The Hausmann-Gorky Effect

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Abstract

For over a century, legal scholars have debated the question of what to do about the debts incurred by despotic governments; asking whether successor non-despotic governments should have to pay them. That debate has gone nowhere. This paper examines whether an Op Ed written by Harvard economist, Ricardo Hausmann, in May 2017, may have shown an alternative path to the goal of increasing the cost of borrowing for despotic governments. Hausmann, in his Op Ed, had sought to produce a pricing penalty on the entire Venezuelan debt stock by trying to shame JPMorgan into removing Venezuelan bonds from its emerging market index. JPMorgan did not comply, but there was a pricing penalty. Intriguingly, the penalty hit only one bond; an issue by Venezuela's state-owned oil company that went on the market two days prior to the Hausmann's piece. That bond then began to carry the name in the market of "Hunger Bond." Using quantitative data and interviews with investors, we try to understand the causes of the Hunger Bond penalty and ask whether there are lessons for policy makers.

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I. Odious Regimes versus Odious Debts

For over a century, legal scholars have debated the question of whether there is, or should be, in public international law, a doctrine of Odious Debts. The general rule in international law is that governments inherit the debts of prior governments, regardless of their character. This is known as the "strict rule of government succession" (Buchheit et al. 2007). History teaches us nevertheless that there have been exceptions to the strict rule, where new governments have not paid the debts of their predecessors. Two of the most famous are the debts of Imperial China and the Russian Tsar. Almost always the reason has been that the new government has found the prior one distasteful or illegitimate (Buchheit et al., 2007; Ludington et al., 2010). The question for international law scholars though, has been whether there are recognizable legal excuses for a government not to pay the debts of their distasteful predecessors; excuses that can serve as a legal defense against lawsuits that unhappy creditors inevitably bring.

In particular, the instances that have generated the most discussion are those where a government becomes hostile to the interests of its own people and uses the proceeds of its borrowing to do things like buy guns to quash popular uprisings. The question then is whether the despotic government's debts have to be repaid once the good guys succeed in taking over. Over the years, this question has intrigued scholars from a variety of disciples including economics, philosophy, political science, history, and law (Dimitriu 2015; Gosseries 2007; Perez & Weissman 2007).

To take the perspective of the discipline that has been most interested in Odious Debts other than law, economics, the rationale for an anti-despot exception to the strict rule of government succession is the following: If creditors know, ex ante, that the debts incurred by despotic governments are legally infirm, they are going to be less willing to lend to them. In other words, the cost of capital for despotic governments will be higher than that of good governments. That, in turn, will deter despots from seeking power in the first place or, to the extent every despot starts out a good guy, deter the good guys from turning bad. Alternatively, lack of financial resources will weaken the odious government and, hopefully, lead to a democratic transition (Stiglitz 2003; Kremer & Jayachandran 2006; Bolton & Skeel 2007; Center for Global Development 2010).[1]

Despite the scores of academic articles advocating some version of an Odious Debt exception, the rule of government succession rule remains strict in international law.[2] The reason

[1] There are also skeptics from the economic perspective, who point to implementation barriers and possible collateral damage. (Rajan 2004; Choi & Posner 2007; Janus 2012).

[2] To quote from two prominent legal commentators:

Anna Gelpern writes:

> [N]o national or international tribunal has ever cited Odious Debt as grounds for invalidating a sovereign obligation. Each of the treaties and other examples of state practice cited even by the doctrine's most thorough and principled advocates appears fundamentally flawed-it lacks one or more of the doctrine's essential elements and/or is accompanied by a chorus of specific disavowals of the doctrine by indispensable parties. But even if the examples were on point, the fact that Odious Debt's most fervent proponents to this day must cite an 1898 treaty and a 1923 arbitration as their best authorities suggests that the law-making project is in trouble.

is that changes in public international law require a high degree of consensus in the international community, and particularly so among the most powerful nations. And there is no way to get consensus on a definition of what it means for a government to be despotic. Put simply, the move towards a legal doctrine of Odious Debt that focuses on starving despotic regimes of capital has not gained traction.

For purposes of this paper, we largely put to the side the question of whether raising the cost of capital for despotic regimes is welfare enhancing. Instead, we focus on the narrower question of whether recent events in Venezuela have shown an unexpected, and alternative, path to the goal of increasing the cost of borrowing for despotic governments.

The key events that took place, were the following:

> First, on May 23, 2017, the asset management arm of Goldman Sachs (GSAM) purchased $2.8 billion in bonds of the Venezuelan state-owned oil company, PDVSA. GSAM paid 31 cents on the dollar, for a total disbursement of about $865 million (Vyas & Kurmanaev 2017). Nomura Capital also purchased some of these bonds – about $100 million – but GSAM that garnered the bulk of the attention (Vyas & Kurmanaev 2017). On its face, GSAM appeared to have purchased these bonds on the market through a broker. But, almost simultaneously, Venezuela's international reserves increased by a large amount. The top panel of Figure 1 shows the monthly evolution of Venezuela's stock of international reserves. Reserves, which had reduced from $10.6 billion at the end of January 2017 to $10.1 billion at the end of April 2017, increased by roughly $750 million (back to nearly $10.6 billion) during May 2017. Daily data from the Central Bank of Venezuela show a sudden jump in reserves within two days of the of GSAM purchase of PDVSA bonds with an increase in reserves from $10,130 million on May 23 to $10,893 million on May 25 (bottom panel of Figure 1). Already on June 1st 2017, Jenkins (2017) and Jenkins & Zerpa (2017) pointed out that this $765 million increase in international reserves was suspiciously close to the $865 million paid by GSAM for the PDVSA bond. That, combined with the fact that the broker was a little-known intermediary that was likely a front, suggested to some that these bonds, while purportedly sold to GSAM in a secondary market transaction, were actually being sold by the Venezuelan government (Wigglesworth & Long 2017).

Gelpern (2005, p. 406).

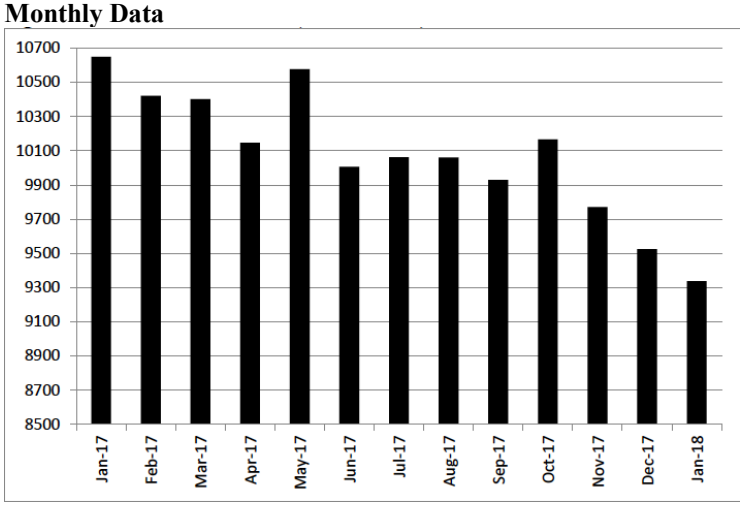
Christoph Paulus writes:

> The present article addresses itself exactly to [the] task [of analyzing the historical basis for a doctrine of Odious Debts] and comes to the conclusion that the remarkable inconsistencies within this historical development in addition with the almost complete lack of any explicit case material lead to the result that there is no such legal concept of odious debts.

Paulus (2007, abstract). For more optimistic perspectives on the existence of an Odious Debt doctrine, see Howse (2007); King (2016).

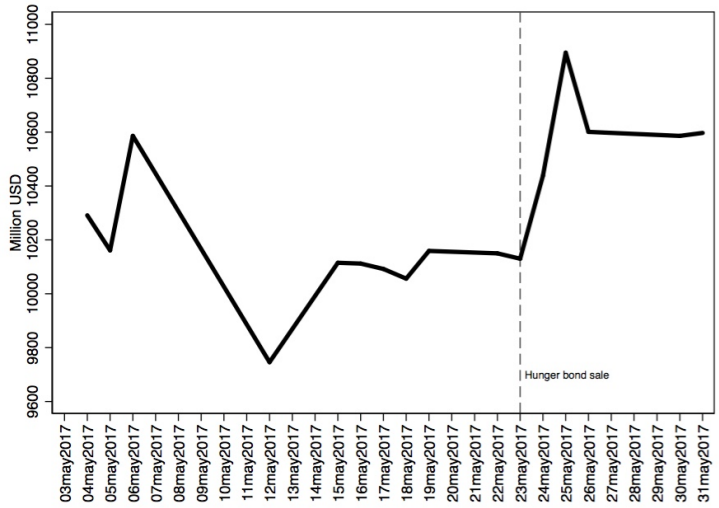
Figure 1: International reserves (millions USD)

Monthly Data



Source: Trading Economics

Daily Data



Source: Central Bank of Venezuela

Second, on May 26, 2017, the Harvard economist, Ricardo Hausmann, published an Op Ed in Project Syndicate titled "Hunger Bonds" (Hausmann 2017). Hausmann argued that investing in Venezuelan bonds was causing immense harm to the Venezuelan people, because it was helping finance a despotic regime that was privileging the repayment of bondholders over the welfare of people (who were and are, literally, suffering through a malnutrition crisis). He also, the same day, went on Bloomberg Television to talk about his idea (Crooks 2017). Hausmann's target in the May 2017 piece was JP Morgan's emerging markets index (the EMBI+). He was advocating that JP Morgan remove Venezuela from the EMBI+ so as to make Venezuelan bonds less attractive to the markets and particularly fund managers who measure their performance as a function of how they do vis-à-vis the index. Pulling no punches, he asked:

> Should decent people put their money in emerging-market bond funds? The returns of the JP Morgan Emerging Market Bond Index (EMBI+) are heavily influenced by what happens in Venezuela. The reason is simple: while Venezuela represents only about 5% of the index, it accounts for about 20% of its yield, because the yield on Venezuelan debt is about five times larger than that of other countries in the index, a reflection of the huge risk premium that Venezuela faces. Moreover, the price volatility of Venezuelan debt – the highest in the EMBI+ – accounts for a disproportionate share of the index's daily price movements.
>
> You might invest in the EMBI+ because it promises higher returns, or because you want to make your savings available to a larger segment of humanity. But if you do, you will root for Venezuelan debt, which means wishing for really bad things to happen to Venezuela's people.

Relevant, for our story, is that Hausmann does not at any point in his piece mention the Goldman Sachs purchase two days prior.[3] Nor does he say anything about the legal doctrine of Odious Debts. His piece was about the ethics of investing. Indeed, he wasn't even the first have used the "hunger bonds" term. It had been coined months prior by a Venezuelan businessman, Jorge Botti, in a Twitter post and had not garnered much attention; at least not in terms of impacting the willingness of investors to buy Venezuelan bonds. Hausmann's timing in using the term in his Project Syndicate piece, however, was near perfect.

Adding two plus two, GSAM appeared to be providing direct funding to the Venezuelan government, flying in the face of Hausmann's plea for the government to be starved of capital. Adding fuel to the fire, GSAM appeared to have purchased its bonds at roughly 31 cents on the dollar (about 100 basis points below what other similarly situated PDVSA bonds were trading at). The Washington Post, the Boston Globe, the New York Times, the Wall Street Journal, Reuters, Bloomberg, Fortune, Forbes, the Financial Times, the Economist, all reported on the story. Those stories then got tweeted out by Ricardo Hausmann and then retweeted by US Senator Marco Rubio, both of whose followers number in the hundreds of thousands. Hausmann also went on CNN; this time talking about the GSAM purchase (Gillespie 2017). Protests broke out outside GSAM's office in New York, with many protesters using the term "hunger bonds" on their placards. The result: The Hunger Bond name got indelibly joined with the single issuance that GSAM had purchased on May 25, 2017 (as opposed to all Venezuelan bond issues, as Hausmann and Botti had originally intended).

