Crude Credit: The Political Economy of Natural Resource Booms and Sovereign Debt Management*

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Abstract

Oil, gas, and minerals have notoriously adverse effects on institutional quality. But when global liquidity is high, risk-tolerant investors are more willing to lend to all borrowers, even resource-rich countries with low-quality institutions. Despite the availability of cheaper credit during commodity booms, we argue that countries do not increase current borrowing to mitigate future revenue shortfalls during commodity busts. Instead, they rely on resource windfalls to meet their current financing needs, fearing they would otherwise forfeit national policy discretion to global financial markets. We leverage primary evidence from extensive field research across five Latin American countries to show that national economic officials (i.e. finance ministers and central bank governors) are wary of high indebtedness, after past commodity booms ended in cycles of lofty spending, borrowing, and default. For sovereign borrowers, high bond market indebtedness often reduces government discretion over economic policy, whereas windfalls increase it; all else equal, national governments will favor the latter. Using data on 22 Latin American and Caribbean countries from 1996 to 2019, we find that governments issue bonds less frequently, in smaller amounts, as their GDP share from resource rents or oil and gas production increases. These findings make an important contribution to our understanding of how commodity cycles affect global capital markets: sovereign borrowers do not fully leverage commodity booms to expand their fiscal space or budgetary room to finance more spending over time.

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1 Introduction

In December 2008, President Rafael Correa of Ecuador refused to repay $30.6 million in bonds, despite having $5.65 billion in cash reserves, claiming that this debt was "illegitimate" and bondholders were "real monsters."[1] Ecuador went on to default on $3.2 billion of debt, then repurchased most of it at 35 cents on the dollar.[2] Within three years, the world's major sovereign credit rating agencies — S&P, Moody's, and Fitch — seemed to have all but forgotten this event: they upgraded their assessment of Ecuador, praising "the government's capacity to secure access to new external financing."[3] The small Latin American nation continued to be a speculative creditor, but investors were optimistic: given that oil accounted for over half of all Ecuadorian exports, high oil prices were expected to improve the government's ability (if not willingness) to honor outstanding commitments. As a result, investors offered Ecuador better access to private credit at lower interest rates. JPMorgan's Emerging Market Bond Index (EMBI) Global – the benchmark index for measuring sovereign risk among investors – showed a more than five-fold improvement in Ecuador's risk premium between 2008-2011, falling by 3,885 basis points over 3 years (see Figure 1).

The political economy literature expects investor sentiment to improve during commodity upturns. When global capital markets are awash in money, as was the case during the 2000s commodity boom, investors show an increased appetite for higher-risk assets like Ecuador's (Ballard-Rosa, Mosley and Wellhausen, 2021). In light of this expectation, President Correa's choice not to use sovereign debt markets to hedge Ecuador's commodity dependence was puzzling. Despite the cheaper financing costs, Ecuador issued *less* sovereign debt during this period (see Figure 1); rather than leverage low interest rates to borrow more, Correa's government largely withdrew from capital markets, returning briefly in June 2014. Though

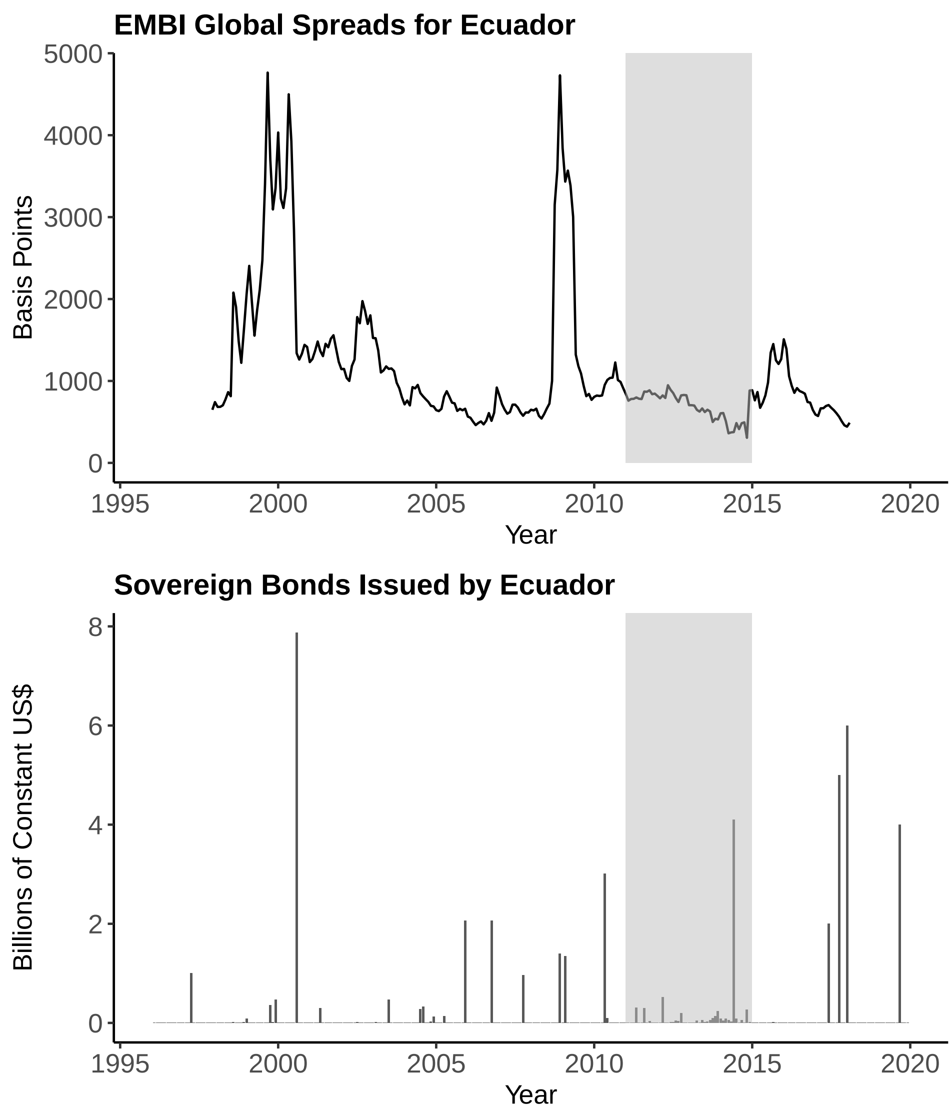
[1]Naomi Mapstone. "Ecuador Defaults on Sovereign Bonds." *Financial Times.* 12 December 2008.

[2]Vivianne Rodrigues and Andres Schipani. "Ecuador Returning to Bond Market After 2008 Default." *Financial Times.* 15 June 2014.

[3]Nathan Gill. "Ecuador Credit Rating Raised by Moody's on China, Finances." *Bloomberg.* 14 September 2012.

capital markets were eager to lend, Ecuador was far less eager to borrow, instead turning to oil windfalls (along with oil-backed loans from China) to cover its financing needs. President Correa understood "that markets are a reality" but also declared that he would "never subject the country to those markets!"[4]

Figure 1: EMBI Global Spreads and Amount of Debt Issued by Ecuador, 1996–2019



This figure shows the value of EMBI Global spreads for Ecuador (top), in basis points, and the amount of sovereign debt issued by the central government of Ecuador (bottom), in billions of constant US dollars. The period of investor optimism discussed in the text (between 2011 and 2014) is shaded in grey. Sources: JP Morgan and Bloomberg Terminal, respectively.

[4] "Person of The Year interview with Rafael Correa." *Latin Finance.* 13 March 2015.

For a developing country like Ecuador that has suffered repeatedly from financial crises, Correa's market skepticism has strong political appeal nationally. However, too much market circumspection risks missing important financing opportunities that could enhance state capacity. If creditors were willing to finance Ecuador cheaply, it is surprising that President Correa — a trained economist — chose not issue more debt to boost Ecuador's fiscal space or budgetary room to finance more spending over time.

Is Ecuador's response an exception, or a rule? To what extent do national governments adjust their borrowing behavior in response to commodity windfalls? We argue that governments fear forfeiting national policymaking discretion to global markets. Whereas bonds reduce the incumbent's discretion over economic policy, windfalls increase it; all else equal, governments will favor the latter. Using data on 22 countries in Latin America and the Caribbean between 1996 and 2019, we show that Ecuador is no exception: all else equal, governments in the region tend to *reduce* bond issuance as natural resource revenue increases. Instead of taking advantage of cheap credit to increase borrowing and public spending, these governments use windfalls to meet existing fiscal needs, issuing bonds less frequently and in smaller amounts. Conversely, regional bond issuance tends to increase when fiscal revenue or resource windfalls decline.

We argue that developing countries do not take advantage of this financing opportunity because public officials and sovereign debt managers have internalized the historic lessons from the late 20th century debt crises: sovereign borrowing is economically, politically, and electorally costly. Even in the best of times, developing markets like Ecuador are subject to high risk premiums (Wibbels, 2006); their political autonomy is constrained by bondholders (Kaplan and Thomsson, 2017); and voters are generally critical of large public debt (Bansak, Bechtel and Margalit, 2021). In contrast, windfalls do not require repayment and are less subject to public scrutiny (Paler, 2013); hence, governments tend to prefer it.

Ironically, when governments decide not to expand their fiscal space with cheap debt issuance, they make it more difficult to smooth fiscal consumption over time. Financing tends to be more expensive during commodity downturns, meaning their ongoing resource reliance threatens to hinder both their borrowing capacity and policy discretion, potentially further destabilizing the economy.

Given its combination of deep capital market development and historical oil dependence, Latin America is the ideal region for our analysis. On average, governments in the region have funded about two-fifths of their external financing (or more than 11 percent of their total GDP) in global capital markets, beginning with the Brady Plan in 1989. Other resource-rich regions, like Sub-Saharan Africa, have limited experience with sovereign bond issuance.[5]

An extensive literature debates the extent to which natural resources have adverse effects on political institutions and democratic governance (Dunning, 2008; Ross, 2015). Latin America has at times exhibited a resource curse: in Argentina (Gonzalez, 2018), Brazil (Caselli and Michaels, 2013), Colombia (Martínez, 2023), and elsewhere, oil royalties are associated with increased patronage, though they also tend to facilitate redistribution (Dunning, 2008). From a sovereign risk perspective, scholars have paid less attention to the relationship between commodity cycles and financial governance institutions. In parallel, a growing body of work seeks to explain capital market behavior using supply-side considerations (the creditor perspective), but demand-side predictors (the debtor perspective) did not receive much attention until recently (Mosley and Rosendorff, 2023). The IMF classifies 51 countries as resource rich and 12 countries as "prospectively" resource rich (Venables, 2016),[6] but researchers know little about the conditions characterizing capital market borrowing in these countries. Natural resources have previously been studied in tandem with taxation (e.g. Paler, 2013; Borge, Parmer and Torvik, 2015; Martínez, 2023), but not, to our knowledge, along with other forms of public financing. We aim to fill this gap by bringing together two strands of research on natural resources and sovereign debt that have largely ignored one another previously.

[5] Other than South Africa, which regularly issues bonds since 1991, most nations in the region only entered bond markets after 2006.

[6] This classification, according to Venables (2016, 162), "is based on a country deriving at least 20 percent of exports or 20 percent of fiscal revenue from nonrenewable natural resources."

We begin by reviewing the predictors of supply and demand for sovereign debt, developing expectations for credit demand in a resource-rich region. We test these expectations using monthly bond issuance data for 22 countries. Probit and tobit models show that higher natural resource rents and changes in production are associated with a decline in both bond issuance frequency and issuance. In robustness checks, we use seemingly unrelated regressions (SUR) to examine the compositional nature of sovereign debt, confirming that a decrease in bond issuance is not offset by increases in other types of borrowing. Notwithstanding the availability of resource windfalls, the countries most likely to borrow from capital markets are those with sustained technocratic expertise. In conclusion, we discuss how our results apply to other regions of the world and present avenues for future research.

2 Natural Resources and Sovereign Debt

2.1 The Creditor Perspective

Faced with limited time and certainty, international investors evaluate sovereign credit risk using a small number of indicators, such as electoral and political uncertainty (Kaplan, 2013), public deficit size and inflation rate (Mosley, 2000), elections and time in office (Brooks, Cunha and Mosley, 2022), balanced budget rules (Kelemen and Teo, 2014), membership in international organizations (Gray, 2009), size and conditions of IMF loans (Chapman et al., 2017), central bank independence (Bodea and Hicks, 2018), regime type (Ballard-Rosa, 2020), and creditworthiness of peer countries (Brooks, Cunha and Mosley, 2015). Developing countries are subject to greater scrutiny; given the higher investment risk, investors seeking to enter these markets tend to take more indicators into account (Brooks, Cunha and Mosley, 2015).

The reputational implications of natural resource wealth have received limited attention (see Collier 2017 for an exception). Perhaps this is because natural resources can have a mixed effect on sovereign credit risk. On the one hand, resource windfalls increase countries' *ability* to repay outstanding debt commitments — and debt repayment is often most important to investors. On the other hand, resource windfalls might reduce a country's *willingness* to honor its commitments, as incumbents can afford to default on their debt and eschew capital markets altogether. This is, in part, because natural resources tend to increase corruption (Vicente, 2010; Caselli and Michaels, 2013; Brollo et al., 2013), reduce transparency (Williams, 2011), weaken property rights (Jensen and Johnston, 2011), strengthen authoritarian rule (Ross, 2015), and reduce the demand for democratic accountability (McGuirk, 2013), though these negative effects are conditional on the quality of domestic institutions and the availability of human capital resources (Jones Luong and Weinthal, 2006; Kurtz and Brooks, 2011). Previous research has identified the existence of a "democratic advantage" (Schultz and Weingast, 2003): liberal democracies are more likely to honor their debt commitments than autocracies, as voters can sanction political leaders in the event of default.[7] We are less likely to observe this sanctioning mechanism in resource-rich countries, where democratic accountability is typically much weaker; if so, then resource-rich countries should be even less likely to repay their debt than their resource-poor counterparts.

Ballard-Rosa, Mosley and Wellhausen (2021) allow us to reconcile these mixed expectations by showing that the democratic advantage is contingent on global liquidity. Resource rents might lead to a deterioration in institutional quality, but from the perspective of investors, the liquidity provided by resource booms outweighs these institutional concerns. As global liquidity increases, investors become more risk-tolerant and are willing to lend to anyone — even to resource-rich countries with potentially corrupt leaders who are not held accountable. Hamann, Mendoza and Restrepo-Echavarria (2020) argue that higher oil prices and production are associated with lower long-run perceptions of sovereign risk. In the appendix, we provide statistical evidence that confirms this finding, reflecting investors' willingness to look beyond the expectations of the resource curse, under the right conditions.

[7] As Archer, Biglaiser and DeRouen (2007) show, the democratic advantage does not necessarily translate into better credit ratings.

2.2 The Debtor Perspective

Commodity upturns might lead to better borrowing conditions due to increased global liquidity, but for developing countries, borrowing is expensive even in the best of times. Not only are countries subject to high risk premiums, their policy autonomy is often constrained by bond markets. Given that bondholders can withdraw capital at any moment, governments that are more reliant on bond markets must exhibit greater fiscal discipline — for example, by setting more ambitious targets for balanced budgets and low inflation (Kaplan and Thomsson, 2017). Sovereign borrowing can also be electorally costly. Voters are often fiscal conservatives who support austerity (Blinder and Holtz-Eakin, 1984; Peltzman, 1992; Bansak, Bechtel and Margalit, 2021), though they care little about debt when informed that debt reduction would imply cutting spending and hiking taxes (Bremer and Bürgisser, 2022).

Policymakers have internalized the high costs of debt issuance from past debt crises (Dargent, 2014, 2020). Learning from these crises, they became more selective borrowers, in what former Argentine Finance Minister Aldo Ferrer called "vivir con lo nuestro," or living within one's own means (Campello, 2015, 177). Similary, according to former Argentine Finance Minister José Luis Machinea, the debt crisis experience prompted the region to "learn from history and from governments that have collapsed from grave economic crises."[8]

Drawing on primary interview evidence and official commentaries across five Latin American countries, we expect that government officials have reinforced this notion of policy learning over time. For instance, Nelson Barbosa, Brazil's Finance Minister (2015-2016) under left-wing President Dilma Rousseff, concurs that his country changed its borrowing behavior in recent decades: "it ended in debt in the 1980s. It ended in debt in the 1990s. But, we are not going to go down this road again."[9] Chile's former Central Bank governor and current Finance Minister, Mario Marcel, echoed a fiscal learning motif when discussing 21st century regional policy making: "macro disequilibrium was the Achilles heel of the new democra-

[8]Authors' interview. Santiago, Chile, 2007.

[9]Authors' interview. Brasília, Brazil, 2017.

cies. We learned a lot about what to avoid from experience."[10] These lessons paid dividends from the perspective of former Argentine Secretary of the Treasury, Miguel Braun: "much of the region, Chile, Colombia, etc...[has done] the reform... so more people will be part of the global economy; they have less debt, high levels of reserves, flexible exchange rates, low inflation, and they weathered the storm last year fantastically well."[11]

Of course, not all countries in the region pursued an explicit policy of "desendeudamiento" (de-indebtedness), as Argentina did between 2003 and 2013, and not all were as confrontational as former Ecuatorian President Correa, who suggested nervous investors "take a Valium" (Campello, 2015, 132). But these lessons tend to cross ideological lines, as illustrated by Minister Barbosa's caution about indebtedness above. Similarly, Alberto Acosta, a former energy and mining minister under leftist President Correa, emphasized that Ecuador's government today has again "moved toward neoliberalism because of the crisis, the macroeconomic failure... there is not a miracle source where you turn a key to creates dollars; it arrives at a point where there is no more."[12]

In contrast to capital market constraints, resource rents generate additional fiscal space with no strings attached: they allow governments to increase spending in politically and electorally strategic sectors without the need to remain accountable to voters or bondholders, weakening individuals' motivation to monitor their leaders (Paler, 2013). Latin America's "pink tide" in the early 2000s, when several leftist presidents came to power, was only possible because these presidents had abundant foreign currency from resource windfalls that could finance statist, nationalist, and redistributive policies, without repayment concerns (Remmer, 2012). Alternative sources of revenue relaxed policy constraints and reduced bondholders' ability to discipline leftist incumbents (Campello, 2015). Bonds decrease the incumbent's discretion over economic policy, whereas rents increase it; all else equal, governments will favor the latter. In light of this evidence, we predict that sovereign bond issuance will sys-

[10]Authors' interview. Santiago, Chile, 2007.
[11]Authors' interview. Buenos Aires, Argentina, 2019.
[12]Authors' interview. Quito, Ecuador, 2015.

tematically *decline* as natural resource windfalls increase. Specifically, Hypothesis 1 and 2 predict that the *frequency* of bond issuance as well as the *size* of issued bonds will decline when resource revenues increase — for example, when countries derive a higher GDP share from resource rents, when resource production increases, or when resource prices are high. Under these circumstances, incumbents can withdraw from capital markets — partially or completely — because they have additional fiscal space.

> **Hypothesis 1:** *All else equal, governments will issue bonds less frequently as natural resource windfalls increase.*

> **Hypothesis 2:** *All else equal, governments will issue bonds in smaller amounts as natural resource windfalls increase.*

When might governments be more equipped to use bond markets to hedge against revenue shortfalls? The predicted advantages of resource revenue over sovereign borrowing decline when countries have steady access to capital markets. Technocratic expertise can help improve sovereign debt management by defraying the costs of entering capital markets. First, given that many Latin American technocrats have been trained in mainstream economics, they often share similar policy preferences to bondholders. The political cost of bond issuance is often lower because they are less likely to view their policy autonomy as potentially constrained by capital markets. For example, scholars have found that cabinet members' education reflects their ideological preferences, and is often a good predictor of the policies they will pursue during their appointment (Chwieroth, 2007; Nelson, 2014; Kaplan, 2018). In particular, finance ministers with graduate degrees in economics from US universities are more likely to hold mainstream technocratic beliefs: they tend to promote fiscal discipline, capital account openness, and trade liberalization when in power (Nelson, 2014).

Secondly, less frequent turnover of cabinet members allows for learning and continuity, which in turn reduces the economic cost of bond issuance. Finance ministers with longer tenure are better able to issue bond prospectuses, orchestrate road show presentations, organize bond auctions, and facilitate networks of relationships with potential investors. They are also better able to smooth consumption over time by issuing debt, independent of natural resource wealth. As a consequence, bond issuance might be less costly when finance ministers are technocrats with job stability, in which case natural resource wealth should be less important: these governments should borrow from capital markets more frequently, in greater amounts, notwithstanding the availability of additional windfalls.

3 Empirical Tests: The Effect of Natural Resource Booms on Bond Issuance

3.1 Data

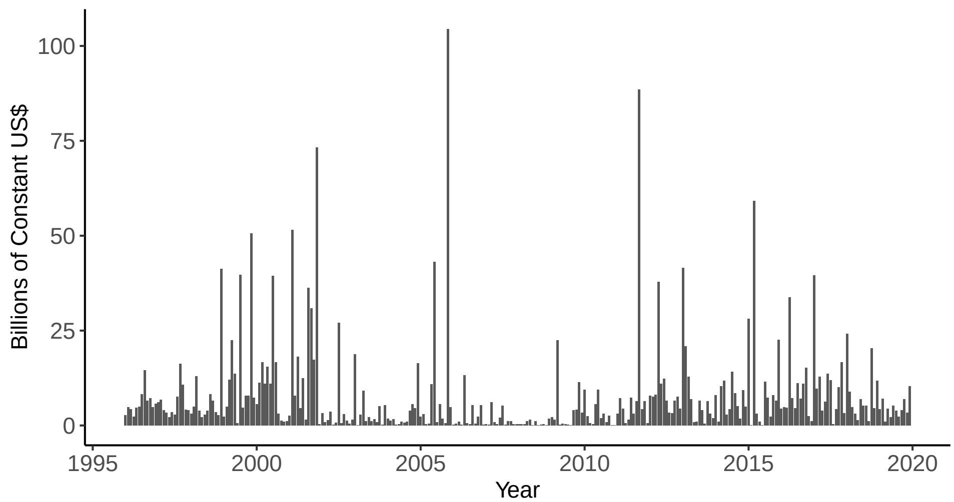
3.1.1 Dependent Variable

Following Ballard-Rosa, Mosley and Wellhausen (2021), we use Bloomberg Terminals to retrieve all bonds issued by 22 countries in Latin America and the Caribbean[13] between 1996 and 2019, focusing on untapped bonds with maturities greater than one year. Figure 2 shows the total amount of debt issued during this period.

