power vis-à-vis the lower house. The approach taken in this paper, by modeling the strategic interaction between the cabinet and the legislative majority, and relating it to observable features of the electoral system and the cabinet's composition, is an effort to move beyond such ad hoc use of political dummy variables.

Conclusion

Imperial Brazil was the most successful of all Latin American sovereign borrowers. Capital markets on both sides of the Atlantic rewarded the Brazilian state for its commitment to debt repayment, providing it with increasing amounts of credit at lower cost.[51] As a result, Brazilian governments could smooth public expenditures, and avoid the economic distortions arising from abrupt changes to tax rates, by recourse to borrowing. The government was "rationed-in" the capital market. Most strikingly, Brazil's ability to borrow long at home was unparalleled elsewhere in Latin America. Indeed, only in the relatively advanced, industrializing economies of the North Atlantic was there a similar reliance on domestic sources of state finance.

Despite its enviable ability to borrow, the Brazilian state's bonds also exhibited a highly variable credit risk. This risk is indicated by an original measure of the yield and risk premium on Brazilian domestic bonds, constructed using more than 3,000 weekly observations of the price of bonds that comprised the core of Brazil's domestic debt. A systematic search for breaks in the risk premium series revealed four significant shifts from 1829 to 1891.

Evaluating the impact of political or institutional factors on fiscal outcomes over time is often accomplished through the use of dichotomous ("dummy") variables. Such an approach, by assuming an unchanging mean, fails to acknowledge that a variety of other factors may explain shifts in the series. Many of these other factors may be difficult to test for, in that they lack independent indicators that can be used in empirical work. By identifying shifts in the mean of the risk premium series through a structural breaks approach, it is possible to assess the significance of political-institutional effects. Though there has been little (or no) historical work done on the cabinet-legislative politics of debt service during the imperial era, the results here reveal that bond holders were not only informed about changes that impacted the bargaining power of the legislative majority, but used that information to update their expectations of default. Brazilian default risk was viewed by the market through a political lens.

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[51] A companion paper to this one focuses on Brazil's sterling bonds in the London market from 1825 through 1889.

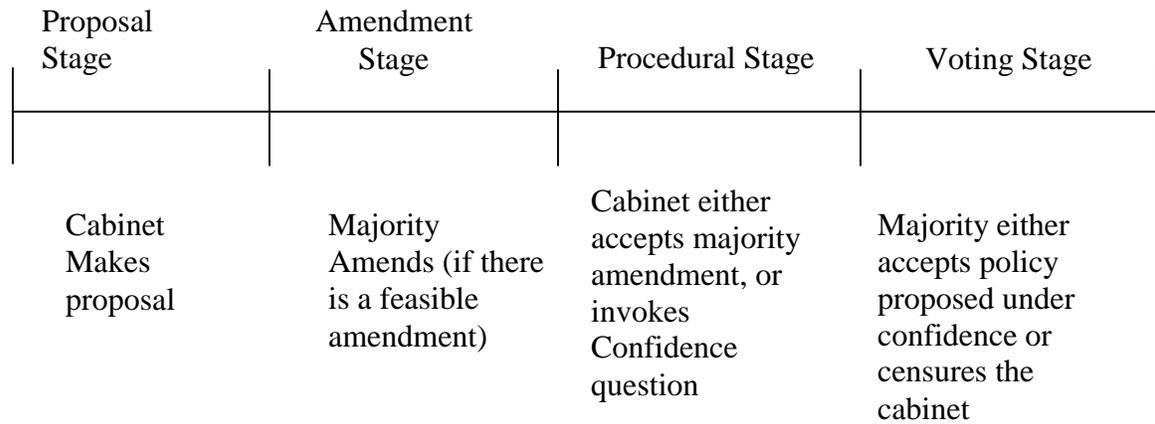Figure 1. Sequence of Actions Cabinet-Chamber Majority Game