Third, also on May 26, piggybacking on the protests, a Venezuelan opposition leader, Julio Borges, sent out public letters – purportedly aimed at the investment community – asserting that a large portion of the proceeds of the bond issue would be used to buy military

[3] We emailed and asked him specifically and he responded that he had known nothing about the GSAM purchase at the time he wrote the Hunger Bonds piece – he only learned of it two days later from a Wall Street Journal piece that he then tweeted. Email of Sunday, February 25, 2018 ("the conflation of the piece with the transaction was pure serendipity. I wanted to dry up the market for Venezuelan debt because it was clearly odious").

equipment (supposedly $300 million worth). The letters also condemned the Venezuelan government for being illegitimate and asserted that the opposition, when it came to power, would call for a "thorough investigation of this dubious transaction" (Jenkins & Soto 2017). And it added, for good measure, that the bonds would not be paid if and when the opposition came into power (perhaps prejudging what the investigation would show). Versions of these letters had also been sent out prior to the GSAM purchase of the Hunger Bonds, in April 2017, but they had gotten little attention. Now, thanks to a combination of factors, they had made the international news.

What appears to have happened as a result of the foregoing sets of events, unintentionally in the case of some of the actors, was to create chatter in the market about some combination of a heightened legal risk and reputational taint for anyone purchasing the particular bond issue that GSAM and Nomura had purchased on May 23, 2017 (the Hunger Bond).

On its first day of trading (May 25, 2017), the Hunger Bond had a yield to maturity of 3,720 basis points, corresponding to a spread over US Treasuries of 3,552 basis points (Table 1). Two comparable bonds also issued by PDVSA, one maturing 8 months before the Hunger Bond (PDVSA 2011, 12 3/4%, 17/02/2022) and one maturing 19 months after the Hunger Bond (PDVSA 2014, 6%, 16/05/2024) were trading at yields of 3,329 and 2,872 basis points, respectively (corresponding to spreads over US Treasuries of 3,171 and 2,681 basis points).[4] While on the first day of trading, the Hunger bond traded at a discount with respect to comparable bonds, it traded at a large premium with respect to what GSAM had purportedly paid for it. On May 23, GSAM had paid 31 cents for the bond and, on May 25, the bond closed at a price of 37.9: a 22% price increase in two days.

Table 1: Hunger Bond, Spread and Liquidity at Issuance

Date	Hunger Bond (PDVSA 2014 6% 28/10/2022)				Control 1 (PDVSA 2011, 12 3/4%, 17/02/2022)				Control 2 (PDVSA 2014, 6%, 16/05/2024)			
	Price	YTM (bps)	Spread (bps)	Bid/Ask	Price	YTM (bps)	Spread (bps)	Bid/Ask	Price	YTM (bps)	Spread (bps)	Bid/Ask
05/25/17	37.9	3,720	3,552	0.1	61.3	3,329	3,171	0.9	39.5	2,872	2,681	0.8
05/26/17	32.7	4,299	4,130	0.1	61.2	3,341	3,183	1	39.8	2,855	2,663	1
05/29/17	32.7	4,313	4,142	0.1	60.9	3,366	3,207	0.8	39.6	2,867	2,675	1
05/30/17	32.5	4,312	4,146	0.1	61.4	3,329	3,173	0.9	39.6	2,866	2,677	0.9
05/31/17	32.3	4,332	4,195	0.1	61.2	3,341	3,187	1.0	39.4	2,885	2,698	1
06/01/17	32.6	4,363	4,162	0.1	60.7	3,387	3,231	1.1	39.1	2,911	2,723	1
06/02/17	32.7	4,325	4,151	0.1	60.9	3,369	3,216	1.0	39.5	2,897	2,696	1

On the day of the Hausmann Project Syndicate piece, the price of the Hunger Bond dropped by 14% (from 37.9 to 32.7, just above the price paid by GSAM) and the yield and the spread increased by nearly 600 basis points (the yield reached 43% and the spread surpassed 4,100 basis points). There was, however, no change in price in the other two PDVSA bonds described in Table 1. In the next 5 days of trading, the spread of the Hunger Bond remained stable at around 4,151 basis points. The other two bonds continued trading at a price similar to that of May 25. The increase in the spread documented in Table 1 is remarkable given the discount at which

[4] Note that the first bond is closer in maturity with respect to the Hunger Bond but it has a much higher coupon (12 ¾% instead of 6%). The second bond has longer maturity but the same coupon (6%). In theory, when comparing spreads the coupon should not make a big difference. However, the coupon changes the duration of the bond and may become important in the presence of high default risk.

Venezuelan bonds were already trading. Roughly speaking, between 5/25 and 6/2, the week after Hausmann's project syndicate piece came out, Goldman took a loss of about $50 million on the Hunger Bond. To provide more context, the spread between a Venezuelan bond with a Collective Action Clause requiring a 100% vote to change payment terms and one of roughly the same maturity that required only a 75% vote (i.e., a weaker bond, vis-à-vis a future restructuring) was in the 5-10 basis points around same time (Carletti et al., 2017). To quote Christine Jenkins of Bloomberg:

> Opponents [of the Maduro regime had] struggled to bring attention to the [protest] movement until May, when Goldman Sachs Group Inc. made a big purchase that provided the regime with desperately needed dollars. Critics pounced on what they saw as a soulless investment bank throwing a lifeline to a despot. "Hunger bonds" became one of the themes of a demonstration outside Goldman's New York headquarters, and the phrase showed up in tweets and memes featuring images of malnourished Venezuelans scavenging for food. The opposition-controlled National Assembly vowed to investigate the deal (Bartenstein & Rosati 2017).

Many of the press accounts about these bonds, and our interviews with investors, suggested that the market was imposing a penalty on them because of some combination of a higher risk of future repudiation and reputational taint. But neither the market players we spoke to nor the press accounts either made clear what the legal basis for the increased risk of future repudiation was or what the long-term pricing penalty was. Below, we attempt to unpack these questions.

As noted at the outset, prior attempts to create an international legal regime that would condemn the debts of particular despotic government as Odious have largely failed. At least part of the reason has been that the governments around the world – who control the determination of what international law is – have been unable to coordinate agreement over a clear and implementable definition of an Odious Regime.[5]

An alternate route, that has received minimal attention has been the possibility of using domestic laws, either of the country of the despotic regime, or those the jurisdictions where the debt was issued (e.g., New York). Here, the idea would be to find and use infirmities with particular debts under domestic laws to threaten their repudiation in the future – for example a failure to follow the proper procedures for obtaining legislative authorization for a debt issuance (something that a despot might be unwilling to do). If it were the case that despotic regimes were highly likely to make legal process errors whereas good governments were not, then we have, in theory, a way to increase the cost of capital for bad regimes.

The foregoing route is unlikely to satisfy advocates for the traditional idea of an Odious Debt regime. That is because the traditional goal of the Odious Debt idea was to taint all of a

[5] To quote the opening paragraph of a World Bank report on the topic:

> The last few years have seen a rising chorus of demands from non-governmental and civil society organizations for the cancellation of the sovereign debt of many developing countries on the grounds that such debt is "odious". Yet there is little agreement on a workable definition of "odious" debts. This should hardly be surprising, because those promoting the cancellation of "odious" debts are doing so for a variety of reasons, often pursuing widely differing aims.
> (Nehru & Thomas 2008).

despotic regime's debt stock, regardless of legal infirmities with individual issuances. But that sort of a legal regime is showing few signs of materializing anywhere anytime soon. Our premise though is that inherent in the nature of a despotic regime is that there will be high levels of misbehavior and corruption. That is, a high probability that there will be characteristics of individual bond issuances that, if flagged in advance for investors, would cause them to avoid these issuances. And the Hunger Bonds may provide one such example, perhaps pointing in the direction of a new and workable mechanism for achieving at least some of the goals of the Odious Debt movement.

Before concluding that a path to a new method of forcing the cost of capital for despotic regimes has been devised though, we have to figure out whether in fact there was a meaningful Hausmann Effect on the pricing of these bonds and, if so, how long it lasted and how it evolved as a function of additional pieces of news regarding Venezuela's impending default.

The ongoing Venezuelan debt crisis allows us to ask these questions in a relatively clean fashion for a number of reasons. First, because Venezuela has so much debt outstanding; with multiple bonds that are near identical to the Hunger Bond, albeit without comparable levels of legal taint and condemnation by the international press, we can examine the precise effect of the Hunger Bond taint. Second, Venezuela, while appearing to be on the brink of default when GSAM purchased the Hunger Bonds – the six-month CDS contracts at the time were predicting a probability of default of over 70% -- managed to stay out of default for another six months. Indeed, as of this writing in March 2018, although Venezuela is rumored to have generally stopped paying on all of its bonds and has been classified as being in selective default by the rating agencies, investors have not yet called for accelerations. And a moratorium with investor lawsuits has not yet occurred. That gives us more data in a near-default scenario – where we would expect the effect of the taint to be highly salient to investors -- that we would have expected to have.

II. Analysis and Empirical Tests

Before delving into empirical tests, we first set out the possible legal risks with the Hunger Bonds that could translate into an increased risk of repudiation by some future and more legitimate government of Venezuela. There were four possible elements to this heightened legal risk/reputational stink around the Hunger Bond issuance.

> First, there was the observation that even though the bonds were purportedly issued by PDVSA, a large portion of the proceeds of the bonds appeared to have gone directly into the coffers of the Republic; hence the sudden increase in its international reserves. If, in effect, the bonds had been issued by the Republic, using the oil company as a front (and there were other facts that would have helped make this claim), then that might mean that the bonds were legally infirm when issued. The reason being that, under Venezuelan domestic law, all debt issuances by the Republic require legislative approval. If the issuance was really a Republic issuance, with PDVSA as a front, then it was illegally issued since legislative approval had not been obtained. And given the hostility of the members of the legislature to the Maduro administration, approval probably would not have been forthcoming.

Arguing for foregoing though (what is called "alter ego" liability), is a long shot as commentators have pointed out and the first few cases on this matter have suggested that (Weidemaier 2017). PDVSA is a 100% owned subsidiary of the Republic of Venezuela. So, in a sense, it is not surprising that the Republic would choose to take for itself a portion of the capital raised by PDVSA. For courts to agree to do veil piercing, there would have to be more; specifically, evidence of fraud.

Second, the below-market rates at which the bonds were issued created a whiff of corruption. Someone somewhere might have gotten a kickback since there was no obvious reason, otherwise, for the bonds to be issued at a 100 basis points below what equivalent other bonds were being traded. Suspecting that there was corruption – and there is undoubtedly a lot of corruption all over the place with the Venezuelan bonds – is not enough without more concrete evidence though. Further, to the extent the entity asserting corruption as a defense to paying the debt is a future (non-Maduro) government in Venezuela, this assertion will hit the objection that, as a legal matter, the future and current government of Venezuela are one and the same and that a debtor cannot assert its own corruption as a defense to paying its debts.[6]

Third, is the OID or Original Issue Discount problem. When GSAM purchased the Hunger Bond in 2017, the stated yield on the bond was 6%. The market yield though, for a similarly situated already trading PDVSA bond was in the mid 30s and GSAM's purchase price suggested an even higher yield of around 40%. In other words, the principal amount on the bond was inflated considerably. Given the predictions of imminent default at the time, this was relevant because when a bond defaults and payments are accelerated, it is the principal amount that is accelerated and not the un-accrued interest. So, GSAM would end up getting a bonus in the form of unearned interest masquerading as principal – all at the expense of the Venezuelan taxpayer and other, prior, creditors. As a legal matter, bankruptcy courts in the US sometimes will refuse to recognize the fake principal; and commentators speculated that GSAM's bond would be vulnerable to the same problem – although it has to be noted that this risk only comes into play if PDVSA goes into a US (or similar) bankruptcy court proceeding; and it is not clear, at this stage, that that is the way its default will play out.

Fourth, the letters sent by the Venezuelan opposition and the publicity and criticism that the GSAM purchase received put investors on notice regarding the legal infirmities with the bonds. Credit Suisse, for one, announced publicly that it would not facilitate trading in this bond (Wigglesworth & Platt 2017). And JPMorgan's EMBI+ index, Hausmann's original target, while ignoring his broad call for it to drop all of the Venezuelan sovereign debt from the index, dropped the Hunger Bond issuance. This final element is potentially

[6] A complication here is whether a successor regime can use the "unclean hands" defense to defend actions by its predecessor regime. In the corporate context, this has been held to be possible in at least some contexts such as that of a receiver in bankruptcy. *See* Scholes v. Lehmann, 56 F.3d 750, 752-53 (7th Cir. 1995) (Posner, J.); *see also* Buchheit et al. 2007: 1257-58). But less likely in the sovereign context where a new government is trying to defend against paying the obligations of a misbehaving predecessor government. *See* Republic of Iraq. v. ABB et al., __ F. 3d __ (2d. Cir. 2014). So, ultimately, this may boil down to whether the court in question sees PDVSA as a separate enough from the Republic to view it as a corporation or sees it as essentially the sovereign.

important, as a legal matter, because it makes it difficult for the kinds of sophisticated investors who buy distressed sovereign debt to be able to argue that they did not know about the legal infirmities (lack of knowledge of an infirmity with a bond might protect investors – but only to the extent that they can plausibly make such a case). That said, investors, especially after multiple sales have been conducted and the brouhaha over the Hunger Bonds has died down could argue that they didn't know, and it would be hard to disprove that.

