World Development 180 (2024) 106645

Contents lists available at ScienceDirect

World Development

journal homepage: www.elsevier.com/locate/worlddev

Regular Research Article

Crude credit: The political economy of natural resource booms and sovereign debt management

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ARTICLE INFO

Dataset link: https://doi.org/10.7910/DVN/NWWX4E

Keywords:
Natural resources
Sovereign debt
Public finance
Latin America

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, governments will favor the latter. Using data on 22 Latin American and Caribbean countries from 1996 to 2020, we find that governments issue bonds less frequently, in smaller amounts, as their oil and gas production or GDP share from resource rents 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 to finance more spending over time.

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 rated as a speculative grade investment, but market 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 2009 and 2011, falling by 3885 basis points over three years (see Fig. 1).

The political economy literature expects investor sentiment to improve during commodity upturns. When global capital markets are awash in money, as during the 2000s commodity boom, investors show an increased appetite for higher-risk assets like Ecuador’s (Ballard-Rosa, Mosley, & 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 Fig. 1); rather than leverage low interest rates to borrow more, Correa’s government withdrew from capital markets, returning briefly in June 2014. Though 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

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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.

https://doi.org/10.1016/j.worlddev.2024.106645
Accepted 20 April 2024
Available online 7 May 2024

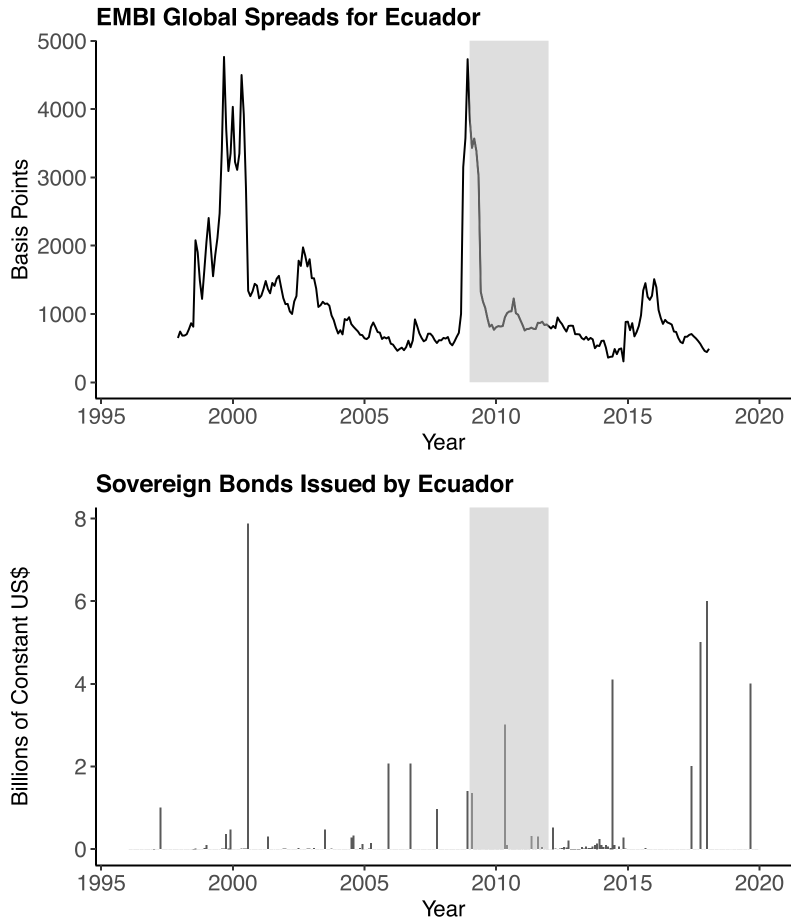

Fig. 1. EMBI global spreads and amount of debt issued by Ecuador, 1996–2020.
This figure shows the value of EMBI Global spreads for Ecuador (top), in basis points, and the amount of sovereign debt issued by the central government of Ecuador (bottom), in billions of constant US dollars. The period of investor optimism discussed in the text (after December 2008) is shaded in gray.
Source: JP Morgan and Bloomberg Terminal, respectively.

"that markets are a reality" but also declared that he would "never subject the country to those markets!"[4]

For a developing country like Ecuador that has suffered repeatedly from financial crises, Correa's market skepticism has strong political appeal. But it also risks missing important financing opportunities: when used prudently, sovereign debt allows governments to invest in infrastructure, education, and healthcare, while creating jobs, enhancing productivity, and improving the overall standard of living — all of which is essential for a developing country. If creditors were willing to finance Ecuador cheaply, it is surprising that President Correa – a trained economist – chose not to 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 2020, 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 revenues 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 historical 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 & Thomsson, 2017); and voters are generally critical of too much public debt (Bansak, Bechtel, & Margalit, 2021). In contrast, windfalls do not require repayment and are less subject to public scrutiny (Paler, 2013); hence, national governments tend to prefer it. An important disadvantage of this strategy, however, is that governments lose the opportunity to expand their fiscal space with cheap debt issuance, making it harder to smooth fiscal consumption across the business cycle. Borrowing tends to be more expensive during commodity downturns, meaning resource-rich countries like Ecuador cannot implement long-term development strategies that foster social welfare and economic growth. Instead, they often have to cut social spending when their population needs it most (Wibbels, 2006).

