Sovereign Liquidity Shocks

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Abstract

This paper estimates the macroeconomic effects of changes in sovereign risk. I identify a novel series of shocks using high-frequency movements in asset prices around International Monetary Fund announcements, which I characterize as sovereign liquidity shocks. Using this series, I estimate the dynamic causal effects of changes in sovereign risk on macroeconomic variables. A sovereign liquidity shock associated with a 100-basis-point increase in sovereign spreads decreases output by 0.96 percent in the months following the shock, with the contraction primarily driven by declines in investment, as well as disruptions in international corporate lending and trade.

JEL codes: E32, E44, F32, F34, O19

Keywords: sovereign debt, default risk, liquidity, macroeconomic effects, high-frequency identification, SVAR-IV

Sovereign debt crises are often accompanied by substantial losses in aggregate output. An extensive literature on sovereign debt has sought to explain this negative relationship between sovereign default risk and output. On the one hand, declining output can lead to increases in sovereign risk, as governments have greater incentives to default in response to deteriorating economic conditions. On the other hand, increases in sovereign risk can result in output losses through various economic and financial channels. The fundamental identification challenge of estimating the macroeconomic effects of sovereign risk lies in this joint determination of sovereign risk and output.

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In this paper, I address the simultaneity issue between sovereign default risk and output fluctuations by identifying credibly exogenous changes to sovereign default risk. In particular, I exploit high-frequency movements in asset prices in response to announcements made by the International Monetary Fund (IMF). The IMF can act as a lender of last resort for countries experiencing sovereign debt crises, whereby a country may negotiate with the IMF for lending arrangements. I collect 67 announcements made by the IMF regarding its arrangements with Argentina from 2005 to 2022. The announcements receive ample media coverage and trigger immediate price responses of Argentine sovereign bonds. I specifically focus on Argentina, as it is one of the most extensively studied countries in the sovereign debt literature. In addition, Argentina serves as an attractive setting for the methodology of the paper, given Argentina's involvement in multiple IMF lending programs within the sample period. To isolate the impact of the announcements, I measure changes in credit default swap (CDS) spreads in a tight window around each announcement. By measuring the high-frequency responses, I can plausibly rule out reverse causality, as the macroeconomic conditions are already priced in prior to the announcement and are unlikely to change within the window. I then use variation in the responses across CDS tenors to isolate a series of surprises corresponding to news about Argentina's access to credit from the IMF. Using this series as an external instrument in a proxy structural vector autoregressive (VAR) model, I identify a sovereign liquidity shock and estimate its dynamic causal effects.

I find that sovereign default risk has significant effects on the economy. A sovereign liquidity shock that increases sovereign risk causes an immediate decline in output. In terms of magnitude, a sovereign liquidity shock associated with a 100-basis-point increase in the sovereign bond spread results in an output decline of 0.96 percent at the trough of responses in the months following the shock. The contractionary effect gradually dissipates, with the decrease in output remaining statistically significant for over a year. I also find that the output response is largely driven by declines in investment. These results are robust along a number of dimensions, including the selection of announcements, the construction of the instrument, the sample period, the identification strategy, and the model specification.

Beyond the output costs of sovereign risk, I find evidence that channels related to international lending and trade may play a role through fluctuations in corporate costs of borrowing and terms of trade. A 100-basis-point increase in the sovereign spread has a statistically significant pass-through of 67 basis points on corporate spreads for Argentine firms that borrow in global bond markets. Additionally, imports decline significantly in conjunction with a decrease in the terms of trade. This finding aligns with existing evidence from the sovereign debt literature that trade channels contribute to efficiency losses during default episodes (Mendoza and Yue, 2012; Gopinath and Neiman, 2014). In contrast to the existing evidence from advanced economies that emphasize domestic financial intermediation channels (Gennaioli et al., 2014; Bocola, 2016), I find little evidence that such channels play a key role in Argentina. During the sample period, Argentine bank balance sheets exhibited low exposure to dollar-denominated sovereign bonds, limiting the impact of rising sovereign risk on domestic bank assets and lending.

Related literature and contribution. This paper is most closely related to Hébert and Schreger (2017), which examines the immediate effects of sovereign default risk on equity returns of Argentine firms. The authors exploit high-frequency responses around 15 court rulings concerning the Argentine sovereign debt restructuring process from 2011 to 2014. I build on the contributions of the paper by examining not only examining the immediate financial effects, but also the macroeconomic effects and their propagation mechanisms. Estimating the macroeconomic responses provides evidence on the real costs of default risk, helping connect reduced-form evidence with quantitative sovereign debt models. My results on the high-frequency financial responses are in line with the findings from the paper both in terms of sign and magnitude, with an increase in sovereign risk causing a significant decline in the Argentine stock market index and a depreciation of the local currency. Although the magnitudes align with respect to the effect of exogenous changes in sovereign risk, a key difference of this paper is that the shocks I identify differ in interpretation from those of Hébert and Schreger (2017). I identify the effect of exogenous changes in sovereign risk that is driven by news about Argentina's access to credit, which I characterize as sovereign liquidity shocks. In comparison, Hébert and Schreger (2017) identify exogenous changes through legal decisions that determined Argentina's payment obligations on its defaulted debt.

This paper is also related to the literature examining the macroeconomic effects of sovereign risk. Bahaj (2020) provides a reduced-form estimation of the macroeconomic effects of sovereign risk in the context of the European debt crisis by identifying shocks to sovereign spreads using a narrative approach. Bocola (2016) and Arellano et al. (2024) structurally estimate the output costs of sovereign risk by examining the effects of financial intermediation in the context of the eurozone crisis. Neumeyer and Perri (2005), Uribe and Yue (2006), Corsetti et al. (2013), and Kaas et al. (2020) estimate the macroeconomic effects of sovereign risk using structural models in the context of emerging market economies.

I contribute to this literature by providing a novel approach to identify exogenous changes in sovereign risk. To the best of my knowledge, my paper is the first to estimate the macroeconomic effects of sovereign risk by exploiting IMF announcements. This paper is also the first to use external instruments in a VAR in the context of sovereign default risk in emerging market economies. The methodology of using IMF announcements is also flexible in that it can be applied to estimate the macroeconomic effects of sovereign risk for other countries.[1]

[1] As of December 2023, 51 countries were involved in active IMF lending programs and 94 countries had

Beyond the causal effects of sovereign risk, this paper contributes to the extensive literature on sovereign debt reviewed by Tomz and Wright (2013), Aguiar and Amador (2014), and Bolton et al. (2023). A key question in the literature concerns the magnitude and the sources of the costs of default. Without default costs that serve as a punishment, a model of sovereign debt under limited commitment cannot sustain positive levels of debt in equilibrium. The seminal paper of Eaton and Gersovitz (1981) considers reputation costs in the international capital market, while Bulow and Rogoff (1989) argue that sovereign debt cannot be sustained by reputation alone. Cole and Kehoe (2000) develop a model of self-fulfilling debt crises that incorporates an exogenous cost of default through productivity losses. Aguiar and Gopinath (2006) and Arellano (2008) feature exogenous output costs of default in their quantitative models of sovereign debt, which has become standard in the literature (Uribe and Schmitt-Grohé, 2017; Aguiar and Amador, 2021). For instance, Hatchondo and Martinez (2009) and Chatterjee and Eyigungor (2012) assume exogenous output costs in models of sovereign debt that feature long-term debt. A number of papers have explored the sources of the output costs of default. Rose (2005) empirically examines the effects of sovereign default on trade, while Mendoza and Yue (2012) develop a model that incorporates efficiency losses through frictions in financial intermediation and trade. Aguiar et al. (2009) and Acharya et al. (2024) introduce political economy factors to explain both the economic volatility and the high levels of debt observed in emerging market economies. Lastly, Corsetti et al. (2006) and Azzimonti and Mitra (2024) incorporate multilateral financial institutions (e.g., IMF) in a sovereign debt model to examine the trade-off between official liquidity provision and debtor moral hazard.

This paper contributes to the broader literature on sovereign debt by shedding light on the potential sources of default costs. I examine various propagation channels throughout the paper, highlighting that investment accounts for a significant share of the output loss. In contrast to the existing evidence that focuses on domestic financial intermediation channels in advanced economies, I find that such channels may be more muted in countries such as Argentina, where domestic banks have minimal exposure to dollar-denominated sovereign bonds. Instead I find evidence that channels related to international corporate lending and trade may play a role. Although this paper provides corroborating evidence for the sources of default costs, the focus of the paper concerns sovereign risk rather than outright default. Further work is required to directly relate the findings of this paper to the quantitative models of sovereign debt.

The methodology of this paper draws extensively from the high-frequency identification literature, primarily developed in the context of monetary policy shocks (Kuttner, 2001; Bernanke and Kuttner, 2005; Gürkaynak et al., 2005; Gertler and Karadi, 2015; Nakamura

outstanding credit with the IMF. I discuss this more in detail in Section 1.

and Steinsson, 2018; Bauer and Swanson, 2023b). The baseline analysis of this paper is most closely related to the proxy VAR methodology from Gertler and Karadi (2015). I also employ a methodology similar to Gürkaynak et al. (2005) to decompose the series of surprises when isolating the sovereign liquidity shock measure. More recently, the high-frequency identification literature has expanded to other settings (Känzig, 2021, 2023).

I contribute to this literature by providing a novel application that exploits institutional features of the IMF to capture sovereign liquidity shocks. This paper is not the first to use high-frequency identification in the sovereign debt literature. As previously mentioned, Hébert and Schreger (2017) and Bahaj (2020) use high-frequency identification to estimate the effects of sovereign risk on stock prices and unemployment rates respectively. In addition to the novelty and flexibility of my approach mentioned earlier in this section, this paper is the first to exploit variation in surprises across CDS tenors to decompose the series of surprises. This allows for a clean identification of shocks that are driven by movements in short-term sovereign risk.

Roadmap. The rest of the paper proceeds as follows. In Section 1, I provide institutional context on the IMF lending programs and the announcements that I use to capture the exogenous shocks. Section 2 describes the methodology, including the construction of the surprise series and the econometric identification. Section 3 presents the results with discussions on the macroeconomic effects and the transmission channels. Section 4 concludes.

1 Institutional Context

When a country enters a debt crisis, the IMF can act as the lender of last resort to promote macroeconomic stability. If a country either defaults on its sovereign debt or experiences increased risks of default, the country can negotiate with the IMF for lending programs that may impact the probability or the extent of default. The use of IMF lending programs is widespread among emerging market economies and low-income countries. As of December 2023, 51 countries were involved in active IMF lending commitments, with disbursements totaling $27 billion for 2023. The number of countries with outstanding credit to the IMF is even higher at 94 countries with a total of $148 billion in outstanding credit.[2] Also, participation in an IMF program is often a precondition for engaging in debt restructuring negotiations with official and private creditors.[3]

[2]Lending statistics based on lending data and USD/SDR exchange rate data from the IMF as of December 31, 2023. The statistics on total disbursements and total outstanding credit exclude lending from the Resilience and Sustainability Trust, as it pertains to lending for building resilience to external shocks, such as climate change and pandemics.

[3]Both the Paris Club and the G20 Common Framework, which concern debt restructuring with official creditors, explicitly require participation in an IMF-supported program before entering debt negotiations.

The lending instruments are categorized based on the duration of lending, the severity of the country's economic conditions, and the income level of the country. For example, Stand-By Arrangements provide credit lines to advanced and emerging market economies for up to three years. Another lending instrument is the Extended Fund Facility, which consists of scheduled quarterly disbursements for up to five years. During the sample period, Argentina was involved in a total of five IMF lending programs, consisting of four Stand-By Arrangements and one Extended Fund Facility.

The negotiation process with the IMF mainly concerns the terms of lending. This may include the schedule of disbursements and repayments of the loan, along with the set of policy targets that the IMF imposes on the country to promote debt sustainability. The policy targets may involve specific quantitative targets (e.g., primary fiscal surplus target at 2 percent of GDP), as well as structural policy goals (e.g., strengthening monetary policy credibility by providing more central bank independence). Reaching an agreement often takes months, if not years, with the IMF issuing multiple announcements throughout the negotiations. For example, in the month leading up to the approval of a $50 billion Stand-By Arrangement for Argentina in June 2018, the IMF issued three announcements: a statement on the progress of negotiations, an announcement of a staff-level agreement, and an announcement of final approval by the IMF board.

Following the approval of a deal, the lending program is subject to quarterly reviews by the IMF. In each quarterly review, approval is conditional on satisfactory efforts to meet the program goals stipulated in the agreement. However, the lending programs can also be subject to adjustments in each quarterly review. For example, in the first quarterly review of the Stand-By Arrangement mentioned above, the IMF agreed to revise the total available credit for Argentina from $50 billion to $57 billion. Each quarterly review process involves a set of announcements similar to the aforementioned example.

The example below is an excerpt from an announcement on June 4, 2018, which provided a broad update on negotiations:

> *"IMF staff and the Argentine authorities have been engaged in a very constructive and close dialogue in response to the authorities' request for financial support for their economic plan. Talks are well advanced. As we have said all along, this will be a plan driven by the Argentine government's priorities, with a particular focus on protecting the most vulnerable, and strengthening the local economy in light of the recent financial market turbulence."*

Markets pay close attention to IMF announcements, as reflected in immediate price responses of Argentine sovereign bonds. The market responses are especially significant for

This is also often required by private creditors, although there is no strict requirement (Bai et al., 2024; IMF, 2024).

the announcements that signal imminent approval of a lending program or quarterly review. For instance, the example above resulted in the five-year cumulative probability of default decreasing by 2.2 percentage points.[4] I explain the market responses around announcements more in detail in Section 2.1.

On June 7, 2018, three days after the aforementioned announcement, the IMF announced an agreement on a lending program:

> *"The Argentine authorities and IMF staff have reached an agreement on a 36-month Stand-By Arrangement (SBA) amounting to US$50 billion. This staff-level agreement will be subject to approval by the IMF's Executive Board, which will consider Argentina's economic plan in the coming days. The authorities have indicated that they intend to draw on the first tranche of the arrangement but subsequently treat the loan as precautionary. . . "*

This announcement specified the size of the lending program, along with some broad policy targets of the program. The IMF Board approved this $50 billion lending program two weeks later on June 20, 2018, which was publicized through another press release.

Since the IMF makes decisions taking into consideration the state of the country's economy, the decisions resulting from the negotiations are not exogenous. For this reason, I will measure changes in the price of financial instruments in a tight window around the press releases to isolate the exogenous surprises in response to the announcements.