To reiterate, the foregoing sets out the legal and reputational risks that observers of the Venezuelan debt situation speculated about with regard to the bonds that GSAM purchased in May 2017. As is hopefully clear from the discussion above, we do not think that any one of the foregoing factors is conclusive in the sense of a lawyer being able to predict with a high degree of certainty that some judge in New York would rule that the Hunger Bonds were infirm and that PDVSA (or the government of Venezuela) was not obligated to pay it. Indeed, we would say that all four of the foregoing factors add up to no more than a low probability of a court ruling that a future government was justified in not paying them.

That said then, the question is the extent to which this combination of added legal risk and taint served to penalize the Hunger Bond. We are interested in whether, why, and for how long, the market penalized this particular bond issue. We know from press accounts that there was a penalty imposed by the market at the very start, when GSAM purchased the bond. But did it persist, especially after attention from the press diminished, and can we unpack its elements? In examining this question, we use two approaches.

First, using data on pricing for the Hunger Bond and closely comparable Venezuelan bonds, we analyze the evolution of the pricing penalty. To unpack the effect of reputational taint from legal risk, we look to two things: (a) what happens to the price penalty as press attention to the Hunger Bonds dissipates; and (b) the degree to which there is a reverse Hausmann effect when "un-tainting" events occur.[7]

Second, we interviewed investors at thirty different investment firms (and spoke to over fifty investors) holding Venezuelan bonds about their perception of the Hunger Bond, any pricing penalty that they perceived regarding it, and the reasons for that.

[7] The two events we examine are: (a) when the US Treasury Department, on August 25, 2017 put out a list of bonds, trading in which was exempt from sanctions, and failed to exclude the Hunger Bonds (a matter on which was rumored to have been discussed at the US Treasury department) and (b) when, on November 28, 2017, after credit default swaps had been triggered for PDVSA, the International Swap Dealers Association determined that one of the bonds that could be delivered into the auction was the Hunger Bond – in effect, therefore, making a determination that whatever taint that these bonds had, they were still acceptable for purposes of a generic CDS contract written on a package of PDVSA bonds. We pick these events because they are the two that the financial press comments on in the context of the Hunger Bonds not being singled out either for sanctions or as ineligible for delivery in the CDS auction. (Jenkins & Bartenstein 2017; Scigliuzzo 2013).

Figure 2: Spreads of the Hunger Bond and PDVSA 2024 6% bond

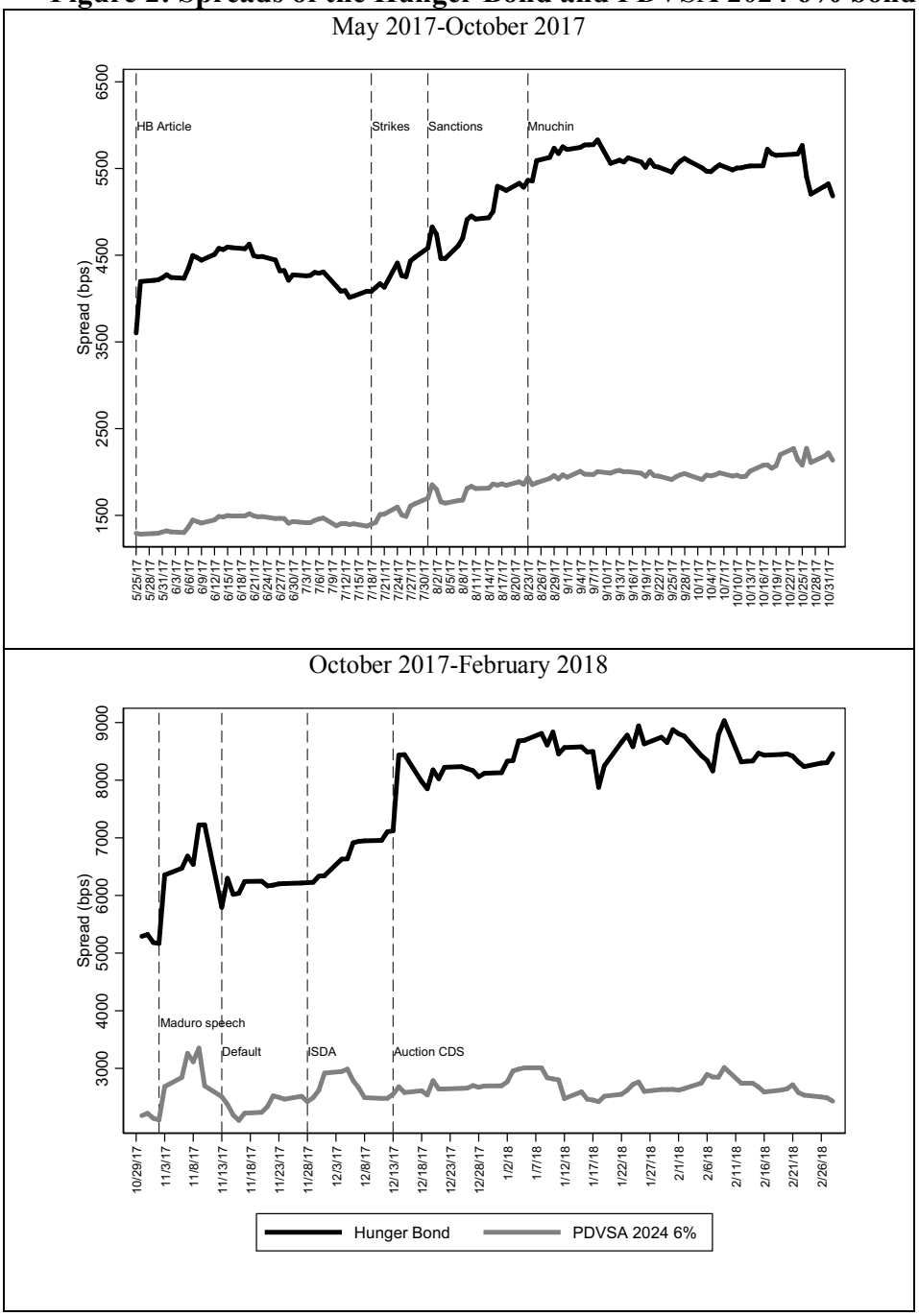


Figure 2 shows that the Hunger bond always trades at a penalty over the 2024 PDVSA bond described in Table 1 that has an identical coupon.[8] Surprisingly, after the August 25

[8] Investors and asset managers repeatedly told us that, because of the large difference in coupon (6% versus 12.75%), the February 2022 bond is not directly comparable to the Hunger Bond. While the Hunger Bond had higher spread than the February 2022 Bond until late July, after the Venezuelan strikes of July 17 and the US threat of sanctions, the

announcement by Secretary Mnuchin of a list of Venezuelan bonds exempt from sanctions (a list that included the Hunger Bond), the spread of the Hunger Bond increased, surpassing 5,500 basis points in mid-September.[9] The spread of the Hunger Bond then decreased in the second half of September.

The bottom panel of Figure 2 plots the spread of the 2 bonds during the last quarter of 2017 and the first two months of 2018. The valuation of all Venezuelan bonds collapsed after President Maduro gave a speech that discussed the need to restructure Venezuela's debt. In the aftermath of the speech, the spread of the 2024 bond increased by about 700 basis points (from 3,792 to 4,468) and the spread of the Hunger Bond increased by nearly 1,200 basis points (from 5,142 to 6,316 basis points). In November, Venezuela missed a series of payments and its bonds were rated as in selective default by Standard & Poor's. This event increased the spread of the Hunger Bond but had no effect on the spread of the 2024 bond.

The triggering of the CDS and the ISDA declaration that the Hunger Bond was included in a list of acceptable bonds was followed by an increase in the spread of all bonds, but the increase in spread was (relatively) more muted for the Hunger Bond than for the 2024 bond. There was then a jump in the spread of the Hunger Bond (from 6,896 to 8109 basis points) on December 13 and almost no change in the spread of the 2024 bond. This jump in spread happened on the same day of the auction which determined the payout on credit default swaps tied to bonds issued by PDVSA. Note that the increase in spread did not affect the 2024 bond and may have been specifically related to the Hunger Bond and its inclusion in CDS deliverables. According to Scigliuzzo (2013):

> Banks valued defaulted bonds of Venezuela's state oil company PDVSA at just 17.625 cents on the dollar … The PDVSA valuation was well below the 24.5 cents at which the government's sovereign debt was valued in a similar credit default swaps auction the previous day. Traders and investors said the likely reason was the inclusion of a controversial - and highly illiquid - 2022 bond on the list of PDVSA securities eligible to be put into the auction. "It seems to me the 2022s determined the price," said one of the traders. "I was a bit surprised by the level." The 2022s became widely known as "hunger bonds" earlier this year when it was reported that Goldman Sachs purchased much of the US$3bn run of notes - and did so at a steep discount. This led to criticism that Goldman was providing hard currency to the administration of President Nicolas Maduro…Opponents said money needed to help struggling Venezuelans would be diverted to make payments to service the debt.

price of the February 2022 bonds decreased at a faster rate than the price of the Hunger Bond. On July 20, the spread of the February bond surpassed that if the Hunger Bond. The differential between the two 2022 bonds then peaked after the imposition of sanctions on President Maduro on July 31st. The two 2022 bonds went back to trading at a similar spread in August 15.

[9] The title of Bloomberg's piece says it all: "Goldman's Hunger Bonds Dodge U.S. Sanctions That Bypass Traders" (Jenkins & Bartenstein 2017).

Figure 3 compares the prices (clean and gross) of the Hunger Bond with those of the 2024 PDVSA bond. The figure shows that the prices, which had converged in late October 2017, diverged rapidly in early December and widened further after December 13.