Our data, collected in 2022, differ from Ballard-Rosa, Mosley and Wellhausen in two ways: we end our coverage in 2019 (rather than 2016) and include smaller Latin American countries like Guyana, Suriname, and Uruguay. Like the authors, we generate two dependent variables: *Sovereign Issued* is a dichotomous indicator of whether the central government issued debt in primary capital markets each month; if applicable, *Ln Sovereign Amount Issued* indicates how much debt was issued, in constant 2022 US dollars (logged). We add one US dollar to country-months without issues before logging.

[13] These are all countries with over 500,000 inhabitants, excluding Cuba and Haiti (see appendix for list).

Figure 2: Total Amount of Sovereign Debt Issued, 1996–2019



This figure pools *Sovereign Amount Issued* for all countries in the sample, for every month between January 1996 and December 2019. Estimations use the logged value of each variable, adding one dollar before logging when the value equals zero. Source: Bloomberg Terminal.

3.1.2 Independent Variables

Four independent variables quantify natural resource revenue. The first is *Resource Rents* (as a percentage of GDP), the sum of oil, natural gas, coal, mineral, and forest rents, calculated as the difference between the price of each commodity and the average cost of producing it. While this variable (drawn from the 2023 version of the World Development Indicators) is only available on a yearly basis, it allows us to quantify how much natural resource revenue directly accrues to the state.

The remaining three resource-related variables are available on a monthly basis. First, *Ln Oil and Gas Production* is the average daily output of crude oil, natural gas, and other liquids, in thousands of barrels per day (logged), compiled by the US Energy Information Administration (EIA). Second, Gruss and Kebhaj's (2019) country-specific *Commodity Price Index* weighs up to 45 individual commodities — from aluminum to zinc — by their share of net exports in a country's aggregate output. The resulting variation allows us to estimate how much each country gains or loses from monthly changes in global prices. A net oil exporter like Venezuela, for example, stands to gain much more from an increase in global oil prices than a net importer like Nicaragua.

Finally, *Field Discovery* denotes the discovery of a giant, supergiant, or megagiant oil and gas field — a field with over 500 million recoverable barrels of oil or over 3 trillion cubic feet of gas — between 1996 and 2019, compiled by Horn (2014), updated by Cust, Mihalyi and Rivera-Ballesteros (2021).[14] *Ln Oil and Gas Production* and *Commodity Price Index* capture information about resource output today, whereas *Field Discovery* represents "new shocks about future output" (Arezki, Ramey and Sheng, 2017, 121), reflecting beliefs about tomorrow's resource windfalls.

Oil, gas, metals, and other non-renewable resources have a low price elasticity of supply (van der Ploeg and Poelhekke, 2009). Producers are not able to immediately adjust the supply in response to demand changes, so they cannot respond to price changes by increasing or decreasing production overnight. Hence, *Ln Oil and Gas Production* is unlikely to change quickly in response to price changes, and the inverse is equally unlikely to occur because Latin American nations are price takers and not price setters. This gives us confidence that resource prices and resource output will have separate effects on the outcomes of interest.

3.1.3 Control Variables

A mix of political and economic indicators is likely to influence borrowing decisions. *Mainstream Minister*, based on data collected by Kaplan (2018), denotes whether the incumbent Finance Minister (or equivalent) earned a master's degree or above from an economics department in the US; these individuals should be more likely to issue bonds, at greater amounts, since they face fewer political costs when entering capital markets. *Minister Turnover* tallies the frequency of Finance Minister turnover in the previous five years. When turnover is frequent, there is less learning and less continuity, which might translate into less frequent debt issuance. Relatedly, *Debt Crisis Experience* indicates whether the

[14] Since the authors provide this information on a yearly basis, we use LexisNexis to uncover the exact month of discovery.

country in question experienced any sovereign debt crisis episode in the past (Laeven and Valencia, 2020).

Election Month and *Left Executive* (Cruz, Keefer and Scartascini, 2021) account for the possible existence of electoral cycles and partisan differences; other than Guyana and Jamaica, all countries in our sample are presidential systems with strong presidents (Tsebelis and Alemán, 2005). To gauge the effect of institutional constraints on governments' ability to issue debt, we include a dichotomous indicator for the existence of a fiscal council, an independent non-partisan agency that assesss government compliance with fiscal policy and fiscal rules, using data collected by Davoodi et al. (2022), as well as for a country's political constraints, using Henisz's POLCON III index.

To quantify the existence of alternative sources of revenue and the existence of fiscal constraints, models include *IMF Agreement* (based on data from Kentikelenis, Stubbs and King 2016 complemented by the IMF MONA Database) and five variables reported by CEPAL: *Fiscal Balance* as well as *Tax Revenue* (both as a percentage of the GDP), *Ln Core Inflation*,[15] *GDP Per Capita* (in thousands of constant 2010 US dollars), and *GDP Growth* (in percent). Multilateral loans, fiscal surpluses, and higher tax income should reduce a country's borrowing needs, whereas low inflation, high GDP per capita, and high GDP growth should make it easier for countries to borrow.

Lastly, models control for *Capital Openness* (Chinn and Ito, 2006), *Ln International Reserves* (in billions of US dollars, from the Joint External Debt Hub), and the *US Treasury Rate* (the per annum yield on ten-year Treasury constant maturities, reported by the US Federal Reserve), since an increase in US rates should reflect tighter borrowing conditions globally. Inflation and treasury rates are lagged by one month; *Ln International Reserves* is lagged by one quarter; and *Fiscal Balance*, *Tax Revenue*, *GDP Per Capita*, *GDP Growth*, and *Capital Openness* (which are only available on a yearly basis) are lagged by one year.

[15] Guyana's inflation figures are not available from CEPAL; we use the World Development Indicators instead.

3.2 Empirical Strategy

The average nation included in the analysis issued untapped bonds with maturities greater than one year in 71.9 of all 288 months between January 1996 and December 2019. Yet there is considerable variation between countries: while Uruguay issued bonds in 137 out of 288 months, Guyana did not issue bonds at all. This means that *Ln Sovereign Amount Issued* is left-censored: it takes the value of zero for a substantial number of observations. Our empirical strategy must account for this censoring, as parameters obtained with ordinary least squares would be biased.

Like Ballard-Rosa, Mosley and Wellhausen (2021), we model bond issuance using a two-step strategy. First, a probit selection equation models whether our outcome of interest is observed, that is, whether a sovereign government issues a bond in a given month, as captured by the latent variable y_i^*. If the outcome is observed, the second step is to estimate an equation with the observed dependent variable y_i — in our case, *Ln Sovereign Amount Issued*:

$$y_{it}^* = x_{it}'\beta + \varepsilon_{it} \tag{1}$$

$$y_{it} = \begin{cases} 0 & \text{if } y_{it}^* \leq 0 \\ y_{it}^* & \text{if } y_{it}^* > 0 \end{cases} \tag{2}$$

This two-step process captures our expectation that both the decision to issue debt and — if applicable — the amount of debt issued are influenced by natural resources. Models include a time trend and country fixed effects to control for heterogeneity across units. For small values of t, probit or tobit models with fixed effects can yield biased estimates (Greene, 2004), but the long duration of our time series minimizes this issue.

3.3 Results

Table 1 presents the results of the first stage regression: a series of probit models investigating what predicts Latin American governments' initial choice to issue bonds. Model 1 only includes the four resource-related independent variables, all of which have a negative effect on the dependent variable *Sovereign Issued*, which supports Hypothesis 1. In particular, governments are significantly less likely to issue bonds as their GDP share coming from resource rents increases, as oil and gas production increases, or as the monthly commodity price index increases. Models 2 and 3 include political and economic control variables, respectively, whereas Model 4 includes all controls.

Since the coefficients of a probit model are difficult to interpret, Figure 3 builds on Model 4 to provide the predicted probabilities of observing *Sovereign Issued*, by country, at different values of *Resource Rents*. Between 1996 and 2019, Guyana, Honduras, and Panama issued bonds rarely or not at all, hence the low predicted probability for these three. Though there is variation from one country to another, the negative effect of *Resource Rents* on the outcome of interest is consistent across Latin America and the Caribbean, as is the effect of *Ln Oil and Gas Production*, which Figure 4 confirms.

Table 1 also supports our expectation that technocratic expertise is associated with higher debt issuance. Finance Ministers with graduate degrees from US economic departments are less constrained by global capital markets, and thus significantly more likely to issue bonds. Frequent minister turnover has the opposite effect: when turnover is high, governments are less likely to invest in market relations, including new bond issuance. The remaining control variables follow the expected directions. For instance, governments with a fiscal council or running a fiscal surplus tend to issue bonds at a lower frequency, as do those with alternative revenue sources (e.g. taxes), while those with high GDP growth tend to borrow more regularly to finance their expansionary needs.

If a government decides to issue bonds in a given month, Table 2 presents the results of the second stage regression: a series of tobit models with *Ln Sovereign Amount Issued* as the dependent variable. Again, the four resource-related variables have a negative effect on the outcome, supporting Hypothesis 2. In these models, linear change in the independent variable *Resource Rents* is associated with multiplicative change in the dependent variable

Table 1: The Effect of Natural Resources on Sovereign Debt Issuance, 1996–2019

	Dependent Variable:			
	Sovereign Issued (Yes = 1)			
	(1)	(2)	(3)	(4)
Resource Rents, % of GDP $_{t-1}$	-0.027^{***}	-0.030^{***}	-0.036^{***}	-0.033^{***}
	(0.007)	(0.008)	(0.010)	(0.011)
Ln Oil and Gas Production $_{t-1}$	-0.130^{**}	-0.088	-0.245^{***}	-0.167^{***}
	(0.059)	(0.060)	(0.064)	(0.064)
Commodity Price Index $_{t-1}$	-0.009^{*}	-0.011^{**}	-0.005	-0.003
	(0.005)	(0.005)	(0.006)	(0.007)
Field Discovery $_{t-1}$	-0.166	-0.200	-0.168	-0.184
	(0.213)	(0.209)	(0.230)	(0.227)
Mainstream Minister = 1		0.312^{***}		0.234^{***}
		(0.050)		(0.053)
Minister Turnover (5 Years)		-0.067^{***}		-0.051^{***}
		(0.017)		(0.018)
Debt Crisis Experience = 1		0.043		0.015
		(0.056)		(0.059)
Election Month = 1		-0.045		-0.073
		(0.150)		(0.160)
Left Executive = 1		0.050		0.031
		(0.052)		(0.055)
Fiscal Council = 1		-1.048^{***}		-1.107^{***}
		(0.134)		(0.141)
Political Constraints		0.249^{*}		0.256
		(0.144)		(0.162)
IMF Agreement = 1			0.036	0.020
			(0.054)	(0.057)
Fiscal Balance, % of GDP $_{t-1}$			-0.028^{**}	-0.033^{***}
			(0.013)	(0.012)
Tax Revenue, % of GDP $_{t-1}$			-0.013	-0.027^{*}
			(0.014)	(0.015)
Ln Core Inflation $_{t-1}$			0.102	-0.078
			(0.087)	(0.071)
GDP Per Capita $_{t-1}$			0.030	0.022
			(0.020)	(0.022)
GDP Growth, % $_{t-1}$			0.022^{***}	0.017^{**}
			(0.007)	(0.007)
Capital Openness $_{t-1}$			-0.035	-0.163
			(0.106)	(0.109)
Ln International Reserves $_{t-1}$			0.423^{***}	0.397^{***}
			(0.058)	(0.064)
US Treasury Rate, % $_{t-1}$			-0.043	-0.031
			(0.032)	(0.034)
AIC	6303.616	6036.349	5947.559	5701.903
Log Likelihood	-3124.808	-2984.174	-2937.779	-2807.952
Observations	6,288	6,014	5,975	5,708

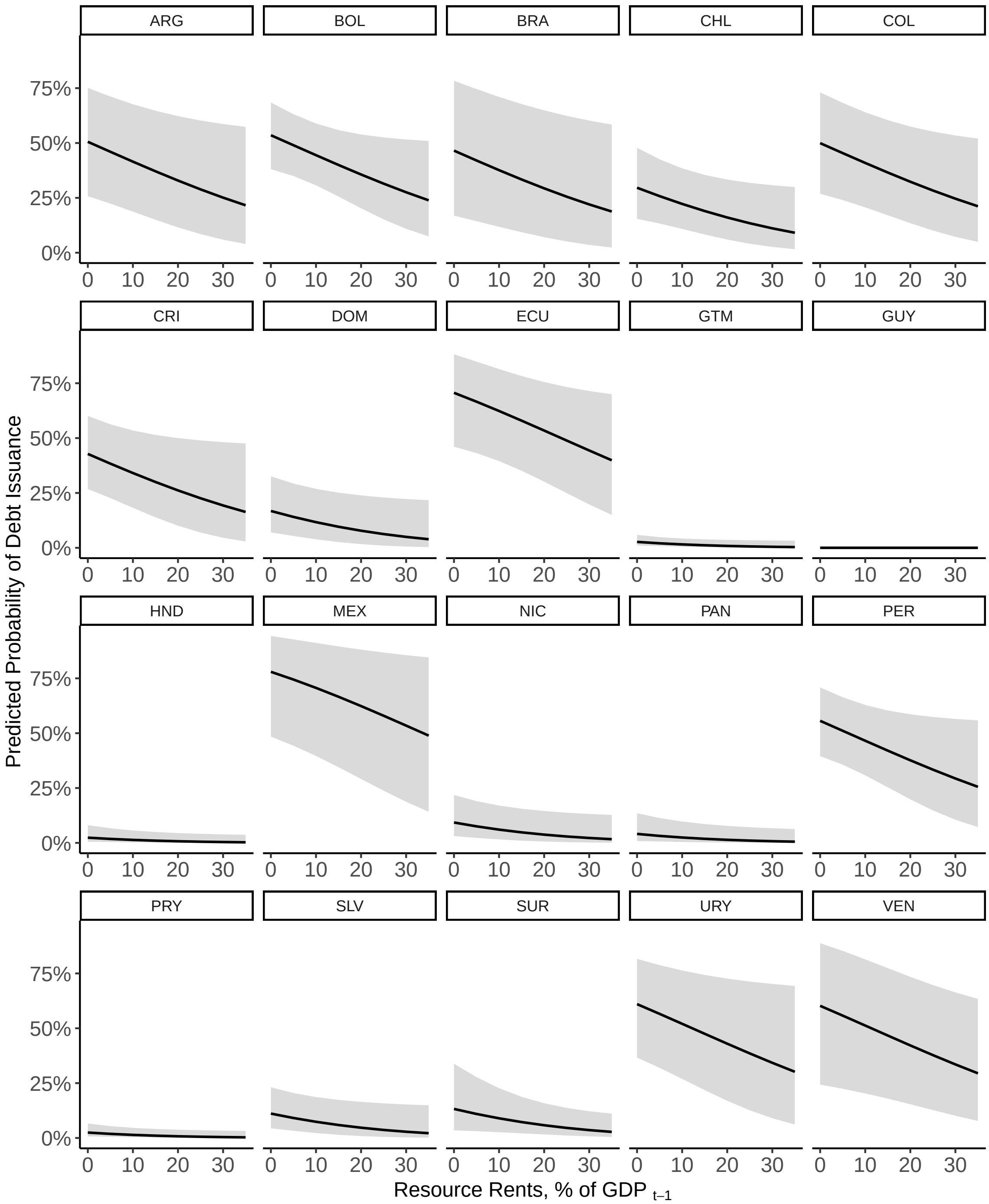
This table presents the results of probit models that include country fixed effects, a constant, a time trend, and standard errors clustered by country. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Table 2: The Effect of Natural Resources on Amount of Sovereign Debt Issued, 1996–2019

	Dependent Variable:			
	Ln Sovereign Amount Issued			
	(1)	(2)	(3)	(4)
Resource Rents, % of GDP $_{t-1}$	-0.600^{***}	-0.629^{***}	-0.756^{***}	-0.672^{***}
	(0.155)	(0.161)	(0.208)	(0.217)
Ln Oil and Gas Production $_{t-1}$	-3.208^{***}	-2.342^{**}	-5.357^{***}	-3.775^{***}
	(1.169)	(1.159)	(1.260)	(1.249)
Commodity Price Index $_{t-1}$	-0.202^{**}	-0.245^{**}	-0.105	-0.078
	(0.101)	(0.105)	(0.131)	(0.137)
Field Discovery $_{t-1}$	-3.263	-3.828	-3.300	-3.489
	(4.765)	(4.574)	(5.087)	(4.911)
Mainstream Minister = 1		6.501^{***}		4.829^{***}
		(1.013)		(1.070)
Minister Turnover (5 Years)		-1.341^{***}		-1.054^{***}
		(0.326)		(0.352)
Debt Crisis Experience = 1		0.991		0.325
		(1.110)		(1.145)
Election Month = 1		-0.994		-1.459
		(3.035)		(3.195)
Left Executive = 1		0.718		0.326
		(1.044)		(1.123)
Fiscal Council = 1		-20.867^{***}		-22.164^{***}
		(2.551)		(2.667)
Political Constraints		5.026^{*}		4.796
		(2.876)		(3.137)
IMF Agreement = 1			0.647	0.435
			(1.095)	(1.128)
Fiscal Balance, % of GDP			-0.542^{**}	-0.639^{**}
			(0.259)	(0.253)
Tax Revenue, % of GDP $_{t-1}$			-0.350	-0.603^{*}
			(0.299)	(0.313)
Ln Core Inflation $_{t-1}$			1.930	-1.611
			(1.742)	(1.490)
GDP Per Capita $_{t-1}$			0.749^{*}	0.549
			(0.401)	(0.434)
GDP Growth, % $_{t-1}$			0.416^{***}	0.318^{**}
			(0.152)	(0.146)
Capital Openness $_{t-1}$			-0.056	-2.900
			(2.139)	(2.156)
Ln International Reserves $_{t-1}$			8.230^{***}	7.446^{***}
			(1.160)	(1.241)
US Treasury Rate, % $_{t-1}$			-1.048	-0.822
			(0.649)	(0.667)
Log(Scale)	3.118^{***}	3.092^{***}	3.107^{***}	3.083^{***}
	(0.012)	(0.012)	(0.012)	(0.013)
AIC	18078.104	17620.585	17210.865	16774.078
Log Likelihood	-9011.052	-8775.292	-8568.433	-8343.039
Observations	6,288	6,014	5,975	5,708

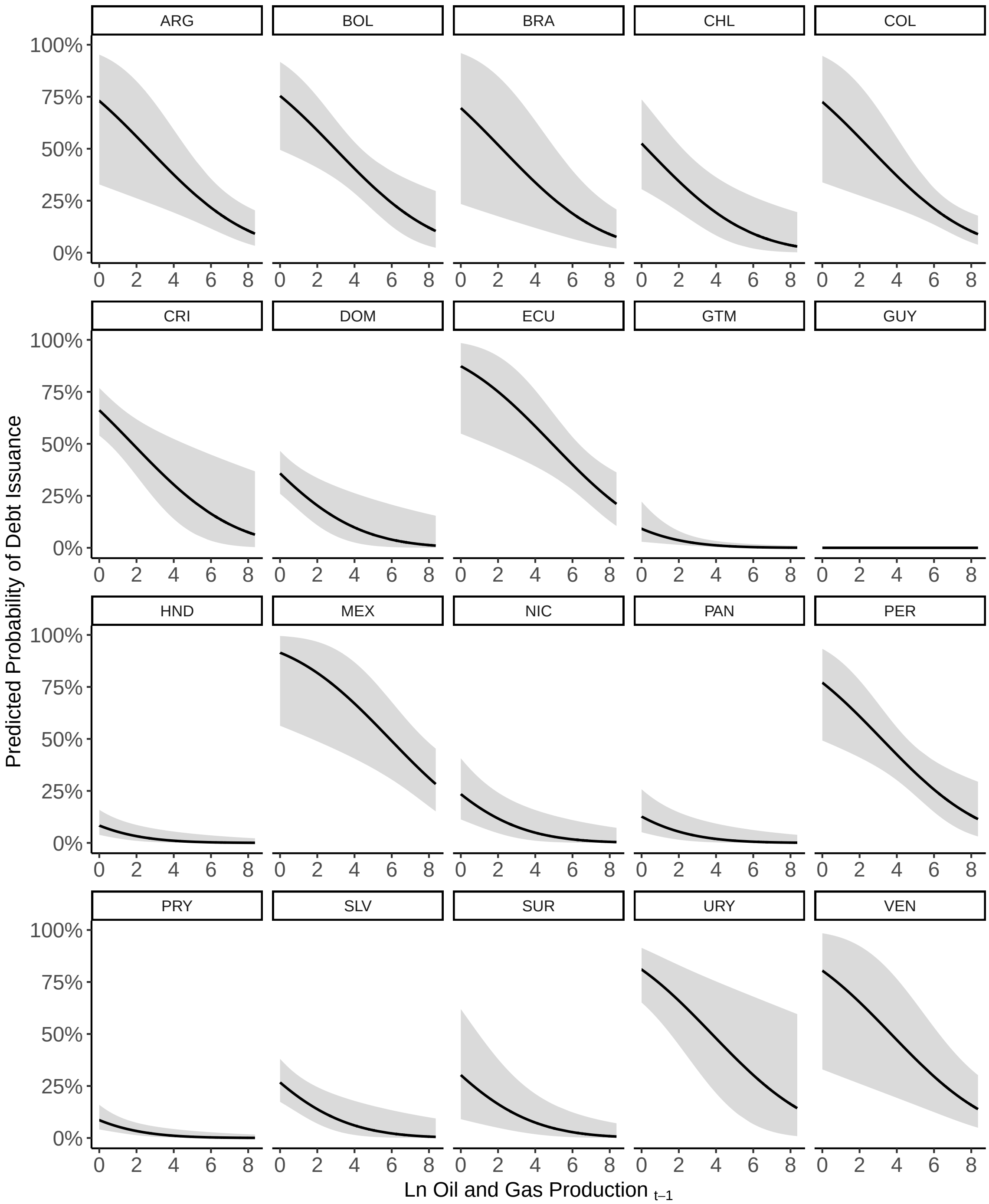
This table presents the results of tobit models that include country fixed effects, a constant, a time trend, and standard errors clustered by country. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Figure 3: Predicted Probability of Observing *Sovereign Issued* Conditional on *Resource Rents*, by Country



This figure shows the predicted probability of observing *Sovereign Issued*, by country, conditional on values of *Resource Rents*. This figure is based on Model 4 of Table 1, which includes country fixed effects, a constant, a time trend, and standard errors clustered by country.