2 Methodology

The methodology to estimate the macroeconomic effects of changes in sovereign default risk involves two main steps: constructing the surprise series and estimating the effects using a proxy VAR.

I construct the surprise series using changes in the prices of financial instruments around IMF announcements, which I discuss in Section 2.1. I first measure high-frequency responses in CDS spreads on Argentine sovereign bonds denominated in US dollars (USD) across multiple tenors. Using these changes in spreads across tenors, I decompose the surprises by performing principal-components analysis and a rotation of the factors in the spirit of Gürkaynak et al. (2005). I argue that this isolates the surprises about Argentina's access to credit, which I characterize as a measure of sovereign liquidity shocks. Then, I aggregate the surprise series that corresponds to the sovereign liquidity shocks to the monthly level.

[4] I use two-day windows to capture the market responses, which I discuss in Section 2.1.2. I calculate the five-year cumulative risk-neutral probability of default from credit-default swap (CDS) spreads following the methodology from Hull and White (2000).

I provide the econometric framework for the baseline analysis, as well as a number of additional identification strategies, in Section 2.2. The baseline methodology involves using the monthly surprise series as an external instrument for sovereign liquidity shocks in a proxy VAR. This closely follows the methodology developed by Stock and Watson (2012) and Mertens and Ravn (2013). To mitigate any concerns regarding any potential background noise in the measurement of the surprise series, I also estimate the aggregate effects using a heteroskedasticity-based identification strategy (Rigobon and Sack, 2004). In an effort to improve our understanding of the aggregate effects and potential transmission channels, I use local projections (Jordà, 2005; Stock and Watson, 2018) to estimate the effects of the identified sovereign liquidity shocks on a wider range of variables.

2.1 Surprise Series

To construct the surprise series, I use press release records from the IMF and data on CDS spreads from S&P Capital IQ. I provide details on each dataset in Appendix A.1.

The IMF press release records provide the sample of announcements regarding Argentina from July 2005 to December 2022. For each IMF announcement, I obtain the full text of the press release, along with the date of announcement and any relevant documents and transcripts. I use 67 announcements specific to Argentina. This includes all IMF announcements dedicated to discussing IMF lending programs involving Argentina, as well as other developments concerning the relationship between Argentina and the IMF. The constraints on the sample period are due to data availability of other relevant variables (i.e., data on CDS spreads and monthly macroeconomic variables). I exclude press releases regarding updates on the state of the economy or economic forecasts to minimize concerns that the announcements can affect beliefs about economic fundamentals.[5] I provide the full list of announcements used in the analysis in Appendix A.2.

To measure the market response to announcements, I use daily data on CDS spreads from S&P Capital IQ from July 2005 to December 2022. A credit default swap (CDS) is a type of credit derivative instrument that provides insurance against default on a particular set of bonds issued by the reference entity. In the context of this paper, the reference entity is the Republic of Argentina. When entering into a CDS contract, the buyer agrees to make periodic payments to the seller until the end of the contract or until a credit event (i.e., default) occurs. The length of time remaining until the end of the contract is known as the tenor, with the five-year tenor being the most traded CDS tenor by volume. The dataset I use contains tenors ranging from one year to ten years, with one tenor for each year.

The CDS contracts are regulated by the International Swaps and Derivatives Association

[5] The sample of 67 announcements excludes any announcements related to the World Economic Outlook or the Regional Economic Outlook.

(ISDA), which oversees a determinations committee that can declare credit events. If and when the determinations committee declares a credit event, ISDA holds an auction to determine the price of the defaulted bonds, which determines the recovery rate. The CDS seller is then responsible for paying the buyer the difference between the face value and the auction value of the bonds. When entering CDS contracts or trading them in financial markets, the price is often quoted in terms of CDS spreads. The CDS spread is the total annual payment that the buyer must make as a percent of the face value of the bonds being insured if the upfront payment is set to zero. The CDS spread reflects the risk of default, with higher risks of default resulting in higher premia to insure against default. This is analogous to how bond yield spreads reflect default risk. In fact, under frictionless financial markets, a no arbitrage condition equates the CDS spread with the associated bond yield spread relative to the risk-free rate (Duffie, 1999). Using the CDS spreads, I also calculate the cumulative risk-neutral probability of default to aid with interpretation of the results.

Despite the similarities between CDS spreads and bond spreads, there are two main advantages of using CDS spreads. First, using CDS spreads provides a direct measure of default risk and does not require taking a stance on which risk-free rate to use in the process of calculating the spread.[6] The second advantage is that price discovery tends to occur in the CDS market, with CDS spreads often moving ahead of the bond market (Ammer and Cai, 2011). The setting of this paper is particularly apt for using CDS spreads, given that emerging market sovereign entities make up a significant share of the most traded reference entities by volume.[7]

2.1.1 Narrative Evidence

Before discussing the construction of the surprise series, I present three specific examples of announcements. These examples illustrate that markets respond to such announcements and that these reactions can be interpreted as revisions in default expectations.

On June 4, 2018, the IMF issued a statement highlighting the progress of negotiations with Argentina. Three days later, the IMF staff and Argentina reached an agreement on a $50 billion Stand-By Arrangement, which is a line of credit extended to Argentina for three years. The announcement also stated that Argentina will draw $15 billion from the credit line immediately after formal approval by the IMF board. As discussed in Section 1,

[6] This is particularly useful given that the sample period includes periods before and after the 2008 financial crisis, when the conventional reference risk-free rate to price derivatives changed from the London Inter-Bank Offered Rate (LIBOR) to the overnight index swap (OIS) rate (Hull and White, 2013).

[7] For example, in the six-month period from March to August 2018, the ten most traded single-name reference entities were all sovereign entities. The ranking is based on the average weekly notional value traded (DTCC, 2019). The Argentine Republic was the sixth most traded reference entity in this period. As of June 2022, there is $1.2 trillion in total notional amount outstanding for CDS contracts with sovereign reference entities (Benzoni et al., 2023).

the initial announcement on June 4th led to the five-year cumulative probability of default decreasing by 2.2 percentage points. The announcement of the program received extensive coverage by major news publications, with a number of articles explicitly comparing the results of the negotiations relative to market expectations. The New York Times reported that the credit line was "an amount that was larger than expected" (Politi, 2018). Similarly, the Wall Street Journal specified that the deal was "at the upper end of the $30 billion to $50 billion range that analysts had expected" (Zumbrun and Dube, 2018). The article also mentioned that the agreement came together faster than expected, given that the Argentine authorities formally requested the IMF for assistance just a month earlier.

On March 3, 2022, the IMF staff and the Argentine authorities agreed on a $45 billion Extended Fund Facility. This arrangement consisted of a schedule of quarterly loan disbursements over the course of two and a half years, including a $9.7 billion disbursement immediately after board approval. Unlike the Stand-By Arrangement from 2018, this agreement was the culmination of a prolonged negotiation process lasting nearly two years. Another dissimilarity from the previous example is that the markets reacted negatively to the announcement. Bond prices decreased, and the five-year cumulative probability of default increased by 0.4 percentage points.[8] Again, the announcement received significant press coverage, with a number of articles focusing on the market response. Reuters reported on the announcement with the headline "Argentina bonds sink in snub to $45 billion IMF deal" (Bianchi and Campos, 2022).

On July 28, 2023, the IMF staff reached an agreement on an updated policy package to complete one of the quarterly reviews of the Extended Fund Facility program, including an agreement to disburse $7.5 billion to Argentina.[9] However, this still fell short of Argentina's request to immediately access all remaining disbursements scheduled for 2023, which totalled to $10.6 billion. The markets responded favorably nonetheless, with the five-year cumulative probability of default decreasing by 1.8 percentage points. Figure 1 shows the intraday response for Argentine bonds. The bond price jumps quickly in response to the reporting of the announcement, and levels off few hours later. Also, the price movements around this announcement show that the markets respond not only to the origination of lending programs, but also to the announcements regarding the quarterly reviews. In addition to the market movements, the press coverage provides convincing evidence that these announcements induce revisions in default expectations. For instance, the Financial Times reported

[8] One potential explanation for the negative market reaction is that bond prices had increased significantly a few months earlier when the IMF announced positive progress on negotiations on January 28, 2022 (Rosario and Squires, 2022). Therefore, it is likely that the market had already priced in that there will be an agreement, and the March announcement possibly fell short of market expectations in terms of the contents of the agreement (e.g., disbursement amount/schedule).

[9] Although this announcement is not in my sample for the econometric analysis, I discuss this example to show the intraday response, which I only observe from July 2023 onwards.

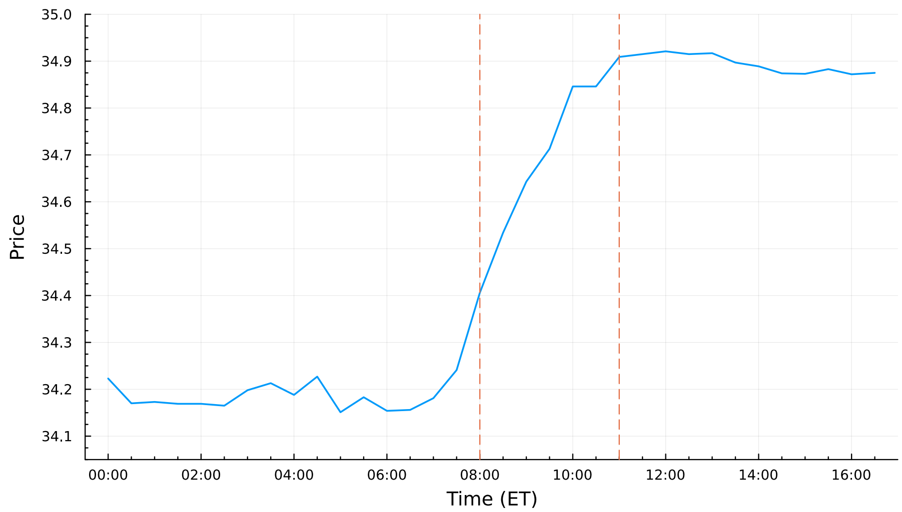


Figure 1: Intraday Response to IMF Announcement

Notes: This figure shows the intraday price on July 28, 2023 for a USD-denominated Argentine bond maturing in 2030 with a 0.75% coupon rate. The dashed vertical lines denote the earliest reporting of the announcement (by Ámbito Financiero) and the time of the press release after the announcement. Source: Bloomberg Finance L.P.

on the announcement, linking it directly to default risk with the headline, "Argentina reaches last-minute deal with IMF to avoid default" (Nugent, 2023).

2.1.2 Constructing the surprise series

I construct the surprise series by examining the changes in CDS spreads around IMF announcements. As mentioned in Section 1, the decisions of the IMF are subject to endogeneity concerns, as the IMF takes into account Argentina's economic conditions when making decisions concerning lending programs. To address this issue, I measure high-frequency responses around IMF announcements to isolate the impact of IMF's decisions on market movements. This plausibly ensures that I do not pick up the effects of economic conditions influencing CDS spreads, assuming that the economic conditions are priced in before the announcement and do not change within the measurement window. With the additional assumptions that there is no background noise and that risk premia are constant within the measurement window, the changes in CDS spreads can be interpreted as revisions in default expectations caused by the IMF announcements.[10]

To construct the surprise series, I first measure the changes in CDS spreads for each tenor i and announcement date d in the following manner:

$$Surprise_{i,d} = P_{i,d+1} - P_{i,d-1}, \tag{1}$$

[10]See Appendix B.1 for the relevant asset pricing equations.

where $P_{i,d+1}$ and $P_{i,d-1}$ indicate the average CDS spreads one trading day after the announcement date and one trading day before the announcement date respectively.

I choose the size of the event window to be at the two-day level mainly due to data limitations. The daily average is the most granular level of data available, given that intraday data are only available for a small subset of the sample period. In addition, the exact timing of the initial public announcement is not always clear to identify. For example, journalists occasionally report on the news before the official press release appears on the IMF website. Since I only have data on the date of each announcement, I use the changes in average CDS spreads between the day after the announcement date and the day before the announcement. This two-day window ensures that I can capture the surprises regardless of whether the announcement occurs before, during, or after trading hours.[11]

Table 1 shows the magnitude of market surprises corresponding to the announcement dates and a set of control dates for each CDS tenor. On average, there is an absolute change of 234 basis points in the five-year CDS spread on announcement days, which corresponds to an average change of 1.08 percentage points in the five-year cumulative probability of default. The shorter tenors respond more in terms of magnitude on announcement days with an average absolute change of 319 basis points in the one-year CDS spread, corresponding to an average change of 1.78 percentage points in the one-year cumulative default probability. In other words, the IMF decisions generally influence the probability of defaulting within the next year more than the probability of defaulting within the next five years. This is reasonable, given that the IMF decisions result in immediate access to credit or news about imminent access to credit. This affects Argentine government's liquidity, and consequently its ability to make debt repayments in the near future.[12]

I conduct a placebo test to compare the market responses on announcement days relative to a randomly selected sample of non-announcement days.[13] On average, the changes in CDS spreads on announcement days is larger in magnitude relative to control days across all tenors. The variance of the daily announcement series is 10.1 times that of the daily control series for the one-year CDS spreads. I test this difference in variance formally using a Brown-Forsythe test of group variances, and confirm that the difference is statistically significant with a p-value of less than 0.01.

[11] Hébert and Schreger (2017) also use two-day event windows to examine high-frequency responses of Argentine CDS spreads.

[12] For instance, in the context of the announcement on July 28, 2023 discussed earlier, Argentina had a \$2.6 billion payment due three days later. Markets were concerned that Argentina would default within weeks without additional funds from the IMF.

[13] I randomly select one control date corresponding to each announcement from the set of dates within 30 calendar days of the announcement date, but excluding any date within 10 calendar days of the announcement date. This exclusion addresses potential issues of selecting control dates on days when the market movements (or lack thereof) may be correlated with the announcements.

	1Y	2Y	3Y	4Y	5Y	6Y	7Y	8Y	9Y	10Y
CDS Spreads (bps)										
Announcement	319	277	252	243	234	229	224	220	217	214
Control	118	111	108	104	103	101	99	97	95	94
Default Probability										
Announcement	1.78	1.31	1.31	1.20	1.08	1.15	1.29	1.27	1.25	1.20
Control	0.64	0.81	0.84	0.80	0.85	0.81	0.82	0.82	0.81	0.78

Table 1: Placebo Test — Mean Absolute Value Change

Notes: This table shows the changes in CDS spreads and the five-year cumulative probability of default on announcement and control dates across tenors. Each cell shows the mean absolute value daily change for the selected set of dates and the corresponding tenor. I report the CDS spread changes in basis points and the default probability changes in percentage points.