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

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

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 & Michaels, 2013), Colombia (Martínez, 2023), and elsewhere, oil royalties are associated with increased patronage, though they also 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 & 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. We know, for example, that volatility in commodity prices reduces bank lending in Uganda (Agarwal, Duttagupta, & Presbitero, 2020), increases the cost of borrowing for firms (Bermpei, Karadimitropoulou, Triantafyllou, & Alshalahi, 2023), and is a significant predictor of banking crises in low-income countries (Eberhardt & Presbitero, 2021). However, we are missing the perspective of resource-rich governments, whose fiscal policy choices can affect economic development by either exacerbating or mitigating commodity price cycles. Natural resources tend to be studied in tandem with taxation (e.g. Borge, Parmer, & Torvik, 2015; Martínez, 2023; Paler, 2013), but less so along with other forms of public financing. We fill this scholarly gap by bringing together two strands of research on natural resources and sovereign debt that have largely ignored one another previously.

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 the frequency and amount of issued bonds. 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 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, & Mosley, 2022), balanced budget rules (Kelemen & Teo, 2014), membership in international organizations (Gray, 2009), size and conditions of IMF loans (Chapman, Fang, Li, & Stone, 2017), central bank independence (Bodea & Hicks, 2018), regime type (Ballard-Rosa, 2020), and creditworthiness of peer countries (Brooks, Cunha, & 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 et al., 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 increase corruption (Brollo, Nannicini, Perotti, & Tabellini, 2013; Caselli & Michaels, 2013; Vicente, 2010), reduce transparency (Williams, 2011), weaken property rights (Jensen & Johnston, 2011), strengthen authoritarian rule (Ross, 2015), and reduce the demand for democratic accountability (McGuirk, 2013). That said, such downsides are conditional on the quality of domestic institutions and the availability of human capital resources (Jones Luong & Weinthal, 2006; Kurtz & Brooks, 2011). Previous research has identified the existence of a "democratic advantage" (Schultz & 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, resource-rich countries should be even less likely to repay their debt than their resource-poor counterparts.

Ballard-Rosa et al. (2021) and Zeitz (2022) allow us to reconcile these mixed expectations by showing that the democratic advantage is contingent on global liquidity: as global liquidity increases, investors become more risk-tolerant. Of course, global financial flows can increase for many reasons, including low interest rates, quantitative easing, and government stimulus packages. But when they increase due to commodity booms, risk-tolerant investors become more willing to lend — even to resource-rich countries with corrupt leaders who are rarely held accountable. 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. Appendix E provides statistical evidence that higher oil prices and production are associated with lower long-run perceptions of sovereign risk. This reflects investors' willingness to look beyond the expectations of the resource curse, at least when the conditions are right.

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. These countries are subject to high risk premiums and their policy autonomy is often constrained by bond markets. Given that bondholders possess the threat of capital exit, governments with a high reliance on bond markets must exhibit greater fiscal discipline — for example, by setting more ambitious targets for balanced budgets and low inflation (Kaplan & Thomsson, 2017). Sovereign borrowing can also be electorally costly. Voters are frequently fiscal conservatives who support austerity (Bansak et al., 2021; Blinder & Holtz-Eakin, 1984; Peltzman, 1992), though they care less about debt when informed that debt reduction would imply cutting spending and hiking taxes (Bremer & Bürgisser, 2022).

At the same time, individuals have exaggerated expectations of potential resource revenues, particularly with respect to oil (Collier, 2017). Policymakers often overestimate the commercial viability of oil discoveries and underestimate the time elapsed between discovery and

[5] Seventeen nations in sub-Saharan Africa issue international bonds. But other than South Africa, which regularly issues bonds since 1991, these nations only entered bond markets after 2006 (Zeitz, 2022).

[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".

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

production, which is, on average, between four and six years (Arezki, Ramey, & Sheng, 2017). Experts make budget projections based on high oil prices, which are difficult to predict (Hamilton, 2009). Even beyond national borders, international organizations are also guilty of overoptimism: in October 2019, months before Guyana began to produce oil, 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 income and low public trust, like Latin America: poverty shortens individuals' time horizons, and reduced social trust increases the fear that politicians will pocket resource revenues (Collier, 2017).

When voters demand short-term consumption over long-term investment, incumbents might 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!"[8] Indeed, 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 & 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. However, oil prices declined within a decade and this increased liquidity evaporated. A commodity price correction tends to be associated with reduced bank lending, as commodity volatility curtails banks' balance sheets (Agarwal et al., 2020; Eberhardt & Presbitero, 2021). As a result, Latin American countries defaulted in the 1980s and entered lengthy, IMF-coordinated debt restructurings that limited each country's policy autonomy, while promoting austerity, devaluation, and capital account liberalization. These debt restructurings also led to a shift in the domestic political responses to natural resource windfalls, as we show below.

2.3. Learning from the past

Policymakers internalized the high costs of debt issuance from Latin America's 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). Notably, this pattern also occurred in countries that did not directly experience a debt crisis, such as Chile and Colombia. For example, José Luis Machinea – who was the U.N.'s Executive Secretary for the Economic Commission for Latin American and the Caribbean (ECLAC) in the wake of these shocks during the mid 2000s – stated that these debt crisis experiences prompted the region to "learn from history and from governments that have collapsed from grave economic crises".[9]

Drawing on primary interview evidence and official commentaries across five Latin American countries, we expect government officials to reinforce 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".[10] Chile's former Central Bank governor and current Finance Minister, Mario Marcel, echoed a fiscal learning motif when discussing 21st-century regional policymaking: "Macro disequilibrium was the Achilles heel of the new democracies. We learned a lot about what to avoid from experience".[11] These lessons paid dividends from the perspective of former Argentine Secretary of the Treasury, Miguel Braun: "Much of the region, Chile, Colombia, etc... [has implemented] 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".[12]