Figure 3: Prices (clean and gross) of the Hunger Bond and PDVSA 2024 6% bond

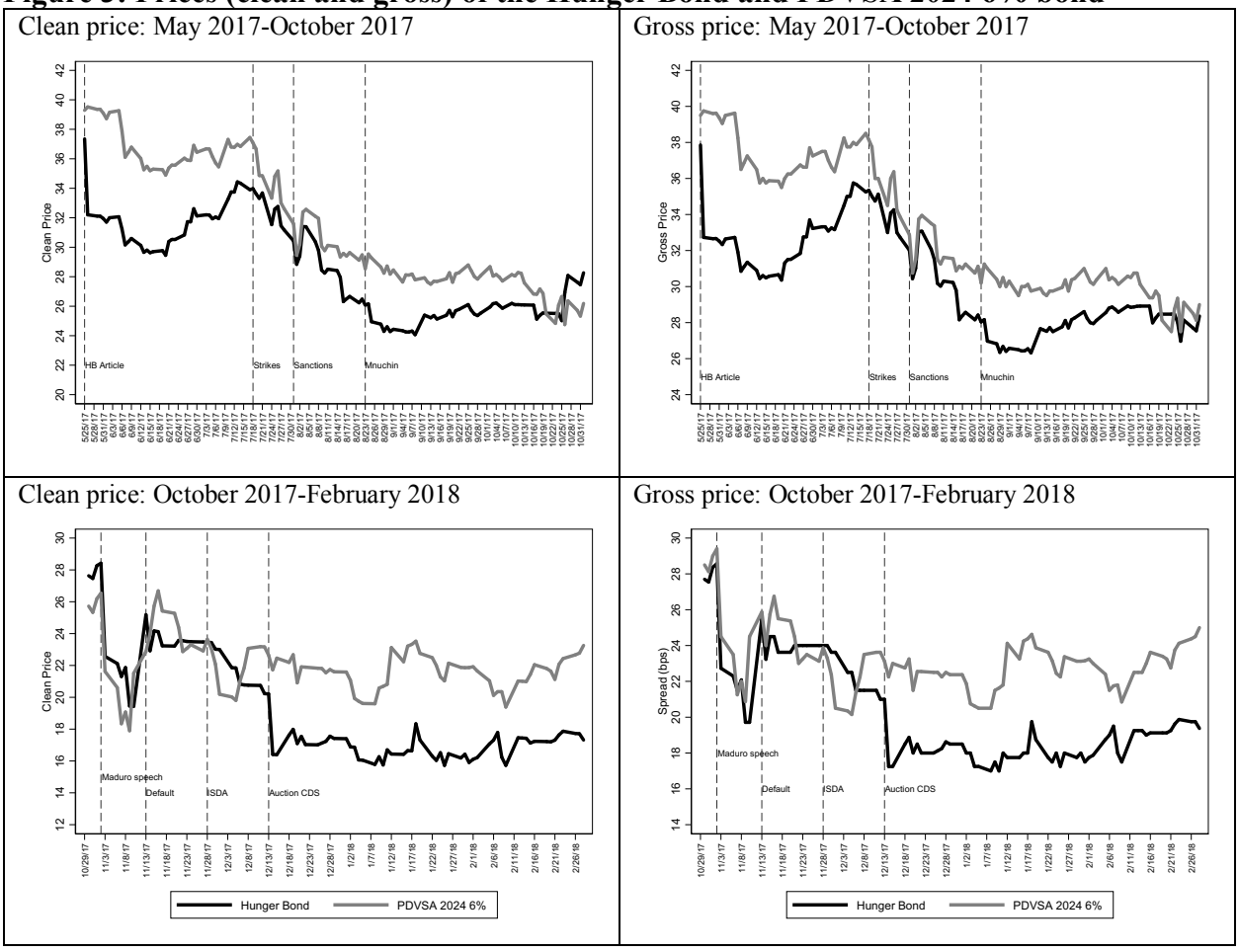


Table 2 reports the results of a set of regressions aimed at explaining the drivers of the spread of the Hunger Bond. All regressions use daily data and are estimated for the period May 25, 2017-December 31st 2017.[10] The first column regresses the spread over a set of eight dummy variables that capture the events described in Figures 1 and 2.[11] Each dummy takes a value of one starting from the day of the event and zero before the event. The dummy for the Hunger Bond article takes value zero for just one day and value one for all other observations. Hence, when we

[10] We obtain similar results if we use yields instead of spreads. All results are robust to estimating the model with Newey-West Standard errors and with a GARCH(1,1) model.

[11] These events are: (i) the publication of Hausmann's article; (ii) the strikes of July 19, 2017; (ii) the imposition of sanctions of President Maduro (August 2, 2017); (iv) the exemption of the Hunger Bond from US sanctions (August 25, 2017); (v) President Maduro speech about the possibility of restructuring Venezuela's debt (November 2, 2017); (vi) Venezuela classified in selective default (November 13, 2017); (vii) ISDA's inclusion of the Hunger Bond in a list of bonds that are acceptable for the purposes of a generic CDS contract written on a package of PDVSA bonds (November 28, 2017); and (viii) the auction of December 13.

include this dummy the results for all other variables are the same to what we would have obtained by dropping the first observation from the sample (Salkever, 1976).

We find that the publication of Hausmann's article is associated with a 650 basis point increase in the spread of the Hunger Bond, the imposition of sanctions on Maduro is associated with a 550 basis point increase in the spread, and Maduro's speech with a nearly 1,400 basis point increase in the spread of the Hunger Bond.

Table 2: The drivers of the spread on the Hunger Bond (OLS regressions)

This table presents a set of OLS regressions where the dependent variable is the spread on the 6% PDVSA bond with maturity on 28/10/2022 (the Hunger Bond). The explanatory variables are a dummy that takes a value of one after the publication of Hausmann's article, a dummy that takes value one in weeks with a high number of Google searches for the term "Hunger Bonds," a dummy that takes value one after the strikes of July 19, 2017, a dummy that takes value one after the imposition of sanctions of President Maduro (August 2, 2017), a dummy that takes value one after the hunger bond was exempted from sanctions (August 25, 2017), a dummy that takes value one after President Maduro speech about the possibility of restructuring Venezuela's debt (November 2, 2017), a dummy that takes value one after Venezuela was classified in selective default (November 13, 2017), a dummy that takes value one after ISDA included the Hunger Bond in a list of bonds that acceptable for purposes of a generic CDS contract written on a package of PDVSA bonds (November 28, 2017), a dummy that takes value one after the December 13 auction, the spread on the 6% PDVSA bond with maturity on 16/05/2024, the first 3 principal components of the spreads of all PDVSA and Republic of Venezuela bonds (excluding the Hunger Bond) that mature after 2021.

	(1)	(2)	(3)	(4)	(5)
Hunger Bond Article	653.3***	547.4***	536.8***	464.4***	444.3***
	(30.42)	(38.04)	(39.64)	(44.71)	(47.03)
Google Searches				197.6***	210.9***
				(35.81)	(37.15)
Strikes	-78.38	-197.6***	-171.2**	-125.2**	-111.9*
	(56.40)	(48.79)	(67.76)	(50.22)	(62.19)
Sanctions on Maduro	555.0***	345.8***	293.7***	336.1***	294.1***
	(79.25)	(80.87)	(91.74)	(80.56)	(91.23)
HB exempt from sanct.	478.3***	330.8***	284.6***	323.9***	284.6***
	(65.59)	(63.68)	(73.03)	(63.64)	(73.27)
Maduro Speech	1,394***	819.1***	973.4***	792.2***	883.4***
	(178.0)	(255.6)	(318.1)	(256.5)	(315.0)
Venezuela in SD	-468.4***	-353.0**	-387.5*	-347.6**	-396.3**
	(179.1)	(168.6)	(203.4)	(168.9)	(200.3)
HB ISDA elegible	403.5***	173.7	141.1	162.9	112.7
	(92.19)	(131.5)	(140.4)	(133.1)	(141.8)
December 13 Auction	1,255***	1,278***	1,330***	1,279***	1,304***
	(121.0)	(130.3)	(177.1)	(131.6)	(177.8)
PDVSA 05/2024		0.572***		0.599***	
		(0.154)		(0.156)	
1st PC Ven bonds			120.6***		131.7***
			(34.75)		(34.80)
2nd PC Ven bonds			189.9**		169.7*
			(90.82)		(90.20)
3rd PC Ven bonds			-61.76		-48.56
			(83.97)		(82.35)
Constant	3,552***	2,019***	3,686***	1,947***	3,707***
	(120.3)	(413.7)	(56.73)	(417.5)	(54.22)
Observations	157	157	157	157	157
R-squared	0.964	0.970	0.972	0.971	0.972

Robust standard errors in parentheses

Surprisingly, we find that the Hunger Bond's exemption from sanctions and its inclusion in the ISDA list are associated with an increase in its spread and that Venezuela's selective default rating is associated with a drop in the spread of the Hunger Bond (an issue that we return to when

we report on our interviews). The strikes of July 19 have a negative but not statistically significant coefficient. Finally, the December 13 auction has a large effect (1,200 basis points) on the valuation of the Hunger Bond.

One problem with the results of Column 1 is that they do not discriminate between shocks that are specific to the Hunger Bond and shocks that affect all Venezuelan bonds. To address this issue, we augment the model with the spread of the PDVSA May 2024 bond. Inasmuch, the spread on this bond captures aggregate shocks that affect all Venezuelan sovereign bonds, the coefficients of the dummies should then measure how the events included in the regression affect the Hunger Bond above and beyond their effect on other Venezuelan bonds.

Column 2 of Table 2 shows that the spread of the 2024 bond is closely correlated with that of the Hunger Bond (the point estimate implies that a 100 basis point increase in the spread of the 2024 bond is associated with 57 basis points increase in the spread of the Hunger Bond). When we control for the spread of the 2024 bond, the coefficient on the dummy for strikes becomes larger (in absolute value) and statistically significant. This finding confirms the visual impression of Figure 2 which suggested that the strikes had a larger effect on the comparator bonds. The Hunger Bond article, US sanctions on Maduro, Maduro's speech, and the selective default dummies remain statistically but their coefficients are now smaller. The ISDA ruling, instead is no longer statistically significant. The December 13 dummy is instead unchanged with respect to the results of column 1. Whatever happened on December 13, it was specific to the Hunger Bond.

The choice of the May 2024 bond as a benchmark is arbitrary and it would be problematic if there are shocks that are specific to this bond. To address this issue, we create a synthetic benchmark by taking the first three principal components of 14 PDVSA and Republic of Venezuela bonds that mature after 2021 (we use all bonds for which we have data excluding the Hunger bond and Regulation 144 bonds).

Table A1 in the appendix shows the eigenvalues of the 14 components and shows that the first 3 components capture nearly 99% of the total variance. In other words, the first three components capture the near totality of the aggregate shocks that hit Venezuelan bonds. Figure A1 plots the loading of the first component. It shows that shocks to this component raise all spreads by approximately the same amount. This finding indicates that the first component is a level effect that captures Venezuela's sovereign risk. Figure A2 plots the loading of the second component. This component discriminates between PDVSA and Republic bonds. A shock to this component increases the spreads of PDVSA bonds (positive loading) and decreases the spread of Republic bonds (negative loading). Figure A3 plots the loading of the third component. In this case, the picture is not as clear as for the other two components. However, this third component seems to capture the slope of the yield curve. A positive shock to this factor decreases the slope of the yield curve by lowering most long-term rates (negative loadings) and increasing most short-term rates (positive loadings).

Column 3 of Table 2 substitutes the February 2024 bond with the scores of the three components described above. We find that the first component (the one that captures Venezuela's sovereign risk) is positively correlated with the spread of the Hunger Bond. The point estimates suggest that a one-unit increase in this component is associated with a 120 basis points increase in

the spread of the Hunger Bond. As suggested by Figure A2, the second component is also positively correlated with the spread (this the PDVSA specific effect), the third component is not statistically significant. More interesting for our purposes, when we control for these factors we find results which are similar to those of Column 2. This finding suggests that the 2024 bond is a good benchmark for the Hunger Bond.

In column 4 we test the hypothesis that the Hunger Bond penalty reduced as press attention to the Hunger Bonds dissipated. To this purpose we use Google Trends and recover the index for searches of "Hunger Bond." This index (which does not measure the number of searches but the relative popularity of a given item) is available at weekly frequency and ranges from zero (most weeks) to 100 (the week of May 28, 2017). We create a dummy variable that takes a value of one during weeks when the index was greater than 20 and 0 in the remaining weeks. Column 4 estimates the same model of Column 2 controlling for Google searches. Most results are unchanged and the Google Search dummy is positive and statistically significant. The point estimate indicates that in weeks with a high number of searches for "Hunger Bonds" the spread of the Hunger Bond was about 200 basis points higher than in weeks with a low number of searches. The remaining results are unchanged. Column 5 estimates the model controlling for the principal components of the 14 Venezuelan bonds and finds results similar to those of column 4.

In Table 3, we estimate a set of regressions similar to those of Table 2, but use bond prices (we use the clean price) instead of spreads. All columns confirm the presence of a large and statistically significant effect of the Hunger Bond article (at 5 points, the effect corresponds to 13% of the price on the first day of trading). Columns 1 and 2 of Table 3 have results which are qualitatively similar to those of the corresponding column of Table 2 (coefficients have the opposite interpretation as spreads and prices move in opposite directions). However, column 3 shows that, when we control for the first three principal components of the prices of other Venezuelan bonds, the only dummies that remain significant are those for Hunger Bond article, the Maduro Speech, and the December 14 auction.[12] Columns 4 and 5 of Table 3 corroborate our previous finding that Google Searches are negatively correlated with the valuation of the Hunger Bond. The estimates suggest a 2 point effect and it is compensated for by a drop (from 5 to 3) in the coefficient of the Hunger Bond article.

In Table 4 we conduct a series of robustness tests. Columns 1 and 2 estimate models similar to those of columns 4 and 5 of Table 2, but substitutes the Google search dummy with individual dummies for the specific values of the index (the excluded category is zero). We find that a low number of searches (a value of the index below 20) are associated with an insignificant spread differential with respect to the excluded dummy (no searches) and that high number of searches are associated with an increase in spread that ranges between 100 and 250 basis points. Columns 3 and 4 estimate the same model of columns 4 and 5 of Table 3. Also. in this case, we find that a high number of searches reduces the price of the Hunger Bond by 1 to 2 points (between 3% and 6% of the issuance price).