Figure 2 shows the aggregated monthly series of the market movements for announcement dates and control dates. The fluctuations of the monthly announcement series are much more pronounced relative to the control series, with large movements in both positive and negative directions. The largest monthly surprise occurs in May 2018, which featured four announcements regarding negotiations for a new lending program.[14] In addition to the large number of announcements during this month, these announcements had a large average impact on CDS spreads due to the uncertainty regarding the progress of negotiations. The program was subsequently approved in the following month, which corresponds to the largest monthly surprise that is associated with a decrease in CDS spreads.

2.1.3 Decomposing the surprise series

The IMF announcements contain two types of information. The first type is information on Argentina's access to credit through news about lines of credit and disbursements. The second type concerns information on the policy targets that the IMF imposes on the Argentine government. As mentioned in Section 1, this can be in forms of both quantitative targets and broader policy goals. Without any decomposition, the changes in CDS spreads on announcement days capture market responses to both types of information.

In order to examine the effect of liquidity shocks on default risk and the macroeconomy, it is necessary to isolate the market responses to news about Argentina's access to credit. To do so, I decompose the surprises using three complementary methodologies.

Principal component analysis and rotation. The baseline methodology to decompose the surprises involves using principal components analysis and a rotation of the extracted components, following the methodology from Gürkaynak et al. (2005).

[14] The results are robust to excluding the surprises in this month, which I discuss in Appendix C.5.

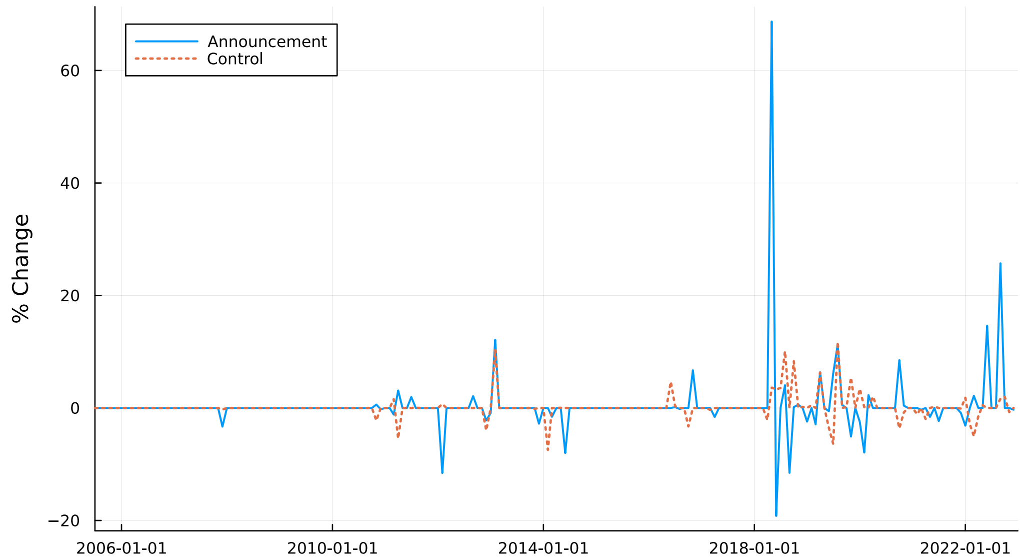


Figure 2: Comparison of Surprise Series and Control Series - 1-Year CDS

Notes: This figure shows the aggregated monthly surprises for one-year CDS spreads corresponding to the announcement and control dates. I aggregate to the monthly level by taking a weighted sum of all surprises within each calendar month, where I weight by the number of days remaining in the month divided by the total number of days in the month.

The key assumption I make is that the short-term probability of default is primarily driven by news regarding credit access. Specifically, I assume that the one-year CDS spread is only affected by the information regarding credit access released in the announcements, while changes in all other tenors are driven by both information regarding credit access and the policy conditionality. This is on the basis that changes in credit access directly impact the country's ability to meet its debt obligations in the near future, which affects the short-term CDS spreads. In contrast, the policy conditions focus on long-term fiscal sustainability. Legislating and implementing the policy changes takes a significant amount of time, and the policy targets often consist of targets multiple years ahead.[15] In Figure 3, I examine the relationship between the market surprises in the one-year CDS spreads and forecast revisions of the primary deficit. The figure provides evidence that in fact, the surprises in the one-year CDS spreads are uncorrelated with changes in expectations regarding the country's primary deficit for the following calendar year.[16]

This still does not rule out issues of anticipation effects, where the economy may respond within the same year in response to changes in expectations about future policies multiple years ahead. For instance, households may save more today in anticipation of decreased

[15]For example, the press release corresponding to the 2018 board approval of the $50 billion Stand-By Arrangement included fiscal and monetary policy targets for 2020 and 2021 respectively (IMF, 2018).

[16]The uncorrelated relationship is robust to excluding outliers.

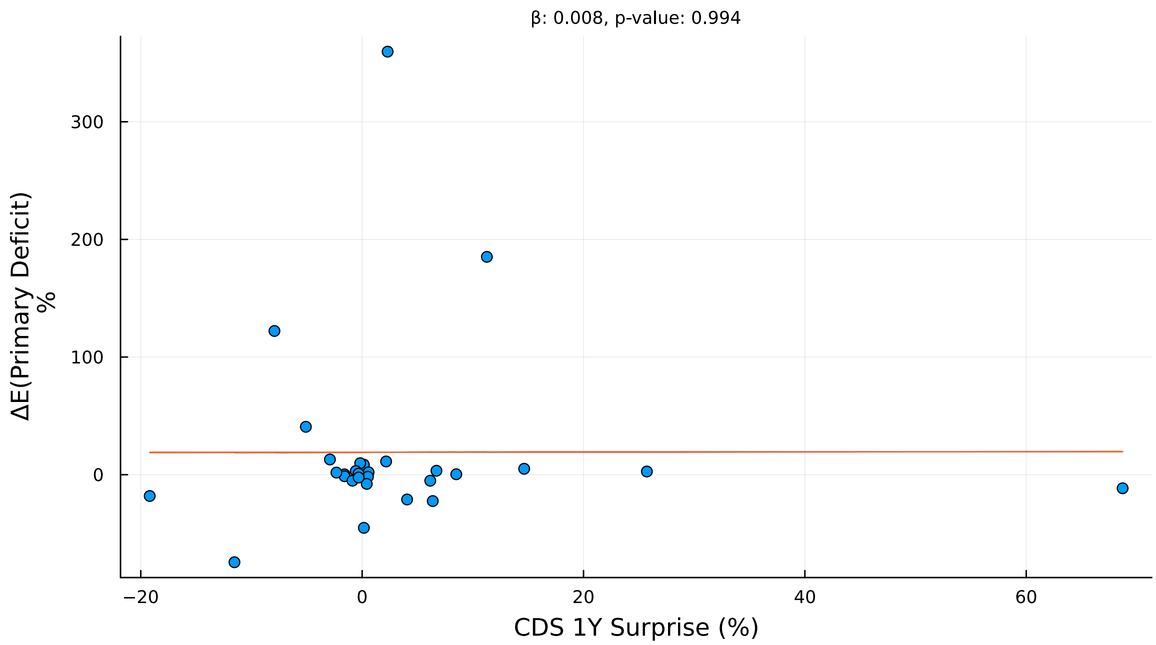


Figure 3: Forecast Revisions of Primary Deficit

Notes: This figure examines the relationship between market surprises and forecast revisions of the primary deficit. Each point represents a month with at least one announcement. The horizontal axis corresponds to the percent changes in one-year CDS spreads; the vertical axis corresponds to the changes in professional forecast survey responses regarding the expectation of the the primary deficit for the next calendar year. The Argentine central bank conducts the survey monthly with respondents consisting of professional forecasters. I provide details of the survey in Appendix A.3. The sample size is limited to 29 months, as the survey dataset is only available from June 2016 and do not include any months without an announcement. I compute the change in expectations by computing the difference in the mean forecast between the closest surveys before and after the announcement month.

government transfers three years in the future. In the presence of such effects, news regarding policy targets would indirectly impact the short-term probability of default. However, this anticipation effect is unlikely to be significant in the context of this paper, given Argentina's history of failing to comply with the prescribed policy targets. An article in El País (a major Spanish newspaper) from 2023 reports on Argentina's relationship with the IMF, stating that Argentina has "most often failed to comply with the terms set by the financial agency, while frequently renegotiating the programs it has agreed to" (Alconada Mon, 2023). For example, the lending program from 2018 involved modifications to the performance criteria in every quarterly review before the cancellation of the program in 2020.[17] In other words, the information on policy targets are unlikely to significantly affect expectations of future policies in the first place, thus minimizing concerns for any potential anticipation effects.[18]

[17] The cancellation of the 2018 Stand-By Arrangement in July 2020 led to a two-year restructuring process, which resulted in the 2022 Extended Fund Facility.

[18] The Market Expectations Survey used in Figure 3 is limited to forecasts up to one year ahead. Therefore, it is difficult to empirically verify whether the IMF announcements affect expectations about future policies

I implement principal components analysis and subsequently rotate the extracted components as follows. I first take the changes in CDS spreads across all tenors on announcement dates and perform principal components analysis to obtain two components: $\mathbf{f_1}$ and $\mathbf{f_2}$. The first principal component explains 92.6 percent of the variance and the second principal component explains 7.2 percent of the variance. I then rotate the components such that the first component corresponds to the changes in the CDS spread of the shortest tenor and the second component corresponds to changes in CDS spreads of all other tenors that are not driven by changes in the shortest tenor CDS. I explain this methodology further in Appendix B.2.

I interpret the rotated first component, which I call $\mathbf{z_1}$, to correspond to the surprises regarding Argentina's access to credit from the IMF.[19] This interpretation holds under the key assumption that the market responses to the announcements for the one-year CDS spreads only reflect news regarding Argentina's access to credit.

Finally, I aggregate $\mathbf{z_1}$ to the monthly level by taking a weighted sum for each calendar month. I weight each value of $\mathbf{z_1}$ according to the timing of the corresponding announcement within each month, where the weight is defined as the number of days remaining in the month divided by the total number of days in the month.[20] This implies that announcements that occur earlier in the month receive higher weights, as they would have more time to impact the monthly average values used in the VAR. I denote this aggregated monthly surprise series by $\mathbf{z}^{\ell}$, and use this as the external instrument in a proxy VAR.

Factor analysis. As an alternative method of decomposing the surprises, I directly estimate a two-factor latent model, which I outline in Appendix B.3. This methodology explicitly assumes that the surprises in CDS spreads are driven by two orthogonal factors, which I interpret to be the credit-access factor and the policy-conditionality factor. In addition, I maintain the key assumption from the baseline methodology that the one-year CDS spreads are only driven by the factor representing credit access. Rather than imposing this assumption in the rotation matrix of principal components, I directly impose that the loading of the policy-conditionality factor on the one-year CDS spreads is zero. Using maximum likelihood estimation, I estimate the loadings and the variance of the error term, which I then use to obtain the estimated factor realizations via ordinary least squares. I aggregate the estimated credit-access factor to the monthly level using the same weighted aggregation method used in the baseline methodology.

multiple years ahead.

[19] Note than $\mathbf{z_2}$ is not necessarily independent of Argentina's access to credit. $\mathbf{z_2}$ can be interpreted to contain all information from the IMF announcements that are not captured by $\mathbf{z_1}$, which can include information relevant to the future path of $\mathbf{z_1}$.

[20] The results are robust to other aggregation methods, which I show in Appendix C.5. See Kilian (2024) for a discussion on aggregation methods.

Although this factor analysis methodology relies on a similar set of assumptions as the baseline methodology, it obviates concerns specific to principal components analysis, such as sensitivity to outliers and the potential difficulty of interpreting the extracted components.

Narrative zero restrictions. As a further alternative, I relax the key assumption that the policy-conditionality factor does not influence one-year CDS spreads. Instead, I impose a set of narrative zero restrictions in a two-factor latent model to estimate the structural factors driving the CDS surprises. This approach allows for a more flexible decomposition while maintaining a clear economic interpretation of the underlying shocks.

This methodology employs a narrative classification of IMF announcements to identify whether each event represents a surprise to credit access, policy conditionality, or both. Using the textual content of the announcements, I systematically classify events into three categories: pure credit-access events, pure policy-conditionality events, and mixed events. Pure credit-access events introduce new information about Argentina's access to credit from the IMF but does not mention anything remotely related to policy conditionality. In contrast, pure policy-conditionality events contain new information about policy conditions but no changes in information regarding credit access. Mixed events may include elements of both factors. Out of the 67 total announcements, 19 are pure credit-access events, 7 are pure policy-conditionality events, and the remaining 41 announcements are mixed events. I show how CDS spreads respond to each type of announcement in Appendix A.4.

Based on the three defined categories, I impose zero restrictions: the policy-conditionality factor is set to zero for pure credit-access events, and the credit-access factor is set to zero for pure policy-conditionality events. I do not impose any restrictions on the mixed events. I then estimate the factor loadings and latent factors by solving a constrained minimization problem. Finally, I aggregate the estimated credit-access factor to the monthly level using the same weighted aggregation method used in the baseline methodology. Appendix B.4 provides further methodological details and classification examples.

2.1.4 Potential threats to identification

Although the decomposition separates the surprises in Argentina's access to credit and the surprises in policy targets, market surprises may still reflect other underlying mechanisms. I discuss three potential threats to identification from the high-frequency identification literature: information effects, predictability of surprises, and correlation with other shocks. I conduct a series of empirical diagnostic tests, and conclude that there is no evidence to suggest that any of the potential threats are present.

Information effects. One potential threat to interpreting the decomposed monthly series as surprises regarding Argentina's access to credit is that the IMF may release private information through its announcements. This would arise from asymmetric information between the IMF and market participants, whereby the IMF possesses private signals that are partially revealed through its announcements.