Figure 4: Predicted Probability of Observing *Sovereign Issued* Conditional on *Ln Oil and Gas Production*, by Country



This figure shows the predicted probability of observing *Sovereign Issued*, by country, conditional on values of *Ln Oil and Gas Production*. This figure is based on Model 4 of Table 1, which includes country fixed effects, a constant, a time trend, and standard errors clustered by country.

Ln Sovereign Amount Issued, which is logged. According to Model 4, a one percent increase in the ratio of resource rents to GDP is associated with a nearly 49 percent decline in the size of issued bonds.[16] Since both *Ln Sovereign Amount Issued* and *Ln Oil and Gas Production* are logged, their coefficients represent the elasticity of the former relative to the latter: a one percent increase in oil and gas production is associated with a significant 3.8 percent decrease in the size of bonds issued in the subsequent month. The commodity price index also has a negative effect on the outcome, as do oil or gas field discoveries, though these effects are not statistically significant once the control variables are included. The remaining coefficients in Table 2 mirror the size, direction, and significance of those in Table 1, reinforcing our confidence in the robustness of these findings. Overall, countries appear to issue significantly more debt out of necessity (when tax revenues and resource rents are low), but not when it is cheap to do so (when commodity prices are high or the US treasury rate is low).

In the appendix, we show that these results are robust to excluding the sample's largest oil producers (Brazil, Mexico, and Venezuela). These results also hold when we replace *Mainstream Minister* with *Mainstream Central Bank President* or when we exclude Ecuador and Argentina, which largely left international bond markets after defaulting and only returned in 2014 and 2016, respectively. Finally, we interact *Mainstream Minister* with the four natural resource variables and find no consistent effect, concluding that technocrats' choice to issue sovereign debt is driven by factors other than natural resource revenue.

3.4 Robustness Checks

3.4.1 Comparison With Debt from State-Owned Enterprises

We showed that sovereigns issue fewer bonds, in smaller amounts, following increases in resource rents or resource production. Still, sovereigns could be delegating bond issuance to state-owned enterprises in the extractive sector, which "operate in opaque institutional

[16] $100 \times (e^{\beta_1} - 1) = 100 \times (e^{-0.672} - 1) = -48.93138$.

environments that lack oversight" (Mahdavi, 2020, 6). To test for this possibility, we turn to bonds issued by national oil, gas, and mining companies (NOCs) like PDVSA (Venezuela), Pemex (Mexico), Petrobras (Brazil), or CODELCO (Chile). *NOC Issued* is a dichotomous indicator of whether any of the country's NOCs issued debt in primary capital markets each month; if applicable, *Ln NOC Amount Issued* indicates how much debt was issued, in constant 2022 US dollars (logged). As with sovereign debt, *Ln NOC Amount Issued* is left-censored: while Pemex issued debt in 101 months, Yacimientos Petrolíferos Fiscales Bolivianos did not issue debt a single time. For this reason, we estimate probit and tobit models, excluding countries without NOCs (see full list in appendix) — hence the reduced number of observations.

Table 2 shows that NOCs, like sovereigns, issue bonds more frequently and in larger amounts as the ratio of resource rents to GDP increases — in other words, as a larger share of natural resource revenue accrues directly to the state. However, the other three resource-related variables have non-significant effects that go in different directions, suggesting that these companies do not borrow to invest in oil and gas extraction in the wake of a field discovery. Their borrowing behavior is similarly unresponsive to most domestic political factors, like minister education, minister turnover, or election cycles. Rather, NOCs issue significantly fewer bonds, in smaller amounts, when a left executive is in power or when the government is under an IMF agreement, as such agreements often condition loan disbursement to state-owned enterprise audit, reform, and even privatization. Conversely, higher fiscal balance, higher GDP per capita, smaller international reserves, and cheaper credit (as indicated by the US treasury rate) are associated with significant increases in NOC borrowing. Compared to sovereigns, NOCs are less responsive to natural resource revenue: they have more opaque decision-making and are therefore less constrained by capital markets. But these results suggest that sovereigns are not offsetting their reduced bond issuance by increasing NOC borrowing when resource windfalls are large.

Table 3: The Effect of Natural Resources on NOC Bond Issuance, 1996–2019

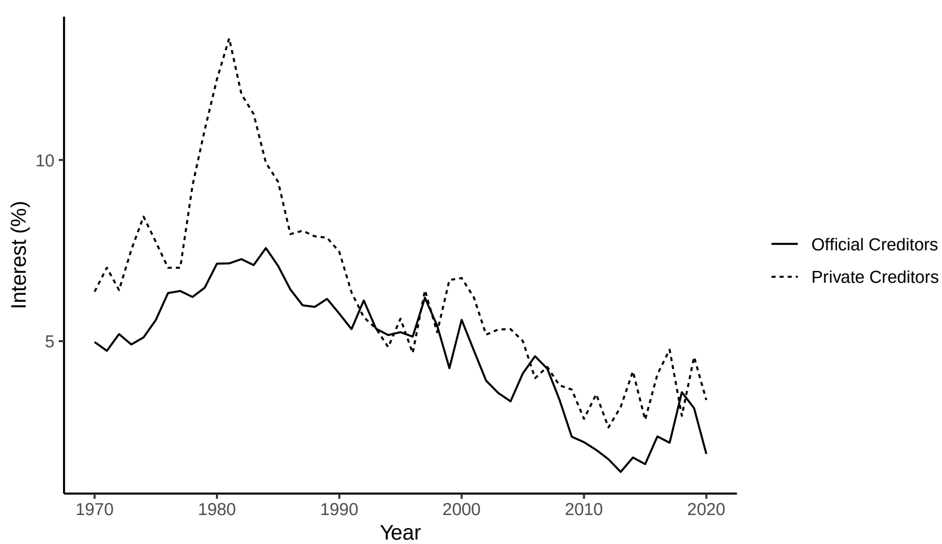
	Dependent Variable:	
	NOC Issued (Yes = 1)	Ln NOC Amount Issued
	(1)	(2)
Resource Rents, % of GDP $_{t-1}$	-0.066^{***}	-1.901^{***}
	(0.025)	(0.692)
Ln Oil and Gas Production $_{t-1}$	-0.068	-2.031
	(0.260)	(7.171)
Commodity Price Index $_{t-1}$	0.005	0.157
	(0.020)	(0.581)
Field Discovery $_{t-1}$	-0.026	-0.401
	(0.317)	(8.918)
Mainstream Minister = 1	0.060	1.431
	(0.169)	(4.644)
Minister Turnover (5 Years)	-0.091^{**}	-2.626^{**}
	(0.042)	(1.164)
Debt Crisis Experience = 1	0.041	1.087
	(0.118)	(3.349)
Election Month = 1	-0.148	-3.760
	(0.305)	(8.211)
Left Executive = 1	-0.368^{**}	-10.924^{***}
	(0.149)	(4.187)
Fiscal Council = 1	0.146	4.210
	(0.220)	(5.977)
Political Constraints (POLCON)	-0.325	-9.458
	(0.335)	(9.392)
IMF Agreement = 1	-0.458^{***}	-12.737^{***}
	(0.163)	(4.563)
Fiscal Balance, % of GDP $_{t-1}$	0.070^{**}	2.093^{**}
	(0.035)	(0.999)
Tax Revenue, % of GDP $_{t-1}$	0.004	0.019
	(0.048)	(1.265)
Ln Core Inflation $_{t-1}$	-0.009	-0.592
	(0.203)	(5.818)
GDP Per Capita $_{t-1}$	0.115^{*}	3.360^{*}
	(0.061)	(1.742)
GDP Growth, % $_{t-1}$	-0.003	-0.097
	(0.013)	(0.371)
Capital Openness $_{t-1}$	-0.363	-10.226
	(0.277)	(7.489)
Ln International Reserves $_{t-1}$	-0.423^{***}	-11.958^{***}
	(0.152)	(4.288)
US Treasury Rate, % $_{t-1}$	-0.222^{***}	-6.223^{***}
	(0.072)	(1.965)
Log(Scale)		3.383^{***}
		(0.030)
AIC	1129.325	2797.062
Log Likelihood	-531.662	-1364.531
Observations	3,004	3,004

This table presents the results of a probit model and a tobit model. All models include country fixed effects, a constant, a time trend, and standard errors clustered by country. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

3.4.2 Comparison With Other Types of Debt

Our results could be a function of sovereigns moving *away* from bondholders and *toward* other creditors. Official creditors — bilateral and multilateral — charge lower interest rates than private creditors, as Figure 5 shows. According to Bunte (2019), developing countries choose their creditors based on the strength of domestic interest groups. Natural resources, too, may explain variation in borrowing portfolios: governments could be leveraging windfalls to negotiate even better conditions with official creditors than with commercial banks or decentralized bondholders. When commodity prices and production increase, the *composition* of sovereign debt might change; a decline in the relative weight of bonds might be offset by an increase in other types of debt. After defaulting on sovereign bonds in 2008, for instance, Ecuador used bilateral deals with China to supplement its credit needs.[17]

Figure 5: Average Interest on New External Debt Commitments, by Type of Creditor



As this figure shows, private creditors tend to charge a higher average interest on new external debt commitments than official creditors. Source: World Bank (2022).

Compared to resource rents, all kinds of debt — even multilateral or bilateral — reduce governments' room to maneuver in one way or another, which is why we do not expect to

[17]Luciana Lopez and Eduardo Garcia. "Moody's Raises Ecuador to Caa1, Outlook Stable." *Reuters.* 13 September 2012.

see systematic changes in sovereign debt composition as natural resource windfalls increase (at least not when controlling for other factors). Still, we test for this possibility using data on public and publicly guaranteed external debt stocks, excluding maturities under one year, from 1996 to 2019 for 16 countries in Latin America and the Caribbean.[18] These data, drawn from the World Bank's International Debt Statistics (2022), quantify the annual amount of outstanding debt (disbursed or undisbursed), in current US dollars, disaggregated by type of creditor (bilateral, multilateral, commercial banks, and bonds). Because the data include public *and* publicly guaranteed debt, we are not able to distinguish between sovereign governments and state-owned enterprises (like NOCs), as before.

Since the choice between different creditors reflects a trade-off relationship, our outcome is compositional. For compositional outcomes, Philips, Rutherford and Whitten (2016) propose a log-ratio transformation — in our case, the logged ratio of multilateral debt to bonds, the logged ratio of bilateral debt to bonds, and the logged ratio of debt from commercial banks to bonds — and recommend estimating error correction models (ECMs) with a seemingly unrelated regression (SUR) approach. ECMs allow researchers to obtain both the short-term and the long-term effects of the independent variables, whereas SURs allow for correlated errors, which is typically the case with compositional outcomes. While ECMs can be estimated both with stationary data and with cointegrated series (Boef and Keele, 2008), we find mixed evidence that our integrated series are cointegrated.[19] Thus, we estimate first-difference models, which render integrated variables stationary without assuming cointegration:

$$\Delta Y_{it} = \beta_0 + \beta_1 \Delta X_{1,it} + \beta_2 \Delta X_{2,it} + \beta_3 \Delta X_{3,it-1} + \beta_4 X_{4,it} + Z_{it} + \mu_i + \tau_t + \varepsilon_{it}, \qquad (3)$$

where β_1, β_2, and β_3 are the coefficients for the first differences of *Resource Rents*, *Ln Oil and Gas Production*, and *Commodity Price Index*, respectively, while β_4 is the coefficient

[18]These are the same countries as before, excluding Chile, Nicaragua, Paraguay, Suriname, Trinidad and Tobago, and Uruguay, for which bond stocks are not available from the World Bank.

[19]See appendix for integration and cointegration tests.

for *Field Discovery*, a dichotomous variable that does not need to be differenced because it is stationary by definition (Beck and Katz, 2011, 344). Z_{it} is a set of control variables (the same used in previous models, aggregated at the year level); μ_i are country fixed effects, τ_t is a time trend, and ε_{it} is the error term. The outcome ΔY_{it}, a change in the relative debt stock, can be more easily compared to our previous outcome, *Ln Amount Issued*, which is a flow and not a stock. Table 4 presents the results.

When natural resource revenue increases, we find no evidence that countries move away from bondholders and toward other creditors. Holding all else constant, an increase in *Resource Rents*, *Ln Oil and Gas Production*, *Commodity Price Index*, or *Field Discovery* does not lead to significant changes in multilateral, bilateral, or commercial bank lending at the expense of bonds. Across all three models in Table 4, in fact, the strongest predictor of variation in the dependent variables is *Minister Turnover*: the shorter the tenure of Finance Ministers, the larger the share of debt coming from multilateral lenders, bilateral lenders, or commercial banks, as opposed to bondholders. These results, combined with those in Tables 1 and 2, indicate that bond issuance — more so than other types of debt — requires a degree of expertise that is lost when turnover is frequent. Moreover, higher inflation is associated with an increase in the relative size of bonds: all else equal, governments facing higher inflation shift away from multilateral creditors or commercial banks and toward bondholders, and this shift is statistically significant. Overall, countries tend to borrow less from capital markets when resource windfalls are abundant, and this is not because they are borrowing more elsewhere.[20]

[20] In the appendix, we present additional models with absolute debt stock (by type of borrower) as the outcome of interest. As *Resource Rents* increase, we observe a significant increase in bilateral debt stock and a significant decrease in debt stock from commercial banks, but no significant change in bond stock. Since these results refer to the total amount of outstanding debt, they are not directly comparable to our main results, which examine new debt issued each month.

Table 4: The Effect of Natural Resources on Sovereign Borrowing: Trade-Offs Between Creditors, 1996–2019

	Dependent Variable:		
	$Ln\left(\frac{Multilateral}{Bonds}\right)_{\Delta}$	$Ln\left(\frac{Bilateral}{Bonds}\right)_{\Delta}$	$Ln\left(\frac{Comm.Banks}{Bonds}\right)_{\Delta}$
	(1)	(2)	(3)
Resource Rents, % of GDP $_{\Delta}$	−0.014	−0.001	−0.042
	(0.018)	(0.020)	(0.026)
Ln Oil and Gas Production $_{\Delta}$	−0.126	−0.120	−0.078
	(0.147)	(0.164)	(0.215)
Commodity Price Index $_{\Delta}$	−0.003	−0.016	0.010
	(0.017)	(0.019)	(0.026)
Field Discovery $_{t-1}$	−0.023	0.010	0.049
	(0.146)	(0.163)	(0.213)
Mainstream Minister = 1	0.057	−0.004	−0.014
	(0.087)	(0.097)	(0.127)
Minister Turnover (5 Years)	0.081^{***}	0.080^{***}	0.056
	(0.026)	(0.029)	(0.038)
Debt Crisis Experience = 1	0.025	0.113	−0.043
	(0.109)	(0.121)	(0.159)
Left Executive = 1	−0.088	−0.029	−0.024
	(0.095)	(0.106)	(0.139)
Fiscal Council = 1	−0.071	0.166	−0.035
	(0.164)	(0.183)	(0.240)
Political Constraints	−0.209	−0.238	−0.190
	(0.223)	(0.249)	(0.326)
IMF Agreement = 1	0.114	0.060	−0.016
	(0.080)	(0.089)	(0.116)
Fiscal Balance, % of GDP $_{t-1}$	−0.003	0.016	−0.033
	(0.020)	(0.023)	(0.030)
Tax Revenue, % of GDP $_{t-1}$	0.013	−0.012	−0.015
	(0.032)	(0.036)	(0.047)
Ln Core Inflation $_{t-1}$	-0.341^{**}	−0.258	-0.526^{**}
	(0.160)	(0.178)	(0.234)
GDP Per Capita $_{t-1}$	0.044	0.010	−0.012
	(0.041)	(0.046)	(0.060)
GDP Growth, % $_{t-1}$	0.013	0.021	0.039^{**}
	(0.012)	(0.014)	(0.018)
Capital Openness $_{t-1}$	0.172	0.206	0.277
	(0.187)	(0.208)	(0.273)
Ln International Reserves $_{t-1}$	−0.097	−0.129	−0.183
	(0.090)	(0.100)	(0.131)
US Treasury Rate, % $_{t-1}$	−0.045	−0.084	−0.111
	(0.061)	(0.068)	(0.089)
R^2	0.118	0.135	0.123
Observations	303	303	303

This table presents the results of seemingly unrelated regressions, which allow for correlated errors. All models include country fixed effects, a constant, and a time trend. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

4 Discussion

Why wouldn't politicians take advantage of issuing cheap debt? This finding might seem counter-intuitive when compared to a political economy scholarship predicting that natural resource windfalls will foment fiscal imprudence and political opportunism. Individuals have exaggerated expectations of potential resource revenues, particularly when it comes to oil (Collier, 2017). Policymakers often overestimate the commercial viability of oil discoveries and underestimate the time elapsed between discovery and production, which is, on average, between four and six years (Arezki, Ramey and Sheng, 2017). Experts make budget projections based on high oil prices, though these prices are difficult to predict (Hamilton, 2009). Even beyond national borders, international organizations are also guilty of such overoptimism: in October 2019, just before oil production was scheduled to start in Guyana, the IMF predicted that the country's economy would grow by 85.6 percent in the following year (IMF, 2019).

Unsurprisingly, voters respond to these predictions by demanding more public spending: they want resource revenue to trickle down from economic elites to ordinary citizens. These patterns are particularly acute in environments characterized by low levels of income and public trust, such as Latin America: poverty shortens individuals' time horizons, and a diminished degree of social trust increases the fear that politicians will pocket resource revenues (Collier, 2017).

When voters demand short-term consumption over long-term investment, incumbents often engineer electoral business cycles. Carmelo Lauría, who served in three different Venezuelan presidential cabinets, claims that "a constant in Venezuelan politics is expansive fiscal policy. No politician wants to lose votes. We don't close institutions or businesses because we don't want to lose votes. We don't want to head off inflation because we don't want to lose votes. The state has too much power. I managed a petrol state. I know!"[21]

[21] Authors' interview. Caracas, Venezuela, 2007.

This is how Latin America responded to past commodity booms. In the four years after the 1974 oil shock, 61.7 percent of Ecuador's windfall was spent by the public sector and 17.4 percent was spent by the private sector; in Venezuela, these figures reached 60.7 and 48.6 percent, respectively (Talvi and Végh, 2005, 164). In other words, Ecuador only saved 20.9 percent of its windfall, and Venezuela actually *lost* 9.3 percent. Ecuador, Venezuela, and other Latin American countries funded such shortfalls by borrowing from commercial banks and global capital markets. But within a decade, Latin American countries had defaulted, and entered into lengthy, IMF-coordinated debt restructurings. These restructurings generally limited each country's policy autonomy, by promoting austerity, devaluation, and capital account liberalization.

In light of these historical lessons about indebtedness, the lack of political opportunism today is logical. Political leaders internalized the hefty costs of extensive sovereign borrowing, helping constrain cheap debt issuance more recently. Surprisingly, however, they did not heed its benefits. If they opted to borrow more at cheaper rates today, politicians could finance greater government expenditures over time and help smooth fiscal spending patterns. In a region with a history of commodity booms and busts, it is surprising that governments fail to hedge against revenue shortfalls from potential commodity downturns. Without hedging, governments are plagued by a time-inconsistency problem that leaves them issuing debt to cover revenue shortfalls during downturns, when high funding costs threaten to intensify policy constraints and amplify indebtedness. Ironically, the fear of indebtedness during good times might exacerbate indebtedness during bad times.

5 Conclusion

This study uses monthly data from 1996 to 2019 for 22 countries in Latin America and the Caribbean to examine the relationship between fiscal revenue and debt financing, between natural resources and bond markets. We find that countries issue bonds at a significantly lower frequency, and in smaller amounts, as the GDP share coming from resource rents increases, or as oil and gas production increases. The implication is not that bonds and windfalls are simply alternative outputs in a government's production profile. Rather, we attribute this pattern to the high political cost of borrowing and the comparatively low cost of resource reliance. Bondholders charge high risk premiums and tend to pressure for fiscal discipline, whereas voters punish incumbents for growing public debt. However, neither bondholders nor voters tend to scrutinize the size of resource rents. All else equal, incumbents prefer an opaque source of funding that gives them full discretion to implement their preferred economic policies, without the constraints imposed by capital markets or citizens, even if this preference restricts their ability to engage in long-term consumption smoothing. We also find that higher and more sustained levels of technocratic expertise tends to defray the costs of entering capital markets, enabling countries to issue more bonds.

Despite the focus on Latin America, our theoretical framework has the potential to explain borrowing behavior across the developing world and offers several future research opportunities. As Gabon, Ghana, Nigeria, Senegal, Tanzania, Zambia, and other resource-rich countries in Sub-Saharan Africa enter global bond markets, it becomes increasingly important to understand the interaction between bond issuance and fiscal revenues, including the extent to which the former complement the latter. This has important implications for national budgets, government spending, and economic development.

Finally, in building our framework, we provide qualitative evidence that historical policy lessons may help natural resource economies avoid financial boom and bust cycles. Future research can examine the extent to which institutions anchor this learning and protect the natural resource sector from such market volatility, reducing the risk that emerging market economies incur onerous debts by borrowing too much from overoptimistic creditors.