We also explored whether differences in spreads can be due to the Original Issue Discount problem. But we found limited traction for this story. An application of OID would imply a large penalty for the Hunger Bond (see Figure A6 and Box 1), but this penalty should increase as the

[12] The first three components explain 99.5% of the variance of the 14 bond prices.

default probability increases. However, the spread between the hunger bond and the sililarly dated February 2022 bond decreased as the default probability increased at the end of 2017.

Table 3: The drivers of the price of the Hunger Bond (OLS regressions)

This table presents a set of OLS regressions where the dependent variable is the clean price of the 6% PDVSA bond with maturity on 28/10/2022 (the Hunger Bond). The explanatory variables are a dummy that takes a value of one after the publication of Hausmann's article, a dummy that takes value one in weeks with a high number of Google searches for the term "Hunger Bonds," a dummy that takes value one after the strikes of July 19, 2017, a dummy that takes value one after the imposition of sanctions of President Maduro (August 2, 2017), a dummy that takes value one after the hunger bond was exempted from sanctions (August 25, 2017), a dummy that takes value one after President Maduro speech about the possibility of restructuring Venezuela's debt (November 2, 2017), a dummy that takes value one after Venezuela was classified in selective default (November 13, 2017), a dummy that takes value one after ISDA included the Hunger Bond in a list of bonds that acceptable for purposes of a generic CDS contract written on a package of PDVSA bonds (November 28, 2017), a dummy that takes value one after the December 13 auction, the clean price of the 6% PDVSA bond with maturity on 16/05/2024, the first 3 principal components of the clean prices of all PDVSA and Republic of Venezuela bonds (excluding the Hunger Bond) that mature after 2021.

	(1)	(2)	(3)	(4)	(5)
Hunger Bond Article	-5.260***	-4.217***	-4.912***	-3.358***	-3.935***
	(0.262)	(0.308)	(0.221)	(0.338)	(0.367)
Google Searches				-1.942***	-1.466***
				(0.272)	(0.309)
Strikes	1.175***	2.226***	-0.0709	1.552***	0.234
	(0.447)	(0.320)	(0.547)	(0.340)	(0.470)
Sanctions on Maduro	-3.692***	-1.910***	-0.595	-1.752***	-0.805
	(0.542)	(0.477)	(0.550)	(0.457)	(0.519)
HB exempt from sanct.	-2.210***	-1.292***	-0.0763	-1.210***	-0.178
	(0.421)	(0.337)	(0.441)	(0.330)	(0.411)
Maduro Speech	-5.940***	-2.631***	-6.715***	-2.338**	-5.445***
	(0.722)	(0.948)	(1.082)	(0.935)	(1.052)
Venezuela in SD	2.017***	1.389**	1.369	1.334**	1.567*
	(0.722)	(0.650)	(0.854)	(0.651)	(0.801)
HB ISDA elegible	-1.471***	-0.372	-0.152	-0.274	-0.0749
	(0.361)	(0.513)	(0.580)	(0.526)	(0.562)
December 13 Auction	-4.102***	-4.242***	-4.963***	-4.254***	-4.717***
	(0.425)	(0.483)	(0.579)	(0.494)	(0.564)
PDVSA 05/2024		0.498***		0.542***	
		(0.0874)		(0.0846)	
1st PC Ven bonds			0.798***		1.091***
			(0.190)		(0.200)
2nd PC Ven bonds			-5.350***		-4.269***
			(0.737)		(0.766)
3rd PC Ven bonds			0.457		0.253
			(0.747)		(0.610)
Constant	37.86***	18.21***	37.62***	16.46***	37.04***
	(1.15)	(3.452)	(0.353)	(3.344)	(0.334)
Observations	157	157	157	157	157
R-squared	0.933	0.947	0.958	0.957	0.962

Robust standard errors in parentheses

Table 4: The drivers of the spreads and prices of the Hunger Bond, Robustness analysis

This table presents a set of OLS regressions where the dependent variable is either the spread (columns 1 and 2) or the clean price (columns 3 and 4) of the 6% PDVSA bond with maturity on 28/10/2022 (the Hunger Bond). The explanatory variables are a dummy that takes a value of one after the publication of Hausmann's article, a dummy that takes value one in weeks with a high number of Google searches for the term "Hunger Bonds," a set of dummies for the different search ranking provided by Google, a dummy that takes value one after the strikes of July 19, 2017, a dummy that takes value one after the imposition of sanctions of President Maduro (August 2, 2017), a dummy that takes value one after the hunger bond was exempted from sanctions (August 25, 2017),a dummy that takes value one after President Maduro speech about the possibility of restructuring Venezuela's debt (November 2, 2017), a dummy that takes value one after Venezuela was classified in selective default (November 13, 2017), a dummy that takes value one after ISDA included the Hunger Bond in a list of bonds that acceptable for purposes of a generic CDS contract written on a package of PDVSA bonds (November 28, 2017), a dummy that takes value one after the December 13 auction, the spread (columns 1 and 2) or the clean price (columns 3 and 4) of the 6% PDVSA bond with maturity on 16/05/2024, the first 3 principal components of the spreads of clean prices of all PDVSA and Republic of Venezuela bonds (excluding the Hunger Bond) that mature after 2021.

	Spread regressions		Clean price regressions	
	(1)	(2)	(3)	(4)
Hunger Bond Article	506.3***	490.6***	-3.502***	-4.295***
	(61.70)	(64.47)	(0.477)	(0.454)
Search Index 11	77.93	98.46	0.384	-0.349
	(105.7)	(104.1)	(0.495)	(0.453)
Search Index 12	10.15	4.152	-0.121	-0.169
	(41.97)	(41.93)	(0.286)	(0.264)
Search Index 13	-92.41**	-86.75*	0.624*	0.639**
	(45.77)	(45.58)	(0.356)	(0.291)
Search Index 25	238.5***	231.7***	-1.815***	-1.344***
	(42.76)	(43.37)	(0.331)	(0.319)
Search Index 48	167.2***	176.8***	-1.777***	-1.081***
	(49.46)	(52.03)	(0.358)	(0.381)
Search Index 100	97.89	121.8*	-1.754***	-1.143**
	(60.17)	(64.65)	(0.471)	(0.461)
Strikes	-111.2*	-87.00	1.591***	0.0536
	(57.88)	(70.01)	(0.384)	(0.468)
Sanctions on Maduro	334.6***	289.1***	-1.523***	-0.655
	(84.43)	(92.61)	(0.490)	(0.510)
HB exempt from sanct.	338.7***	284.6***	-1.260***	-0.201
	(66.89)	(77.79)	(0.350)	(0.457)
Maduro Speech	825.0***	943.3***	-2.546**	-5.764***
	(261.2)	(326.6)	(1.091)	(1.118)
Venezuela in SD	-307.7*	-336.3*	1.598**	1.296
	(169.8)	(202.1)	(0.759)	(0.814)
HB ISDA elegible	194.3	160.0	-0.255	-0.168
	(139.4)	(152.4)	(0.564)	(0.586)
December 13 Auction	1,276***	1,315***	-4.256***	-4.764***
	(131.6)	(184.3)	(0.505)	(0.576)
PDVSA 05/2024	0.521***		0.550***	
	(0.183)		(0.113)	
1st PC Ven bonds		112.1***		0.950***
		(41.19)		(0.256)
2nd PC Ven bonds		163.0*		-4.460***
		(96.30)		(0.770)
3rd PC Ven bonds		-70.43		0.214
		(87.92)		(0.664)
Constant	2,156***	3,692***	16.12***	37.24***
	(491.9)	(55.22)	(4.461)	(0.358)
Observations	157	157	157	157
R-squared	0.972	0.973	0.958	0.963

Robust standard errors in parentheses

To summarize, we find the following: (A) there is a significant and persistent pricing penalty that applies to the Hunger Bond. When we compare the Hunger Bond with a similar dated

PDVSA bond (which, however, has a higher coupon) this penalty persists for approximately two months, when we compare the Hunger bond with a bond with a slightly longer maturity (19 months) but the same coupon and the penalty persists from when the Hunger Bond starts trading to the end of dataset (March 1st 2018); (B) the size of the penalty is correlated with the salience of the Hunger Bond story; (C) surprisingly, some factors that we thought should have reduced the, relative, reputational taint of the Hunger Bond are either irrelevant (the inclusion of the Hunger Bond in the list of ISDA eligible instruments) or associated with an drop in the valuation of the Hunger Bond (the exemption of the Hunger Bond from US sanctions) . This finding may suggest that the source of the reputational taint is important.[13]

III. The Natives Respond

The foregoing results suggest a Hausmann Effect. It diminishes over time, but remains substantial as of this writing, roughly ten months later.

The results do not, however, clearly tell us what the causal dynamics for the price penalty were. Our primary hypothesis, starting out, had been that Hausmann had caused something of a crowd sourced reputational taint to this one bond. If that was the case, we should have seen variables measuring greater crowd attention to the Hunger Bond issue to correlate with higher yields for the bond (greater distaste) and also higher yields for the bond upon the occurrence of events reducing the reputational taint (or increasing their legitimacy).

The three events we used were Google Searches, where a high number should indicate greater crowd attention, and the exclusion of the Hunger Bond from US sanctions and the choice of the ISDA Determinations Committee to allow the Hunger Bond to be submitted in its auction. Our prediction was that the first variable (Google Searches) would correlate with a yield increase and the second and third variables (exemption from sanctions and inclusion in the auction list) would correlate with yield decreases vis-à-vis the other, untainted, PDVSA bonds. We did get the first predicted result (on the Google Searches), but on the second two events we either find that the event was irrelevant or that it had the opposite result from our prediction.

To try to understand what was going on, we talked to a set of investors in Venezuelan bonds. The questions we asked were the following: Why were investors staying away from the Hunger Bond? Was it some sense of heightened morality in the bankers that Hausmann's piece triggered? How much of it was reputational taint? How much was the threat by the opposition party that it would investigate and perhaps repudiate the debt using the OID argument? Was the Hausmann Effect going to dissipate?

Below, we report on what we heard from a set of investors in Venezuelan debt with whom we had conversations during the period July 1, 2017 and March 5, 2018. The context of these conversations was that these investors were willing to talk to us because one of us had been writing about how, from a legal perspective, a restructuring of Venezuelan debt might take place – and the

[13] As of this writing, we are attempting to investigate the puzzle here further.

investors generally had questions about that.[14] As part of those conversations, the Hunger Bond inevitably came up, since one of the questions investors had was what kind of additional haircut this bond issuance might face in a debt restructuring.

Summarizing the conversations at thirty investment firms, with over fifty portfolio managers we came away with six main observations. We do not offer these observations from our investor conversations for the truth of what we were told. Our respondents could have been spinning us. Nevertheless, we hope that the way they talked about the Hunger Bond can help our understanding of the quantitative results.

At the outset, there were some consistent themes. First, not one investor we spoke to mentioned, or came close to mentioning, the morality of buying Venezuelan debt as a factor influencing their purchasing choices. Second, they all knew about the pricing penalty – often they had graphs to show us -- and thought it would likely remain.

1 Why the Price Penalty?

Our conversations with investors initially focused on the question of how they perceived the differential value of Venezuelan sovereign bonds that required a vote of 100% of the creditors for any modifications to payment terms as compared to those that required 85% and 75% votes. These, to us, were substantial differences. Other things equal, the 100% bonds are harder to restructure than the 85% and 75% ones. And the 85% ones are harder to restructure than the 75% ones. Yet, our analysis was showing little in the way of pricing differences among these bonds. By contrast, the Hunger Bond, over the same period of time, had traded at a substantial discount to other similar bonds, with differences in legal risk that seemed less substantial (to put it mildly) as compared to the differential in vote thresholds mentioned above.