I consider two types of information effects that may be present. First, the IMF may possess private information about Argentina's economic fundamentals, such as aggregate demand. This would be analogous to the information effect in the high-frequency identification of monetary policy shocks (Nakamura and Steinsson, 2018; Jarociński and Karadi, 2020; Miranda-Agrippino and Ricco, 2021). Given that the IMF's mandate is to promote macroeconomic stability, the IMF may offer larger lending programs when it perceives Argentina's economic outlook as weak, and smaller ones when it sees strength. Accordingly, when the IMF announces a lending program that is larger (smaller) than expected, the markets may interpret the announcement as a signal that the IMF is pessimistic (optimistic) about Argentina's future economic fundamentals. The second type of information effect would involve the IMF possessing private information about Argentina's performance with respect to policy conditionality during the quarterly reviews of lending programs. Since the policy conditionality is intended to promote fiscal sustainability, the IMF may reward or penalize Argentina based on how well it is abiding by the conditions. In this case, the IMF would provide a larger (smaller) lending program when it observes optimistic (pessimistic) private signals about Argentina's performance with respect to the policy conditions. I introduce a model that formalizes these mechanisms and outline a series of empirical tests in Appendix B.5.

I test for the presence of the two information effects by examining the relationship between revisions of professional forecasts and the market surprises. I use professional forecasts from the Argentine central bank's monthly survey of professional forecasters, which includes forecasts of the GDP growth rate and the primary deficit for the following calendar year. I provide details of the survey and the empirical specifications in Appendices A.3 and B.5 respectively.

To test for the information effect about economic fundamentals, I examine the relationship between output forecast revisions and the market surprises using a sample of announcements that excludes quarterly reviews. Excluding quarterly reviews ensures that information effects about policy performance are not present and do not contaminate the results. I find that the surprises that increase CDS spreads are associated with insignificant decreases in the output growth forecasts. I show the estimated regression results in Appendix A.5. This relationship fails to provide evidence for the presence of the information effect about economic fundamentals. In the presence of the information effect about economic fundamentals, the relationship would have the opposite relationship, where surprises that increase the CDS spreads (i.e., lower-than-expected access to credit) would signal that the IMF is more optimistic about economic fundamentals than previously expected.

To test for the information effect about policy performance, I examine the relationship between primary deficit forecast revisions and the market surprises using a sample of announcements that consists of quarterly reviews. Having ruled out the information effect about economic fundamentals, I can isolate and test for the impact of policy performance without concern for offsetting channels. I focus on the primary deficit forecasts rather than the output forecasts, as the sign of the relationship between performance with respect to policy conditions and output forecasts is unclear, especially for a one-year horizon. Policy conditionality associated with IMF lending programs are primarily intended to promote long-term fiscal sustainability, which could involve both expansionary and recessionary effects in the short-term. Using primary deficit forecast revisions provides the most direct measure of news about policy performance, as the primary deficit is one of the most frequently used conditionality metrics, with programs requiring a reduction in the deficit.

I find that the surprises that increase CDS spreads are associated with insignificant increases in the primary deficit forecasts. I show the estimated regression results in Appendix A.5. This is consistent with the absence of the information effect about policy performance, as it shows that the surprises are not informative of revisions in primary deficit forecasts. In the presence of the information effect about policy performance, one would expect a positive and significant relationship between primary deficit forecast revisions and the surprises. For example, surprises that increase CDS spreads—indicating lower-than-expected access to credit—would suggest that the IMF is penalizing Argentina for underperformance, such as a larger-than-expected primary deficit. This would then raise expectations for future primary deficits.

I show that the results to test for both types of information effects do not change when using the full sample of announcements in Appendix A.5. I also provide a detailed discussion of the motivations for the empirical tests and their connection to the stylized model in Appendix B.5.3.

Predictability of surprises. Another potential threat is that the surprises may not in fact be surprises. The validity of the surprise series requires that it cannot be forecasted, meaning that it must be uncorrelated with economic and financial variables available prior to the announcement. This relates to findings that monetary surprises are predictable in the monetary policy shock literature (Cieslak, 2018; Miranda-Agrippino and Ricco, 2021). Sastry (2024) formalizes a model where the predictability of surprises can arise from market misspecification of the policy rule (Bauer and Swanson, 2023a), as well as differences in the interpretation of public signals between the policymaker and the market (Angeletos et al., 2021).

I test for the predictability of surprises by performing a series of Granger causality tests and a test for serial correlation of the surprise series. The Granger causality tests confirm that past macroeconomic and financial variables do not have forecasting ability with respect to the surprise series, which I show in Appendix A.6. I test for serial correlation in Appendix A.7, and conclude that there is no evidence that the surprise series exhibits serial correlation.

Correlation with other shocks. The final potential threat that I consider is the correlation of the surprise series with other shocks. The surprise series must be uncorrelated with other exogenous shocks, so that the surprise series can be used to identify the unique causal effects of the exogenous shock of interest (Ramey, 2016).

I test for correlation between the surprise series and a number of identified structural shocks from the literature, and find no evidence that the surprise series is picking up other shocks. I present the corresponding results in Appendix A.8.

2.2 Econometric Estimation

The baseline econometric estimation of this paper employs the proxy VAR approach using the monthly surprise series as an external instrument for sovereign liquidity shocks. In addition to the baseline methodology, I conduct further analyses to perform robustness checks and to gain a better understanding of the transmission channels.

2.2.1 External Instrument VAR

To estimate the aggregate effects of sovereign liquidity shocks, I use monthly data of macroeconomic variables that are commonly used in the sovereign debt literature. I include the sovereign bond spread, real GDP, CPI, exchange rate, policy rate, and the Argentine stock market index in the baseline analysis. Appendix A.1 provides the full list of data sources and their corresponding variables.

As a measure of sovereign spreads, I use the Emerging Market Bond Index (EMBI) spread for Argentina constructed by J.P. Morgan. The country-specific EMBI spreads measure the bond yield spreads between the USD-denominated sovereign bonds of the emerging market economy and U.S. Treasury securities.

I obtain data on real GDP and CPI from two sources: Argentina's statistical agency, INDEC, and a CPI dataset published by Graciela Bevacqua. I use INDEC's monthly series of real GDP from 2002 to 2022 and the monthly series of CPI from 2002 to 2006, as well as 2017 onwards. For the period between January 2007 and December 2016, I use CPI measures published by Graciela Bevacqua, who served as the head of Argentina's official CPI at INDEC until 2007. I use the two different sources for CPI, as INDEC misreported CPI data between 2007 and 2015, during which time Bevacqua was dismissed from her role.[21] Bevacqua subsequently published her own data, which serves as a more accurate CPI measure during the period of misreporting.

To measure exchange rates, I use the Blue Chip Swap rates published daily by Ámbito Financiero, a major financial newspaper in Argentina. The Blue Chip Swap rate is the exchange rate implied by buying domestic law Argentine government bonds in Argentine Pesos on-shore and selling them in US Dollars off-shore. Given the presence of capital controls and fixed official exchange rates during the sample period, the Blue Chip Swap rates provide a preferred measure of exchange rates (Hébert and Schreger, 2017). I also use the Blue Dollar rate as part of the robustness checks. The Blue Dollar rate is the exchange rate between the Argentine Peso (ARS) and the US Dollar (USD) offered by clandestine currency exchange services in Argentina.

I use data on the monetary policy rate from the Bank for International Settlements (BIS). The reference used for the monetary policy rate has changed multiple times throughout the sample period, but mostly consist of either the interest rate on central bank notes or central bank reverse repo operations.

Finally, I use the Argentine Mercado de Valores (MERVAL) index as a measure of the stock market performance. The MERVAL index is Standard and Poor's Argentine stock market index consisting of leading stocks trading on the Bolsas y Mercados Argentinos (BYMA) exchange.

Using the data described above, I estimate the following reduced-form VAR in levels using monthly data from January 2002 to December 2022:

$$\mathbf{y}_t = \boldsymbol{\alpha} + \mathbf{B}_1\mathbf{y}_{t-1} + \ldots + \mathbf{B}_p\mathbf{y}_{t-p} + \mathbf{u}_t, \tag{2}$$

where $\mathbf{y}_t$ is an $n \times 1$ vector of endogenous variables, i.e., EMBI spread, log GDP, log CPI, log exchange rate, interest rate, and log MERVAL index. $\boldsymbol{\alpha}$ is an $n \times 1$ vector of constants, and $\mathbf{B}_1,\ldots,\mathbf{B}_p$ are $n \times n$ coefficient matrices. I set the lag length p equal to six months in the baseline analysis given the relatively short sample from 2002 to 2022. Nevertheless, I show that the results are robust to varying lag lengths in Appendix C.5. Finally, $\mathbf{u}_t$ is the $n \times 1$ vector of reduced-form innovations with covariance matrix $\boldsymbol{\Sigma}$.

I assume that there is a linear mapping between the reduced-form innovations $\mathbf{u}_t$ and an $n \times 1$ vector of mutually uncorrelated structural shocks $\boldsymbol{\varepsilon}_t$:

$$\mathbf{u}_t = \mathbf{S}\boldsymbol{\varepsilon}_t, \tag{3}$$

[21] The Argentine government's manipulation of its official CPI is documented in detail by Daniel and Briones (2019). In response to the prolonged misreporting, the IMF issued a declaration of censure in February 2013, which served as an official warning of potential sanctions and expulsion. The censure was eventually lifted in November 2016.

where $\mathbf{S}$ is a nonsingular $n \times n$ matrix mapping the structural shocks to the reduced-form innovations. This assumes that the VAR is invertible, meaning that the VAR contains all the information required to recover the structural shocks (Stock and Watson, 2018; Plagborg-Møller and Wolf, 2021).[22] As the structural shocks are mutually uncorrelated, the covariance matrix of $\boldsymbol{\varepsilon}_t$, denoted by $\mathbf{\Omega}$, is a diagonal matrix.[23]

I assume that one of the structural shocks is a sovereign liquidity shock, denoted ε_t^ℓ. Without loss of generality, I denote this shock as the first element of $\boldsymbol{\varepsilon}_t$, i.e., $\varepsilon_{1,t} = \varepsilon_t^\ell$. This implies that the first column of $\mathbf{S}$, denoted $\mathbf{s}_1$, captures the effect of ε_t^ℓ on $\mathbf{u}_t$, and consequently $\mathbf{y}_t$. In other words, identifying $\mathbf{s}_1$ allows me to estimate the macroeconomic effects of sovereign liquidity shocks.

In order to identify $\mathbf{s}_1$, I use the monthly surprise series z_t^ℓ as an external instrument for ε_t^ℓ. For z_t^ℓ to be a suitable instrument, the instrument must be valid and relevant, expressed as the following:

$$\text{Validity/Exogeneity:} \quad \mathbb{E}[z_t^\ell \boldsymbol{\varepsilon}_{2:n,t}] = \mathbf{0}, \tag{4}$$

$$\text{Relevance:} \quad \mathbb{E}[z_t^\ell \varepsilon_{1,t}] \neq 0, \tag{5}$$

where $\boldsymbol{\varepsilon}_{2:n,t}$ is an $(n-1)\times 1$ vector consisting of all structural shocks excluding the sovereign liquidity shock $\varepsilon_{1,t} = \varepsilon_t^\ell$. The exogeneity condition requires that z_t^ℓ captures unpredictable surprises with no background noise, as discussed earlier in Section 2.1. I test for the relevance assumption and discuss the first stage results in Section 3.2.

If the assumptions stated in equations 2 to 5 hold, then $\mathbf{s}_1$ can be identified up to sign and scale by running the regression:

$$\mathbf{y}_t = \tilde{\boldsymbol{\alpha}} + \tilde{\mathbf{B}}(\mathbf{L})\mathbf{y}_{t-1} + \mathbf{s}_1 y_{1,t} + \tilde{\mathbf{u}}_t, \tag{6}$$

via equation-by-equation two-stage least squares using z_t^ℓ as the instrument for $y_{1,t}$. The lag polynomial $\tilde{\mathbf{B}}(\mathbf{L})$ has the same number of lags as Equation 2. The point estimates of this regression are equivalent to estimates from the regression:

$$\hat{\mathbf{u}}_t = \boldsymbol{\gamma} + \mathbf{s}_1 \hat{u}_{1,t} + \boldsymbol{\eta}_t, \tag{7}$$

using z_t^ℓ as the instrument for $\hat{u}_{1,t}$. This is perhaps a more intuitive specification given that $\mathbf{s}_1$ identifies the effect of ε_t^ℓ on $\mathbf{u}_t$.

I estimate $\mathbf{s}_1$ using monthly data from July 2005 to December 2022. This sample period is

[22]Strictly speaking, only the shock of interest (discussed later) must be invertible for identification using external instruments. However, relaxing the invertibility assumption requires the instrument to satisfy a lead-lag exogeneity condition (Stock and Watson, 2018).

[23]Assumption 3 implies $\mathbf{\Sigma} = \boldsymbol{S\Omega S'}$.

shorter relative to the sample used for the reduced-form VAR, which starts in January 2002. This is due to data limitations, as high-frequency data for CDS spreads are only available for more recent periods. The use of different sample periods to estimate the reduced-form VAR and the structural impact vector $\mathbf{s}_1$ is common in the literature, as the longer sample allows for more precise estimates in the reduced-form VAR (Gertler and Karadi, 2015). I scale $\mathbf{s}_1$ by normalizing $s_{1,1}$ such that a one-unit positive shock of ε_t^ℓ corresponds to a 100-basis-point increase in the Argentine EMBI spread.[24]

Using the estimated normalized structural impact vector $\hat{\mathbf{s}}_1$ and the coefficient matrices $\hat{\mathbf{B}}_1, \ldots, \hat{\mathbf{B}}_p$, I compute the impulse responses to a sovereign liquidity shock. I provide a detailed explanation of this external instruments approach in Appendix B.6. To conduct inference, I use residual-based bootstrap confidence bands with 10,000 replications, following the approach in Gertler and Karadi (2015) and Bauer and Swanson (2023b).

2.2.2 Local Projections

To gain a deeper understanding of the transmission of sovereign liquidity shocks to the economy, I also use local projections to examine the dynamic causal effects on a wider range of outcome variables.

I estimate the dynamic causal effects using local projections, following the methodology from Jordà (2005). To compute the impulse responses, I first extract the sovereign liquidity shock from the monthly VAR:

$$Shock_t^\ell = \mathbf{s}_1' \mathbf{\Sigma}^{-1} \mathbf{u}_t, \tag{8}$$

where $\mathbf{s}_1$ is the structural impact vector, $\mathbf{\Sigma}$ is the covariance matrix of $\mathbf{u}_t$, and $\mathbf{u}_t$ is the vector of reduced-form innovations (see Stock and Watson (2018) for the derivation).