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 Ecuadorian President Correa, who suggested nervous investors "take a Valium" (Campello, 2015, 132). But these lessons 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 create dollars; it arrives at a point where there is no more".[13]

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 stoking repayment concerns (Remmer, 2012). Alternative sources of revenue relaxed policy constraints and reduced bondholders' ability to discipline leftist incumbents (Campello, 2015). Bond indebtedness decreases the incumbent's discretion over economic policy, whereas rents increase it; all else equal, governments will favor the latter. Given this evidence, we predict that sovereign bond issuance will *not* increase as natural resource windfalls increase. Indeed, Hypotheses 1 and 2 predict that the *frequency* of bond issuance and 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.*

Considering these historical lessons about indebtedness, today's lack of political opportunism is logical. Political leaders internalized the hefty costs of extensive sovereign borrowing, helping constrain cheap debt issuance more recently. The downside is that policymakers do not heed the benefits of borrowing in times of boom. If they borrowed more at cheaper rates, they would be able to increase expenditures over time and smooth 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 face a time-inconsistency problem that

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

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

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

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

[12] Authors' interview. Buenos Aires, Argentina, 2019.

[13] Authors' interview. Quito, Ecuador, 2015.

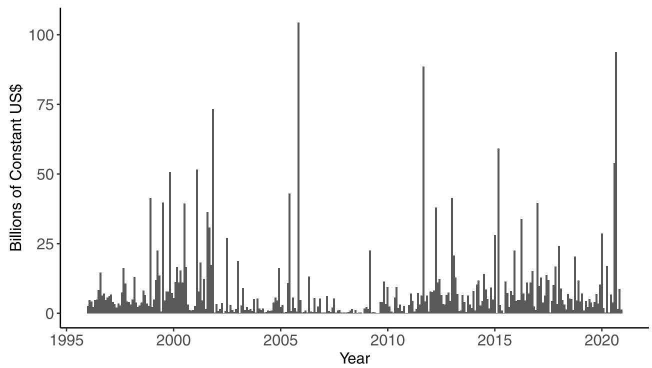

Fig. 2. Total amount of sovereign debt issued, 1996–2020.
This figure pools *Sovereign Amount Issued* for all countries in the sample, for every month between January 1996 and December 2020. Estimations use the logged value of each variable, adding one dollar before logging when the value equals zero.
Source: Bloomberg Terminal.

leaves them issuing debt to cover revenue shortfalls during downturns, when high funding costs threaten to intensify policy constraints and amplify indebtedness. Ironically, governments might have learned too much — the fear of indebtedness during good times might exacerbate indebtedness during bad times.

When might governments be more equipped to use bond markets to hedge against 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. Their political cost of bond issuance is 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; Kaplan, 2018; Nelson, 2014). In particular, finance ministers with graduate degrees in economics from US universities are more likely to hold mainstream technocratic beliefs: they promote fiscal discipline, capital account openness, and trade liberalization when in power (Nelson, 2014).

Second, less frequent turnover of cabinet members allows for learning and continuity, reducing 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. In 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 analysis

3.1. Data

3.1.1. Dependent variable

Following Ballard-Rosa et al. (2021), we use Bloomberg Terminals to retrieve all bonds issued by 22 countries in Latin America and the Caribbean[14] for each month between January 1996 and December 2020, focusing on untapped bonds with maturities greater than one year. Fig. 2 shows the total amount of debt issued during this period.

Our data, collected in 2022, differ from Ballard-Rosa et al. in two ways: we end our coverage in 2020 (rather than 2016) and include smaller Latin American countries like Guyana, Suriname, and Uruguay. Similarly to 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 all country-months without issues before logging.

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. *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). Gruss and Kebhaj's (2019) country-specific *Commodity Price Index* (updated in 2023) 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. For instance, a net oil exporter like Venezuela stands to gain 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 2020, compiled by Horn (2014), updated by Cust, Mihalyi, and Rivera-Ballesteros (2021).[15] *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 et al., 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 & Poelhekke, 2009). Producers are unable 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 from one month to another in response to price changes, and the inverse is equally unlikely 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 likely influences 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 a mainstream economics

[14] These are all countries with over 500,000 inhabitants, excluding Cuba and Haiti: 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.

[15] Since Cust et al. (2021) and Horn (2014) provide this information yearly, we use LexisNexis to uncover the exact month of discovery.

Table 1
The effect of natural resources on sovereign debt issuance, 1996–2020.