Proposal Stage	Amendment Stage	Procedural Stage	Voting Stage
Cabinet Makes proposal	Majority Amends (if there is a feasible amendment)	Cabinet either accepts majority amendment, or invokes Confidence question	Majority either accepts policy proposed under confidence or censures the cabinet

Figure 2. Spatial Model of Bargaining Between Cabinet and the Chamber Majority
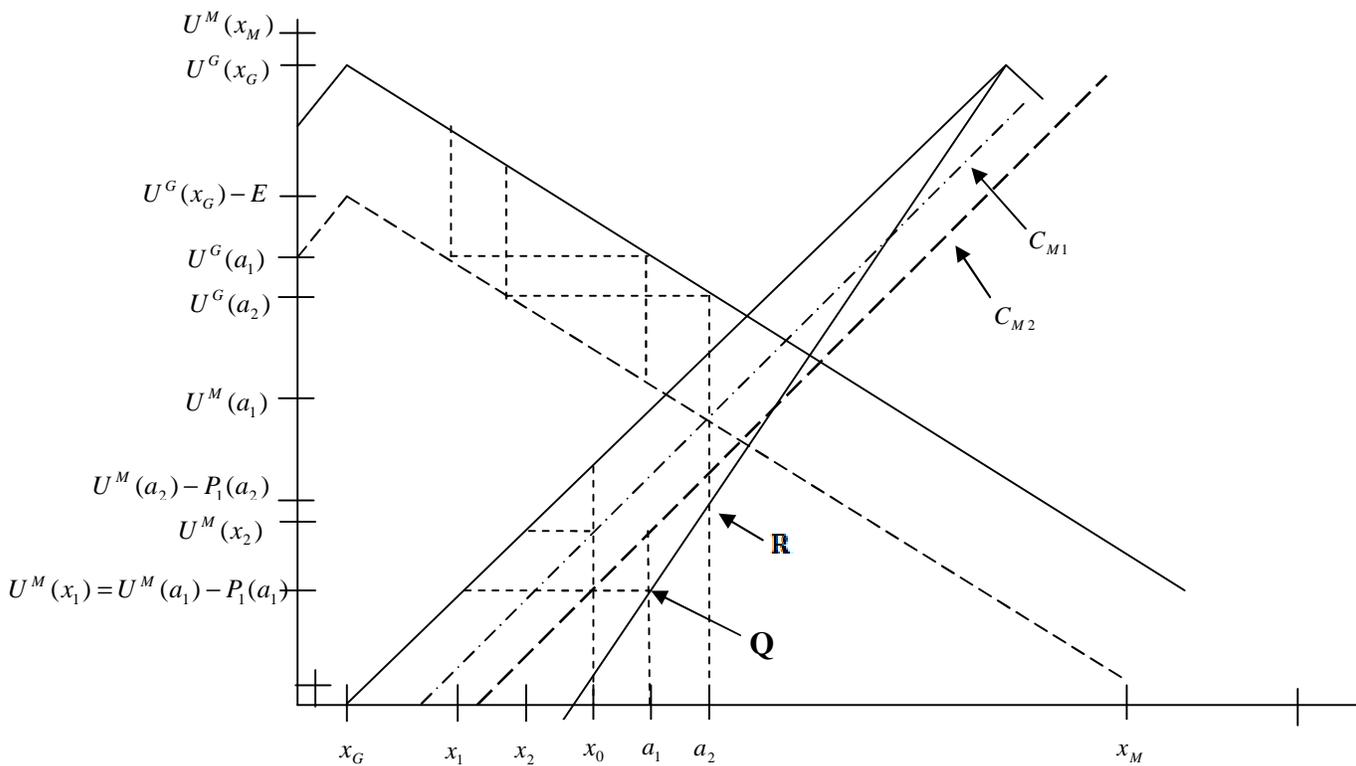
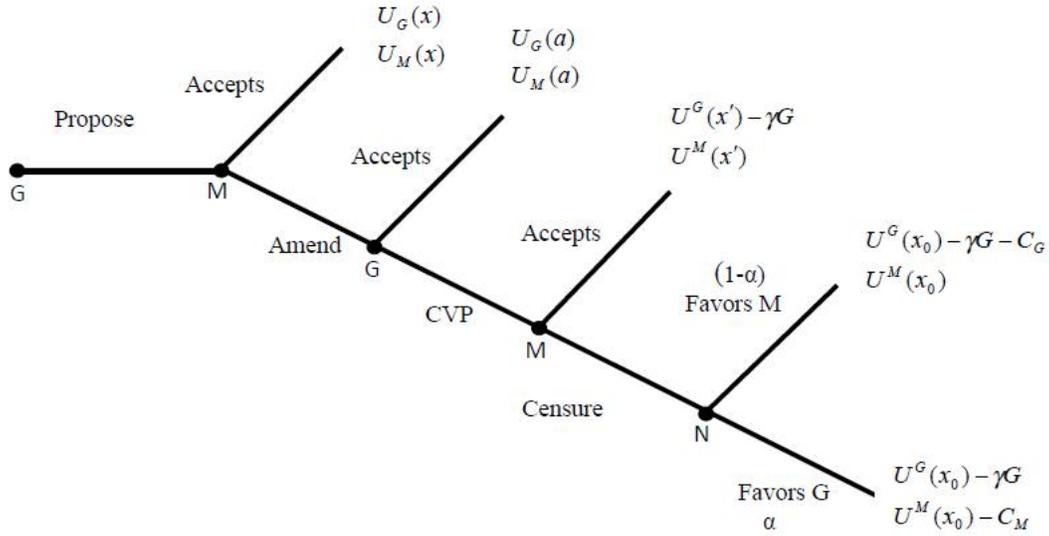Figure 3. Cabinet-Chamber Majority Game under the "Moderating Power"
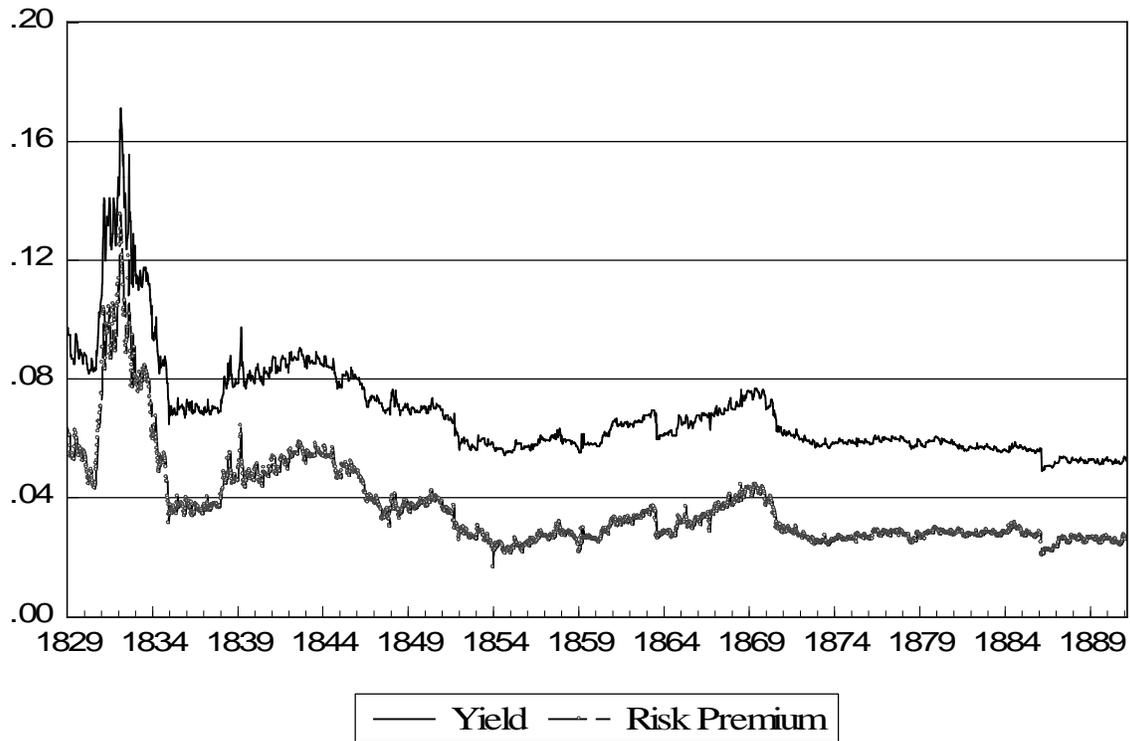