I then estimate the effect on variable y_i at horizons h using local projections:

$$y_{i,t+h} = \alpha_h^i + \phi_h^i Shock_t^\ell + \beta_{h,1}^i y_{i,t-1} + \ldots + \beta_{h,p}^i y_{i,t-p} + \xi_{i,t,h}, \tag{9}$$

where ϕ_h^i is the coefficient of interest, as it captures the impulse response to the sovereign liquidity shock for variable i at horizon h. For monthly variables, I use six lags in the baseline specification. I conduct inference using a residual-based wild bootstrap with 10,000 replications.[25]

A number of the outcome variables of interest are only available at the quarterly level.

[24] Another common normalization method is to set $\mathbf{\Omega} = \boldsymbol{I}_n$. This implies that a one-unit positive shock to ε_t^ℓ corresponds to a one standard deviation positive effect on $y_{1,t}$.

[25] The bootstrap confidence bands account for the fact that the series of sovereign liquidity shocks is a generated regressor. See Pagan (1984) and Murphy and Topel (1985) for discussions on generated regressors.

For these variables, I run the set of regressions by aggregating the sovereign liquidity shock series to the quarterly level, using the sum of all shocks within each quarter. I estimate the effects for horizons of up to 12 quarters using four lags in the baseline specification.

3 Results

3.1 High-Frequency Response

Before examining the macroeconomic effects of sovereign liquidity shocks, I examine the high-frequency responses to financial variables. To estimate the immediate effects of the announcements on financial variables, I conduct an event-study analysis. The methodology draws on work by Cook and Hahn (1989), Kuttner (2001), and Bernanke and Kuttner (2005). I use the sample of announcement days and run the following regression:

$$\Delta y_t = \alpha + \beta \Delta r_t + \zeta_t, \tag{10}$$

where Δy_t is the change in the outcome variable of interest during the event window corresponding to the announcement at date t, and Δr_t is the change in the relevant variable reflecting sovereign risk (e.g., EMBI spread, probability of default) during the event window for the announcement at date t. ζ_t is the error term, and β is the coefficient of interest. The outcome variables consist of the Argentine stock market index, the Argentine commodity price index, and exchange rates.

The set of identifying assumptions is that changes to sovereign risk during the event windows are driven exclusively by the IMF announcements, and that the announcements affect the outcome variables only through the effect on sovereign risk captured by the explanatory variable. Using the Argentine EMBI spread or the risk-neutral default probability as the explanatory variable allows for a direct comparison with the existing evidence from the literature.[26] Another advantage of using the Argentine EMBI spread is that it allows for a larger sample of announcements. This is because CDS spreads and their implied probabilities of default do not exist during periods of default, whereas EMBI spreads are available for the entire sample period.[27]

Table 2 shows the results of the OLS regressions. I find that a 1-percentage-point increase in the Argentine EMBI spread results in a 1 percent drop in the Argentine stock market

[26] Note that this set of results should not be interpreted as the causal effect of sovereign liquidity shocks, as I do not use the decomposed sovereign liquidity surprise series. Rather, these estimates provide a transparent methodology to examine the financial effects of the changes in the Argentine EMBI spread induced by the IMF announcements.

[27] In the full sample period, there are two credit event periods: August 1, 2014 to May 24, 2016, and May 26, 2020 to September 16, 2020. The timing corresponds to declarations of credit events by ISDA.

	Equity Index	Equity Index (USD, Blue Dollar)	Equity Index (USD, Blue Chip)	Equity Index (USD, Official)
	(1)	(2)	(3)	(4)
ARG EMBI Spread	−1.002	−2.108**	−1.882**	−1.792**
	(0.610)	(0.998)	(0.848)	(0.864)
Observations	71	71	71	71
	Commodity Index	Blue Dollar Exch. Rate	Blue Chip Swap Exch. Rate	Official Exch. Rate
	(5)	(6)	(7)	(8)
ARG EMBI Spread	0.294*	1.105*	0.880*	0.790*
	(0.165)	(0.560)	(0.526)	(0.464)
Observations	71	71	71	71

Table 2: High-Frequency Responses

Notes: This table reports the results for the OLS estimation corresponding to Equation 10. All outcome variables are changes in logs multiplied by 100, and the Argentine EMBI spread is in percents. The equity index is the MERVAL index, which consists of leading stocks trading on the Bolsas y Mercados Argentinos Exchange (BYMA). I report the results for MERVAL in Argentine Pesos (ARS), as well as in USD using three exchange rate measures. The commodity index is the Índice de Precios de las Materias Primas (IPMP), which is the daily commodity price index constructed by the Argentine central bank (BCRA). The IPMP is calculated in USD using prices from global commodity markets, with weights corresponding to Argentina's share of exports across commodity types. Following Hébert and Schreger (2017), I use two-day windows for this event-study analysis. All regressions use heteroskedasticity-robust standard errors. *p<0.1; **p<0.05; ***p<0.01.

index. The effect is even larger when examining the USD-returns, with estimates from -1.8 to -2.1 percent depending on the exchange rate measure. The Argentine Peso depreciates for all exchange rate measures. A 1-percentage-point increase in the Argentine EMBI spread results in estimated depreciations that range between 0.79 percent and 1.1 percent across exchange rate measures. I show that the results are robust to using the restricted sample that excludes periods of default in Appendix C.1.

I also estimate the high-frequency responses using an identification strategy that exploits heteroskedasticity in the data, following Rigobon and Sack (2004). The idea is to filter out any potential background noise in the surprise series by comparing the market surprises during announcement days to a set of non-announcement days. This approach requires a weaker set of assumptions, as it allows for the presence of other shocks during the event windows. The key identifying assumption is that the variance of the shock to the probability of default is higher on announcement days than non-announcement days while the variance

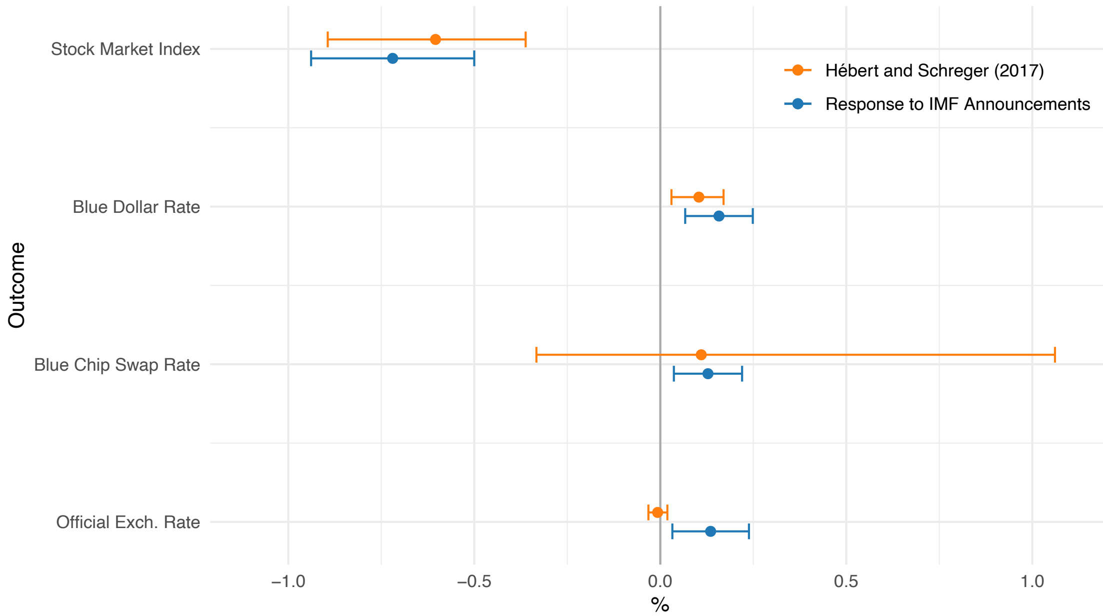


Figure 4: Responses to a 1 pp Increase in Five-Year Default Probability

Notes: This figure shows the point estimate and 95% confidence intervals comparing the results from Hébert and Schreger (2017) with the high-frequency responses to IMF announcements. The estimates are scaled accordingly to reflect a 1-percentage-point increase in the five-year cumulative risk-neutral probability of default. The results correspond to estimates from Table 2 in Hébert and Schreger (2017) and Table C.2 in Appendix C.2 of this paper. Hébert and Schreger (2017) use a value-weighted index of Argentine ADRs (denominated in USD) as its main measure of stock market returns. I use the most comparable measure available from my estimates, which is the MERVAL index converted to USD using the Blue Chip Swap rate.

of all other shocks is unchanged. I present the results in Appendix C.2.

This heteroskedasticity-based identification strategy is the preferred methodology in Hébert and Schreger (2017), which uses 15 legal rulings from 2011 to 2014 regarding Argentine sovereign bonds as the source of exogeneity. I compare my estimates with the main results from Hébert and Schreger (2017) in Figure 4, and find that the results are consistent in both sign and magnitude. Hébert and Schreger (2017) estimate that a 1-percentage-point increase in the five-year probability of default causes a 0.60 percent decrease in Argentine equity prices and a 0.10 percent depreciation in the Blue Dollar exchange rate. My results show that a 1-percentage-point increase in the five-year probability of default results in an 0.88 percent decrease in the stock market index and a 0.16 percent depreciation in the Blue Dollar exchange rate, both with statistical significance at the 1 percent level. The results for the Blue Chip Swap rate also align, with depreciations of 0.11 percent and 0.13 percent in Hébert and Schreger (2017) and in my estimates, respectively. The estimates for the official exchange rates differ, which is likely due to the fact that the sample in Hébert and Schreger (2017) corresponds to a period in which the official exchange rate was far less volatile and diverged significantly from the market-implied exchange rates. In comparison, the sample period I use includes periods when the official exchange rates moved in tandem with the market-implied exchange rates.

3.2 Macroeconomic Effects

Baseline results. As discussed earlier in Section 2.2, the key set of identifying assumptions underlying the results above is that the external instrument is both valid and relevant. The instrument must be correlated with sovereign liquidity shocks while also being uncorrelated with all other structural shocks. In addition to this, the instrument must be sufficiently strong to conduct statistical inference. I perform a weak instrument test and obtain a first-stage heteroskedasticity-robust F-statistic of 28.4, which is above the conventional critical value of 10, as suggested in Montiel Olea et al. (2021). In Appendix C.3, I report the heteroskedasticity-robust F-statistics for a variety of specifications and show that the instrument is consistently strong.

I present the results from the baseline analysis using the external instruments approach in Figure 5. The figure shows the impulse responses to the identified sovereign liquidity shock, with the shock normalized to a 100-basis-point increase in the Argentine EMBI spread on impact. The solid lines correspond to the point estimates, while the dark and light shaded areas correspond to the 68 and 90 percent confidence bands respectively.

A sovereign liquidity shock associated with a 100-basis-point increase in the sovereign bond spread results in a significant decrease in GDP of 0.96 percent at the trough of responses. The effects are persistent, with the statistically significant effects lasting for over a year. The stock market index also declines, with an immediate decrease of 2.5 percent. The effects on stock market performance are relatively short-lived, with no statistically significant effect after 5 months. The exchange rate appreciates slightly on impact, followed by depreciationary effects for the remaining months within the 50-month horizon. The peak response is at the three-month horizon with a statistically significant depreciation of 0.66 percent. Although the depreciationary effects are statistically insignificant for most of the horizon, the currency depreciation is consistent across specifications, with statistically significant effects in a number of specifications. Interest rates respond with an immediate decrease of 16 basis points in response to the sovereign liquidity shock. However, the effects on interest rates are statistically insignificant throughout the 50-month horizon. The price level experiences a slight increase on impact, followed by negative responses. The effects on the price level are not consistently negative across specifications and mostly feature insignificant effects.

Overall, the results from the baseline analysis suggest that sovereign liquidity shocks associated with increases in sovereign default risk have significant contractionary effects reflected in both output and the stock market index. The recessionary effect I find is consistent with evidence from other settings studying the output cost of sovereign risk. Bocola (2016)

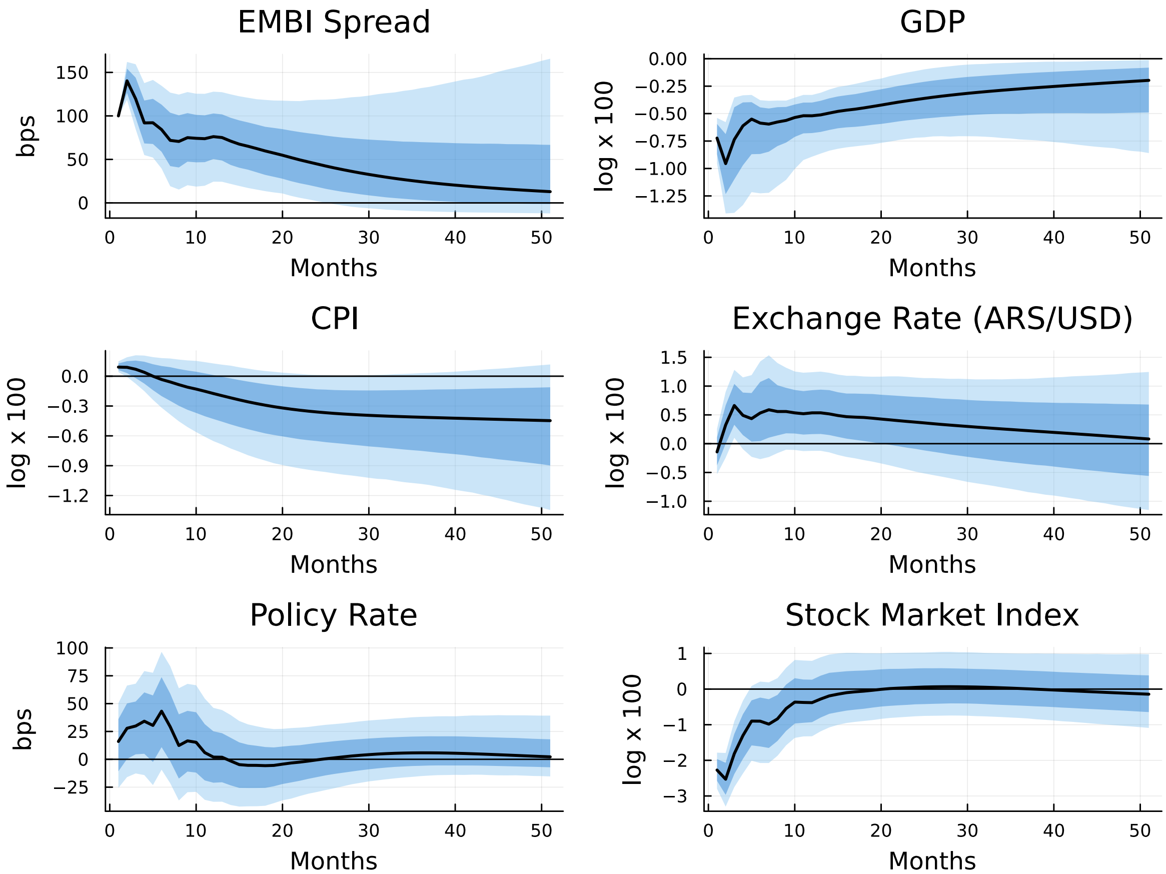


Figure 5: Impulse Responses to a Sovereign Liquidity Shock

Notes: This figure shows the impulse responses to a sovereign liquidity shock estimated using the external instruments approach. The shock is scaled such that it corresponds to a 100-basis-point increase in the Argentine EMBI spread on impact. The solid lines represent the point estimates; the dark and light shaded areas correspond to the 68 and 90 percent confidence intervals respectively.

finds that increases in sovereign risk cause significant declines in output using Italian data. In the context of Argentina, Neumeyer and Perri (2005) find that sovereign risk amplify fundamental shocks and estimate that sovereign risk accounts for a significant proportion of output volatility in Argentina.