	Dependent variable:			
	Sovereign Issued (Yes = 1)			
	(1)	(2)	(3)	(4)
Resource Rents, % of GDP $_{t-1}$	−0.022***	−0.029***	−0.031***	−0.033***
	(0.007)	(0.008)	(0.009)	(0.010)
Ln Oil and Gas Production $_{t-1}$	−0.133**	−0.088	−0.241***	−0.163***
	(0.057)	(0.058)	(0.063)	(0.063)
Commodity Price Index $_{t-1}$	−0.010**	−0.011**	−0.005	−0.004
	(0.005)	(0.005)	(0.006)	(0.006)
Field Discovery $_{t-1}$	−0.146	−0.195	−0.180	−0.195
	(0.211)	(0.208)	(0.226)	(0.224)
Mainstream Minister = 1		0.285***		0.219***
		(0.049)		(0.052)
Minister Turnover (5 Years)		−0.065***		−0.046***
		(0.016)		(0.018)
Debt Crisis Experience = 1		0.097*		0.052
		(0.056)		(0.058)
Election Month = 1		−0.003		−0.022
		(0.147)		(0.157)
Left Executive = 1		0.084*		0.075
		(0.050)		(0.053)
Fiscal Council = 1		−0.914***		−0.968***
		(0.123)		(0.128)
Political Constraints		0.219		0.190
		(0.138)		(0.153)
IMF Agreement = 1			0.042	0.044
			(0.052)	(0.056)
Fiscal Balance, % of GDP $_{t-1}$			−0.034***	−0.037***
			(0.012)	(0.012)
Tax Revenue, % of GDP $_{t-1}$			−0.008	−0.024
			(0.014)	(0.015)
Ln Core Inflation $_{t-1}$			0.077	−0.102
			(0.084)	(0.067)
GDP Per Capita $_{t-1}$			0.032*	0.027
			(0.019)	(0.021)
GDP Growth, % $_{t-1}$			0.022***	0.018**
			(0.007)	(0.007)
Capital Openness $_{t-1}$			−0.030	−0.151
			(0.105)	(0.108)
Ln International Reserves $_{t-1}$			0.418***	0.396***
			(0.057)	(0.062)
US Treasury Rate, % $_{t-1}$			−0.039	−0.027
			(0.032)	(0.033)
AIC	6,527.14	6,259.46	6,131.62	5,888.01
Log Likelihood	−3,236.57	−3,095.73	−3,029.81	−2,901.00
Observations	6,540	6,261	6,191	5,919

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

department in the U.S. or Latin America; 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 continuity, which might translate into less frequent debt issuance. Relatedly, *Debt Crisis Experience* indicates whether a country experienced a past sovereign debt crisis episode (Laeven & Valencia, 2020; Nguyen, Castro, & Wood, 2022).

Election Month and *Left Executive* (Cruz, Keefer, & Scartascini, 2021) account for the possible existence of electoral cycles and partisan differences (Cormier, 2023). Other than Guyana and Jamaica, all countries in our sample are presidential systems with strong presidents (Tsebelis & 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 assesses 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 revenue sources and fiscal constraints, the models include *IMF Agreement* (based on data from Kentikelenis & Stubbs, 2023 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*,[16] *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.

[16] Guyana's monthly inflation figures are not available from CEPAL; we use annual data from the 2023 version of the World Development Indicators instead.

Finally, the models control for *Capital Openness* (Chinn & Ito, 2006), *Ln International Reserves* (in billions of US dollars, from the Joint External Debt Hub), and the *U.S. Treasury Rate* (the annual yield on ten-year Treasury constant maturities, reported by the U.S. Federal Reserve), since an increase in U.S. rates should reflect tighter borrowing conditions globally. We lag inflation and treasury rates by one month, *Ln International Reserves* by one quarter, and *Fiscal Balance*, *Tax Revenue*, *GDP Per Capita*, *GDP Growth*, and *Capital Openness* (which are only available annually) by one year.

3.2. Empirical strategy

The average nation included in the analysis issued untapped bonds with maturities greater than one year in 73.8 of all 300 months between January 1996 and December 2020. Yet there is considerable variation between countries: while Uruguay issued bonds in 139 out of 300 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 et al. (2021), we model bond issuance using a tobit model, which consists of 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 each month, as captured by the latent variable y_i^*. If the outcome is observed, the second step is a linear 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. All 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 potential issue.

3.3. Results

Table 1 presents the results of the first stage regression: four 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 when there are higher resource rents as a share of GDP, monthly oil and gas production, and monthly commodity prices. 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, Fig. 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 2020, Guatemala, Guyana, Honduras, and Paraguay issued bonds rarely or not at all, hence the low predicted probability for these four countries. Notwithstanding some cross-country variation, 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 Fig. 4 confirms.

Table 1 also supports our expectation that technocratic expertise is associated with higher debt issuance. Finance Ministers with graduate degrees from mainstream 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, a fiscal surplus, or alternative revenue sources (e.g. taxes) tend to issue bonds at a lower frequency. Those with high GDP growth borrow more regularly to finance their expansionary needs.

In months when governments issue bonds, Table 2 presents the results of the second stage regression: four 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 a multiplicative change in the dependent variable *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.[17] 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 issue significantly more debt out of necessity (when tax revenues and resource rents are low), but not when it is cheap to do so (i.e. when commodity prices are high, or U.S. Treasury rates are low).

Appendix C shows that these results are robust to excluding the sample's largest oil producers (Brazil, Mexico, and Venezuela) or to excluding 2020, the first year of the COVID-19 pandemic. Our results also hold when we replace *Mainstream Minister* with *Mainstream Central Bank President* or exclude Ecuador and Argentina, which 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. Alternative explanations

3.4.1. Debt from state-owned enterprises

We showed that sovereigns issue fewer bonds, in smaller amounts, following increases in resource rents or resource production. However, did sovereign leaders learn from the past, or are they merely opportunistic? Might they obfuscate national government liabilities by shifting them off-balance sheet to state-owned enterprises? During boom times, politicians might delegate bond issuance to state-owned enterprises in the extractive sector, which "operate in opaque institutional environments that lack oversight" (Mahdavi, 2020, 6). If so, we should observe the same outcomes as in Tables 1 and 2, but for different reasons. To test for the possibility that policymakers replace sovereign debt with debt from state-owned enterprises in times of boom, 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 102 months, Yacimientos Petrolíferos Fiscales Bolivianos did not issue debt a single time. For this reason, we again estimate probit and tobit models,

[17] $100 \times (e^{\beta_1} - 1) = 100 \times (e^{-0.670} - 1) = -48.82914$.