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Appendix

A Descriptive Statistics

Table A.1: Descriptive Statistics: Main Analysis (Monthly Data)

Statistic	N	Mean	St. Dev.	Min	Max
Year	5,708	2,007.708	6.792	1,996	2,019
Month	5,708	6.504	3.450	1	12
Sovereign Issued = 1	5,708	0.259	0.438	0	1
Ln Sovereign Amount Issued	5,708	4.826	8.295	0.000	25.356
NOC Issued = 1	5,708	0.037	0.190	0	1
Ln NOC Amount Issued	5,708	0.771	3.926	0.000	23.208
Resource Rents,% of GDP $_{t-1}$	5,708	4.754	5.509	0.023	33.590
Ln Oil and Gas Production $_{t-1}$	5,708	3.008	2.877	0.000	8.364
Commodity Price Index $_{t-1}$	5,708	99.739	4.719	79.631	118.211
Field Discovery $_{t-1}$	5,708	0.008	0.086	0	1
Mainstream Minister = 1	5,708	0.318	0.466	0	1
Minister Turnover (5 Years)	5,708	2.271	1.700	0	10
Debt Crisis Experience = 1	5,708	0.203	0.402	0	1
Election Month = 1	5,708	0.015	0.121	0	1
Left Executive = 1	5,708	0.417	0.493	0	1
Fiscal Council = 1	5,708	0.086	0.281	0	1
Political Constraints	5,708	0.313	0.216	0.000	0.692
IMF Agreement = 1	5,708	0.229	0.420	0	1
Fiscal Balance, % of GDP $_{t-1}$	5,708	−2.064	2.441	−11.126	7.776
Tax Revenue, % of GDP $_{t-1}$	5,708	14.207	4.325	5.546	30.166
Ln Core Inflation $_{t-1}$	5,708	4.305	0.559	−4.605	6.000
GDP Per Capita $_{t-1}$	5,708	6.908	4.055	1.351	19.181
GDP Growth, % $_{t-1}$	5,708	2.168	3.211	−11.855	13.875
Capital Openness $_{t-1}$	5,708	0.682	0.320	0.000	1.000
Ln International Reserves $_{t-1}$	5,708	22.285	1.685	18.275	26.677
US Treasury Rate, % $_{t-1}$	5,708	3.805	1.466	1.500	6.910

Table A.2: Descriptive Statistics: Robustness Checks (Annual Data)

Statistic	N	Mean	St. Dev.	Min	Max
Year	303	2,008.076	6.970	1,996	2,019
Ln (Multilateral to Bonds) $_{\Delta}$	303	−0.062	0.499	−6.787	1.891
Ln (Bilateral to Bonds) $_{\Delta}$	303	−0.126	0.562	−7.350	1.783
Ln (Commercial Banks to Bonds) $_{\Delta}$	303	−0.113	0.731	−8.180	1.938
Resource Rents, % of GDP $_{\Delta}$	303	−0.123	2.003	−13.451	10.463
Ln Oil and Gas Production $_{\Delta}$	303	0.017	0.208	−1.386	1.065
Commodity Price Index $_{\Delta}$	303	−0.004	1.967	−11.621	8.502
Field Discovery $_{t-1}$	303	0.066	0.249	0	1
Mainstream Minister = 1	303	0.323	0.469	0	1
Minister Turnover (5 Years)	303	2.347	1.818	0	10
Debt Crisis Experience = 1	303	0.182	0.386	0	1
Election Year = 1	303	0.284	0.452	0	1
Left Executive = 1	303	0.436	0.497	0	1
Fiscal Council = 1	303	0.122	0.328	0	1
Political Constraints	303	0.326	0.220	0.000	0.692
IMF Agreement = 1	303	0.422	0.495	0	1
Fiscal Balance, % of GDP $_{t-1}$	303	−2.433	2.040	−11.126	2.300
Tax Revenue, % of GDP $_{t-1}$	303	13.590	4.071	6.126	27.199
Ln Core Inflation $_{t-1}$	303	3.905	1.414	−6.425	4.735
GDP Per Capita $_{t-1}$	303	6.623	2.895	1.768	15.588
GDP Growth, % $_{t-1}$	303	2.064	3.082	−11.855	10.100
Capital Openness $_{t-1}$	303	0.667	0.310	0.000	1.000
Ln International Reserves $_{t-1}$	303	22.573	1.761	19.334	26.642
US Treasury Rate, % $_{t-1}$	303	3.913	1.522	1.803	6.574

B Data Coverage

B.1 Countries Included in the Main Analysis

Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, and Venezuela.

B.2 National Oil, Gas, and Mining Companies

- Argentina: Yacimientos Petrolíferos Fiscales — YPF
- Bolivia: Yacimientos Petrolíferos Fiscales Bolivianos — YPFB
- Brazil: Petróleo Brasileiro — Petrobras

- Chile: Empresa Nacional del Petróleo — ENAP, Corporación Nacional del Cobre de Chile – CODELCO
- Colombia: Ecopetrol
- Ecuador: Petroamazonas
- Mexico: Petróleos Mexicanos — Pemex
- Paraguay: Petróleos Paraguayos — Petropar
- Peru: Petróleos del Perú — Petroperú
- Suriname: Staatsolie Maatschappij
- Trinidad and Tobago: Petroleum Company, The National Gas
- Uruguay: Administración Nacional de Combustibles, Alcoholes y Portland — Ancap
- Venezuela: Petróleos de Venezuela — PDVSA

C Main Results: Alternative Specifications

C.1 Excluding Large Oil Producers or Frequent Defaulters

In this section, we replicate our main results (Table 1), but excluding Brazil, Mexico, and Venezuela (Table C.1). Alternatively, Table C.2 excludes Argentina and Ecuador, which defaulted on their sovereign debt in 1999 and 2001, respectively, and did not regularly issue bonds in the subsequent decade. When we exclude these two countries, our effect sizes are in fact larger than before.

Table C.1: The Effect of Natural Resources on Sovereign Bond Issuance: Excluding Brazil, Mexico, and Venezuela, 1996–2019

	Dependent Variable:	
	Sovereign Issued (Yes = 1)	Ln Sovereign Amount Issued
	(1)	(2)
Resource Rents, % of GDP $_{t-1}$	-0.014	-0.251
	(0.012)	(0.231)
Ln Oil and Gas Production $_{t-1}$	-0.166^{**}	-3.666^{***}
	(0.069)	(1.322)
Commodity Price Index $_{t-1}$	0.002	0.026
	(0.007)	(0.141)
Field Discovery $_{t-1}$	-0.090	-0.540
	(0.403)	(8.076)
Mainstream Minister = 1	0.025	0.420
	(0.058)	(1.146)
Minister Turnover (5 Years)	-0.066^{***}	-1.295^{***}
	(0.021)	(0.393)
Debt Crisis Experience = 1	0.048	1.012
	(0.064)	(1.200)
Election Month = 1	-0.064	-1.165
	(0.188)	(3.639)
Left Executive = 1	-0.037	-1.237
	(0.058)	(1.144)
Fiscal Council = 1	-0.900^{***}	-17.679^{***}
	(0.167)	(3.279)
Political Constraints	0.913^{***}	17.557^{***}
	(0.194)	(3.626)
IMF Agreement = 1	-0.125^{**}	-2.614^{**}
	(0.060)	(1.174)
Fiscal Balance, % of GDP $_{t-1}$	-0.052^{***}	-1.038^{***}
	(0.014)	(0.268)
Tax Revenue, % of GDP $_{t-1}$	-0.030^{*}	-0.651^{**}
	(0.017)	(0.328)
Ln Core Inflation $_{t-1}$	0.072	1.156
	(0.095)	(1.788)
GDP Per Capita $_{t-1}$	-0.027	-0.472
	(0.025)	(0.477)
GDP Growth, % $_{t-1}$	0.014^{*}	0.269^{*}
	(0.008)	(0.156)
Capital Openness $_{t-1}$	0.052	1.607
	(0.115)	(2.227)
Ln International Reserves $_{t-1}$	0.626^{***}	11.939^{***}
	(0.077)	(1.431)
Log(Scale)		3.056^{***}
		(0.014)
AIC	4926.080	14495.867
Log Likelihood	-2423.040	-7206.933
Observations	5,061	5,061

This table presents the results of a probit model and a tobit model. All models include country fixed effects, a constant, a time trend, and standard errors clustered by country. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Table C.2: The Effect of Natural Resources on Sovereign Bond Issuance: Excluding Argentina and Ecuador, 1996–2019

	Dependent Variable:	
	Sovereign Issued (Yes = 1)	Ln Sovereign Amount Issued
	(1)	(2)
Resource Rents, % of GDP $_{t-1}$	-0.058^{***}	-1.135^{***}
	(0.013)	(0.261)
Ln Oil and Gas Production $_{t-1}$	-0.172^{**}	-3.731^{***}
	(0.068)	(1.272)
Commodity Price Index $_{t-1}$	-0.012	-0.255^{*}
	(0.008)	(0.152)
Field Discovery $_{t-1}$	-0.260	-5.027
	(0.239)	(5.176)
Mainstream Minister = 1	0.179^{***}	3.751^{***}
	(0.060)	(1.196)
Minister Turnover (5 Years)	-0.001	-0.123
	(0.023)	(0.423)
Debt Crisis Experience = 1	-0.042	-0.593
	(0.068)	(1.310)
Election Month = 1	-0.073	-1.488
	(0.176)	(3.589)
Left Executive = 1	0.127^{**}	2.249^{*}
	(0.061)	(1.226)
Fiscal Council = 1	-1.087^{***}	-21.600^{***}
	(0.147)	(2.739)
Political Constraints	0.388^{**}	7.268^{**}
	(0.183)	(3.463)
IMF Agreement = 1	0.067	1.507
	(0.065)	(1.239)
Fiscal Balance, % of GDP $_{t-1}$	-0.030^{**}	-0.591^{**}
	(0.014)	(0.270)
Tax Revenue, % of GDP $_{t-1}$	-0.017	-0.409
	(0.017)	(0.332)
Ln Core Inflation $_{t-1}$	-0.421^{*}	-8.946^{***}
	(0.229)	(2.771)
GDP Per Capita $_{t-1}$	0.023	0.577
	(0.024)	(0.462)
GDP Growth, % $_{t-1}$	0.021^{**}	0.409^{**}
	(0.009)	(0.172)
Capital Openness $_{t-1}$	-0.096	-1.213
	(0.135)	(2.615)
Ln International Reserves $_{t-1}$	0.566^{***}	10.602^{***}
	(0.081)	(1.501)
Log(Scale)		3.077^{***}
		(0.014)
AIC	4982.547	14630.065
Log Likelihood	-2450.273	-7273.032
Observations	5,164	5,164

This table presents the results of a probit model and a tobit model. All models include country fixed effects, a constant, a time trend, and standard errors clustered by country. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

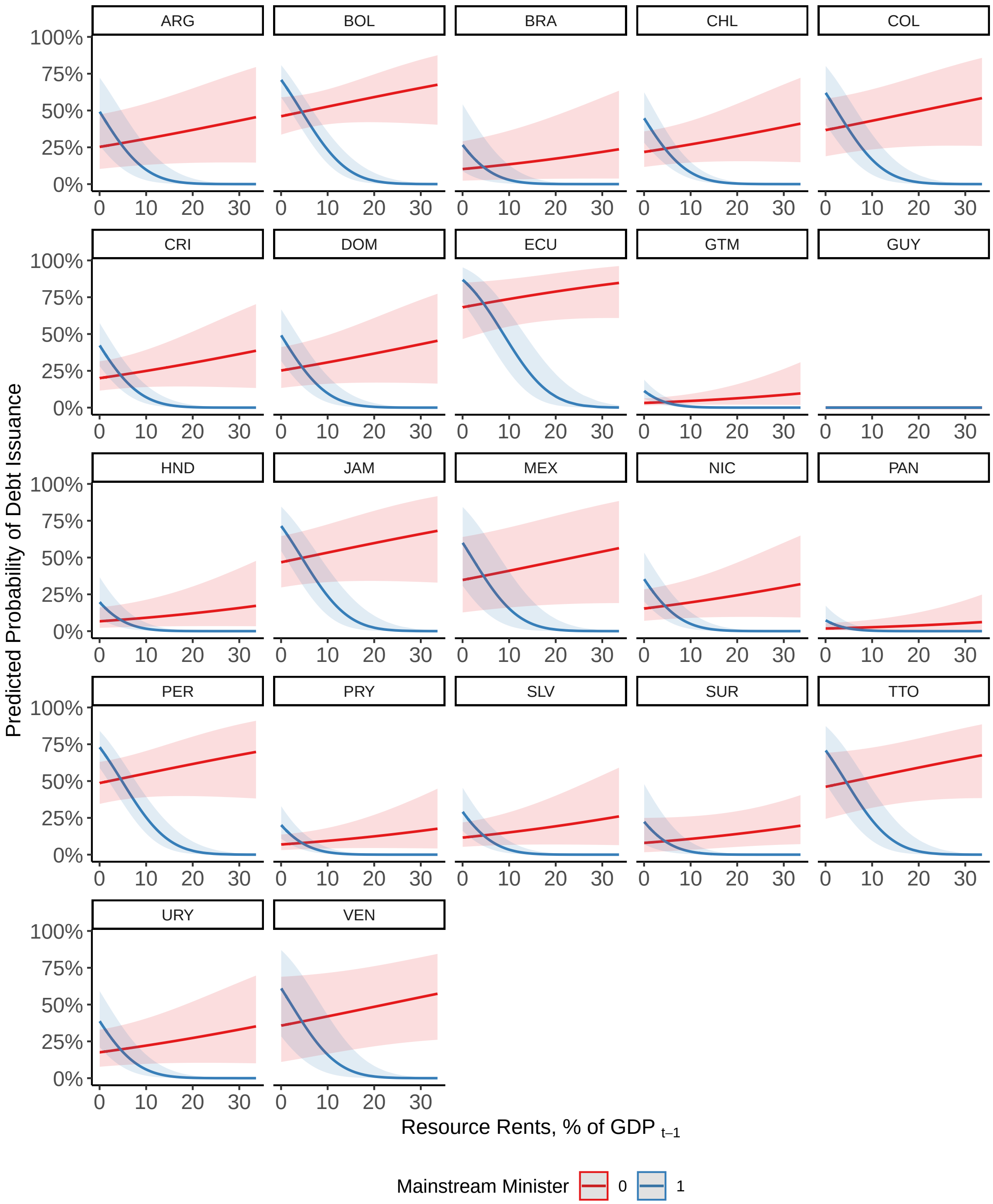
C.2 Interacting Finance Minister with Natural Resource Wealth

Table C.3: The Effect of Natural Resources on Sovereign Bond Issuance: Interacting Finance Minister with Natural Resource Wealth, 1996–2019

	Dependent Variable:	
	Sovereign Issued (Yes = 1)	Ln Sovereign Amount Issued
	(1)	(2)
Resource Rents, % of GDP $_{t-1}$	0.016	0.323
	(0.013)	(0.245)
Ln Oil and Gas Production $_{t-1}$	−0.239***	−5.170***
	(0.067)	(1.281)
Commodity Price Index $_{t-1}$	−0.005	−0.127
	(0.007)	(0.150)
Field Discovery $_{t-1}$	−0.151	−2.932
	(0.317)	(6.789)
Mainstream Minister = 1	−3.168**	−67.655***
	(1.261)	(24.049)
Mainstream Minister × Resource Rents	−0.144***	−2.797***
	(0.020)	(0.349)
Mainstream Minister × Ln Oil and Gas Production	0.216***	4.252***
	(0.027)	(0.487)
Mainstream Minister × Commodity Price Index	0.032***	0.675***
	(0.012)	(0.233)
Mainstream Minister × Field Discovery	0.256	4.719
	(0.483)	(9.192)
Minister Turnover (5 Years)	−0.043**	−0.838**
	(0.018)	(0.339)
Debt Crisis Experience = 1	0.005	0.204
	(0.061)	(1.146)
Election Month = 1	−0.064	−1.327
	(0.162)	(3.135)
Left Executive = 1	0.054	0.751
	(0.058)	(1.145)
Fiscal Council = 1	−1.308***	−25.320***
	(0.158)	(2.809)
Political Constraints	0.408**	7.436**
	(0.168)	(3.204)
IMF Agreement = 1	−0.002	−0.001
	(0.058)	(1.113)
Fiscal Balance, % of GDP $_{t-1}$	−0.028**	−0.535**
	(0.013)	(0.253)
Tax Revenue, % of GDP $_{t-1}$	−0.041***	−0.869***
	(0.016)	(0.314)
Ln Core Inflation $_{t-1}$	0.001	0.162
	(0.082)	(1.662)
GDP Per Capita $_{t-1}$	0.025	0.577
	(0.022)	(0.435)
GDP Growth, % $_{t-1}$	0.018**	0.325**
	(0.008)	(0.147)
Capital Openness $_{t-1}$	−0.074	−1.296
	(0.113)	(2.131)
Ln International Reserves $_{t-1}$	0.335***	6.111***
	(0.068)	(1.275)
Log(Scale)		3.060***
		(0.014)
AIC	5582.014	16652.021
Log Likelihood	−2744.007	−8278.010
Observations	5,708	5,708

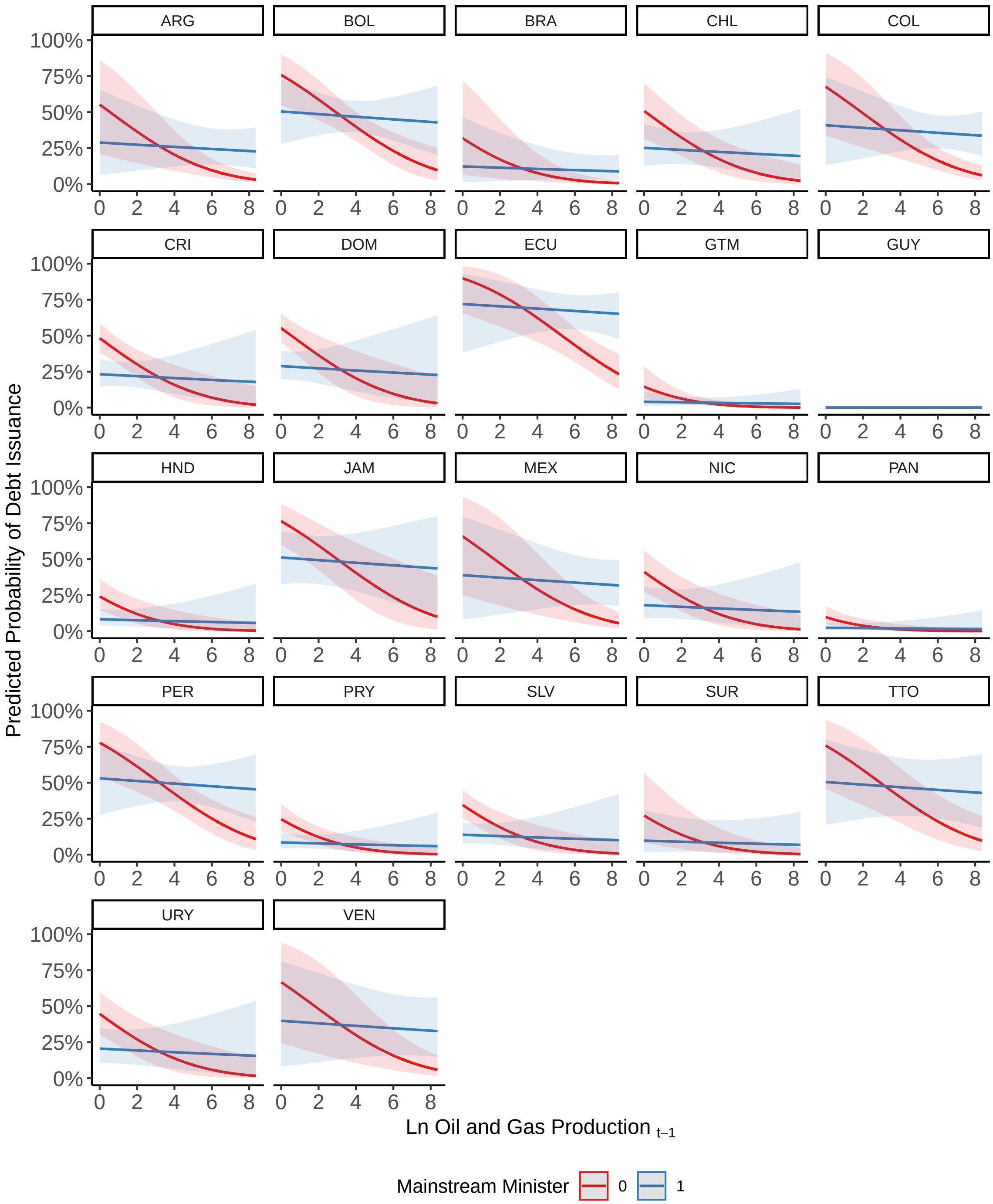
This table presents the results of a probit model and a tobit model. All models include country fixed effects, a constant, a time trend, and standard errors clustered by country. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Figure C.1: Predicted Probability of Observing *Sovereign Issued* Conditional on *Resource Rents* and *Mainstream Minister*, by Country



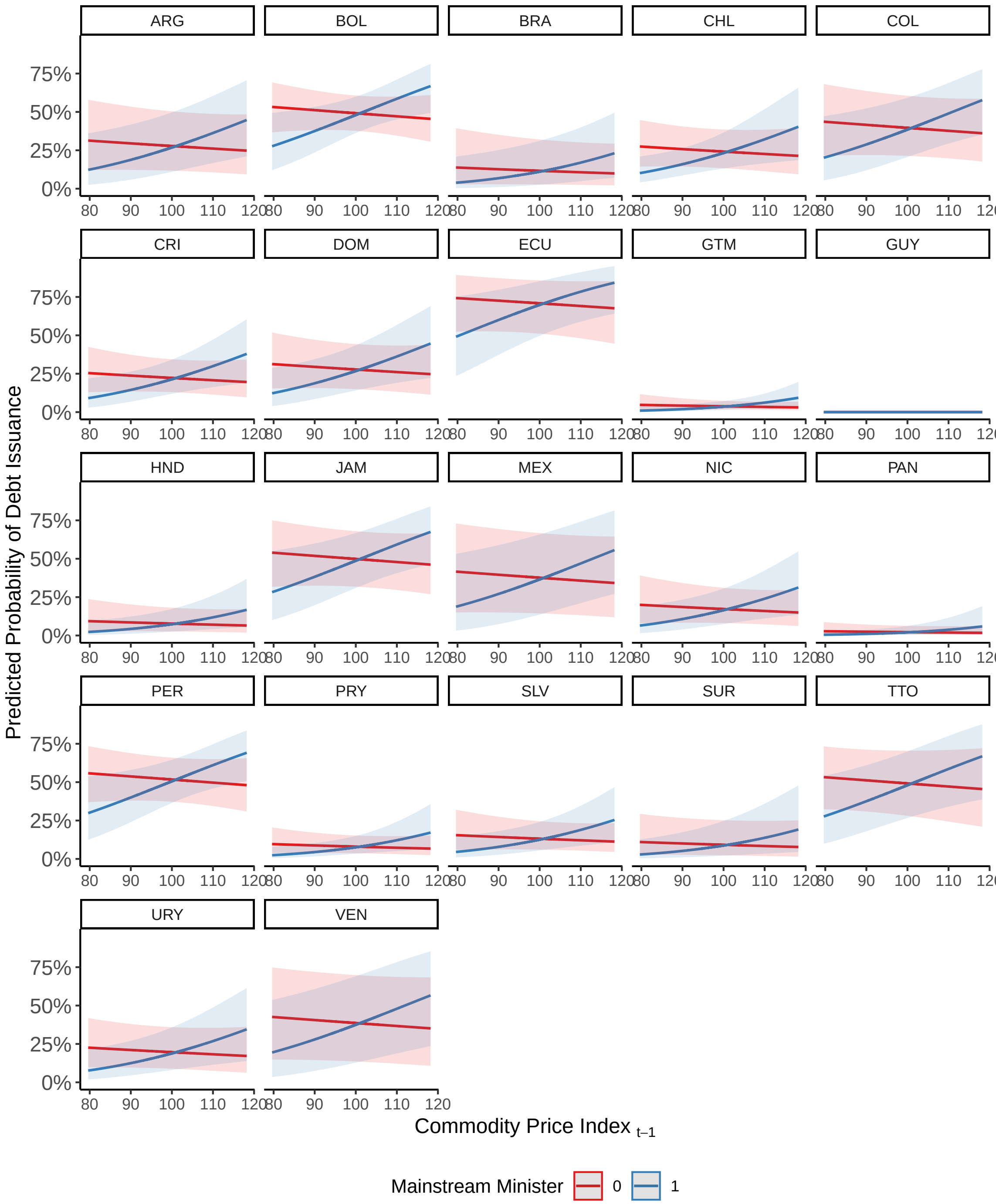
This figure shows the predicted probability of observing *Sovereign Issued*, by country, conditional on values of *Resource Rents* and *Mainstream Minister*. This figure is based on Model 1 of Table C.3, which includes country fixed effects, a constant, a time trend, and standard errors clustered by country.