Figure 4. Apólice Yield and Risk Premium in Rio de Janeiro, 1829-1891

Note: Weekly data. Yield is the annual compound yield. Risk premium is the yield next of the annual compound consol yield in London. Sources: see text.

Figure 5. Share of Cabinet Made Up of Deputies from the Lower Chamber

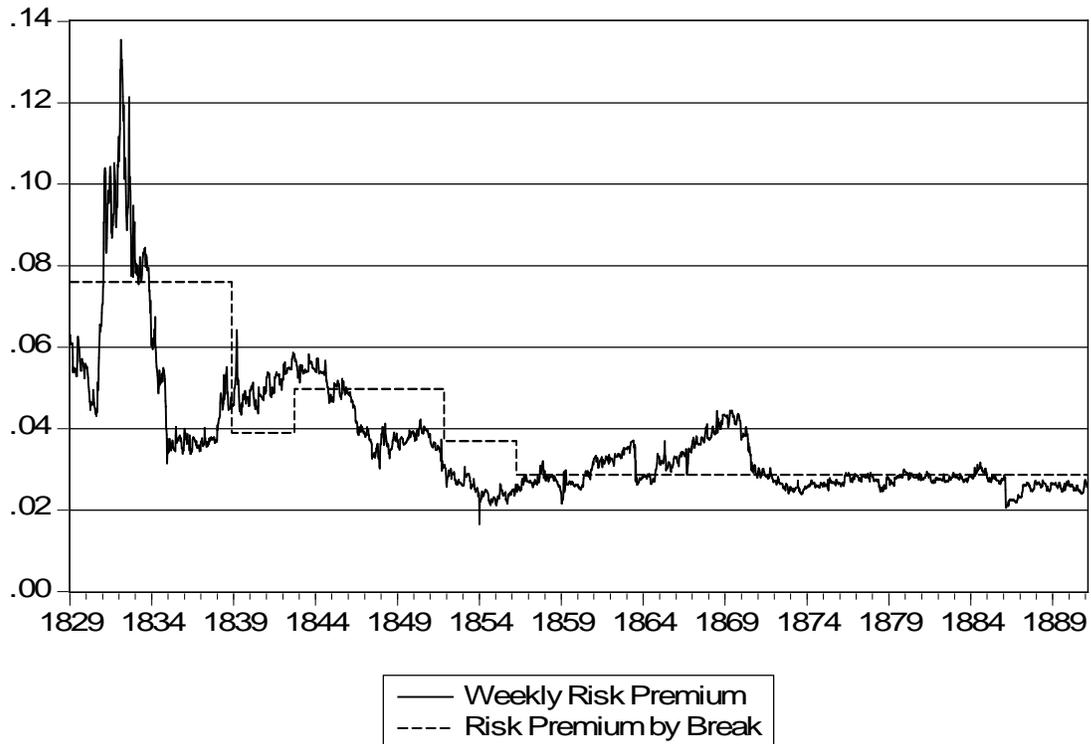Figure 6. Risk Premia Regimes based on Structural Break Points

Table 1. Brazilian Electoral Law Related to Voting for the Chamber of Deputies

Electoral Laws by Year	V (votes per voter)	K (district magnitude in seats)	District Type	Type of plurality vote	Electoral college
1826	k	k	MMD	bloc	1
1846	k	k	MMD	bloc	1
1855	1	1	SMD	bloc	1
1860	3	3	MMD	bloc	1
1875	2/3 k	k	MMD	limited	1
1881	1	1	SMD	bloc	0