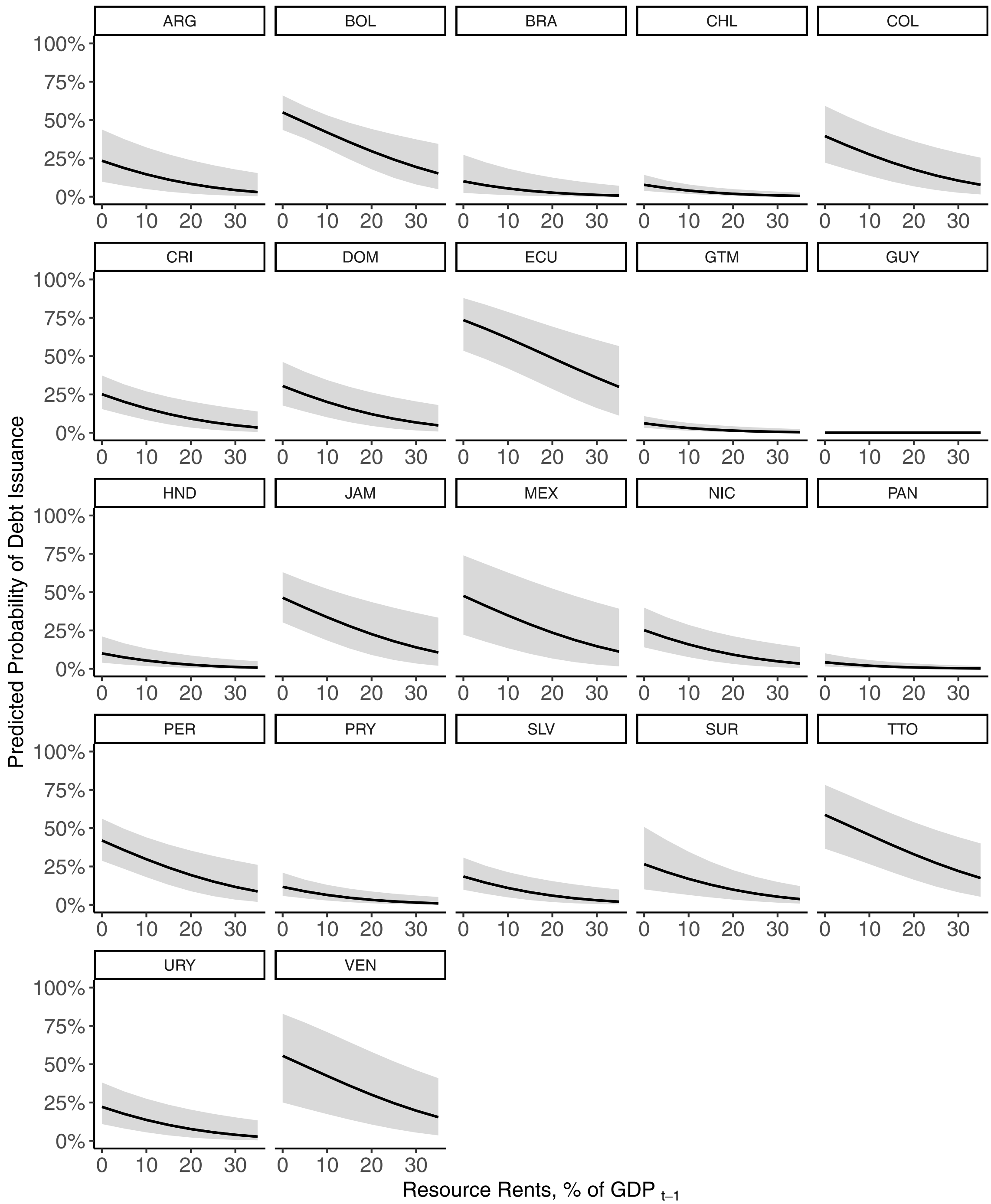

Fig. 3. Predicted probability of observing *Sovereign Issued* conditional on *Resource Rents*, by country.
This figure shows the predicted probability of observing *Sovereign Issued*, by country, conditional on values of *Resource Rents*. This figure is based on Model 4 of Table 1, which includes country fixed effects, a constant, a time trend, and standard errors clustered by country.

excluding countries without NOCs[18] — hence the reduced number of observations.

Table 3 shows that NOCs, like sovereigns, issue bonds less frequently and in smaller 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 consistently 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 or election cycles. Rather, NOCs issue significantly fewer bonds, in smaller amounts, when a left executive is in power, when minister turnover is frequent, 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 GDP per capita, smaller international reserves, and cheaper credit (as indicated by the U.S. treasury rate) are associated with significant increases in NOC

[18] The following countries have no NOC: Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Nicaragua, and Panama.