Figure C.2: Predicted Probability of Observing *Sovereign Issued* Conditional on *Ln Oil and Gas Production* and *Mainstream Minister*, by Country



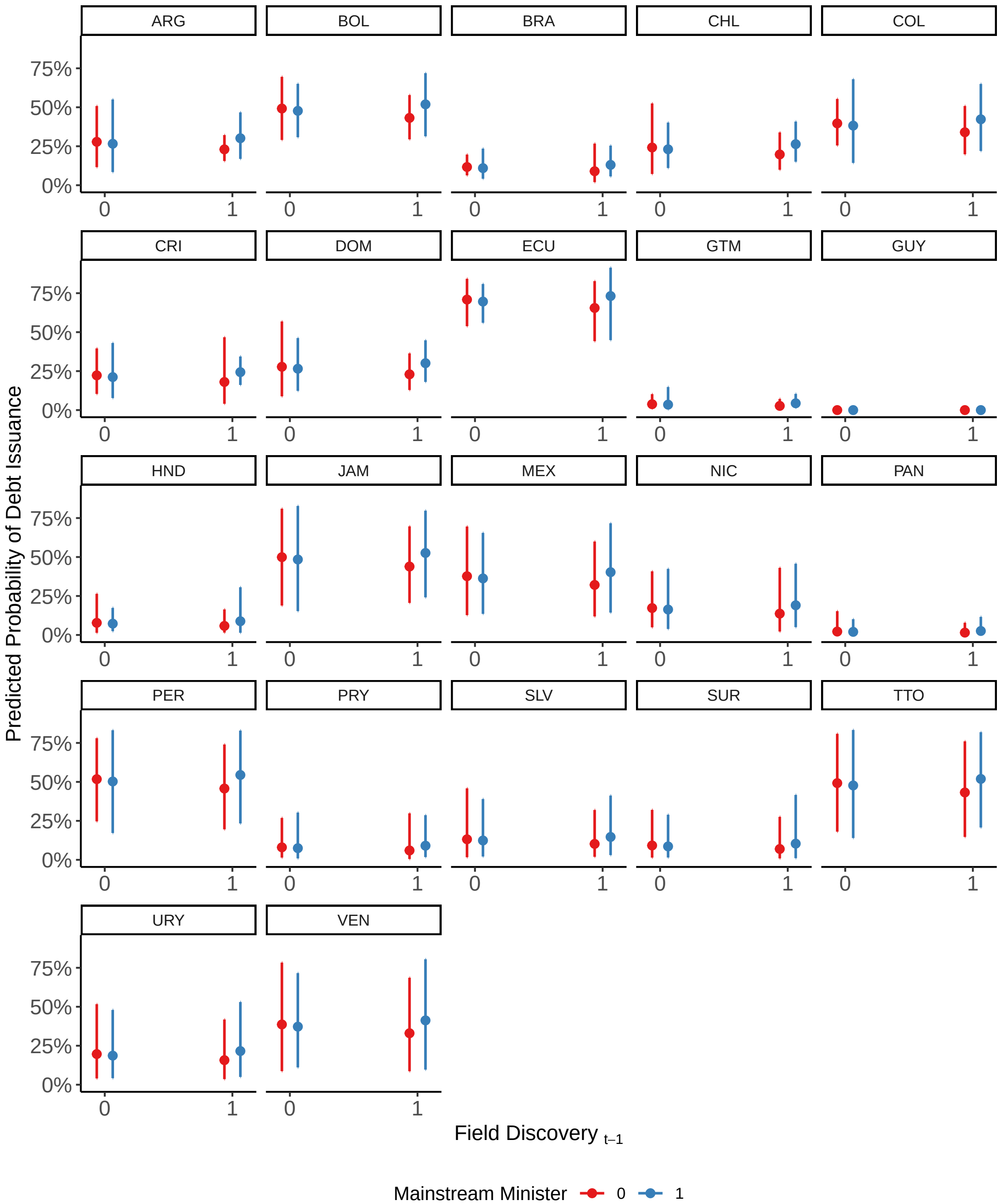
This figure shows the predicted probability of observing *Sovereign Issued*, by country, conditional on values of *Ln Oil and Gas Production* and *Mainstream Minister*. This figure is based on Model 1 of Table C.3, which includes country fixed effects, a constant, a time trend, and standard errors clustered by country.

Figure C.3: Predicted Probability of Observing *Sovereign Issued* Conditional on *Commodity Price Index* and *Mainstream Minister*, by Country



This figure shows the predicted probability of observing *Sovereign Issued*, by country, conditional on values of *Commodity Price Index* and *Mainstream Minister*. This figure is based on Model 1 of Table C.3, which includes country fixed effects, a constant, a time trend, and standard errors clustered by country.

Figure C.4: Predicted Probability of Observing *Sovereign Issued* Conditional on *Field Discovery* and *Mainstream Minister*, by Country



This figure shows the predicted probability of observing *Sovereign Issued*, by country, conditional on values of *Field Discovery* and *Mainstream Minister*. This figure is based on Model 1 of Table C.3, which includes country fixed effects, a constant, a time trend, and standard errors clustered by country.

Table C.3 interacts *Mainstream Minister* with the natural resource variables (*Resource Rents*, *Ln Oil and Gas Production*, *Commodity Price Index*, and *Field Discovery*). Figures C.1 to C.4 allow us to visualize the results, which indicate that technocratic Finance Ministers do not respond to natural resource wealth in a consistent manner. As resource rents increase, technocrats tend issue debt less frequently than non-technocrats; however, their borrowing decisions (relative to non-technocrats) appear to be orthogonal to oil and gas production, oil and gas field discovery, or commodity prices. Given that technocrats have access to cheaper credit to begin with, it is unsurprising that their borrowing decisions are driven by factors beyond natural resource wealth.

C.3 Replacing Finance Minister with Central Bank President

In this section, we replicate our main results (Tables 1 and 2), but replacing *Mainstream Minister* and *Minister Turnover* with *Mainstream Central Bank President* and *Central Bank President Turnover*, respectively. Our main results are robust to these changes: *Resource Rents* and *Ln Oil and Gas Production* continue to have a significant negative effect on the outcomes of interest. Frequent *Central Bank President Turnover*, like frequent *Minister Turnover*, is also associated with a significant decline in the frequency of bond issuance and the size of issued bonds. However, *Mainstream Central Bank President* — unlike *Mainstream Minister* — only has a significant effect on the amount of debt issued, and only at $p < 0.1$.

In addition, Table C.5 controls for *Central Bank Independence*, a measure collected by Bodea and Garriga (2023). However, this variable is not available for two of our countries (Jamaica and Trinidad and Tobago), which is why it is not included in the main analysis.

Table C.4: The Effect of Natural Resources on Sovereign Bond Issuance: Replacing Finance Minister with Central Bank President, 1996–2019

	Dependent Variable:	
	Sovereign Issued (Yes = 1)	Ln Sovereign Amount Issued
	(1)	(2)
Resource Rents, % of GDP $_{t-1}$	-0.043^{***}	-0.865^{***}
	(0.010)	(0.212)
Ln Oil and Gas Production $_{t-1}$	-0.201^{***}	-4.396^{***}
	(0.063)	(1.212)
Commodity Price Index $_{t-1}$	0.004	0.066
	(0.007)	(0.136)
Field Discovery $_{t-1}$	-0.102	-1.617
	(0.234)	(4.708)
Mainstream Central Bank Pres. = 1	-0.096	-1.973^{*}
	(0.063)	(1.196)
Central Bank Pres. Turnover (5 Years)	-0.048^{***}	-0.993^{***}
	(0.006)	(0.115)
Debt Crisis Experience = 1	0.034	0.783
	(0.060)	(1.146)
Election Month = 1	-0.084	-1.814
	(0.163)	(3.174)
Left Executive = 1	0.053	0.679
	(0.053)	(1.077)
Fiscal Council = 1	-1.279^{***}	-25.496^{***}
	(0.156)	(2.834)
Political Constraints	0.308^{*}	5.761^{*}
	(0.162)	(3.074)
IMF Agreement = 1	-0.046	-0.945
	(0.057)	(1.128)
Fiscal Balance, % of GDP $_{t-1}$	-0.029^{**}	-0.577^{**}
	(0.013)	(0.251)
Tax Revenue, % of GDP $_{t-1}$	-0.020	-0.454
	(0.015)	(0.303)
Ln Core Inflation $_{t-1}$	-0.004	-0.308
	(0.084)	(1.636)
GDP Per Capita $_{t-1}$	0.006	0.213
	(0.023)	(0.444)
GDP Growth, % $_{t-1}$	0.024^{***}	0.468^{***}
	(0.008)	(0.147)
Capital Openness $_{t-1}$	0.158	3.973^{*}
	(0.111)	(2.158)
Ln International Reserves $_{t-1}$	0.453^{***}	8.639^{***}
	(0.065)	(1.229)
US Treasury Rate, % $_{t-1}$	-0.038	-0.903
	(0.034)	(0.661)
Log(Scale)		3.073^{***}
		(0.013)
AIC	5694.207	16832.868
Log Likelihood	-2804.103	-8372.434
Observations	5,891	5,891

This table presents the results of a probit model and a tobit model. All models include country fixed effects, a constant, a time trend, and standard errors clustered by country. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Table C.5: The Effect of Natural Resources on Sovereign Bond Issuance: Controlling for Central Bank Independence, 1996–2019

	Dependent Variable:	
	Sovereign Issued (Yes = 1)	Ln Sovereign Amount Issued
	(1)	(2)
Resource Rents, % of GDP $_{t-1}$	−0.034***	−0.721***
	(0.011)	(0.232)
Ln Oil and Gas Production $_{t-1}$	−0.260***	−5.761***
	(0.077)	(1.520)
Commodity Price Index $_{t-1}$	−0.016*	−0.295
	(0.009)	(0.185)
Field Discovery $_{t-1}$	−0.133	−2.132
	(0.248)	(5.137)
Mainstream Central Bank Pres. = 1	0.058	1.076
	(0.068)	(1.343)
Central Bank Pres. Turnover (5 Years)	−0.047***	−0.992***
	(0.006)	(0.128)
Central Bank Independence	−0.140	−1.002
	(0.354)	(7.900)
Debt Crisis Experience = 1	0.075	1.646
	(0.071)	(1.391)
Election Month = 1	−0.116	−2.508
	(0.168)	(3.332)
Left Executive = 1	−0.082	−1.906
	(0.066)	(1.363)
Fiscal Council = 1	−1.291***	−26.175***
	(0.164)	(2.991)
Political Constraints	0.111	1.624
	(0.177)	(3.451)
IMF Agreement = 1	0.045	0.806
	(0.064)	(1.275)
Fiscal Balance, % of GDP $_{t-1}$	0.013	0.242
	(0.016)	(0.334)
Tax Revenue, % of GDP $_{t-1}$	−0.074***	−1.528***
	(0.020)	(0.415)
Ln Core Inflation $_{t-1}$	0.094	1.269
	(0.095)	(1.836)
GDP Per Capita $_{t-1}$	−0.079***	−1.435**
	(0.030)	(0.580)
GDP Growth, % $_{t-1}$	0.031***	0.593***
	(0.008)	(0.163)
Capital Openness $_{t-1}$	−0.129	−1.490
	(0.123)	(2.445)
Ln International Reserves $_{t-1}$	0.339***	6.669***
	(0.069)	(1.340)
US Treasury Rate, % $_{t-1}$	−0.047	−1.096
	(0.036)	(0.715)
Log(Scale)		3.093***
		(0.014)
AIC	4971.694	14556.808
Log Likelihood	−2443.847	−7235.404
Observations	5,315	5,315

This table presents the results of a probit model and a tobit model. All models include country fixed effects, a constant, a time trend, and standard errors clustered by country. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

C.4 Controlling for a Country's Output Gap

Table C.6: The Effect of Natural Resources on Sovereign Bond Issuance: Controlling for a Country's Output Gap, 1996–2019

	Dependent Variable:	
	Sovereign Issued (Yes = 1)	Ln Sovereign Amount Issued
	(1)	(2)
Resource Rents, % of GDP $_{t-1}$	−0.025*	−0.524*
	(0.013)	(0.269)
Ln Oil and Gas Production $_{t-1}$	−0.114	−2.950*
	(0.082)	(1.635)
Commodity Price Index $_{t-1}$	−0.020**	−0.408**
	(0.008)	(0.177)
Field Discovery $_{t-1}$	−0.109	−1.788
	(0.229)	(5.071)
Mainstream Minister = 1	0.184***	4.085***
	(0.059)	(1.195)
Minister Turnover (5 Years)	−0.038*	−0.759*
	(0.022)	(0.410)
Debt Crisis Experience = 1	0.044	0.804
	(0.073)	(1.458)
Election Month = 1	−0.084	−1.654
	(0.172)	(3.405)
Left Executive = 1	−0.012	−0.580
	(0.078)	(1.565)
Fiscal Council = 1	−1.018***	−19.525***
	(0.157)	(2.978)
Political Constraints	−0.186	−4.597
	(0.178)	(3.516)
IMF Agreement = 1	0.070	1.518
	(0.071)	(1.390)
Fiscal Balance, % of GDP $_{t-1}$	0.029	0.558
	(0.019)	(0.387)
Tax Revenue, % of GDP $_{t-1}$	−0.094***	−2.012***
	(0.024)	(0.492)
Ln Core Inflation $_{t-1}$	−0.345**	−7.715***
	(0.140)	(2.656)
GDP Per Capita $_{t-1}$	−0.062**	−1.132*
	(0.029)	(0.591)
GDP Growth, % $_{t-1}$	0.181**	3.173**
	(0.083)	(1.376)
Capital Openness $_{t-1}$	−0.985***	−18.873***
	(0.141)	(2.760)
Ln International Reserves $_{t-1}$	0.101	1.801
	(0.074)	(1.479)
US Treasury Rate, % $_{t-1}$	−0.020	−0.563
	(0.042)	(0.826)
Output Gap, % $_{t-1}$	−0.153*	−2.650**
	(0.081)	(1.350)
Log(Scale)		3.092***
		(0.015)
AIC	4272.924	12462.529
Log Likelihood	−2097.462	−6191.265
Observations	4,145	4,145

This table presents the results of a probit model and a tobit model. All models include country fixed effects, a constant, a time trend, and standard errors clustered by country. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

Table C.6 controls for the *Output Gap*, which is the Hodrick-Prescott filter, indicating the difference between the actual output of a country's economy and its potential output. This variable is only available on a yearly basis and excludes five countries (Dominican Republic, Guyana, Jamaica, Trinidad and Tobago, and Suriname), but its inclusion supports our main findings.

D Robustness Checks: Comparison With Other Types of Debt

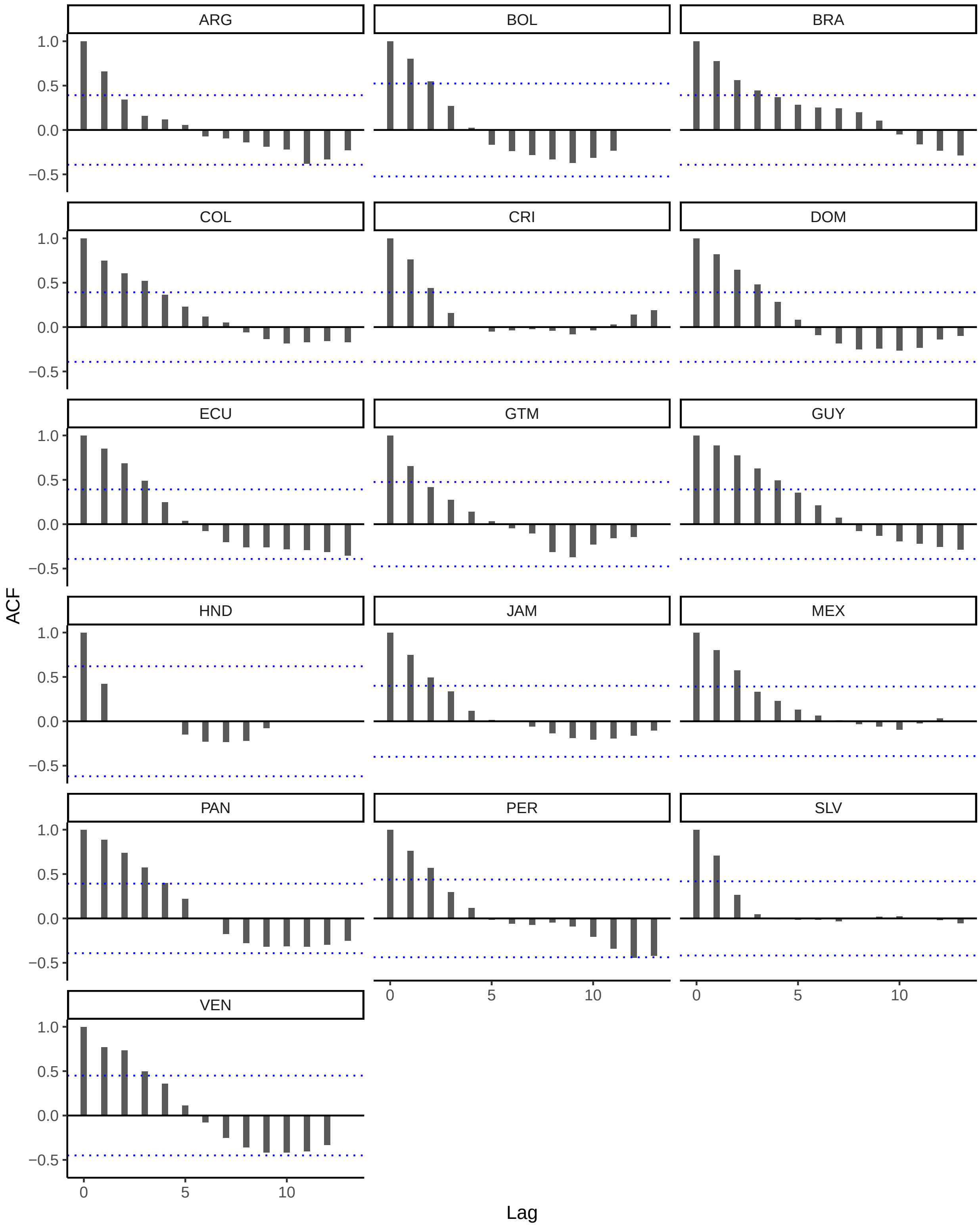
D.1 Cointegration Analysis

Box-Steffensmeier et al. (2014, 161) outline two approaches for cointegration analysis: the Engle-Granger regression approach and the Johansen VAR method. We begin with the Engle-Granger regression approach, which is more straightforward.

The first step of the Engle-Granger approach is to pretest the variables for the order of integration, which we do for each of the 16 countries individually. Using Augmented Dickey-Fuller, KPSS, and Phillips–Perron tests, we find that our outcomes of interest are integrated for several — but not all — countries. To better illustrate these diagnostics, we plot the autocorrelation function (ACF) and the partial autocorrelation function (PACF) for our three main dependent variables, by country.