Alternative specifications. The main results I find in the baseline specification are robust to other specifications. To test robustness with respect to the choice of variables in the VAR, I augment the baseline VAR by including two additional variables: commodity prices and international reserves. I use the index of commodity prices called Índice de Precios de las Materias Primas (IPMP) constructed by the Central Bank of Argentina. The IPMP is calculated in USD using prices from global commodity markets, with weights corresponding to Argentina's share of exports across commodity types. I also obtain the international reserves data from the Central Bank of Argentina, which reports the central bank's USD international reserve amounts daily. I provide the impulse responses using this alternative specification in Appendix C.4. The impulse responses using an otherwise identical methodology to the baseline analysis show similar effects. The results are consistent across all variables in sign, shape, and magnitude, with minimal responses for both commodity prices and international reserves.

I also test that the results are robust to alternative exchange rate measures by conducting the baseline analysis using the Blue Dollar rate in lieu of the Blue Chip Swap rate. I provide the results in Figure C.2a of Appendix C.5. The estimates are similar for all variables. The main difference is that there is a larger depreciationary effect on the Blue Dollar rate in comparison to the Blue Chip Swap rate. The peak depreciationary response is 0.90 percent, as opposed to 0.66 percent in the baseline analysis.

Additionally, I vary the number of lags and find that the results are robust to using more lags. Figures C.2b and C.2c in Appendix C.5 show the impulse response estimates using nine and twelve monthly lags. The sign and shape of the impulse responses are similar to the baseline specification, although the introduction of more lags results in noisier estimates. I also estimate the impulse responses using a restricted sample limited to periods when both the CDS spreads and the set of outcome variables are available (2005 to 2022). I show the impulse response estimates in Figure C.2d of Appendix C.5. The results are robust with similar impulse response estimates. The effects on output and the exchange rates are larger with responses of a 1.3 percent decline in output and a 1.5 percent depreciation, respectively.

Given that the sample period includes the coronavirus pandemic (COVID), I also restrict the sample to periods before 2020.[28] Figure C.2e in Appendix C.5 shows the impulse responses. The output response is significant and similar in magnitude to the baseline analysis with a decline of 0.96 percent at the trough of responses. The estimated responses for the exchange rate and the stock market index are more pronounced relative to the baseline analysis. The currency depreciates 4.6 percent on impact, with a peak response of 6.6 percent in the following month. The effects on exchange rates are statistically significant for the entire 50-month horizon. The stock market responses are larger in magnitude in comparison to the baseline analysis with a 4.1 percent decrease at the trough of responses. However, the responses are not statistically significant, given that the smaller sample results in wider confidence bands.

I also find that the results are robust to alternative methods of aggregating the surprise series to the monthly level. Figures C.2g and C.2h in Appendix C.5 show the impulse response estimates using two alternative methods of aggregation used in the literature. The first alternative method aggregates by taking the sum of surprises without any day-of-month

[28] I also estimate impulse responses using the original sample period while excluding the surprises from 2020 in Figure C.2f of Appendix C.5.

correction. The impulse response estimates using this method are very similar to the baseline results for all variables. The second method follows Gertler and Karadi (2015), which involves a day-of-month correction that carries over across calendar months.[29] The estimates feature more pronounced effects for output and exchange rates. At the peak of responses, output decreases by 2.6 percent and the currency depreciates by 2.3 percent.

Alternative identification strategies. In addition to the alternative specifications, I find that the key results are robust to other identification strategies.

I find that the results are robust to alternative methods of decomposing the surprise series. Figures C.2i and C.2j in Appendix C.5 show the impulse response estimates using the two alternative decomposition methodologies outlined in Section 2.1.3, as well as in Appendices B.3 and B.4. The first alternative method involves directly estimating a two-factor latent model. The estimated impulse responses are similar to the baseline results in sign and shape for all variables, with more pronounced responses in terms of magnitude for exchange rates, policy rates, and the stock market index. The second alternative method provides a flexible approach to decomposing the surprises by relaxing the assumption that the policy conditions do not influence one-year CDS spreads. Instead, the decomposition involves imposing narrative zero restrictions on the factors for a subset of announcements. In comparison to the baseline results, the estimated impulse responses are identical in sign for all variables except CPI, which shows an inflationary response. Similarly to the first alternative decomposition, the magnitude of the responses are larger for exchange rates, policy rates, and the stock market index, when comparing with the baseline results. The output response is similar in magnitude at the trough of responses, but features a more hump-shaped response.

To address any concerns regarding other shocks confounding the measurement of the surprise series, I estimate impulse responses using the heteroskedasticity-based identification strategy from Rigobon and Sack (2004). This approach filters out any background noise in the surprise series by comparing the market surprises during announcement days and a set of control days. I show the estimated impulse responses in Figure C.2k of Appendix C.5. The estimates are similar to the baseline analysis, with slightly larger responses. At the extremum of responses, output decreases by 1.1 percent, the exchange rate depreciates by 1.6 percent, and the stock market index decreases by 3 percent.

[29] One concern of this approach is that it can induce autocorrelation of the monthly series, as discussed in Ramey (2016). To account for this, I use the residual from an AR(1) model of the aggregated monthly surprises.

3.3 Transmission Channels

To better understand how sovereign liquidity shocks propagate throughout the economy, I estimate impulse responses for a wide range of economic and financial variables using local projections. I find that investment and imports decrease significantly in response to sovereign liquidity shocks. Results examining corporate spreads and trade data provide evidence that channels related to international lending and trade contribute to the decline in output. In contrast, results from consolidated bank balance sheets show that domestic financial intermediation channels are minimal, if not absent.

Components of GDP. I show the estimated impulse responses at the quarterly level for the main components of GDP in Figure 6. I obtain quarterly data on the GDP composition from INDEC. Similarly to the baseline analysis, the shock is normalized to a 100-basis-point increase in the Argentine EMBI spread on impact. The output cost of increased sovereign risk appears to be largely attributable to responses in investment, with a decline of 3.1 percent at the trough of responses in the quarter following the shock. The consumption responses are similar in magnitude to overall GDP, whereas government spending responds very little. Both exports and imports decrease, with a decrease of 2.5 percent in imports at the trough of responses one quarter after the shock.

Corporate spreads. In addition to the GDP composition, I examine how channels related to corporate borrowing in global markets may contribute to the decline in output. In theory, given that the sovereign has the ability to divert resources from firms to cover its fiscal needs, sovereign risk should be a component of corporate credit risk.[30] Eichengreen and Mody (2000) and Corsetti et al. (2014) find evidence consistent with this theory, demonstrating a positive relationship between sovereign risk and corporate cost of borrowing in global markets. I show the impulse response estimates for the EMBI spreads and corporate spreads in Figure 7. As a measure of corporate spreads, I use the option-adjusted spreads from the ICE BofA Emerging Markets Corporate Plus Argentina Issuers Index, which tracks the performance of USD-denominated bonds issued by Argentine non-sovereign entities in U.S. bond markets and major eurodollar bond markets. The corporate spread increases in response to a sovereign liquidity shock with statistically significant effects. In terms of magnitude, a 100-basis-point increase in the EMBI spread has an immediate pass-through of 67 basis points on corporate spreads. The pass-through is similar in comparison to other estimates from the literature, including Arellano et al. (2024) who find a pass-through of 64

[30] In Argentina, such expropriation risk has materialized in recent history. In 2012, the Argentine government renationalized YPF, the country's largest energy company, with the justification to reduce the state's energy bill.

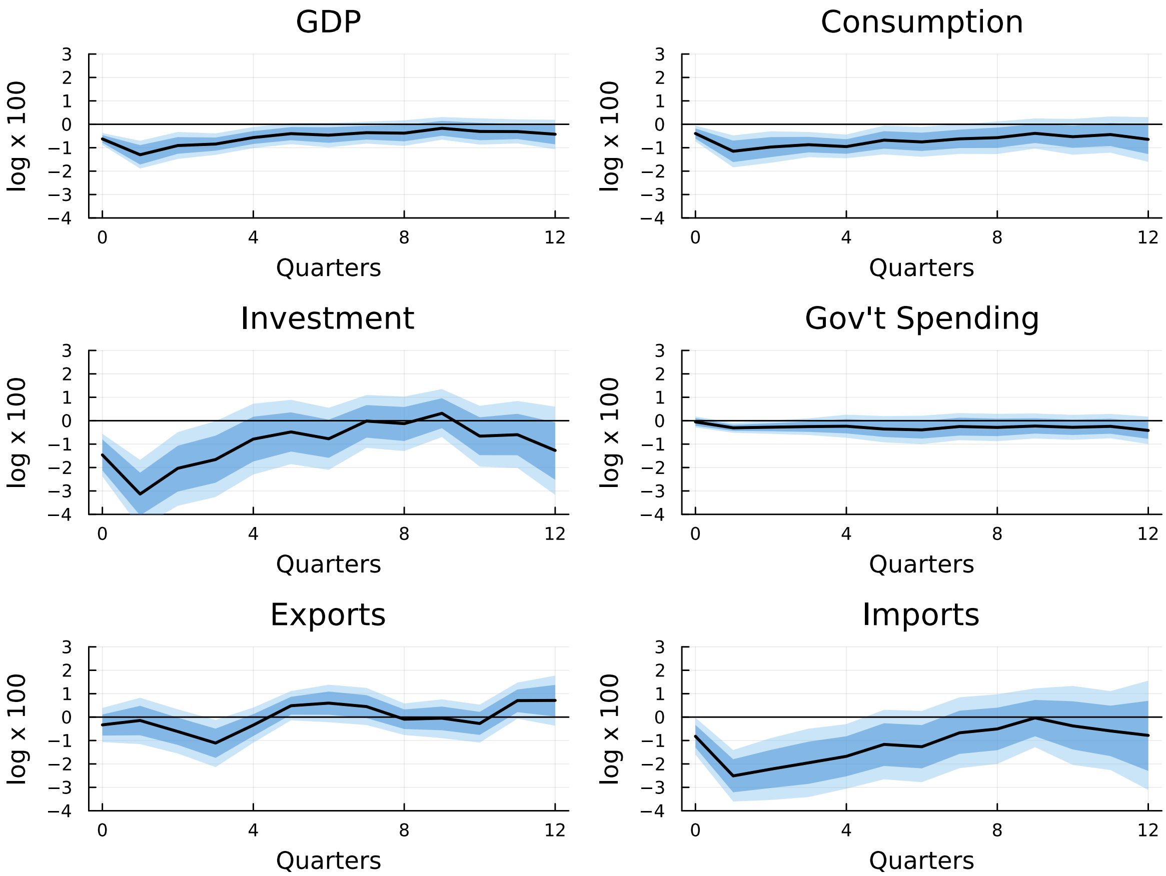


Figure 6: Propagation Channels

Notes: This figure shows the impulse responses to a sovereign liquidity shock estimated using local projections. The shock is scaled such that it corresponds to a 100-basis-point increase in the Argentine EMBI spread on impact. The solid lines represent the point estimates; the dark and light shaded areas correspond to the 68 and 90 percent confidence intervals respectively.

basis points on firms' interest rates using Italian firm micro-data from 2011 to 2013.[31] The significant effect on corporate spreads provides evidence that international lending channels may contribute to the decline in output.

International trade. Another potential channel concerns international trade. Mendoza and Yue (2012) highlight that trade credits to importing firms decline significantly following sovereign defaults, while Gopinath and Neiman (2014) discuss the effects of local currency depreciation on declining imports. Both the loss of trade credits and rising import prices from currency depreciation would contribute to a drop in imports, which results in efficiency losses as imported inputs are replaced by imperfect substitutes. I show the impulse response

[31] Although the estimates from Arellano et al. (2024) provide a useful comparison, their estimates differ in that they measure firms' interest rates with domestic banks, while I use interest rates from global bond markets.