V is the number of votes for deputies that a voter can cast. K is the district magnitude; when expressed as k the district magnitude varies by district. District Type reduces district magnitude to a dichotomous variable, either Single-Member District or Multi-Member District. Type of vote reduces "votes per voter" to a dichotomous variable, either bloc voting, or limiting voting. Electoral College takes on the value of one until 1881 when Brazil used two-tiered voting, and zero after the electoral college was eliminated.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Original Yield	2823	0.069782	0.017675	0.049037	0.171139
Interpolated Yield	3231	0.068994	0.017205	0.049037	0.171139
Interpolated Risk Premium	3231	0.037072	0.016043	0.016596	0.135428
Single Member District	3160	0.195570	0.396701	0	1
Limited Vote	3160	0.081962	0.27435	0	1
Electoral College	3160	0.867089	0.339533	0	1
Chamber in Session	3160	0.438291	0.496256	0	1
Deputies in Cabinet	3160	0.389323	0.204622	0	1

Table 3. Regression of Risk Premium on Structural Breaks and Political Variables

Variable	Structural Break Model	Political-Institutional Model "A"	Political-Institutional Model "B"
BP Regime 2	-0.0371***		
	(0.0084)		
BP Regime 3	-0.0263***		
	(0.0082)		
BP Regime 4	-0.0391***		
	(0.0081)		
BP Regime 5	-0.0474***		
	(0.0081)		
Single Member Districts		-0.01137***	-0.01226***
		(0.0024)(0	(0.0025)
Limited Vote		-0.01476***	-0.01486***
		(0.0029)	(0.0029)
Share of Deputies in Cabinet		-0.01468***	-0.01462***
		(0.0066)	(0.0066)
Electoral College		0.0013	
		(0.0016)	
Chamber in Session		0.0005	
		(0.0044)	
Constant	0.0761***	0.0455***	0.0466***
	(0.0081)	(0.0041)	(0.00406)
N	3231	3160	3160
Adj-r2	0.77	0.184	0.183
F	63.14	6.72	9.9
BIC	-22251	-17751	-17753

Newey-West standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 4: Break Points in the Risk Premium Series for Apólices in Rio de Janeiro, 1829 to 1891

Minimum Interval Length (h)=161 weeks, Maximum number of structural breaks (m)=9

Break Weeks (T_i)	Boundary Months for 90% Confidence Interval	
November 20, 1834	November 20, 1834	September 23, 1836
August 31, 1838	September 8, 1836	May 31, 1839
August 16, 1847	August 3, 1847	February 2, 1849
January 5, 1852	August 11, 1843	January 8, 1852

Parameter	b_i	Corrected Standard Errors
b_1	0.076	0.0075***
b_2	0.039	0.0019***
b_3	0.050	0.0017***
b_4	0.037	0.0006***
b_5	0.029	0.0013***

$R^2 = 0.77$ Number of Breaks Selected By:
$F(5,3226)= 2164$ supF test = 4
n = 3231   Sequential procedure= 4
*** significant at 1% level   Repartition procedure= 4

NOTE: Both the UD max and WD max tests support the alternative of breaks vs. the null of no break. The number of breaks selected using BIC is 9, and using LWZ is 7.

Table 5. Non-Nested Test of Political-Institutional Model

Variable	Structural Breaks + Predicted Risk Premium
BP Regime 2	-0.0367***
	(0.0084)
BP Regime 3	-0.0259***
	(0.0082)
BP Regime 4	-0.0393***
	(0.0081)
BP Regime 5	-0.0456***
	(0.0081)
Predicted RP	0.1972**
	(0.078)
Constant	0.0676***
	(0.0085)
N	3160
r2	0.774
F	71.54
BIC	-21765

Newey-West standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

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