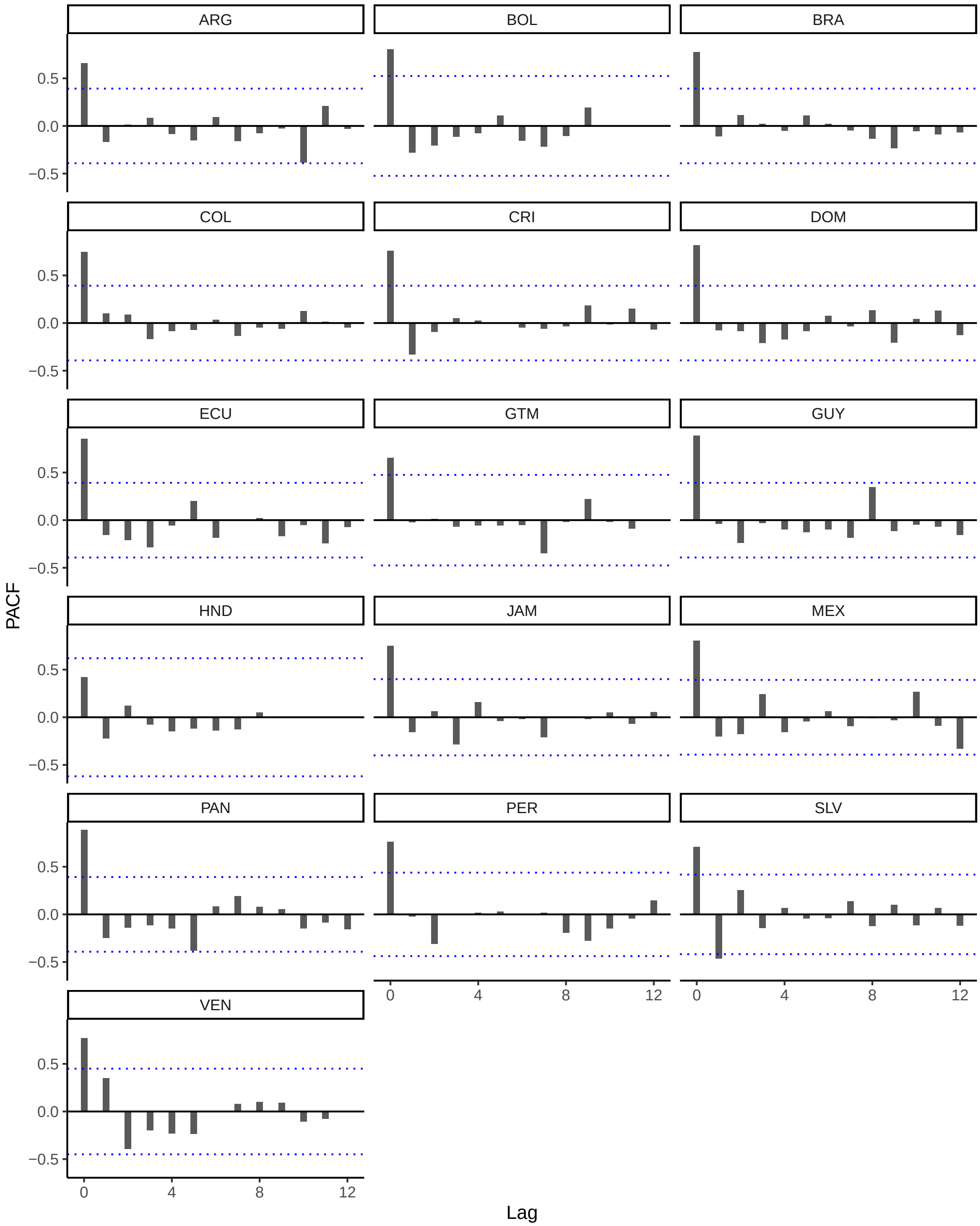
First, Figures D.1 and D.2 show the ACF and PACF, respectively, for the logged ratio of multilateral debt to bonds. Augmented Dickey-Fuller, KPSS, and Phillips–Perron tests (estimated using the `R` command `auto.arima`) suggest the presence of integration for all countries other than Argentina, with second-order integration for one country (Jamaica).

Figure D.1: Autocorrelation Function for $Ln\left(\frac{Multilateral}{Bonds}\right)$, by Country



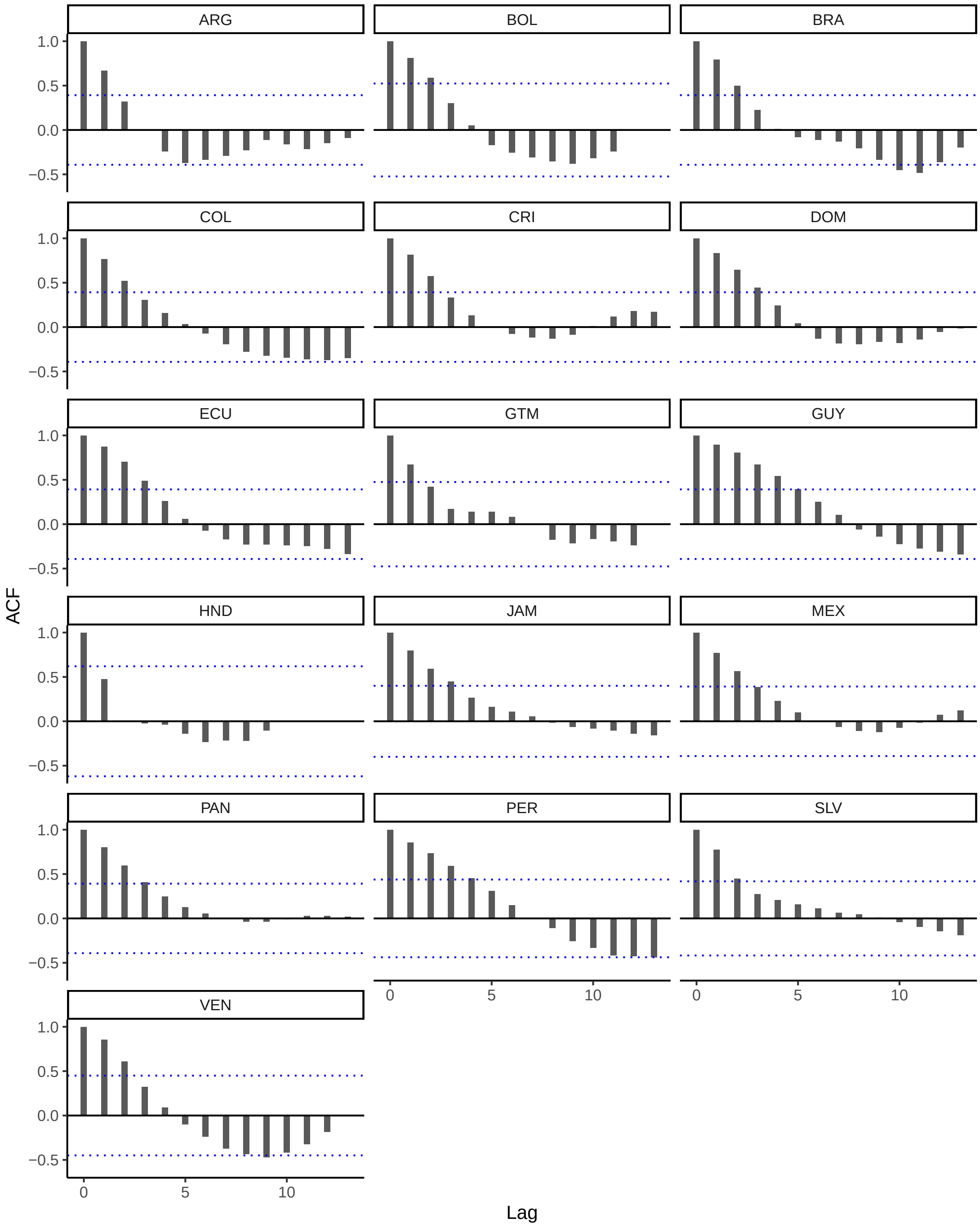
This figure shows the autocorrelation function (ACF) for the first dependent variable.

Figure D.2: Partial Autocorrelation Function for $Ln\left(\frac{Multilateral}{Bonds}\right)$, by Country



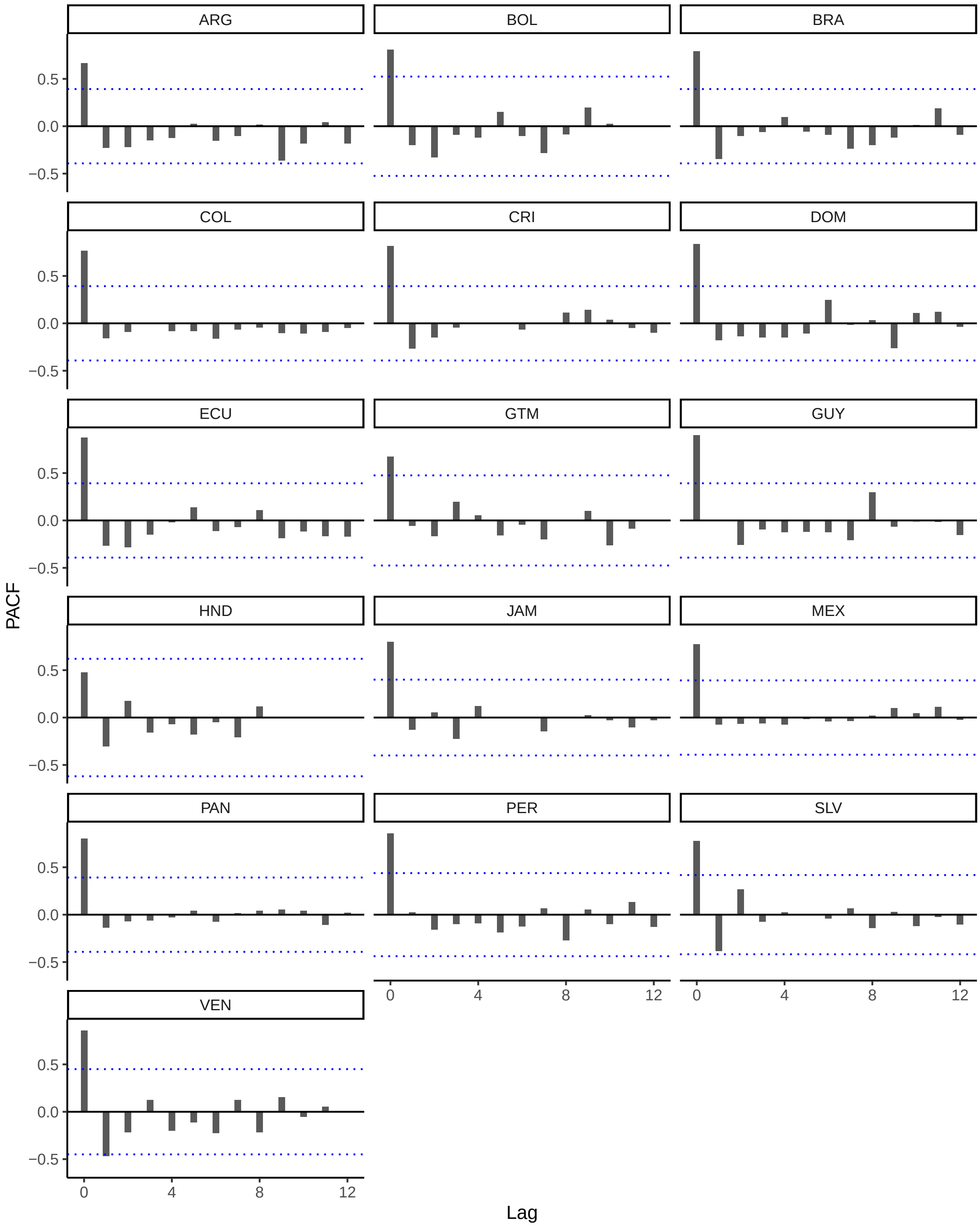
This figure shows the partial autocorrelation function (PACF) for the first dependent variable.

Figure D.3: Autocorrelation Function for $Ln\left(\frac{Bilateral}{Bonds}\right)$, by Country



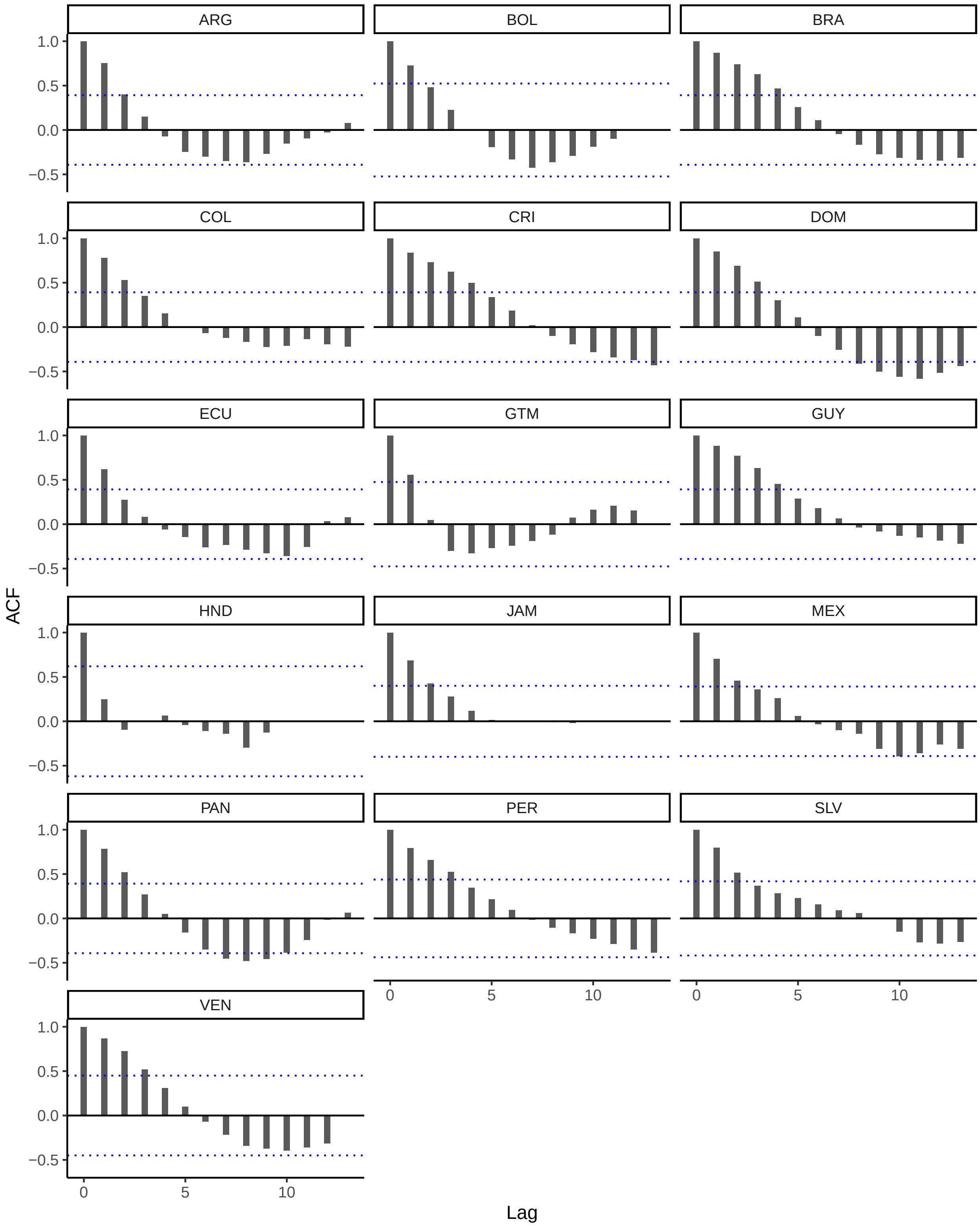
This figure shows the autocorrelation function (ACF) for the second dependent variable.

Figure D.4: Partial Autocorrelation Function for $Ln\left(\frac{Bilateral}{Bonds}\right)$, by Country



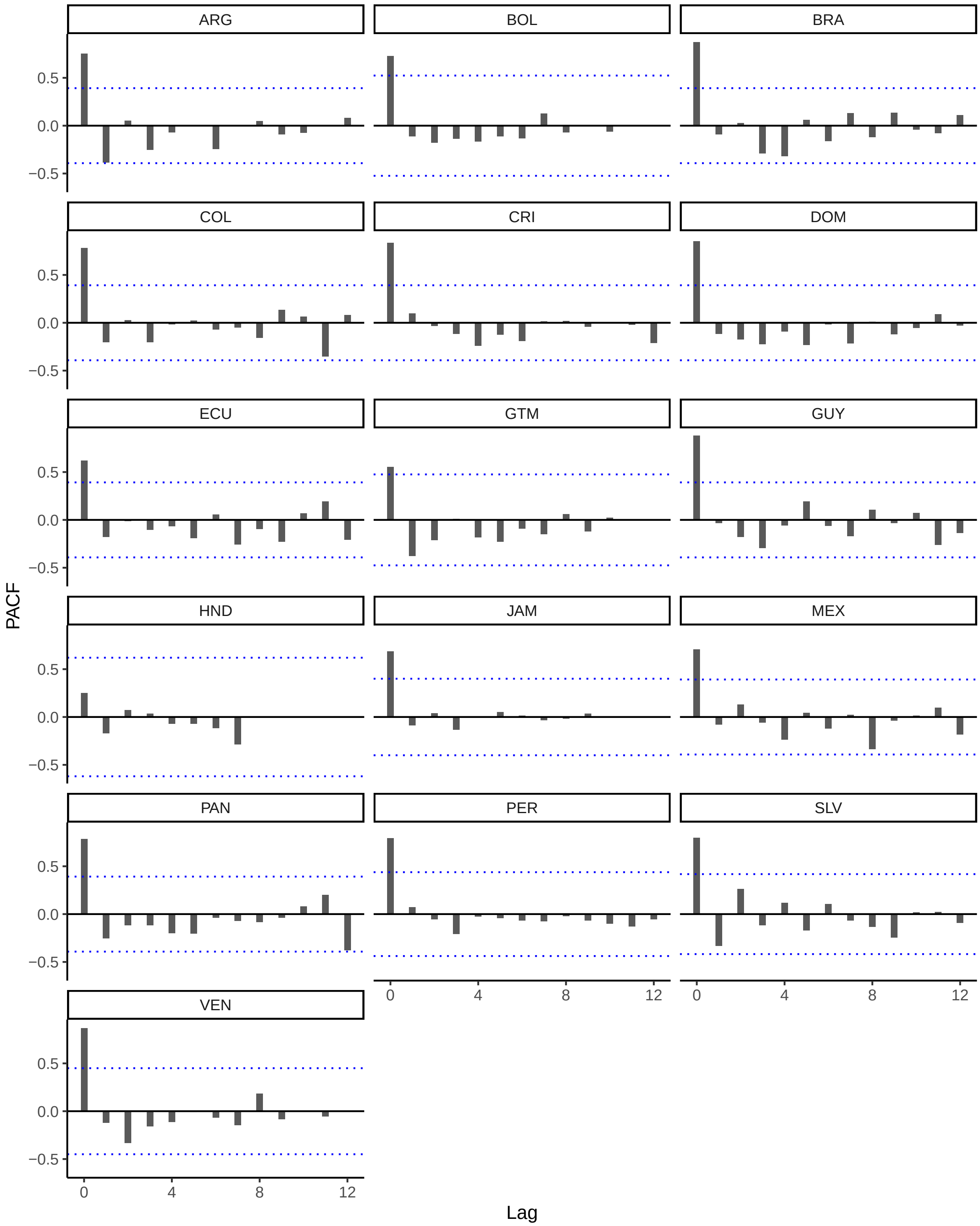
This figure shows the partial autocorrelation function (PACF) for the second dependent variable.

Figure D.5: Autocorrelation Function for $Ln\left(\frac{Comm.Banks}{Bonds}\right)$, by Country



This figure shows the autocorrelation function (ACF) for the third dependent variable.

Figure D.6: Partial Autocorrelation Function for $Ln\left(\frac{Comm.Banks}{Bonds}\right)$, by Country



This figure shows the partial autocorrelation function (PACF) for the third dependent variable.

Second, Figures D.3 and D.4 show the ACF and PACF, respectively, for the logged ratio of bilateral debt to bonds. Augmented Dickey-Fuller, KPSS, and Phillips–Perron tests (estimated using the `R` command `auto.arima`) suggest the presence of first-order integration for 11 countries (Bolivia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Panama, and Peru) and second-order integration for one country (Jamaica).