The response we heard was simple. The voting thresholds mentioned above were not going to make a difference in what deal was offered the bondholders in a restructuring. They might make a difference to someone trying to adopt a holdout strategy, if the holdout was liquidity constrained. But, with the Hunger Bonds, there was a possibility that if there was a new government in place, that these bonds would be separated out for a lower offer than what everyone else was receiving. They were tainted. To quote a senior manager at a large New York-based fund:

> There is taint [to these]. They smell. Many institutions don't want anything to do with this; just the headline risk is enough to avoid it. It is not that it is a big arbitrage. Not worth it to do that trade. Only a few [cents] difference between that bond and the others. And . . . it is . . . controlled by one investor – one big investor who everyone knows. Some . . substantial . . . risk of repudiation. The opposition has said they will repudiate – how many client questions with respect to Hunger Bonds does one want to handle? We don't want clients asking us why we own Hunger Bonds. [ABB MG – Feb 2018]

[14] The two papers on Venezuelan debt restructuring that one of us co authored in 2017 that helped us get these interviews are Buchheit & Gulati (2018 a & b).

At another meeting in New York, the following was the conversation among a set of fund managers (two of whom, both at large funds, had strong opinions on the matter):

> [Manager 1] [The] market knows that these Hunger Bonds have been issued at a deep discount. [They know they] have been infected [with OID issues or other illegalities].
>
> [Manager 2]: [Yes they are] infected – [maybe they] can be treated together as different. There is a repudiation risk. They might get a different deal in a restructuring. They might not get any deal. That's different from other legal terms [such as the Collective Action clauses and Pari Passu clauses] – like the ones you [were asking] about. [MG BOB Feb 2018]

2 No One Wants to be the Subject of Marco Rubio's Tweet Tirades

We followed up responses of the foregoing kind, where respondents said that they perceived a repudiation risk, by trying to unpack what they meant. To do so, we would point out something along the lines of: But isn't the repudiation risk here quite small, especially as contrasted with the value of a bond that cannot be restructured without unanimous approval of the bondholders? Both because Goldman Sachs says that it purchased the bonds on the secondary markets, through a broker, and because the Maduro government does not seem likely to fall anytime soon.

Responses fell along the following lines. Our respondents recognized that the risk of repudiation was small, and would get smaller still as the bond changed hands (each successive purchaser having a stronger legal claim that he or she had simply purchased a legitimate bond on the secondary market). But, the key, they explained, was that they were also institutionally constrained. The Hunger Bond was infamous, and it might draw the attention of their compliance departments. And, if other large institutions were similarly constrained, then the Hunger Bond was likely to remain stuck in the hands of the initial sets of investors. A manager at a mid-size New York fund explained:

> Imagine if Compliance asks why we bought it – and then Marco Rubio sends [a] tweet – you don't want the reputational hit – for five points, no one will do it. For 20 basis points . . . cheaper . . . maybe? We are all worried about some tweet that names us. GSAM – those tweet storms were a nightmare for them. People were tweeting really nasty stuff. Goldman made a great deal financially. But the reputation hit was big. Right now, it has about three basis points difference with the other bonds. . . . [CC – Feb 2018]

A somewhat different perspective had to do with creditor cooperation and coordination. This bond was different enough, that investors worried that they would be isolated in it in the context of a restructuring. A London-based small firm manager said:

> With the hunger bond, things are different. With other bonds, there is institutional support for contract rights. The largest institutions will join to support and defend each other – there is coordination and cooperation. But this bond was weird. We

> just generically fear that this has a huge OID. . . . You will always be vulnerable to this – if you go into a fight – and the other side says it is outrageous and that you are not like the others . . . the other creditors will also be willing to isolate you on this . . . Some people are willing to carry the risk, but not many. But ultimate long-term players don't like this risk [PB – Feb 2018].

We followed up again by asking about the more aggressive funds , the ones who do not have to worry about ethical investors or compliance departments. Indeed, there are funds who one might say embrace the reputation of being aggressive in pushing ethical and legal boundaries. The answer we received here was simple: Liquidity. These investors, even if they were willing to try to construct an arbitrage, want to be able to get out of it quickly. And if they were long the Hunger Bond and needed to get out quickly for whatever reason, they would worry that there would be no big institutions to sell to (and apparently the big institutions are key in creating liquidity).

3 Three Basis Points

One of the questions we were particularly curious about what whether investors thought that, over time, the Hunger Bond discount would disappear. As we saw it, this could happen in a couple of ways. One avenue could be an increased understanding of the fact that the legal risk of repudiation was actually quite small and the other avenue might be a reduction in the adverse publicity over the Hunger Bond. And we raised this.

Our respondents resisted the suggestion that the penalty on the Hunger Bond would completely dissipate; despite one of us affirmatively making the argument to them for what this might happen. For them, the bond had been branded, and that was not going to change any time soon. It would always have a penalty of a few basis points. The initial market penalty had been high; and that was bound to diminish. To quote a large fund manager in London:

> When it was 500 bp difference, [some] people were willing to buy [not us, and the other large firms] – because the repudiation risk, after one thought about it, was just not that big. But maybe not the big players . . . and not the ones with reputations to protect. Small guys who can hide and don't care about Marco Rubio's tirades . . . maybe they can buy. They probably did buy [a little]. . . . [But] no one with a compliance department wants to touch these bonds, so everyone knows the bonds are less liquid. And that produces a discount; slight discount. It is going to settle at about a 2-3 bp discount. Probably has.
>
> Holdouts [like Elliott or Aurelius are not] going to buy this either . . . holdouts want a clean bond; they are going to court. Court won't rule for you, if you have played dirty already. No holdouts want this – if you think holdout would buy, you don't understand the holdout strategy in sovereign . . . [GMG – BUBSB – Feb 2018]

4 What Happens When the Bond Changes Hands?

As noted at the start, we started out skeptical about there being a meaningful legal risk to the Hunger Bond, as compared to the other PDVSA bonds. As a result, we pushed our respondents

on this matter. When they told us that they perceived a repudiation risk, we both pointed out that there was no real evidence that GSAM had not purchased the Hunger Bond on the secondary market from a broker (maybe the broker was suspicious looking, but did GSAM have a duty to investigate?) and we pointed out that surely, after this bond had changed hands many times it was going to be highly unlikely that some court would impute knowledge of the original (possible) problem with the issuance. Our argument did not persuade – and it bears emphasis that these conversations were in a context in which our respondents were speaking to us because they wanted to hear our legal analysis on how various legal factors (such as CACs and *pari passu* clauses) would play out in an eventual restructuring. The following, from a small and aggressive distressed-debt hedge fund in London, is illustrative:

> You are not understanding the dynamic. Legal risk does not play in a restructuring in the way you imagine . . . Sovereign debt restructurings are different. Politicians sometimes need to show that they are being tough. This happened with Kazakhstan some years ago – there was a bank restructuring, which was really the state. There were some fishy bonds – they just got set aside . . . no explanation . . . they just got put aside. I almost bought them . . . but didn't . . . And the other creditors did not squeak [when these bonds were set aside] . . . everyone one knew these were dodgy . . . you bought them at your peril.
>
> This transaction with the "park and hide" bonds, from the Vene Central Bank . . .everyone knew . . . I was offered something like this after the GSAM deal got into trouble. . . even I stayed away. If politicians need to make an example, they will do so. And other creditors won't help. [EC - MG – March 2018]

The theme of other creditors not coming to the assistance of the Hunger Bond holders was one that we heard many times. Multiple respondents pointed out that the purchase of a bond at such a deep discount from face was, in effect, an attempt to obtain a kind of structural priority over the other creditors who had purchased at face or close to it. This was not looked up kindly by others; and their support was considered important in the restructuring context.

5 The Gorilla in the Corner

The one outlier respondent who told us they had purchased the Hunger Bond on the secondary market a few days after June 1, 2017 (and subsequently sold it in October 2017) shared our view that the legal risk eventually would go to zero, but thought there was an additional "Gorilla" factor we were not considering. The NY-based fund manager for this London-based fund, who was one of the few who we spoke to by phone as opposed in person, explained:

> Everything in this market right now is about liquidity. And the coupons are driving liquidity because there is still the hope of receiving coupons . . . even though [there have been no coupons for months] . . . the PDVSA guys keep saying they will pay [not the Republic]. There is no talk of restructuring in Caracas . . . I was there last week . . . no body is thinking restructuring . . . If you compare bonds, you need to compare on coupons . . .

> And for the Hunger Bond there is no liquidity. It has a Gorilla, one big holder who everyone knows. And no one wants to be in the bond with them when push comes to shove . . . Maybe down the line, if they can sell enough of their position. But . . . now, there is a risk . . . penalty . . . just for being in there with them. No big players will buy their position because they would get attacked immediately – it would be too public. No small player will buy because the big player is a Gorilla. So no one buys . . . The bonds are so cheap – a big purchase of multiple hundred million will be seen by everyone . . .
>
> Also, have you looked at who makes a market in these . . . Look at these markets [*shows phone screen to us*] . . . Standard Chartered does not list a price for the 6%, Nomura does not, [X – undecipherable] does not . . . only [Y – undecipherable] does . . . This is illiquid . . . and won't become more liquid, unless the Gorilla leaves . . .[MG-NY-March 6, 2018]

To conclude, an aspect of what our respondents pointed to that we had not considered at the start of our inquiry, was that the spotlight that Hausmann had put, inadvertently, on these "park and hide" transactions. Apparently, during the past few years, the artificial inflation of principal amounts had been occurring frequently with PDVSA debts and there were other transactions that had been planned that were similar to the Hunger Bonds sale. But, thanks to the drama over the Hunger Bonds, they did not go through. If indeed that had happened, the real Hausmann Effect might have been much more significant that the price penalty for the one bond that we have examined.

6 The Puzzling Yield Increases

Our final question for respondents had to do with the two puzzling yield increases that we described in the prior section. Specifically, we had expected to see the decision of the US Treasury to exempt trading in the Hunger Bond from sanctions and the decision of the ISDA Determinations Committee to allow the Hunger Bond to be delivered in the auction to be yield reducing events for the Hunger Bond. After all, these not only were arguably taint reducing events, they explicitly were liquidity enhancing events. The data, however, showed either no effect or an increase in yields instead of a decrease.

Our respondents didn't see a puzzle. The answer was simple. In the case of the Treasury announcement, there had been advance knowledge of what Treasury was likely to do since it had conducted inquiries in the market prior to making its decision. And investors had apparently been disappointed in the its taint-reducing impact on their colleagues. In the case of the ISDA decision, apparently Goldman had delivered the Hunger Bonds to a number of sellers of CDS protection (since it was "cheapest to deliver") and those unhappy recipients had immediately tried to sell it, creating a drop in price (and rise in yield).

IV. A Historical Precursor

The literature on the empirical effects of perceptions or accusations of legal infirmity that might be challenged by successor regimes is sparse; perhaps understandably since there has generally been little legal basis upon which successor regimes could mount challenges. The two articles that have addressed the question that we are aware of are by the economic historians Kim Oosterlinck and Stefanie Collet.

The first of the two relevant articles, Collet (2013), analyzes the price penalty that certain Spanish bonds backed by Cuban revenue streams suffered because of the risk that the US would not pay those debts once it took over Cuba. The US had in effect won Cuba as part of the bounty from the Spanish American war of 1892. Spain wanted the US to take over certain bonds that had been backed by Cuban revenue streams, and the US refused on the grounds that these debts were really those of Spain since the proceeds of the bonds had been used to harm the Cuban people (to suppress their independence movement) rather than to help them. Collet argues that the market recognized the risk of repudiation and imposed a penalty on these bonds as compared to others. What is not clear though is whether the penalty was the product of investors anticipating the Odious Debt argument (which was new at that time) or a recognition that the victors in the war were just not going to take on the debts of the vanquished.

In a more recent article, that also goes back to a time and circumstances around when the Odious Debt ideas originated, Stephanie Collet, along with Kim Osterlinck (2018) tells a story that has remarkable parallels to the one we tell, except that it is from over a century ago. At the center of their story also sits a famous intellectual, this time Maxim Gorky.

The context was the Tsarist regime in Russia in the early twentieth century. The regime was on shaky political ground and desperately needed outside capital. Legislative approval from the recently constituted legislature, however, was not forthcoming. The regime, nevertheless, with the support of the French government and much of the French press (which had been bribed) did a bond issuance in Paris (Oosterlinck 2016, provides a detailed account).

The campaign against the bond was begun a couple of days prior to its issuance by Gorky in a short piece in the one French paper that had not been coopted, L'Humanité.[15] He wrote:

> This money will only help to carry out massacres. Do not give a penny to the executioners of the Russian people, executioners of bodies and executioners of minds! It is painful for me to think that a civilized Europe, which is witnessing the way in which a barbarous power, for fear of losing its position in the country, oppresses, tortures, kills thousands of men, that this Europe is helping precisely the political power in its crime.