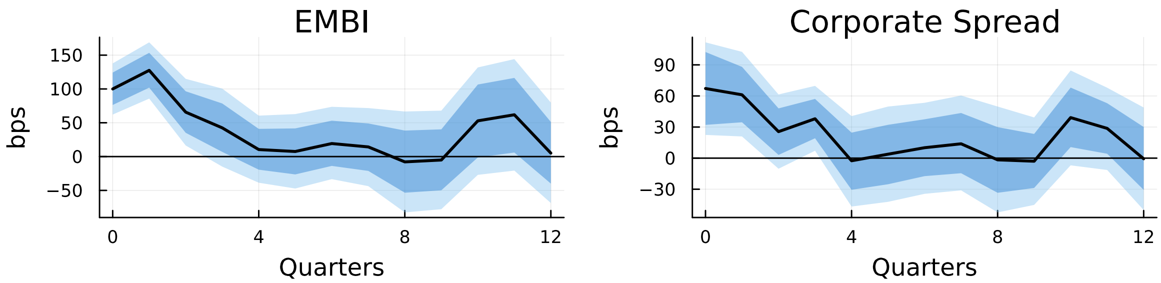


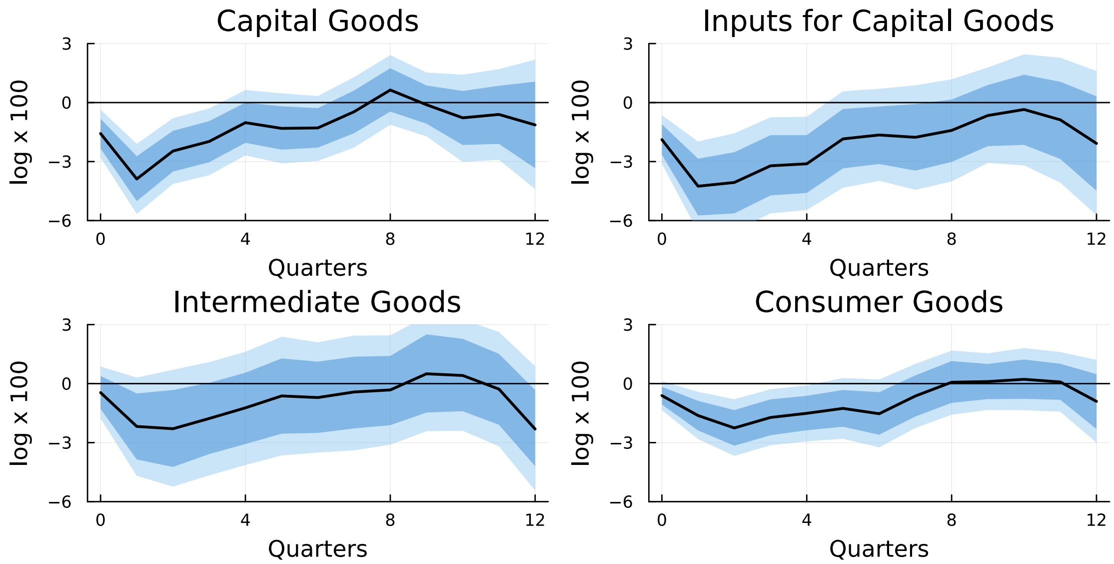
Figure 7: Sovereign and Corporate Spread Responses

Notes: This figure shows the impulse responses to a sovereign liquidity shock estimated using local projections. The shock is scaled such that it corresponds to a 100-basis-point increase in the Argentine EMBI spread on impact. The solid lines represent the point estimates; the dark and light shaded areas correspond to the 68 and 90 percent confidence intervals respectively.

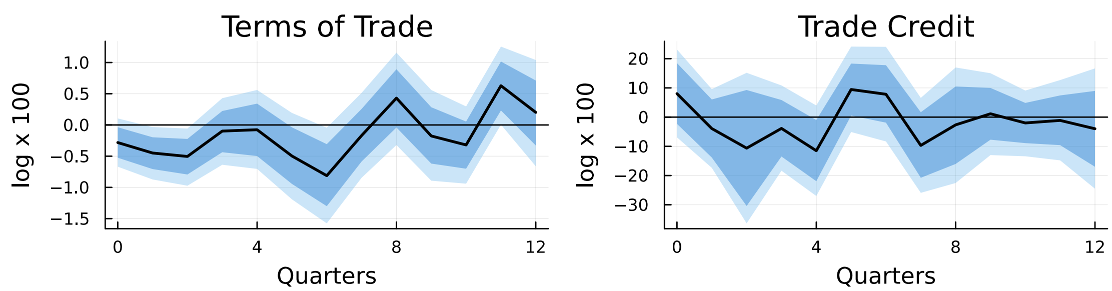
estimates for types of imports in Figure 8a. I obtain the quarterly data on imports by type from INDEC. All types of imports decrease in response to a sovereign liquidity shock with statistically significant effects on imports of capital goods and inputs for capital goods. The drop in imports of inputs for capital goods is largest in magnitude with a decrease of 4.3 percent at the trough of responses. I also estimate the responses in terms of trade and trade credit in Figure 8b. I use quarterly data on terms of trade and the issuance of trade credit from INDEC and BCRA respectively. The trade credit data reflects issuance of letters of credit for import-export activities between domestic Argentine banks and non-related foreign banks. I use the CPI from the baseline analysis and the official exchange rate to convert the trade credit reported in nominal USD to real terms.[32] The terms of trade decline in response to a sovereign liquidity shock, meaning that import prices increase relative to the export prices. This is consistent with a local currency depreciation, which would push import prices up. The estimated responses on terms of trade are statistically significant with a decrease of 0.81 percent at the trough of responses. There is a positive effect on the issuance of trade credit on impact, followed by negative effects for four quarters following the shock. Although the response is considerable in magnitude with a decrease of 11.5 percent at the trough of responses, the estimates are noisy and statistically insignificant. One potential explanation for the absence of statistically significant declines is that trade credit issuance is limited to large financially unconstrained firms that foreign trading partners will continue to trust amid higher sovereign risk. This is consistent with evidence from Petersen and Rajan (1997) and Fabbri and Menichini (2010) that larger firms, which are less likely to be credit-constrained, rely more heavily on trade credit than small firms.

The combination of the estimated responses on imports, terms of trade, and issuance

[32] The results are robust to using nominal USD, as well as computing real terms using the other exchange rate measures.



(a) Imports



(b) Terms of Trade and Trade Credit

Figure 8: International Trade Responses

Notes: This figure shows the impulse responses to a sovereign liquidity shock estimated using local projections. The shock is scaled such that it corresponds to a 100-basis-point increase in the Argentine EMBI spread on impact. The solid lines represent the point estimates; the dark and light shaded areas correspond to the 68 and 90 percent confidence intervals respectively.

of trade credit provides evidence that trade-related channels contribute to the output loss. Firms may find it more difficult to import inputs and capital goods due to rising import prices. This would in turn lead to efficiency losses, as reflected in the loss of output. Although the declines in imports and terms of trade are significant, the lack of significant estimates for trade credits makes it difficult to discern to what extent the trade credit channel contributes to disruptions in trade.

Domestic financial intermediation. In addition to international lending and trade channels, I consider potential channels related to domestic financial intermediation. In response to increased sovereign risk, domestic bank lending to firms may decrease as a result of three channels: a liquidity channel, which results from bank balance sheet losses; a collat-

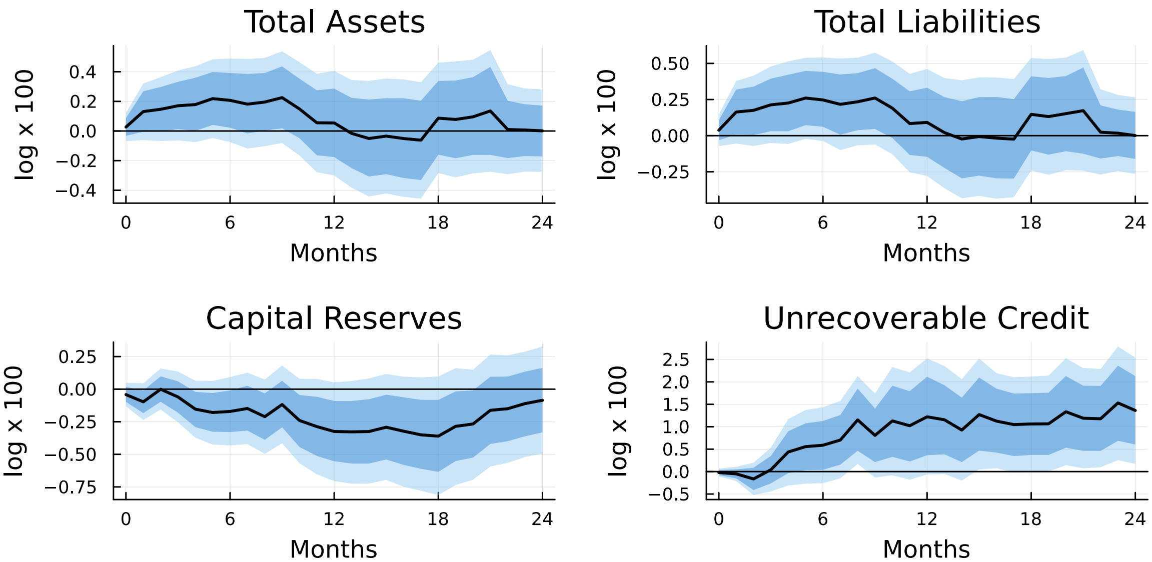


Figure 9: Bank Balance Sheet Responses

Notes: This figure shows the impulse responses to a sovereign liquidity shock estimated using local projections. The shock is scaled such that it corresponds to a 100-basis-point increase in the Argentine EMBI spread on impact. The solid lines represent the point estimates; the dark and light shaded areas correspond to the 68 and 90 percent confidence intervals respectively.

eral channel, which arises from changes in the collateral values pledged by firms; and a risk channel, which stems from precautionary motives to deleverage amid higher sovereign risk (Bocola, 2016; Dassatti et al., 2024). To assess the importance of channels related to domestic financial intermediation, I examine how sovereign liquidity shocks impact bank balance sheets and bank lending. I obtain monthly data on a consolidated bank balance sheet that aggregates the balance sheets of all domestic banks in Argentina from BCRA.[33] Given that the data is based on a consolidated balance sheet, the results only provide evidence of bank activity at the aggregate level.

I show the estimated impulse responses for total bank assets, liabilities, capital reserves, and unrecoverable credit in Figure 9, with the shock scaled to a 100-basis-point increase in the Argentine EMBI spread on impact. Rather than a sudden drop in assets, total assets experience an insignificant increase for the year following the sovereign liquidity shock. The effect is minimal in magnitude with a peak response of 0.23 percent. In Appendix C.6, I show that none of the major types of assets experience a decrease in value, including public assets. This reveals that Argentine banks have low exposure to changes in sovereign risk, which is consistent with the fact that dollar-denominated sovereign bonds account for a small fraction of Argentine bank assets during the sample period.[34] The absence of a negative response in

[33] I deflate the reported nominal peso values using the CPI series from the baseline analysis.

[34] Foreign currency denominated public bonds account for an average of 4.2 percent of total bank assets

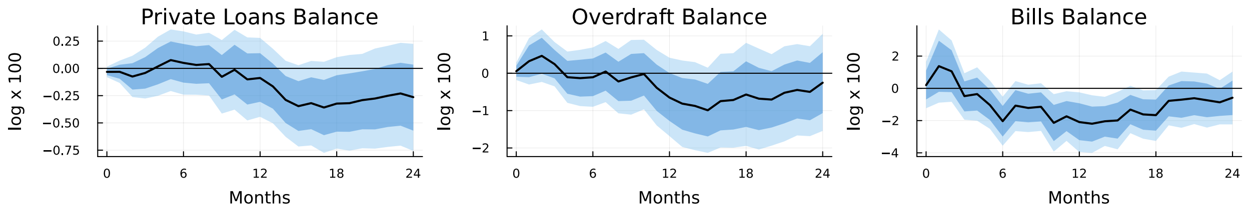


Figure 10: Bank Lending Responses

Notes: This figure shows the impulse responses to a sovereign liquidity shock estimated using local projections. The shock is scaled such that it corresponds to a 100-basis-point increase in the Argentine EMBI spread on impact. The solid lines represent the point estimates; the dark and light shaded areas correspond to the 68 and 90 percent confidence intervals respectively.

assets suggests that both the bank liquidity channel and the collateral channel are unlikely to be significant factors in the context of Argentina.

Similarly to the response in assets, I find a small increase in total liabilities of similar magnitudes to total assets. The response in capital reserves is negative, but statistically insignificant for the entire two-year horizon. The combination of an increase in liabilities and a decrease in capital reserves is opposite to the effect deleveraging would have, as deleveraging would decrease liabilities and increase capital reserves. This indicates that the risk channel of deleveraging in response to higher sovereign risk is also unlikely to play a significant role. Finally, unrecoverable credit increases gradually and becomes statistically significant in the last five months of the two-year horizon. This may reflect the aforementioned channels related to corporate spreads and trade that worsen economic conditions, which consequently increases unrecoverable credit over time.

I show the impulse response estimates for domestic bank lending balances in Figure 10. The balances represent the stock of outstanding peso-denominated lending issued by all Argentine banks. The private loans balance includes all types of lending to the non-financial private sector, such as bills, pledge loans, and mortgages. Overdrafts and bills represent the most common types of firm lending in Argentina, collectively accounting for 70.3 percent of total lending to the non-financial private sector in the sample period. Overdrafts are short-term credit lines for firms with the requirement that repayment is made in under 30 days. Bills are unsecured promissory notes with terms that typically range from 30 to 180 days. The absence of significant effects on bank balance sheets translate to bank lending, which shows insignificant effects throughout the two-year horizon for the private loans balance and the overdraft balance. The bills balance experiences positive responses for the first two months, followed by negative responses for the remaining periods. Overall, these results fail to provide convincing evidence that domestic financial intermediation channels play a key

during the sample period. Following the 2001 Argentine sovereign default, banks gradually decreased their exposure in the early 2000s.

role in the transmission of sovereign risk to output, especially in explaining the immediate contractionary effects observed in the baseline analysis.

Sectors. Finally, I examine how the shocks propagate to various sectors in the economy. To do so, I use quarterly data on a sector-by-sector breakdown of GDP provided by INDEC. Appendix C.7 shows the impulse responses for nine major sectors in Argentina. All sectors experience decreases in output, though the magnitude of the effects are heterogeneous across sectors. The construction and manufacturing sectors account for the largest contractions, with decreases of 2.8 and 1.6 percent at the trough of responses, respectively. This is consistent with the presence of trade-related channels, given that both sectors rely heavily on imported inputs and capital goods.

4 Conclusion

A key identification challenge in estimating the causal effects of sovereign default risk concerns the joint determination of sovereign risk and macroeconomic conditions. This paper proposes a novel identification strategy to credibly estimate the economic effects of sovereign risk, along with its propagation channels. By exploiting high-frequency responses in CDS spreads around IMF announcements, I identify a sovereign liquidity shock and estimate its effects through a proxy VAR model. I find that an increase in sovereign risk leads to a significant decline in output, primarily driven by decreases in investment. The findings indicate that channels related to international corporate lending and trade play prominent roles in the transmission of sovereign risk. In contrast to existing evidence from advanced economies that emphasizes domestic financial intermediation channels, I find that such channels are negligible, if not absent altogether, in Argentina.

References

Acharya, Viral V., Raghuram G. Rajan, and Jack B. Shim, "Sovereign debt and economic growth when government is myopic and self-interested," *Journal of International Economics*, 2024, *150*, 103906.

Aguiar, Mark and Gita Gopinath, "Defaultable debt, interest rates and the current account," *Journal of International Economics*, 2006, *69* (1), 64–83.

_ and Manuel Amador, "Sovereign Debt," in "Handbook of International Economics Vol 4," North-Holland, 2014, pp. 647–87.

_ and _ , *The Economics of Sovereign Debt and Default*, Vol. 1, Princeton University Press, 2021.