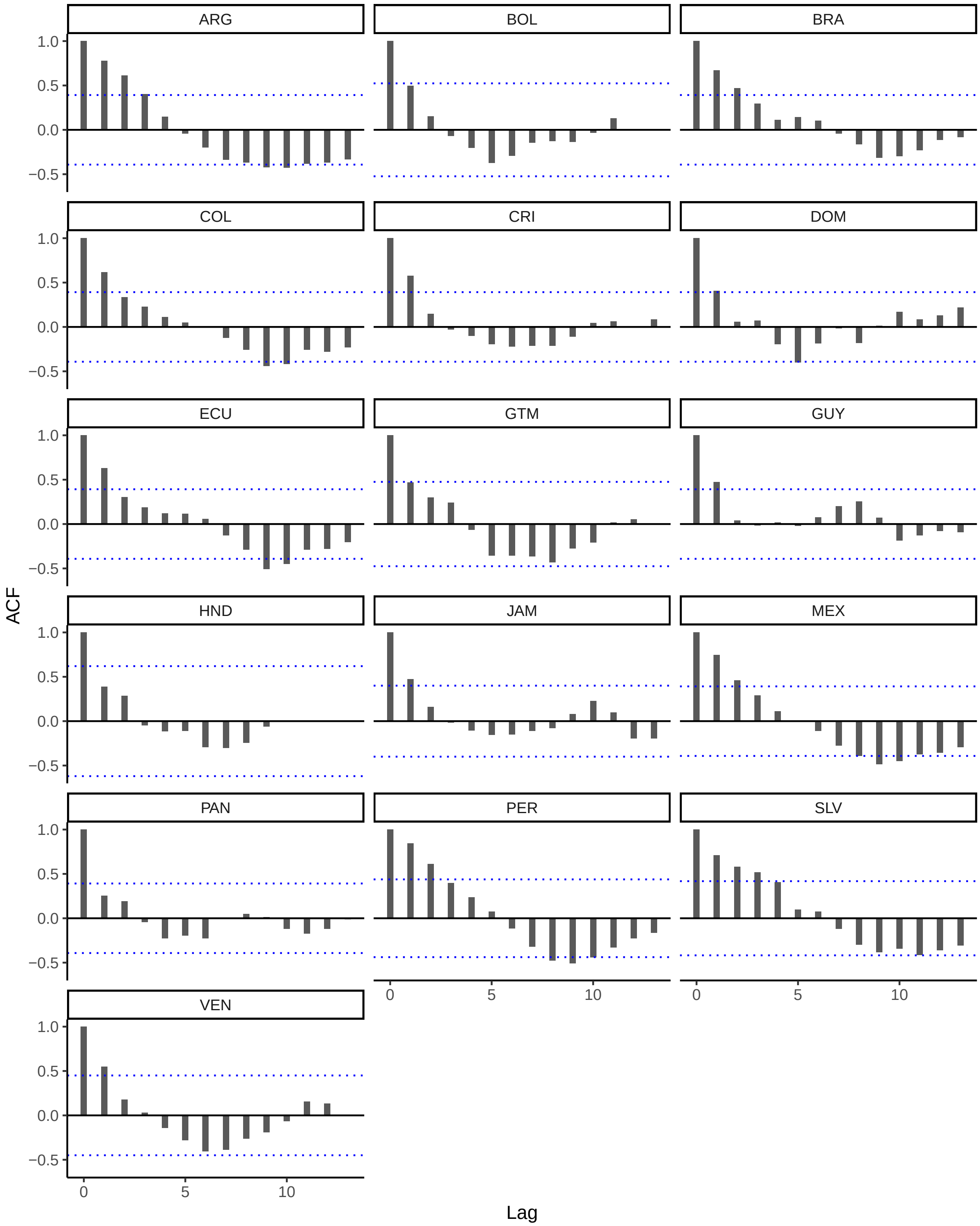
Finally, Figures D.5 and D.6 show the ACF and PACF, respectively, for the logged ratio of commercial banks to bonds. Augmented Dickey-Fuller, KPSS, and Phillips–Perron tests (estimated using the `R` command `auto.arima`) suggest the presence of first-order integration for 9 countries (Bolivia, Brazil, Colombia, Costa Rica, El Salvador, Guyana, Honduras, Jamaica, and Venezuela), and second-order integration for one country (Peru).

We conduct similar tests with key continuous independent variables: *Commodity Price Index*, *Ln Oil and Gas Production*, and *Resource Rents*. We do not conduct these tests with our fourth independent variable (*Field Discovery*) because this variable is binary; since it only takes on values of zero and one, it has "neither infinite variance nor a tendency to revert back toward the mean" (Beck and Katz, 2011, 344) and is therefore stationary by definition.

Figures D.7 and D.8 show the ACF and PACF, respectively, for resource rents (as a percentage of GDP). Augmented Dickey-Fuller, KPSS, and Phillips–Perron tests (estimated using the `R` command `auto.arima`) suggest the presence of first-order integration for four countries (Brazil, El Salvador, Guyana, and Peru).

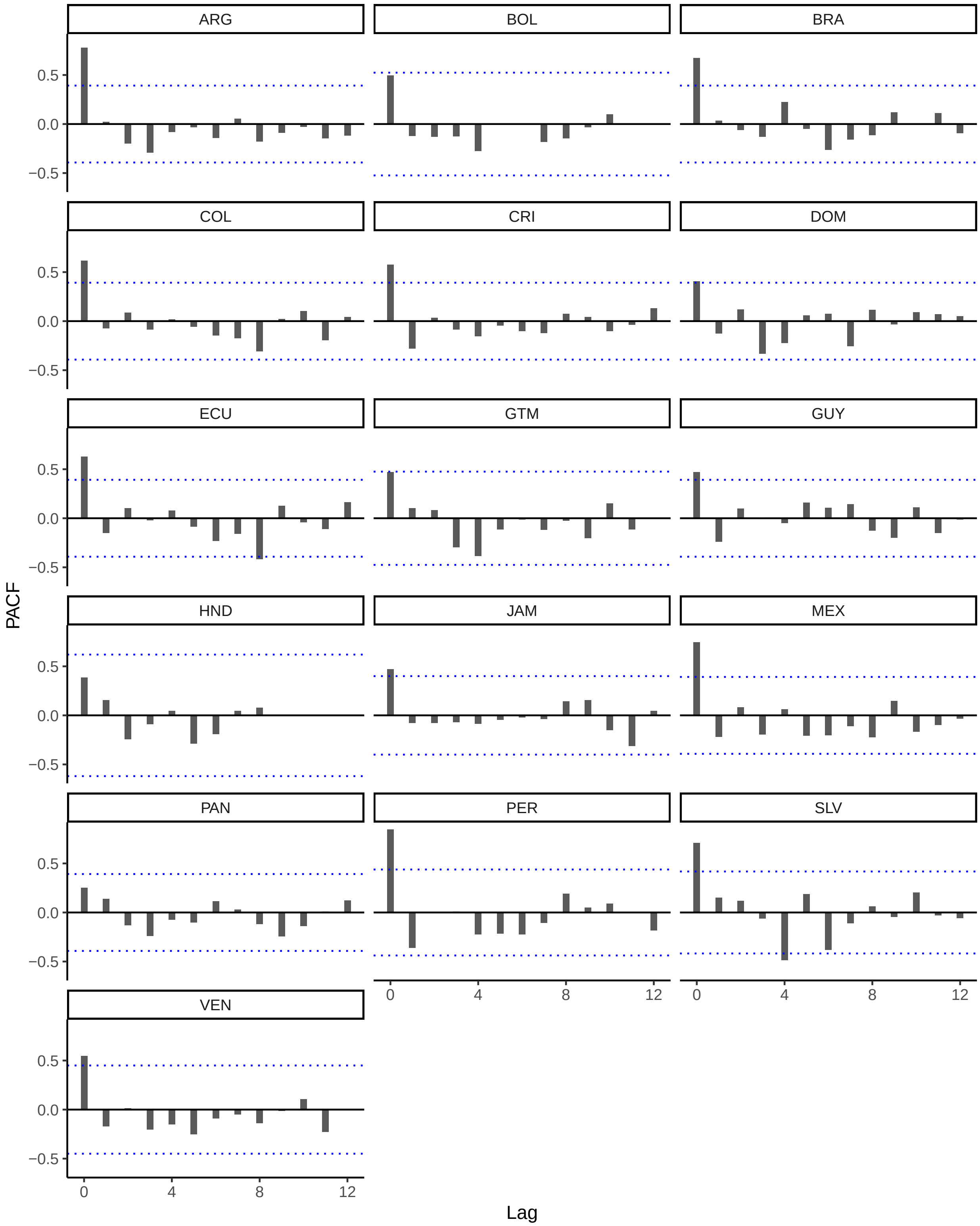
Figures D.9 and D.10 show the ACF and PACF, respectively, for the logged value of oil and gas production. Augmented Dickey-Fuller, KPSS, and Phillips–Perron tests (estimated using the `R` command `auto.arima`) suggest the presence of first-order integration for 10 countries (Argentina, Bolivia, Brazil, Colombia, Ecuador, Guatemala, Honduras, Jamaica, Peru, and Venezuela) and second-order integration for one country (Mexico). Note that the Dominican Republic does not produce any oil, and Guyana produced very little before 2020.

Figure D.7: Autocorrelation Function for *Resource Rents*, by Country



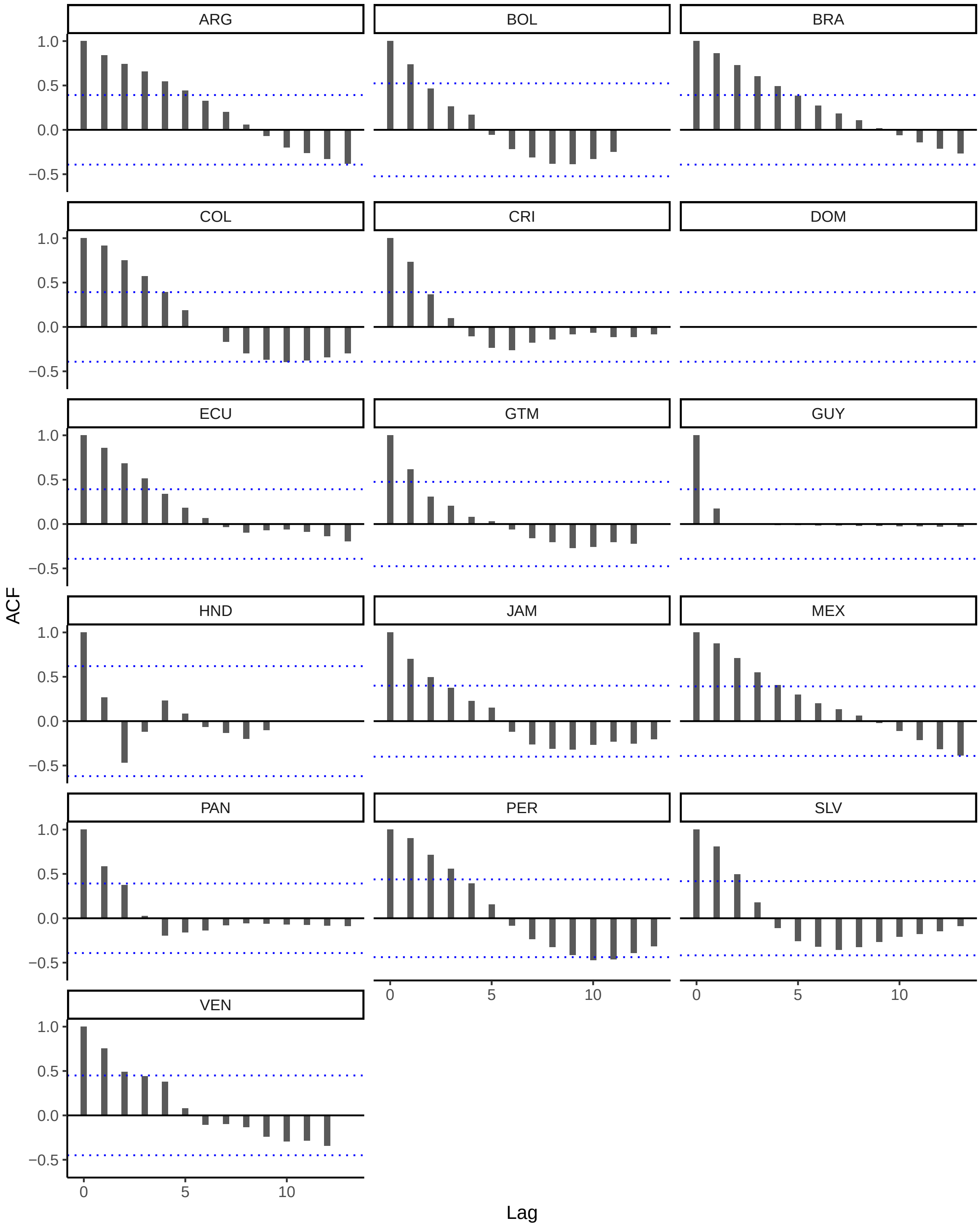
This figure shows the autocorrelation function (ACF) for the independent variable *Resource Rents*.

Figure D.8: Partial Autocorrelation Function for *Resource Rents*, by Country



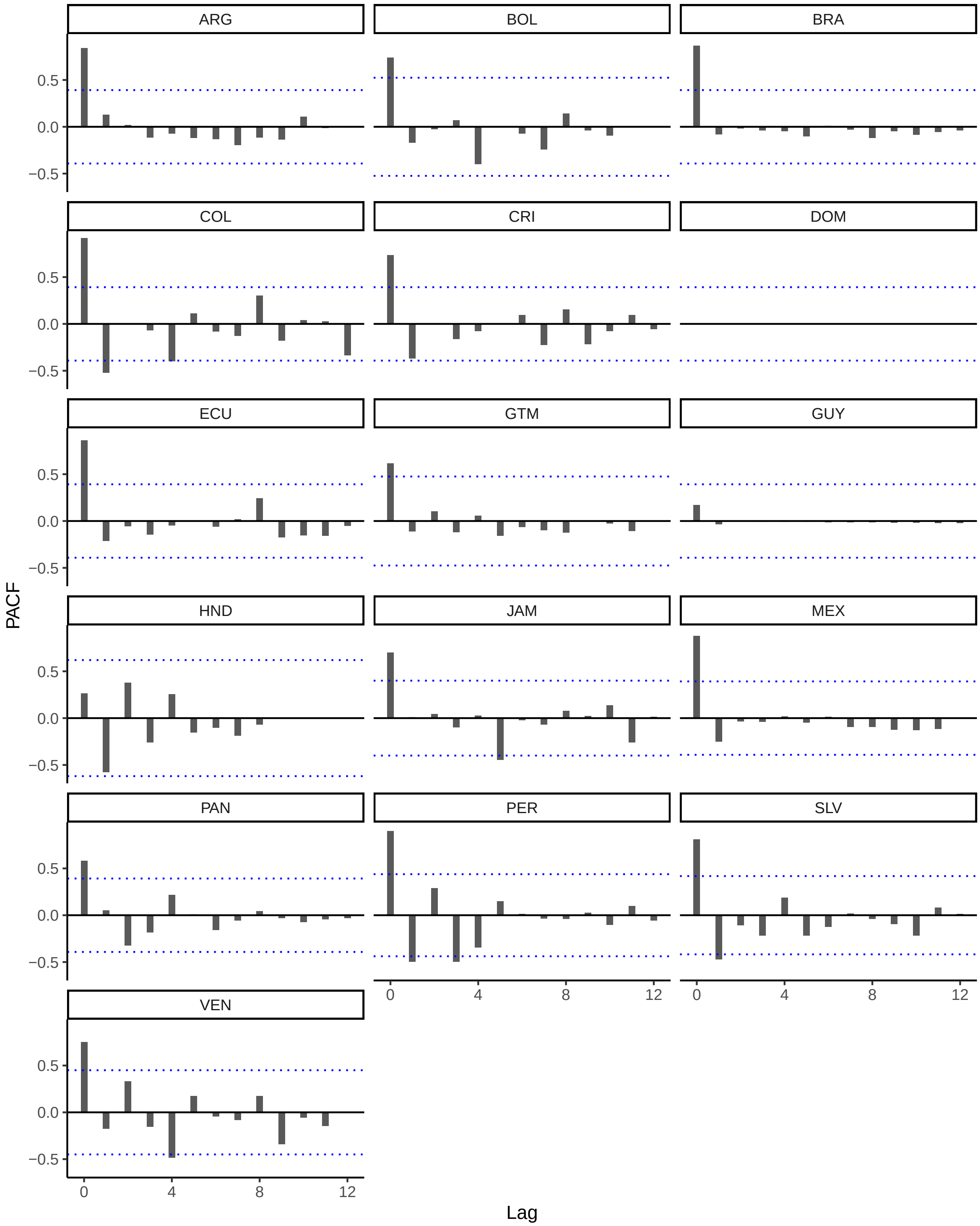
This figure shows the partial autocorrelation function (PACF) for the independent variable *Resource Rents*.

Figure D.9: Autocorrelation Function for *Ln Oil and Gas Production*, by Country



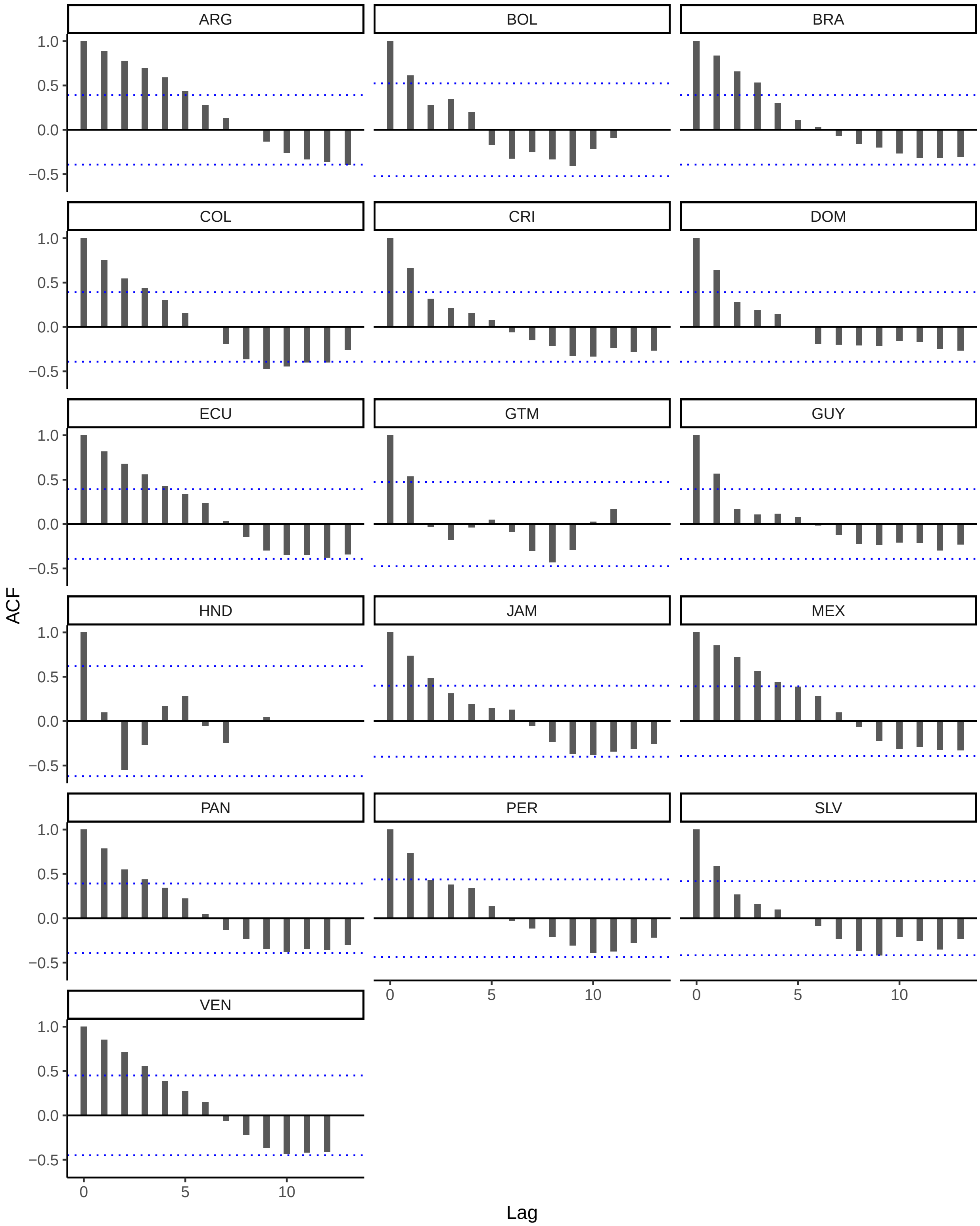
This figure shows the autocorrelation function (ACF) for the independent variable *Ln Oil and Gas Production*.

Figure D.10: Partial Autocorrelation Function for *Ln Oil and Gas Production*, by Country



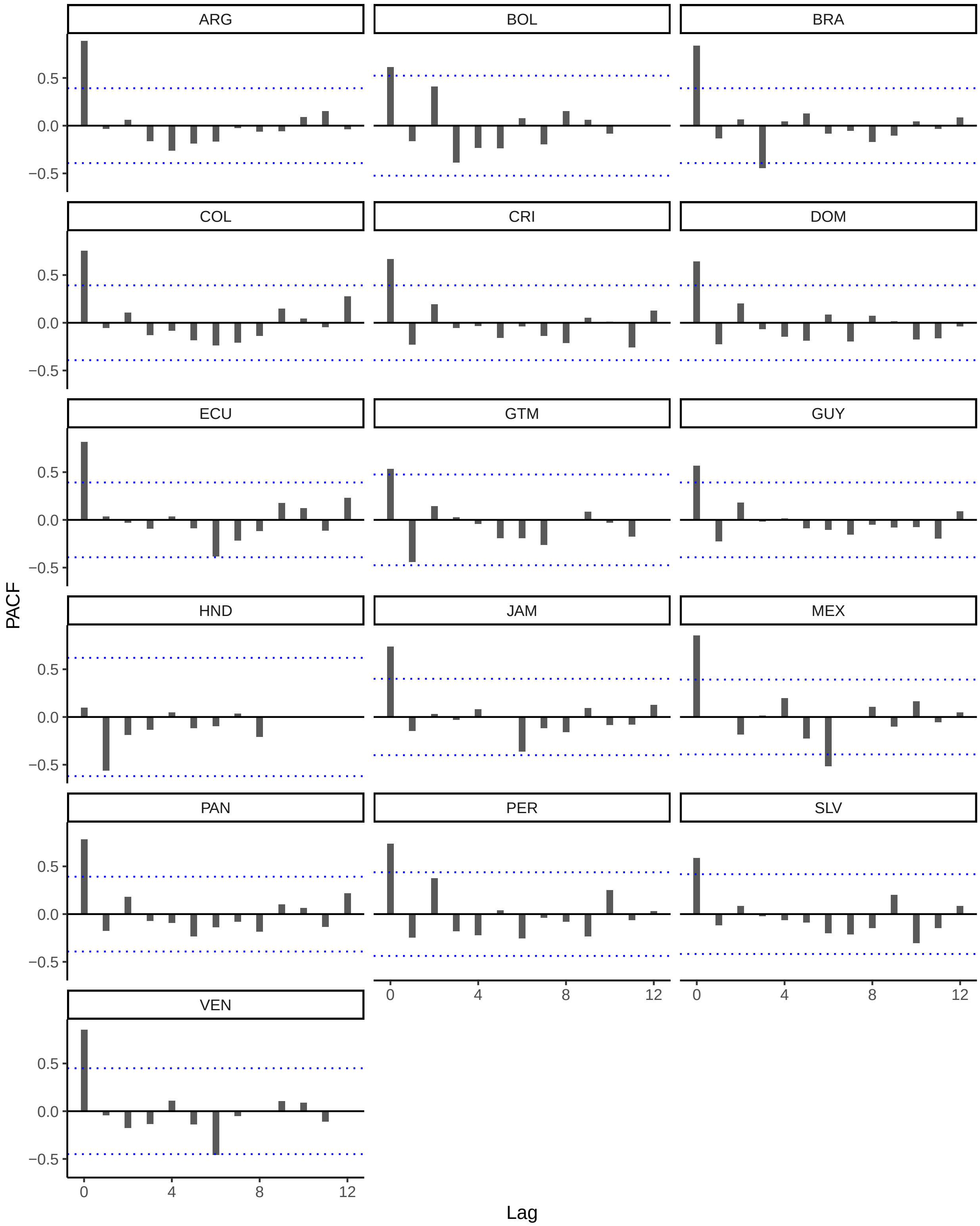
This figure shows the partial autocorrelation function (PACF) for the independent variable *Ln Oil and Gas Production.*

Figure D.11: Autocorrelation Function for *Commodity Price Index*, by Country



This figure shows the autocorrelation function (ACF) for the independent variable *Commodity Price Index*.