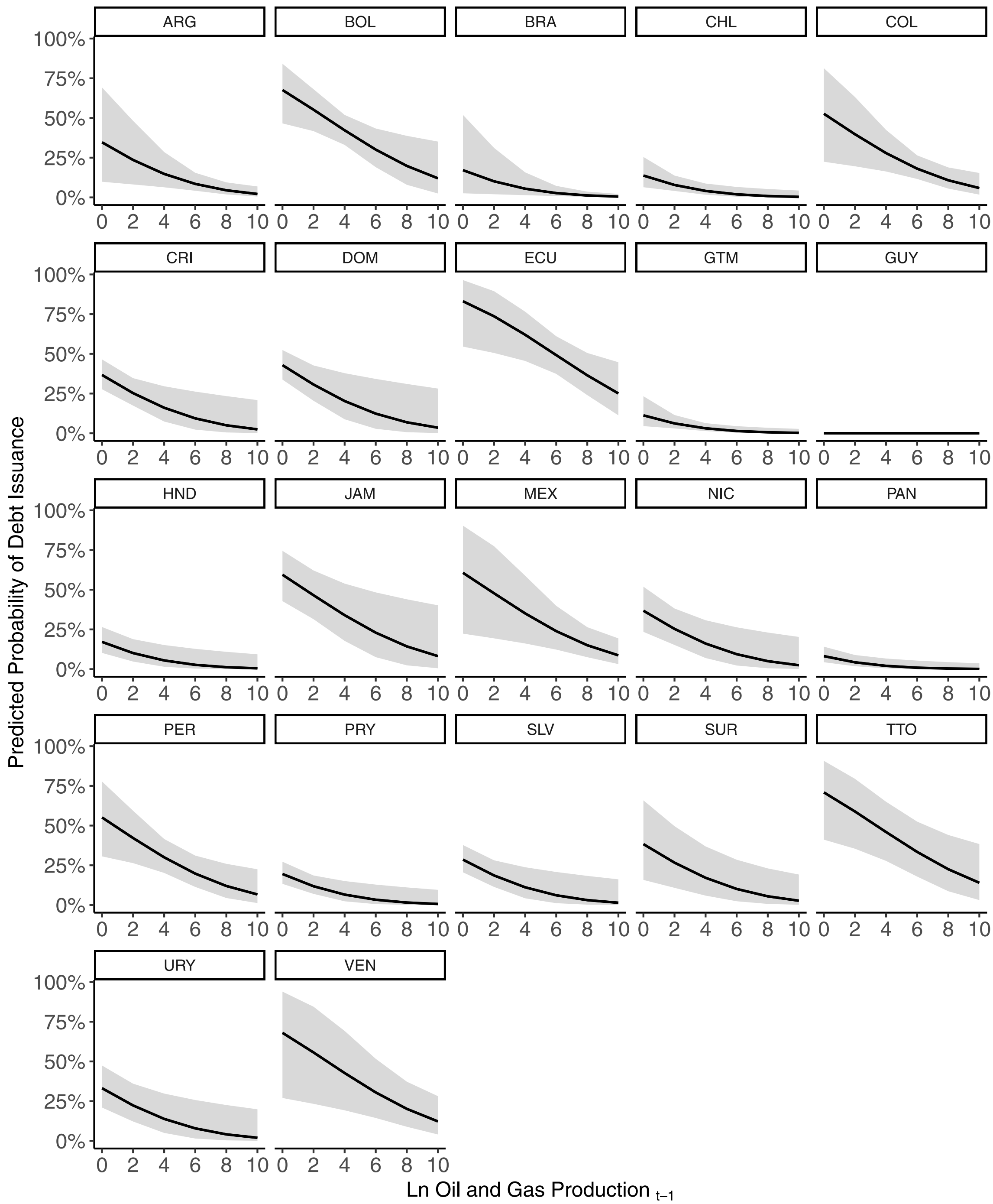

Fig. 4. Predicted probability of observing *Sovereign Issued* conditional on *Ln Oil and Gas Production*, by country.
This figure shows the predicted probability of observing *Sovereign Issued*, by country, conditional on values of *Ln Oil and Gas Production*. This figure is based on Model 4 of Table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

borrowing. Compared to sovereigns, NOCs are less responsive to natural resource revenue: they are less constrained by capital markets due to their opaque decision-making. However, these results suggest that sovereigns are not offsetting their reduced bond issuance by increasing NOC borrowing when resource windfalls are large.

3.4.2. Other types of sovereign debt

Rather than a decline in sovereign borrowing, Tables 1 and 2 could be capturing sovereigns' decision to move *away* from bondholders and *toward* other creditors. Official creditors – bilateral or multilateral – charge lower interest rates than private creditors, as Fig. 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 might leverage windfalls to negotiate even better conditions with official creditors, bypassing 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

Table 2
The effect of natural resources on amount of sovereign debt issued, 1996–2020.

	Dependent variable:			
	Ln Sovereign Amount Issued			
	(1)	(2)	(3)	(4)
Resource Rents, % of GDP $_{t-1}$	−0.501***	−0.606***	−0.651***	−0.670***
	(0.154)	(0.160)	(0.194)	(0.201)
Ln Oil and Gas Production $_{t-1}$	−3.335***	−2.391**	−5.321***	−3.722***
	(1.154)	(1.150)	(1.249)	(1.245)
Commodity Price Index $_{t-1}$	−0.213**	−0.238**	−0.120	−0.086
	(0.098)	(0.103)	(0.126)	(0.132)
Field Discovery $_{t-1}$	−2.845	−3.744	−3.591	−3.742
	(4.760)	(4.597)	(5.050)	(4.894)
Mainstream Minister = 1		6.031***		4.584***
		(1.004)		(1.064)
Minister Turnover (5 Years)		−1.345***		−0.975***
		(0.321)		(0.345)
Debt Crisis Experience = 1		2.123*		1.092
		(1.113)		(1.147)
Election Month = 1		−0.120		−0.407
		(2.980)		(3.138)
Left Executive = 1		1.444		1.242
		(1.024)		(1.096)
Fiscal Council = 1		−18.489***		−19.631***
		(2.403)		(2.486)
Political Constraints		4.470		3.460
		(2.808)		(3.035)
IMF Agreement = 1			0.793	0.908
			(1.087)	(1.125)
Fiscal Balance, % of GDP			−0.689***	−0.730***
			(0.245)	(0.243)
Tax Revenue, % of GDP $_{t-1}$			−0.242	−0.559*
			(0.299)	(0.313)
Ln Core Inflation $_{t-1}$			1.417	−2.109
			(1.710)	(1.453)
GDP Per Capita $_{t-1}$			0.790**	0.661
			(0.392)	(0.421)
GDP Growth, % $_{t-1}$			0.431***	0.341**
			(0.150)	(0.145)
Capital Openness $_{t-1}$			0.034	−2.631
			(2.136)	(2.151)
Ln International Reserves $_{t-1}$			8.199***	7.516***
			(1.147)	(1.217)
US Treasury Rate, % $_{t-1}$			−0.964	−0.718
			(0.646)	(0.661)
Log(Scale)	3.129***	3.105***	3.116***	3.094***
	(0.011)	(0.012)	(0.012)	(0.013)
AIC	18,632.799	18,160.139	17,679.502	17,230.768
Log Likelihood	−9,288.399	−9,045.070	−8,802.751	−8,571.384
Total	6,540	6,261	6,191	5,919