_ , _ , and Gita Gopinath, "Expropriation Dynamics," *American Economic Review*, May 2009, *99* (2), 473–79.

Alconada Mon, Hugo, "'I love you, I hate you': Argentina's toxic relationship with the IMF," *El País English*, July 2023.

Ammer, John and Fang Cai, "Sovereign CDS and bond pricing dynamics in emerging markets: Does the cheapest-to-deliver option matter?," *Journal of International Financial Markets, Institutions and Money*, 2011, *21* (3), 369–387.

Angeletos, George-Marios, Zhen Huo, and Karthik A. Sastry, "Imperfect Macroeconomic Expectations: Evidence and Theory," *NBER Macroeconomics Annual*, 2021, *35*, 1–86.

Arellano, Cristina, "Default Risk and Income Fluctuations in Emerging Economies," *American Economic Review*, 2008, *98* (3), 690–712.

_ , Yan Bai, and Luigi Bocola, "Sovereign Default Risk and Firm Heterogeneity," Working Paper February 2024.

Azzimonti, Marina and Nirvana Mitra, "The Politics of Debt in the Era of Rising Rates," Working Paper 2024.

Bahaj, Saleem, "Sovereign spreads in the Euro area: Cross border transmission and macroeconomic implications," *Journal of Monetary Economics*, 2020, *110*, 116–135.

Bai, Ye, Sanjay Banerji, Zilong Wang, and Wenjing Zhang, "Can participation in IMF programs facilitate sovereign debt rescheduling? The role of program size," *Journal of International Money and Finance*, 2024, *144*, 103079.

Baker, Scott R., Nicholas Bloom, and Steven J. Davis, "Measuring Economic Policy Uncertainty," *The Quarterly Journal of Economics*, 07 2016, *131* (4), 1593–1636.

Bauer, Michael D. and Eric T. Swanson, "An Alternative Explanation for the "Fed Information Effect"," *American Economic Review*, March 2023, *113* (3), 664–700.

_ and _ , "A Reassessment of Monetary Policy Surprises and High-Frequency Identification," *NBER Macroeconomics Annual*, 2023, *37* (1), 87–155.

Baumeister, Christiane and James D. Hamilton, "Structural Interpretation of Vector Autoregressions with Incomplete Identification: Revisiting the Role of Oil Supply and Demand Shocks," *American Economic Review*, May 2019, *109* (5), 1873–1910.

Benzoni, Luca, Christian Cabanilla, Alessandro Cocco, and Cullen Kavoussi, "What does the CDS market imply for a U.S. default?," *Economic Perspectives*, 11 2023.

Bernanke, Ben S. and Kenneth N. Kuttner, "What Explains the Stock Market's Reaction to Federal Reserve Policy?," *The Journal of Finance*, 2005, *60* (3), 1221–1257.

Bianchi, Walter and Rodrigo Campos, "Argentina bonds sink in snub to $45 bln IMF deal," *Reuters*, March 2022.

Bloom, Nicholas, "The Impact of Uncertainty Shocks," *Econometrica*, 2009, *77* (3), 623–685.

Bocola, Luigi, "The Pass-Through of Sovereign Risk," *Journal of Political Economy*, 2016, *124* (4), 879–926.

Bolton, Patrick, Mitu Gulati, and Ugo Panizza, "Sovereign Debt Puzzles," *Annual Review of Financial Economics*, 2023, *15* (Volume 15, 2023), 239–263.

Bulow, Jeremy and Kenneth Rogoff, "Sovereign Debt: Is to Forgive to Forget?," *American Economic Review*, 1989, *79*, 43–50.

Chatterjee, Satyajit and Burcu Eyigungor, "Maturity, Indebtedness, and Default Risk," *American Economic Review*, 2012, *102* (6), 2674–99.

Cieslak, Anna, "Short-Rate Expectations and Unexpected Returns in Treasury Bonds," *The Review of Financial Studies*, 04 2018, *31* (9), 3265–3306.

Cochrane, John H., "Financial Markets and the Real Economy," in Rajnish Mehra, ed., *Handbook of the Equity Premium*, Elsevier, 2007, p. 237–325.

Cole, Harold L. and Timothy J. Kehoe, "Self-Fulfilling Debt Crises," *The Review of Economic Studies*, 01 2000, *67* (1), 91–116.

Cook, Timothy and Thomas Hahn, "The effect of changes in the federal funds rate target on market interest rates in the 1970s," *Journal of Monetary Economics*, 1989, *24* (3), 331–351.

Corsetti, Giancarlo, Bernardo Guimarães, and Nouriel Roubini, "International lending of last resort and moral hazard: A model of IMF's catalytic finance," *Journal of Monetary Economics*, 2006, *53* (3), 441–471.

_ , Keith Kuester, Andre Meier, and Gernot Müller, "Sovereign risk and belief-driven fluctuations in the euro area," *Journal of Monetary Economics*, 2014, *61* (C), 53–73.

_ , _ , André Meier, and Gernot J. Müller, "Sovereign Risk, Fiscal Policy, and Macroeconomic Stability," *The Economic Journal*, 2013, *123* (566), F99–F132.

Daniel, Claudia J. and Cecilia T. Lanata Briones, "Battles over numbers: the case of the Argentine consumer price index (2007–2015)," *Economy and Society*, 2019, *48* (1), 127–151.

Dassatti, Cecilia, Rodrigo Lluberas, Pablo Ottonello, and Diego J. Perez, "Sudden Stops Under the Microscope," Working Paper 2024.

DTCC, "Index Roll Report: Average Weekly Data by Reference Entity," 2019. Depository Trust and Clearing Corporation. Accessed: 2024-05-01.

Duffie, Darrell, "Credit Swap Valuation," *Financial Analysts Journal*, 1999, *55* (1), 73–87.

Eaton, Jonathan and Mark Gersovitz, "Debt with Potential Repudiation: Theoretical and Empirical Analysis," *The Review of Economic Studies*, 04 1981, *48* (2), 289–309.

Eichengreen, Barry and Ashoka Mody, "What Explains Changing Spreads on Emerging Market Debt?," in "Capital Flows and the Emerging Economies: Theory, Evidence, and Controversies," National Bureau of Economic Research, 2000, pp. 107–134.

Everett, Mary, Joe McNeill, and Gillian Phelan, "Measuring the Value Added of the Financial Sector in Ireland," *Quarterly Bulletin Articles*, April 2013, pp. 85–98.

Fabbri, Daniela and Anna Maria C. Menichini, "Trade credit, collateral liquidation, and borrowing constraints," *Journal of Financial Economics*, 2010, *96* (3), 413–432.

Gennaioli, Nicola, Alberto Martin, and Stefano Rossi, "Sovereign Default, Domestic Banks, and Financial Institutions," *The Journal of Finance*, 2014, *69* (2), 819–866.

Gertler, Mark and Peter Karadi, "Monetary Policy Surprises, Credit Costs, and Economic Activity," *American Economic Journal: Macroeconomics*, January 2015, *7* (1), 44–76.

Gopinath, Gita and Brent Neiman, "Trade Adjustment and Productivity in Large Crises," *American Economic Review*, March 2014, *104* (3), 793–831.

Gürkaynak, Refet, Brian Sack, and Eric Swanson, "Do Actions Speak Louder Than Words? The Response of Asset Prices to Monetary Policy Actions and Statements," *International Journal of Central Banking*, 2005, *1* (1).

Gürkaynak, Refet S., Brian Sack, and Jonathan H. Wright, "The U.S. Treasury yield curve: 1961 to the present," *Journal of Monetary Economics*, 2007, *54* (8), 2291–2304.

Haldane, Andrew, Simon Brennan, and Vasileios Madouros, "What is the Contribution of the Financial Sector: Miracle or Mirage?," in "The Future of Finance: the LSE report," The London School of Economics, 2010, chapter 2.

Hatchondo, Juan Carlos and Leonardo Martinez, "Long-duration bonds and sovereign defaults," *Journal of International Economics*, 2009, *79* (1), 117–125.

Hull, John C. and Alan D. White, "Valuing Credit Default Swaps I: No Counterparty Default Risk," *Journal of Derivatives*, 2000, *8*, 29–40.

_ **and Alan White**, "LIBOR versus OIS: The Derivatives Discounting Dilemma," *Journal of Investment Management*, 2013.

Hébert, Benjamin and Jesse Schreger, "The Costs of Sovereign Default: Evidence from

Argentina," *American Economic Review*, October 2017, *107* (10), 3119–45.

IMF, "IMF Executive Board Approves US$50 Billion Stand-By Arrangement for Argentina," June 2018. International Monetary Fund. Accessed: 2024-05-01.

_ , "Questions and Answers on Sovereign Debt Issues - What is the IMF's role in the G20 Common Framework?," 2024. International Monetary Fund. Accessed: 2024-05-01.

Jarociński, Marek and Peter Karadi, "Deconstructing Monetary Policy Surprises—The Role of Information Shocks," *American Economic Journal: Macroeconomics*, April 2020, *12* (2), 1–43.

Jayachandran, Seema, "Selling Labor Low: Wage Responses to Productivity Shocks in Developing Countries," *Journal of Political Economy*, 2006, *114* (3), 538–575.

Jordà, Òscar, "Estimation and Inference of Impulse Responses by Local Projections," *American Economic Review*, March 2005, *95* (1), 161–182.

Kaas, Leo, Jan Mellert, and Almuth Scholl, "Sovereign and private default risks over the business cycle," *Journal of International Economics*, 2020, *123*, 103293.

Kilian, Lutz, "How to construct monthly VAR proxies based on daily surprises in futures markets," *Journal of Economic Dynamics and Control*, 2024, *168*, 104966.

Kuttner, Kenneth N, "Monetary policy surprises and interest rates: Evidence from the Fed funds futures market," *Journal of Monetary Economics*, 2001, *47* (3), 523–544.

Känzig, Diego R., "The Macroeconomic Effects of Oil Supply News: Evidence from OPEC Announcements," *American Economic Review*, April 2021, *111* (4), 1092–1125.

Känzig, Diego R, "The Unequal Economic Consequences of Carbon Pricing," Working Paper 31221, National Bureau of Economic Research May 2023.

Mendoza, Enrique G. and Vivian Z. Yue, "A General Equilibrium Model of Sovereign Default and Business Cycles," *The Quarterly Journal of Economics*, 04 2012, *127* (2), 889–946.

Mertens, Karel and Morten O. Ravn, "The Dynamic Effects of Personal and Corporate Income Tax Changes in the United States," *American Economic Review*, June 2013, *103* (4), 1212–47.

Miranda-Agrippino, Silvia and Giovanni Ricco, "The Transmission of Monetary Policy Shocks," *American Economic Journal: Macroeconomics*, July 2021, *13* (3), 74–107.

Montiel Olea, José Luis, James H. Stock, and Mark W. Watson, "Inference in Structural Vector Autoregressions identified with an external instrument," *Journal of Econometrics*, 2021, *225* (1), 74–87. Themed Issue: Vector Autoregressions.

Murphy, Kevin M. and Robert H. Topel, "Estimation and Inference in Two-Step Econometric Models," *Journal of Business and Economic Statistics*, 1985, *3* (4), 370–379.

Nakamura, Emi and Jón Steinsson, "High-Frequency Identification of Monetary Non-Neutrality: The Information Effect," *The Quarterly Journal of Economics*, 01 2018, *133*

(3), 1283–1330.

Neumeyer, Pablo A. and Fabrizio Perri, "Business cycles in emerging economies: the role of interest rates," *Journal of Monetary Economics*, March 2005, *52* (2), 345–380.

Nugent, Ciara, "Argentina reaches last-minute deal with IMF to avoid default," *Financial Times*, July 2023.

Pagan, Adrian, "Econometric Issues in the Analysis of Regressions with Generated Regressors," *International Economic Review*, 1984, *25* (1), 221–247.

Peersman, Gert, "International Food Commodity Prices and Missing (Dis)Inflation in the Euro Area," *The Review of Economics and Statistics*, 01 2022, *104* (1), 85–100.

Petersen, Mitchell A. and Raghuram G. Rajan, "Trade Credit: Theories and Evidence," *The Review of Financial Studies*, 07 1997, *10* (3), 661–691.

Piffer, Michele and Maximilian Podstawski, "Identifying Uncertainty Shocks Using the Price of Gold," *The Economic Journal*, 2018, *128* (616), 3266–3284.

Plagborg-Møller, Mikkel and Christian K. Wolf, "Local Projections and VARs Estimate the Same Impulse Responses," *Econometrica*, 2021, *89* (2), 955–980.

Politi, Daniel, "Argentina Reaches $50 Billion Financing Deal With IMF," *The New York Times*, June 2018.

Ramey, Valerie A., "Macroeconomic Shocks and Their Propagation," in John B. Taylor and Harald Uhlig, eds., *Handbook of Macroeconomics*, Vol. 2A, Amsterdam: Elsevier, 2016, p. 71–162.

Rigobon, Roberto and Brian Sack, "The impact of monetary policy on asset prices," *Journal of Monetary Economics*, 2004, *51* (8), 1553–1575.

Rosario, Jorgelina Do and Scott Squires, "Argentina Says It Reached $44.5 Billion IMF Deal; Bonds Jump," *Bloomberg News*, January 2022.

Rose, Andrew K., "One reason countries pay their debts: renegotiation and international trade," *Journal of Development Economics*, 2005, *77* (1), 189–206.

Sastry, Karthik, "Disagreements about Monetary Policy," Technical Report, Working Paper 2024.

Stock, James H. and Mark W. Watson, "Disentangling the Channels of the 2007-2009 Recession," *Brookings Papers on Economic Activity*, 2012, p. 81–135.

_ **and** _ , "Identification and Estimation of Dynamic Causal Effects in Macroeconomics Using External Instruments," *The Economic Journal*, 05 2018, *128* (610), 917–948.

Tomz, Michael and Mark L.J. Wright, "Empirical Research on Sovereign Debt and Default," *Annual Review of Economics*, 2013, *5* (Volume 5, 2013), 247–272.

Uribe, Martin and Vivian Z. Yue, "Country spreads and emerging countries: Who drives whom?," *Journal of International Economics*, June 2006, *69* (1), 6–36.

Uribe, Martín and Stephanie Schmitt-Grohé, *Open Economy Macroeconomics*, Princeton University Press, 2017.

Zumbrun, Josh and Ryan Dube, "IMF, Argentina Agree on $50 Billion Bailout Deal," *The Wall Street Journal*, June 2018.