Figure D.12: Partial Autocorrelation Function for *Commodity Price Index*, by Country



This figure shows the partial autocorrelation function (PACF) for the independent variable *Commodity Price Index.*

Finally, Figures D.11 and D.12 show the ACF and PACF, respectively, for the country-specific commodity price index. Augmented Dickey-Fuller, KPSS, and Phillips–Perron tests (estimated using the `R` command `auto.arima`) suggest the presence of first-order integration for 10 of the 16 countries (Argentina, Bolivia, Brazil, Colombia, Ecuador, Jamaica, Mexico, Panama, Peru, and Venezuela).

As these figures and test results show, there is some evidence of integration: the dependent variables are clearly integrated for most (though not all) countries, as are the variables *Commodity Price Index* and *Ln Oil and Gas Production*. In contrast, *Resource Rents* is only integrated for a few countries. But error correction models can be estimated both with stationary and with integrated series, provided the latter are cointegrated (Boef and Keele, 2008). Thus, we proceed to the second step in the Engle-Granger regression approach, which is to find the cointegrating vector. To do so, we regress each dependent variable on the two independent variables that are clearly integrated (*Ln Oil and Gas Production* and *Commodity Price Index*), assessing whether the residuals are stationary. If the residuals are stationary, we can say that these variables are cointegrated. For most countries, Dickey-Fuller, KPSS, and Phillips–Perron tests indicate that the residuals are indeed stationary, and a visual inspection of the ACF confirms this diagnostic. Therefore, we proceed to estimate Johansen's VAR approach; according to Box-Steffensmeier et al. (2014, 164), "in the case of three or more variables, this method more easily identifies the presence of multiple cointegrating vectors."

Johansen's VAR approach tests the rank of $\pi = (A_1 - I)$, where A_1 is an $n \times n$ matrix of parameters and I is an $n \times n$ identity matrix. The rank of $\pi = \lambda_1, \lambda_2, ..., \lambda_n$ represents the number of nonzero characteristic roots, and thus the number of cointegrating vectors. If $\lambda_n = 0$, then the rank of π is 0 and no cointegration exists: no linear combination of the variables is stationary. If the rank of π is 1, then $0 < \lambda_1 < 1$ and there is one cointegrated vector in the system; if the rank of π is 2, then $1 < \lambda_1 < 2$ and there are two cointegrated vectors in the system; and so on (Box-Steffensmeier et al., 2014, 164-165). In Johansen's

Table D.1: Results of λ_{TRACE} Tests Using the Variables $Ln\left(\frac{Multilateral}{Bonds}\right)$, *Ln Oil and Gas Production*, and *Commodity Price Index*

	$H_0 : r = 0$	$H_0 : r \leqslant 1$	$H_0 : r \leqslant 2$
95% critical value	**31.52**	**17.95**	**8.18**
90% critical value	**28.71**	**15.66**	**6.50**
Argentina	17.55	3.98	1.07
Bolivia	63.03	22.63	7.95
Brazil	30.81	11.48	4.00
Colombia	28.57	10.74	3.94
Costa Rica	31.78	13.93	1.07
Ecuador	34.88	11.31	2.83
El Salvador	65.76	12.20	4.78
Guatemala	50.90	24.61	9.50
Jamaica	81.31	37.36	11.49
Mexico	19.47	6.86	0.06
Panama	20.52	7.35	2.59
Peru	34.85	11.78	0.29
Venezuela	37.31	18.81	3.24

VAR approach, the $TRACE$ statistic tests the hypothesis that the number of cointegrating vectors is equal to or smaller than r.

Table D.1 presents the results of λ_{TRACE} tests for the first dependent variable, comparing the 90 and 95 percent critical values to the values obtained for each country (excluding the Dominican Republic, Guyana, and Honduras; given their small oil production or bond issuance, the test cannot be estimated because the matrix is rank-deficient). Given the value of the test statistic, we reject the hypothesis that there is no cointegrating vector for Bolivia, Costa Rica, Ecuador, El Salvador, Guatemala, Jamaica, Peru, and Venezuela at $p = 0.05$. In other words, there is at least one cointegrating relationship for eight of the 16 countries, and in fact two relationships for Guatemala and Jamaica.

Tables D.2 and D.3 present the results of λ_{TRACE} tests for the other two dependent variables, again providing mixed evidence. At $p = 0.05$, Table D.2 finds no cointegrating relationship for four countries (Argentina, Brazil, Mexico, and Venezuela); a cointegrating

Table D.2: Results of λ_{TRACE} Tests Using the Variables $Ln\left(\frac{Bilateral}{Bonds}\right)$, *Ln Oil and Gas Production*, and *Commodity Price Index*

	$H_0 : r = 0$	$H_0 : r \leqslant 1$	$H_0 : r \leqslant 2$
95% critical value	**31.52**	**17.95**	**8.18**
90% critical value	**28.71**	**15.66**	**6.50**
Argentina	23.06	4.34	0.65
Bolivia	62.48	21.56	6.30
Brazil	17.96	8.81	3.50
Colombia	32.80	14.99	5.56
Costa Rica	37.98	11.84	0.64
Ecuador	33.95	11.70	2.87
El Salvador	50.11	10.72	3.30
Guatemala	41.54	6.64	0.14
Jamaica	55.77	18.59	9.08
Mexico	16.47	8.07	0.39
Panama	33.87	6.43	1.97
Peru	43.98	19.14	6.45
Venezuela	28.51	8.29	1.29

Table D.3: Results of λ_{TRACE} Tests Using the Variables $Ln\left(\frac{Comm.Banks}{Bonds}\right)$, *Ln Oil and Gas Production*, and *Commodity Price Index*

	$H_0 : r = 0$	$H_0 : r \leqslant 1$	$H_0 : r \leqslant 2$
95% critical value	**31.52**	**17.95**	**8.18**
90% critical value	**28.71**	**15.66**	**6.50**
Argentina	17.76	3.62	0.10
Bolivia	60.67	23.48	6.70
Brazil	24.86	11.04	1.63
Colombia	35.42	13.97	5.26
Costa Rica	30.09	14.24	2.87
Ecuador	16.70	8.58	3.00
El Salvador	36.25	10.53	2.88
Guatemala	39.30	8.36	0.52
Jamaica	28.90	10.64	0.28
Mexico	16.09	6.15	1.41
Panama	25.33	11.48	4.91
Peru	41.46	17.74	5.68
Venezuela	33.64	12.76	5.23

relationship of order one for six countries (Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, and Panama); and a cointegrating relationship of order two for three countries (Bolivia, Jamaica, and Peru). Likewise, at $p = 0.05$, Table D.3 finds no cointegrating relationship for seven countries (Argentina, Brazil, Costa Rica, Ecuador, Jamaica, Mexico, and Panama); a cointegrating relationship of order one for five countries (Colombia, El Salvador, Guatemala, Peru, and Venezuela); and a cointegrating relationship of order two for Bolivia. Given this mixed evidence, we opted to present first-difference models in the main text, as these models render integrated variables stationary without assuming cointegration.

The downside of a first-difference model, according to Beck and Katz (2011, 343), is that it "throws out any long-run information about y and x," so we cannot distinguish between short-term and long-term effects. Therefore, we supplement our main results with ECMs, estimated following the specification of Keele, Linn and Webb (2016):

$$\Delta Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \beta_0 \Delta X_{it} + \beta_1 X_{it-1} + Z_{it} + \mu_i + \tau_t + \varepsilon_{it}, \tag{4}$$

where α_1 is the error correction rate (that is, the rate at which Y changes to restore its long-run equilibrium with X, a value between –1 and 0); β_0 captures the short-term effect of changes in X on Y; $\frac{\beta_1}{-\alpha_1}$ represents the long-run relationship between X and Y; Z is a set of control variables; μ_i are country fixed effects; τ_t is a time trend; and ε_{it} is the error term (Beck and Katz, 2011). As before, we estimate three SURs to account for correlated error terms.

Table D.4 presents the results. According to its three models, natural resource wealth has no meaningful short-term effect on the outcomes of interest, as indicated by the coefficients for the differences (Δ), which are not statistically significant. In the long term, though, countries tend to shift significantly *toward* bond issuance and away from bilateral debt when *Resource Rents* are high; conversely, they tend to shift*away* from bonds and toward bilateral debt when oil and gas production increases. But given the mixed evidence that the dependent variables are integrated, we opt to present the more conservative results of Table 3.

Table D.4: The Effect of Natural Resources on Sovereign Borrowing: Trade-Offs Between Creditors, 1996–2019 (Error Correction Models)

	Dependent Variable:		
	$Ln\left(\frac{Multilateral}{Bonds}\right)_{\Delta}$	$Ln\left(\frac{Bilateral}{Bonds}\right)_{\Delta}$	$Ln\left(\frac{Comm.Banks}{Bonds}\right)_{\Delta}$
	(1)	(2)	(3)
Dependent Variable $_{t-1}$	−0.236***	−0.196***	−0.124***
	(0.020)	(0.020)	(0.027)
Resource Rents, % of GDP $_{t-1}$	−0.035**	−0.050***	−0.015
	(0.014)	(0.017)	(0.023)
Resource Rents, % of GDP $_{\Delta}$	−0.027	−0.027	−0.047*
	(0.018)	(0.020)	(0.027)
Ln Oil and Gas Production $_{t-1}$	0.060	0.179	0.128
	(0.102)	(0.116)	(0.157)
Ln Oil and Gas Production $_{\Delta}$	−0.096	−0.045	0.021
	(0.142)	(0.162)	(0.219)
Commodity Price Index $_{t-1}$	0.012	0.024	0.000
	(0.013)	(0.015)	(0.021)
Commodity Price Index $_{\Delta}$	0.005	0.000	0.013
	(0.017)	(0.020)	(0.027)
Field Discovery $_{t-1}$	−0.041	−0.042	0.058
	(0.133)	(0.151)	(0.204)
Mainstream Minister = 1	0.017	−0.018	−0.046
	(0.079)	(0.089)	(0.122)
Minister Turnover (5 Years)	0.079***	0.067**	0.054
	(0.024)	(0.027)	(0.037)
Debt Crisis Experience = 1	0.022	0.072	−0.038
	(0.098)	(0.111)	(0.151)
Left Executive = 1	−0.006	0.063	0.009
	(0.090)	(0.102)	(0.139)
Fiscal Council = 1	0.019	0.291*	0.030
	(0.150)	(0.171)	(0.232)
Political Constraints	−0.329	−0.367	−0.191
	(0.205)	(0.233)	(0.316)
IMF Agreement = 1	0.152**	0.122	0.071
	(0.073)	(0.083)	(0.114)
Fiscal Balance, % of GDP $_{t-1}$	0.004	0.020	−0.036
	(0.019)	(0.021)	(0.029)
Tax Revenue, % of GDP $_{t-1}$	−0.006	−0.036	−0.016
	(0.030)	(0.034)	(0.047)
Ln Core Inflation $_{t-1}$	−0.294**	−0.183	−0.401*
	(0.148)	(0.168)	(0.228)
GDP Per Capita $_{t-1}$	0.060	0.007	0.035
	(0.037)	(0.043)	(0.059)
GDP Growth, % $_{t-1}$	0.015	0.024*	0.033*
	(0.011)	(0.013)	(0.018)
Capital Openness $_{t-1}$	0.370**	0.307	0.322
	(0.170)	(0.192)	(0.260)
Ln International Reserves $_{t-1}$	−0.227***	−0.227**	−0.150
	(0.085)	(0.097)	(0.132)
US Treasury Rate, % $_{t-1}$	−0.066	−0.109*	−0.090
	(0.055)	(0.063)	(0.085)
R^2	0.301	0.289	0.212
Observations	303	303	303

This table presents the results of seemingly unrelated regressions, which allow for correlated errors. All models include country fixed effects, a constant, and a time trend. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

D.2 Alternative Specification: Debt Stock by Time of Creditor

Table D.5: The Effect of Natural Resources on Sovereign Borrowing: Debt Stock by Type of Creditor, 1996–2019

	Dependent Variable:				
	Ln Debt, Total $_{\Delta}$	Ln Debt, Multilateral $_{\Delta}$	Ln Debt, Bilateral $_{\Delta}$	Ln Debt, Comm.Banks $_{\Delta}$	Ln Debt, Bonds $_{\Delta}$
	(1)	(2)	(3)	(4)	(5)
Resource Rents, % of GDP $_{Delta}$	0.002	−0.005*	0.012*	−0.033***	0.029
	(0.004)	(0.003)	(0.007)	(0.009)	(0.022)
Ln Oil and Gas Production $_{Delta}$	0.011	−0.028	−0.033	0.030	0.378
	(0.026)	(0.019)	(0.029)	(0.104)	(0.341)
Commodity Price Index $_{Delta}$	0.003	0.003	−0.006	0.018	0.034
	(0.003)	(0.003)	(0.006)	(0.011)	(0.069)
Field Discovery $_{t-1}$	0.006	−0.006	0.028	0.019	−0.320
	(0.014)	(0.019)	(0.059)	(0.112)	(0.455)
Mainstream Minister = 1	−0.003	0.021	−0.075**	−0.042	−0.096
	(0.017)	(0.013)	(0.035)	(0.083)	(0.130)
Minister Turnover (5 Years)	−0.028***	−0.013*	−0.004	0.005	−0.029
	(0.008)	(0.008)	(0.008)	(0.040)	(0.057)
Debt Crisis Experience = 1	0.029	0.023**	0.083**	−0.048	0.039
	(0.018)	(0.011)	(0.041)	(0.095)	(0.038)
Left Executive = 1	−0.015	−0.020	0.054	−0.009	0.066
	(0.023)	(0.019)	(0.035)	(0.165)	(0.137)
Fiscal Council = 1	−0.016	−0.074***	0.190**	−0.247	0.102
	(0.023)	(0.027)	(0.074)	(0.207)	(0.157)
Political Constraints	0.012	0.017	−0.063	0.526	−0.804
	(0.033)	(0.042)	(0.097)	(0.562)	(0.509)
IMF Agreement = 1	−0.007	0.033**	−0.013	−0.103	0.209
	(0.014)	(0.016)	(0.032)	(0.074)	(0.193)
Fiscal Balance, % of GDP $_{t-1}$	−0.008*	−0.012***	0.007	−0.015	−0.002
	(0.004)	(0.004)	(0.006)	(0.030)	(0.039)
Tax Revenue, % of GDP $_{t-1}$	−0.004	0.010*	−0.008	0.007	−0.078
	(0.005)	(0.006)	(0.011)	(0.025)	(0.062)
Ln Core Inflation $_{t-1}$	0.025	−0.010	0.062	−0.015	0.131
	(0.027)	(0.030)	(0.053)	(0.167)	(0.173)
GDP Per Capita $_{t-1}$	−0.003	0.006	−0.019*	−0.015	−0.143**
	(0.005)	(0.009)	(0.011)	(0.044)	(0.068)
GDP Growth, % $_{t-1}$	−0.001	−0.005*	0.004	0.008	0.003
	(0.002)	(0.003)	(0.005)	(0.013)	(0.024)
Capital Openness $_{t-1}$	−0.032	−0.044	0.021	0.231	−0.570**
	(0.039)	(0.046)	(0.054)	(0.278)	(0.288)
Ln International Reserves $_{t-1}$	0.015	0.033	0.006	0.022	0.325***
	(0.019)	(0.022)	(0.026)	(0.115)	(0.116)
US Treasury Rate, % $_{t-1}$	−0.007	0.012	−0.017	−0.005	−0.037
	(0.013)	(0.015)	(0.025)	(0.067)	(0.144)
R^2	0.192	0.124	0.095	0.032	0.047
Observations	368	369	369	369	368

This table presents the results of linear regressions. All models include year fixed effects, country fixed effects, a constant, and standard errors clustered by country. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

While Table 3 looks at different types of external debt in relative terms (i.e. multilateral debt, bilateral debt, and debt from commercial banks *relative* to bonds), Table D.5 looks at each type of debt in absolute terms (i.e. in millions of current US dollars, logged). In absolute terms, country-year pairs with a higher ratio of resource rents to GDP have a significantly larger stock of bilateral debt and a significantly smaller stock of multilateral debt or debt from commercial banks. The remaining resource-related variables have no significant effect on any other type of sovereign debt.

E The Creditor Perspective: Natural Resources and Sovereign Risk Evaluations

In the long-run, according to Hamann, Mendoza and Restrepo-Echavarria (2020), higher oil prices and production are associated with more optimistic sovereign risk evaluations (measured as the Institutional Investor's Index for Country Credit Ratings). Below, we confirm these findings using a different measure of sovereign risk: JP Morgan's Emerging Market Bond Index Global (EMBI Global), which is available on a monthly basis and tracks the total returns for US dollar denominated bonds with outstanding face value of at least $500 million. Higher *EMBI Global* values indicate higher risk; under these circumstances, external borrowing is more expensive. JP Morgan does not provide this index for all countries throughout the entire period. Values for Bolivia and Guatemala, for example, are only available after 2012. Despite these limitations, we choose this dependent variable due to its widespread use among investors to evaluate the performance of external debt instruments in emerging markets.

Like Hamann, Mendoza and Restrepo-Echavarria (2020) and many others who examine the predictors of sovereign spreads (e.g. Brooks, Cunha and Mosley, 2015), we estimate ECMs, conditioning predicted changes in *EMBI Global* on its own past levels, past changes, and levels of the key independent variables. Our key independent variables are the same as in previous analyses (*Resource Rents*, *Ln Oil and Gas Production*, *Field Discovery*, and *Commodity Price Index*), as are the control variables, and we follow the ECM specification outlined in the previous section of the appendix. Table E.1 presents the results.

We find evidence that investors worry about the resource curse in the short run. All else

Table E.1: The Effect of Natural Resources on Sovereign Risk Evaluations, 1996–2018

	Dependent Variable:
	EMBI Global $_{\Delta}$
	(1)
Dependent Variable $_{t-1}$	-0.059^{***}
	(0.014)
Resource Rents, % of GDP $_{t-1}$	2.475
	(1.726)
Resource Rents, % of GDP $_{\Delta}$	4.722^{**}
	(1.999)
Ln Oil and Gas Production $_{t-1}$	-19.306^{**}
	(8.987)
Ln Oil and Gas Production $_{\Delta}$	17.347
	(14.077)
Commodity Price Index $_{t-1}$	-1.232
	(1.067)
Commodity Price Index $_{\Delta}$	-24.459^{*}
	(14.337)
Field Discovery $_{t-1}$	-19.983
	(16.943)
Mainstream Minister = 1	5.759
	(7.151)
Minister Turnover (5 Years)	1.481
	(1.578)
Debt Crisis Experience = 1	27.778^{***}
	(10.767)
Election Month = 1	-29.933
	(19.357)
Left Executive = 1	-21.759
	(16.217)
Fiscal Council = 1	-10.902
	(9.303)
Political Constraints	-29.758
	(27.321)
IMF Agreement = 1	-5.191
	(4.464)
Fiscal Balance, % of GDP $_{t-1}$	-1.155
	(1.961)
Tax Revenue, % of GDP $_{t-1}$	0.727
	(2.086)
Ln Core Inflation $_{t-1}$	-95.885^{***}
	(29.423)
GDP Per Capita $_{t-1}$	-1.099
	(2.783)
GDP Growth, % $_{t-1}$	-2.468^{*}
	(1.278)
Capital Openness $_{t-1}$	-41.824
	(27.450)
Ln International Reserves $_{t-1}$	36.705^{**}
	(14.610)
US Treasury Rate, % $_{t-1}$	4.143
	(4.009)
	(4.345)
R^2	0.056
Observations	2,978

This table presents the results of a linear regression that includes country fixed effects, time (month-year) fixed effects, and a constant. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$.

equal, economies that are more reliant on natural resources tend to be associated with larger risk: a 1% increase in the share of resource rents to GDP is associated with a significant

4.722 short-term basis-point increase in EMBI Global spreads. Still, investors are willing to look past the resource curse if the conditions are right: in the short run, a one-point increase in the *Commodity Price Index* (which ranges from 479.6 to 117.5) is associated with a 24.5 basis-point *decrease* in EMBI Global spreads in the following month, and this decrease is statistically significant.

In the long run, a one-point increase in the *Commodity Price Index* leads to a 24.6 basis-point reduction, though this effect is not statistically significant.[22] Likewise, a 1% increase in oil and gas production is associated with a significant long-term 3.3 basis point decline in EMBI Global spreads.[23] The coefficient for the lagged dependent variable indicates that only 5.9 percent of the deviation (or "error") from long-term yield trends is corrected within one month. Overall, Table E.1 supports our main assumption that investors draw information from the natural resource sector. This response persists for several months, as indicated by the "error" term.

[22] As a reminder, the long-run effect is calculated as $\frac{\beta_1}{-\alpha_1} = \frac{-1.232}{-(-0.050)} = -24.64$.

[23] The long-run effect is $\frac{\beta_1}{-\alpha_1} = \frac{-19.306}{-(-0.059)} = -327.2203$. Since *Ln Oil and Gas Production* is logged, the effect divided by 100 gives the absolute change in *EMBI Global* of a 1% increase in *Ln Oil and Gas Production*.