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

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.[19]

Compared to resource rents, all kinds of debt – even multilateral or bilateral – reduce governments' room to maneuver to some extent. Left-leaning governments, for example, actually favor market finance over official debt, despite higher costs, because private creditors do not condition loan disbursement to unpopular policy reforms that disproportionately harm the working class (Cormier, 2023). Given these countervailing incentives, we do not expect to 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 alternative explanation using data on public and publicly guaranteed external debt stocks, excluding maturities under one year, from 1996 to 2020 for 16 countries in Latin America and the Caribbean.[20] 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 cannot distinguish between sovereign governments and state-owned enterprises (like NOCs), as previously.

Since the choice between different creditors reflects a trade-off relationship, our outcome is compositional. For such 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

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

[20] This analysis excludes Chile, Nicaragua, Paraguay, Suriname, Trinidad and Tobago, and Uruguay, for which bond stocks are not available from the World Bank.

Table 3
The effect of natural resources on NOC bond issuance and amount issued, 1996–2020.

	Dependent variable:	
	NOC Issued (Yes = 1) (1)	Ln NOC Amount Issued (2)
Resource Rents, % of GDP $_{t-1}$	−0.055**	−1.594**
	(0.022)	(0.621)
Ln Oil and Gas Production $_{t-1}$	−0.028	−1.016
	(0.251)	(7.040)
Commodity Price Index $_{t-1}$	0.004	0.139
	(0.019)	(0.550)
Field Discovery $_{t-1}$	−0.016	−0.105
	(0.316)	(8.986)
Mainstream Minister = 1	0.046	1.131
	(0.162)	(4.521)
Minister Turnover (5 Years)	−0.098**	−2.839**
	(0.040)	(1.122)
Debt Crisis Experience = 1	0.071	1.969
	(0.119)	(3.383)
Election Month = 1	−0.143	−3.647
	(0.304)	(8.245)
Left Executive = 1	−0.406***	−12.061***
	(0.145)	(4.110)
Fiscal Council = 1	0.139	4.007
	(0.219)	(6.028)
Political Constraints (POLCON)	−0.067	−2.383
	(0.314)	(8.846)
IMF Agreement = 1	−0.522***	−14.727***
	(0.155)	(4.406)
Fiscal Balance, % of GDP $_{t-1}$	0.053	1.618*
	(0.034)	(0.952)
Tax Revenue, % of GDP $_{t-1}$	0.011	0.243
	(0.045)	(1.223)
Ln Core Inflation $_{t-1}$	0.051	1.122
	(0.199)	(5.765)
GDP Per Capita $_{t-1}$	0.150**	4.352**
	(0.061)	(1.755)
GDP Growth, % $_{t-1}$	−0.003	−0.099
	(0.013)	(0.375)
Capital Openness $_{t-1}$	−0.357	−10.053
	(0.270)	(7.352)
Ln International Reserves $_{t-1}$	−0.443***	−12.565***
	(0.147)	(4.193)
US Treasury Rate, % $_{t-1}$	−0.204***	−5.744***
	(0.071)	(1.952)
Log(Scale)		3.391***
		(0.030)
AIC	1,148.50	2,832.72
Log Likelihood	−541.25	−1,382.36
Observations	3,095	3,095

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.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

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. ECMs can be estimated with either stationary or cointegrated series (Boef & Keele, 2008), but we find mixed evidence that our integrated series are cointegrated.[21] Thus, we estimate first-difference models, which render integrated variables stationary without assuming cointegration:

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

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 for *Field Discovery*, a dichotomous variable that does not need to be differenced because it is stationary by definition (Beck & 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 easily compared to our previous continuous 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 meaningful 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. Instead, one significant 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 or bilateral lenders, 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

[21] See Appendix D for integration and cointegration tests.

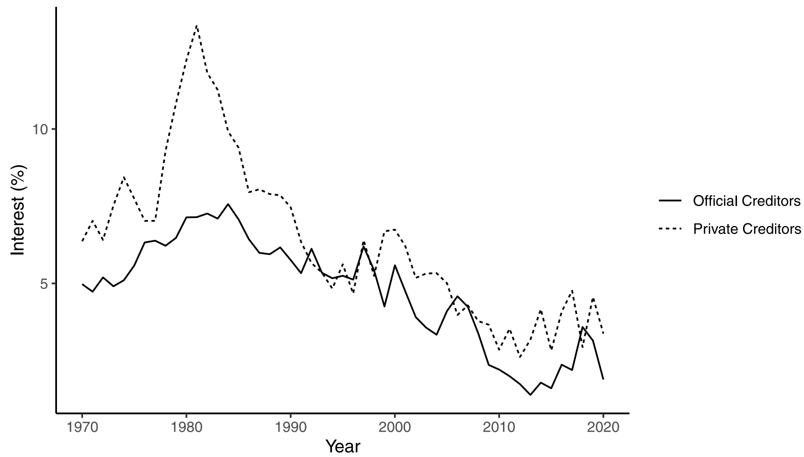

Fig. 5. Average Interest on New External Debt Commitments, by Type of Creditor.
As this figure shows, private creditors typically charge a higher average interest on new external debt commitments than official creditors.
Source: World Bank (2022).