Although the rest of the French press did not pick up on the piece, it got reproduced widely in other countries such as Germany and England (Long 1972). As Oosterlinck and Collet tell the story, the drama levels got raised to such a level that the bond became a subject of debate in the

[15] M. Gorky, "Pas un sou au gouvernement russe", L'Humanité, 9 April 1906.

context of the French presidential elections (Oosterlinck 2016). The opposition to the Tsar, in the form of the socialist party, added fuel to the fire by announcing that the 1906 bond would not be repaid. The storm was of such intensity – in part because it helped connect to the criticism of the French government's support or the Tsar and its manipulation of the press accounts of the strength of the Russian economy -- that debate over the bond lasted for over a year, well into 1907 (Oosterlinck 2016).

Relevant for our purposes, is that the markets imposed a significant penalty on the bond's price (raising its yield). Initially, the bond had been oversubscribed, with a number of prominent underwriters, such as Credit Lyonnaise and Banque de Paris, buying significant portions of it. But, as it became apparent that the markets viewed this particular bond with disfavor, even the attempts of these underwriters and the Russian to artificially maintain the price failed (those sorts of things were not illegal then). And an article by a French journalist in early 1907, revealing the attempts at price manipulation, only helped to heap disfavor on the bond.

While precise estimates of the price penalty are difficult, since easily comparable bonds with identical terms are not available, it was estimated that this particular bond lost almost a third of its value thanks to the campaign that was mounted against it.

To cut a long and fascinating story short, Oosterlinck and Collet find evidence that the 1906 bond suffered a clear penalty over and above the other Russian bonds of the time, and the campaign of denouncement that Gorky started appears to have been the cause. As the years pass, however, and press attention diminishes, the penalty on the 1906 bond appears to also diminish, eventually coming down to near zero. Oosterlinck and Collet's bottom line, therefore, is that while press attention denouncing a regime and its borrowing can have a significant impact on that regime's borrowing costs, it also dissipates as attention diminishes.

The Oosterlinck and Collet story about the Gorky Effect raises a number of questions for our analysis of the Hausmann Effect. In particular, there is the question of whether the effect dissipates over time, to zero, as press attention does. 1906 of course was a very different time; and, in particular, it was a time with the legal regime governing enforcement of sovereign debt was purely reputational. The rule of governmental succession was just as strict then as it is now (if not stricter), but there was no meaningful court proceeding in which that rule would have played a role at the time.

V. Implications

Scholars from both law and economics have struggled, unsuccessfully, for over a century now, to come up with a workable legal doctrine of Odious Debts. The attempts to do so -- some of which the authors here have been involved in – have faced two barriers. First, the difficult of defining what an appropriately despotic regime is, and second, and more difficult, when creditors should be assumed to have had knowledge of the despotism in question. Given the likely costs of creating a new legal risk for creditors that raises the costs on too many potentially beneficial transactions, reform efforts have floundered.

The question then is whether what we have learned about the Hausmann Effect has shown us an alternate path. We know that, at least for a period of some months, the yields on one bond that was the subject of intense press attention and had a potential legal infirmity, was significantly increased relative to other bonds without that level of press attention. Interestingly, as the image below from late February 2018 that we obtained from one of our contacts in the market, whose firm was concerned that the same OID infirmity might infect other PDVSA bonds shows (some of it held), there are other bonds outstanding that have been issued with a similar OID infirmity. But, none of them appears to be suffering the same market penalty that the Hunger Bond is. We inquired about this and the answer was along the following lines: Those bonds have moved into the wider market and the Hunger Bond has not. What is unique about the Hunger Bond is that both the taint and the risk of repudiation are tied to the single big player holding most of the bond. And both big and small players have reasons to avoid being in the bond, as long as that big player is still there.

Sorted by Dirty Bond Price

Petroleos de Venezuela, S.A. (all bonds are denonminated in USD)

Bond	Coupon	Maturity	Issuance Price	Dirty Price Today	Hunger Bond Discount	Accrued (% of Face)	Risk to Par Claim	Issuance Date	Amt Out. (mm)	Days since CPN Rec'vd
PDVSA										
PDVSA 20 (Sec)	8.50%	10/27/2020	71.50	82.60	**-75%**	2.7%	YES	Oct 2016	2,526	116
PDVSA 22	12.75%	2/17/2022	77.00	29.60	**-32%**	6.6%	-	Feb 2011	3,000	186
PDVSA 21	9.00%	11/17/2021	64.00	27.80	**-27%**	6.9%	-	Nov 2011	2,394	276
PDVSA 35	9.75%	5/17/2035	82.10	27.10	**-25%**	7.5%	-	Jun 2012	3,000	276
PDVSA 27	5.375%	4/12/2027	76.15	24.90	**-19%**	2.0%	-	Apr 2007	3,000	131
PDVSA 37	5.50%	4/12/2037	74.00	24.70	**-18%**	2.0%	-	Apr 2007	1,500	131
PDVSA 24	6.00%	5/16/2024	61.00	24.50	**-17%**	4.6%	-	May 2014	5,000	277
PDVSA 26	6.00%	11/15/2026	55.25	24.20	**-16%**	4.6%	-	Dec 2013	4,500	278
PDVSA 22 New	**6.00%**	**10/28/2022**	**31.00**	**20.25**	**n.m.**	**4.9%**	**YES**	**Mar 2016**	**3,000**	**295**
PDVSA Total:									**$ 27,920**	

To summarize, in our one case, it appears that the combination of a vilified regime, a suspicious looking transaction, an identifiable big investor, intense press and then public scrutiny, and a possible legal infirmity combined to cause a sustained and significant price penalty.

To go back to the Odious Debts issue, the question is whether this effect is replicable beyond a single bond. The key to the Hausmann-Gorky effect, as we see it, was shining an intense spotlight on a suspicious looking transaction that, when examined carefully, had potential infirmities. If we assume that despotic or illegitimate regimes – in part because they lack popular support – tend to engage in shady and legally problematic transactions, then the key to replicating the Hausmann-Gorky effect is generating the spotlight on a systematic basis and early enough in the process such that the market decides it is prudent to avoid the securities in question.

Indeed, the most significant impact of the entire Hunger Bond drama was probably not the price penalty being imposed on that one bond issuance, but the deterrent effect that this drama had on those who were contemplating other such transactions. In our interviews, we were told in three separate instances that respondents had been offered transactions akin to the Hunger Bond deal and, because of the cost GSAM had had to bear, they had decided to avoid doing the deals. We

have no way of verifying the foregoing, but it does appear that other transactions of this type did not occur after May 2017.

Moving to the broader canvas, one us (together with Hausmann) had previously suggested the creation of an odiousness sovereign rating system, akin to credit ratings (Hausmann & Panizza, 2017). In that proposal, the odiousness rating scale would assess the odiousness of all the debt issued by a given regime in a given period. The article suggested that, by becoming part of soft international law, odiousness ratings could perhaps provide an estimate of the likelihood that a court would enforce a given debt contract. The article also pointed to several challenges and open questions linked to the creation of an odiousness rating system. The most important challenge, the challenge that has been the main obstacle to the creation of an odious debt doctrine, is that of building international consensus around this idea.

The story of the Hunger Bond suggests a new possibility towards establishing a tool that can limit access to credit by despotic regimes. A public ranking of bonds which lists all potential legal problems of individual bonds could lead to price penalties for bonds with legal infirmities -- such as whether the bond was issued without proper legislative approval or whether the promised use of the proceeds had not materialized – and possibly increase the borrowing costs for regimes that, besides being despotic, adopt murky debt management practices. In the presence of such type of public information, few investors could claim to have bought a bond on the secondary market without knowing the illegal origin of the bond. This would depress the price of the bond in the secondary market and, hence, also increase the cost of funds in the primary market. Such a system could also help the opposition parties in countries with potentially despotic regimes announce their future plans regarding likely investigation or even repudiation of those bonds.

This proposal is far from the odiousness rating system proposed by Hausmann and Panizza (2017). In our modest proposal, the tainting would focus on individual bonds and be based on technicalities, often linked to incompetence and corruption rather than to the despotic nature of the regime. An odious but technically sound regime would escape from the sanctioning effect of our proposal. However, our conjecture is that despotic regimes are also often going to be both incompetent and corrupt and that those traits will show up in their foreign debt transactions.

While modest, our proposal has the advantage of not requiring any legal innovation or international consensus building because it is based on existing law and legal principles. It is thus readily implementable and would be a step, perhaps a small step, in the right direction. At worst, our proposal satisfies the Hippocratic Oath of doing no harm and would create incentives (for all countries) for the adoption more transparent sovereign debt management practices.

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BOX 1: Computing OID valuations

Consider a zero coupon bond issued at 90 and with a one-year maturity. The yield of this bond is 11% (10/90=0.11). The OID value of this bond one day after issuance will be approximately 90 (90+0.11*80/365=90.03). Six months after issuance the OID value will be 95, and one year after issuance it will be 100. Now, consider a bond with a one-year maturity, a 5.5% coupon, and issued at 95. This bond has approximately the same yield of the zero coupon bond. However the yield will have a different composition (a 5.2% return on the zero coupon component and a 5.8% return on the coupon).[16] The bond will also have a different OID value. One day after issuance, the OID value will be approximately 95 and six months after issuance, the OID value will be approximately 100.25 (the zero coupon component is 95+0.052*95/2=97.5 and the coupon is 5.5/2=2.75). At maturity, the OID value will be 105.5. This example shows that the best way to compute the OID value of a bond issued at discount is to decompose the return into a zero-coupon bond and then add the coupon.

Consider for instance the PDVSA 12.75% bond issued on February 17 2011, with February 2022 maturity. On the first day of trading (February 21, 2011), this bond was priced 76.62. If we assume that this price is close to the issuance price (a good assumption, given that the first day of trading was just 4 days after issuance), we can model part of the yield of this bond as that of a zero coupon bond with a 11-year maturity issued at 76.62. This can be obtained by solving the following formula: $100=76.62*(1+r)^{11}$. The solution for r is: $r=(100/76.62)^{1/11}-1=0.0245$, or 2.45%. Next, we compute the return on the coupon which is 12.75/76.62=.167 or 16.7%. The yield to maturity on the bond is then 16.7+2.45=19.1%. Tote that this is similar to the yield to maturity reported by DataStream and listed in Table 1 (18.6%). We can use these yields to compute the OID value of the bond at any point in time. For instance, in mid-August 2011 (6 months after issuance), the OID value of this bond was 83.93: 77.6 is the value of the zero coupon bond (76.62*(1+0.0245/2)=77.6) and 6.375 is the value of the coupon (12.75/2=6.375). One year after issuance, but before paying the coupon, the OID value of the bond is 91.25 (78.5 for the zero coupon component and 12.75 for the coupon), but the day after the payment of the coupon, the bond is worth 78.5.

We can do the same calculations for the 6% PDVSA bond issued on May 15 2014 at 61.75 and expiring in May 2024 and for the Hunger bond. For the Hunger bond, however, the calculation is complicated by the fact that the first day of trading was on May 2017 (about 5 years after the official issuance date). Moreover, it is not clear if the issuance price for this bond should be 31 (this is how much Godman Sachs is reported to have paid for the bond) or 37.9 (the price on the first day of trading). We compute OID values using both prices.

The solid lines of Figure A4 plot the OID value of the zero coupon component of the bonds listed in Table 1 and the segmented lines plot the OID values that also includes the coupon. For the Hunger bond we report two different values: one assuming that the issuance price was 31 and the other one assuming that the issuance price was 37.9.

[16] 5/95=0.052 and 5.5/95=0.058.