Table 4
The effect of natural resources on sovereign borrowing: Trade-Offs between creditors, 1996–2020.

	Dependent variable:		
	$Ln\left(\frac{Multilateral}{Bonds}\right)_{\Delta}$ (1)	$Ln\left(\frac{Bilateral}{Bonds}\right)_{\Delta}$ (2)	$Ln\left(\frac{Comm.Banks}{Bonds}\right)_{\Delta}$ (3)
Resource Rents, % of GDP $_{\Delta}$	−0.013	0.000	−0.029
	(0.017)	(0.018)	(0.024)
Ln Oil and Gas Production $_{\Delta}$	−0.107	−0.101	−0.061
	(0.109)	(0.122)	(0.161)
Commodity Price Index $_{\Delta}$	−0.005	−0.016	0.009
	(0.017)	(0.019)	(0.025)
Field Discovery $_{t-1}$	−0.022	−0.016	0.055
	(0.143)	(0.160)	(0.211)
Mainstream Minister = 1	0.047	−0.005	−0.018
	(0.085)	(0.094)	(0.125)
Minister Turnover (5 Years)	0.075***	0.079***	0.056
	(0.025)	(0.028)	(0.037)
Debt Crisis Experience = 1	0.011	0.104	0.007
	(0.106)	(0.118)	(0.156)
Left Executive = 1	−0.072	−0.023	−0.027
	(0.090)	(0.101)	(0.133)
Fiscal Council = 1	−0.090	0.129	0.044
	(0.153)	(0.171)	(0.226)
Political Constraints	−0.215	−0.210	−0.204
	(0.216)	(0.241)	(0.318)
IMF Agreement = 1	0.092	0.018	−0.026
	(0.076)	(0.085)	(0.113)
Fiscal Balance, % of GDP $_{t-1}$	−0.004	0.013	−0.031
	(0.020)	(0.022)	(0.029)
Tax Revenue, % of GDP $_{t-1}$	0.014	−0.007	−0.011
	(0.031)	(0.034)	(0.046)
Ln Core Inflation $_{t-1}$	−0.281*	−0.228	−0.475**
	(0.148)	(0.165)	(0.218)
GDP Per Capita $_{t-1}$	0.053	0.015	0.001
	(0.040)	(0.044)	(0.058)
GDP Growth, % $_{t-1}$	0.012	0.020	0.042**
	(0.012)	(0.013)	(0.018)
Capital Openness $_{t-1}$	0.154	0.199	0.230
	(0.182)	(0.202)	(0.268)
Ln International Reserves $_{t-1}$	−0.107	−0.131	−0.145
	(0.085)	(0.095)	(0.126)
US Treasury Rate, % $_{t-1}$	−0.051	−0.087	−0.125
	(0.059)	(0.066)	(0.087)
R^2	0.115	0.133	0.112
Observations	313	313	313

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.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

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 or outsourcing debt issuance to less transparent state actors, like NOCs.[22]

4. Conclusion

This study uses monthly data from 1996 to 2020 for 22 countries in Latin America and the Caribbean to examine the relationship between natural resources, fiscal revenues, and bond financing. 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. Bond issuance and resource windfalls are not necessarily substitutes. 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 national governments 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 discretion to implement their preferred economic policies, without the constraints imposed by capital markets or citizens. This may restrict politicians' ability to use national debt to help smooth long-term fiscal consumption and expand their budgetary maneuverability over time. That said, we also find that higher and more sustained levels of technocratic expertise can overcome such obstacles, defraying the costs of capital market entry and enabling countries to issue more bonds regardless of commodity prices or output.

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 relationship between bond issuance, fiscal revenues, and policy discretion, including cross-regional variation in debt crisis management. In contrast to Latin America's decades-long experience with debt markets, African nations did not have access to international credit markets until recently (Zeitz, 2022). Moreover, Latin America has a long history of oil, gas, and mineral extraction, whereas Africa's experience is comparatively recent.[23] With growing global liquidity constraints emerging today, a comparative analysis of Latin America's experienced capital market borrowers and Africa's first-time borrowers may offer new insights into the design of national budgets and borrowing, with important implications for 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 to what extent institutions anchor this learning and protect the natural resource sector from market volatility, reducing the risk that emerging market economies incur onerous debts by over-borrowing from overly optimistic creditors.

[22] In Appendix D, 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.

[23] Latin America's first giant oil field, La Brea, was discovered in Peru in 1868. Sub-Saharan Africa's first giant oil field, Soku, was discovered in Nigeria almost a century later, in 1958 (Horn, 2014).

CRediT authorship contribution statement

Iasmin Goes: Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Stephen B. Kaplan:** Writing – review & editing, Writing – original draft, Resources, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare no competing interests.

Data availability

We have shared all data/code to a public data repository (https://doi.org/10.7910/DVN/NWWX4E).

Acknowledgments

This project was supported by the George Washington University Center for International Business Education and Research (GW–CIBER). We thank Austin Lai and Yaoli Wang for research assistance.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.worlddev.2024.106645.

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