Appendix

Table A1: Principal Component Analysis

This table reports the 14 eigenvalues ordered from highest to lowest. The first eigenvalue explains 94.7% of the total variance/correlation in the spreads of Venezuelan Bonds (PDVSA and Republic). The first 3 eigenvalues explain 98.9% of this variance

```
Principal components/correlation                  Number of obs    =        950
                                                  Number of comp.  =         14
                                                  Trace            =         14
    Rotation: (unrotated = principal)             Rho              =     1.0000

    --------------------------------------------------------------------------
       Component |   Eigenvalue   Difference         Proportion   Cumulative
    -------------+------------------------------------------------------------
           Comp1 |      13.2595      12.8814             0.9471       0.9471
           Comp2 |       .378099      .169713             0.0270       0.9741
           Comp3 |       .208386       .16854             0.0149       0.9890
           Comp4 |      .0398463      .011467             0.0028       0.9918
           Comp5 |      .0283793    .00441068             0.0020       0.9939
           Comp6 |      .0239686    .00777217             0.0017       0.9956
           Comp7 |      .0161965    .00348037             0.0012       0.9967
           Comp8 |      .0127161    .00234463             0.0009       0.9977
           Comp9 |      .0103715    .00251135             0.0007       0.9984
          Comp10 |     .00786011    .00209507             0.0006       0.9990
          Comp11 |     .00576504     .0014094             0.0004       0.9994
          Comp12 |     .00435563    .00161461             0.0003       0.9997
          Comp13 |     .00274102   .000958356             0.0002       0.9999
          Comp14 |     .00178267            .             0.0001       1.0000
    --------------------------------------------------------------------------
```

Figure A1: First factor loadings

The first factor is a level effect as a shock to this factor raises all yields by approximately the same amount

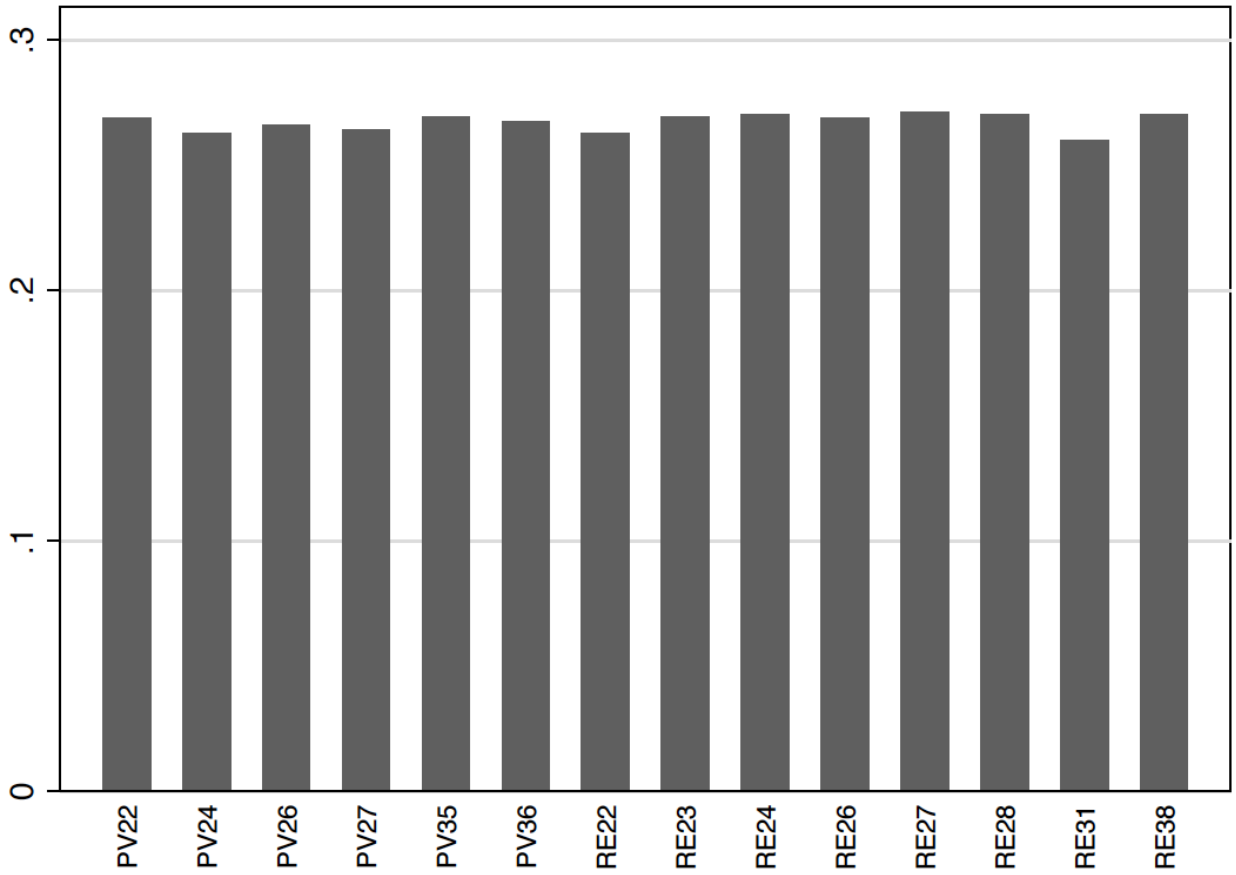

Figure A2: Second factor loadings

The second factor discriminates PDVSA from Republic bonds. A shock to this factor increases the spreads of PDVSA bonds (positive loading) and decreases the spread of Republic bonds (negative loading).

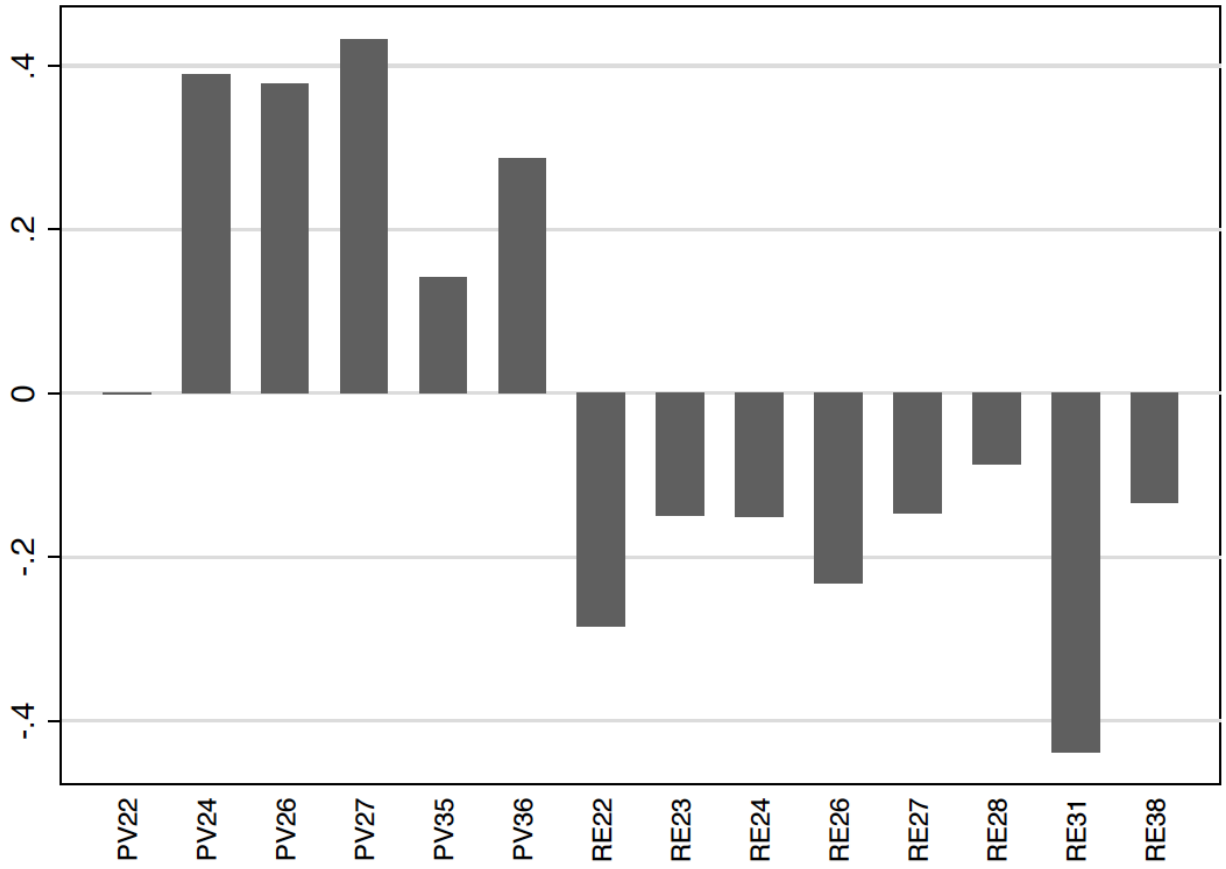

Figure A3: Third factor loadings

The third factor is a slope factor as positive shock to this factor decreases the slope of the yield curve by lowering most long term rates (negative loadings) and increasing most short term rates (positive loadings)

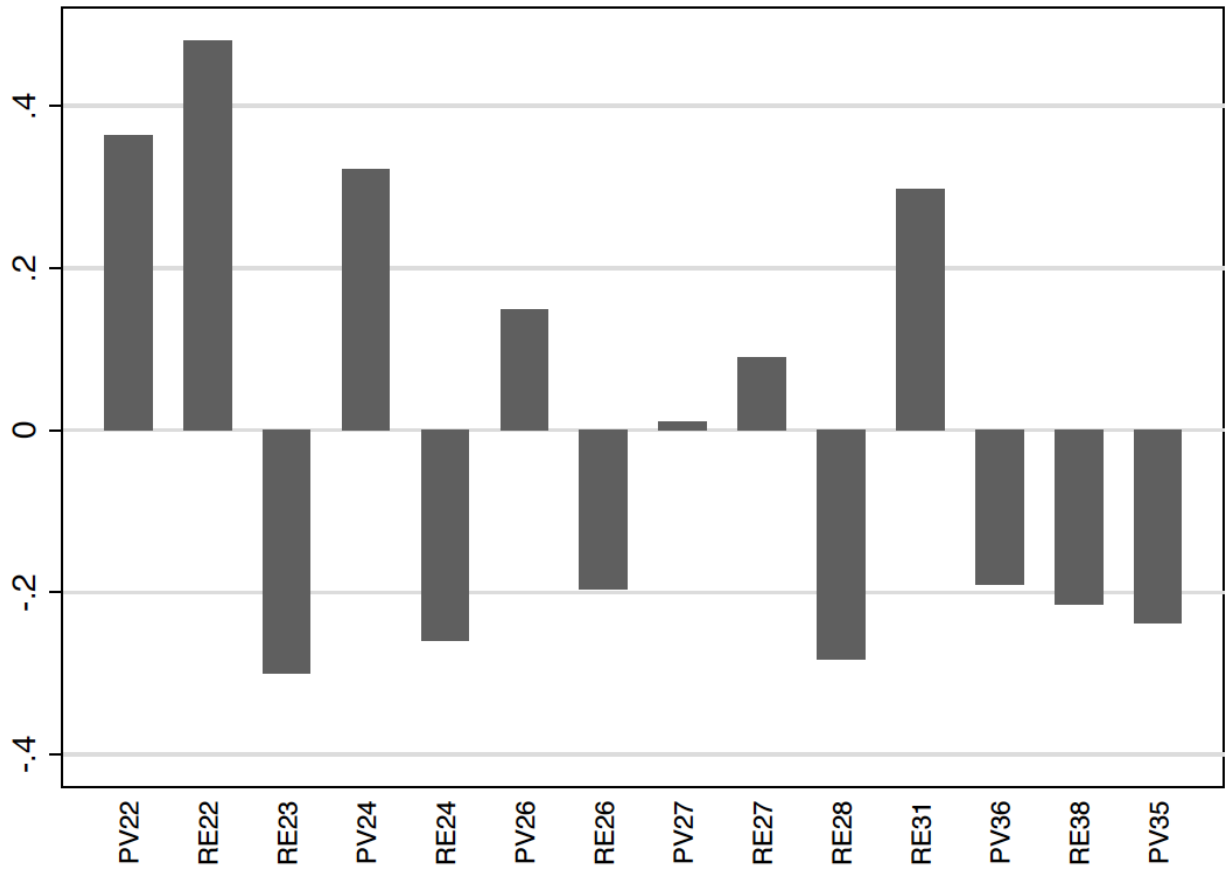

Figure A4: Bond valuation using Original Issue Discount

This figure plots the OID valuation of the three bonds described in Table A1. The straight lines plot the OID valuation of the principal; the overlapping lines plot the OID valuation of the principal plus accrued interests. In the case of the October 2022 bond (the Hunger Bond) there are two alternative OID valuation (see Box 1 for details).