Sovereign Risk and U.S. Monetary Policy Spillover Effects*

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Abstract

This paper examines how U.S. monetary policy shocks affect sovereign risk and macroeconomic conditions in Latin American countries. U.S. monetary tightening increases sovereign bond yield spreads and reduces the market value of government bonds. It also raises lending rates and contracts bank credit to the corporate sector, leading to a decline in industrial production. The empirical analysis employs panel regressions and a panel vector autoregression (PVAR) with an external instrument, incorporating the orthogonalized U.S. monetary policy surprise measure ($mps^{\perp}$) as an exogenous variable. The panel regression results do not provide statistically significant evidence that contractionary U.S. monetary policy increases sovereign risk or adversely affects macroeconomic and financial conditions in Latin America. In contrast, the PVAR estimates indicate that contractionary U.S. monetary policy shocks raise sovereign risk and borrowing costs while weakening credit and real economic activity, providing evidence consistent with the proposed transmission mechanism.

Keywords: U.S. monetary policy shock; sovereign risk; government yield spread; panel vector autoregressive model; exogenous variable approach.
JEL classification: E5; E52; E62; H6; H63

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Riesgo soberano y efecto contagio de la política monetaria de Estados Unidos

Resumen

Este artículo examina cómo las perturbaciones de la política monetaria estadounidense afectan el riesgo soberano y las condiciones macroeconómicas en los países latinoamericanos. El endurecimiento de la política monetaria estadounidense aumenta los diferenciales de rendimiento de los bonos soberanos y reduce el valor de mercado de los bonos gubernamentales. También eleva las tasas de interés y contrae el crédito bancario al sector corporativo, lo que conlleva una disminución de la producción industrial. El análisis empírico emplea regresiones de panel y un modelo autorregresivo vectorial de panel (PVAR) con un instrumento externo, que incorpora la medida de sorpresa ortogonalizadas de la política monetaria estadounidense ($mps^{\perp}$), como variable exógena. Los resultados de las regresiones de panel no proporcionan evidencia estadísticamente significativa de que la política monetaria contractiva estadounidense aumente el riesgo soberano o afecte negativamente las condiciones macroeconómicas y financieras en América Latina. Por el contrario, las estimaciones del PVAR indican que las perturbaciones de la política monetaria contractiva estadounidense aumentan el riesgo soberano y los costos de endeudamiento, al tiempo que debilitan el crédito y la actividad económica real, lo que proporciona evidencia consistente con el mecanismo de transmisión propuesto.

Palabras clave: perturbaciones de política monetaria de Estados Unidos; riesgo soberano; diferencial de la tasa de rendimiento de los bonos soberanos; modelo de vector autorregresivo de panel; enfoque de variable exógena.
Código de clasificación JEL: E5; E52; E62; H6; H63

Risco soberano e efeitos de repercussão da política monetária dos EUA

Resumo

Este artigo analisa a forma como os choques da política monetária dos EUA afetam o risco soberano e as condições macroeconómicas nos países da América Latina. O aperto monetário nos EUA aumenta os spreads das taxas de rendibilidade das obrigações soberanas e reduz o valor de mercado das obrigações do Estado. Além disso, eleva as taxas de juro ativas e contrai o crédito bancário concedido ao setor empresarial, levando a uma diminuição da produção industrial. A análise empírica recorre a regressões de painel e a um modelo de autoregressão vetorial de painel (PVAR) com um instrumento externo, incorporando a medida ortogonalizada da surpresa da política monetária dos EUA (mps^$^{\perp}$) como variável exógena. Os resultados da regressão de painel não fornecem evidências estatisticamente significativas de que a política monetária restritiva dos EUA aumente o risco soberano ou afete negativamente as condições macroeconómicas e financeiras na América Latina. Em contrapartida, as estimativas do PVAR indicam que os choques da política monetária restritiva dos EUA aumentam o risco soberano e os custos de financiamento, ao mesmo tempo que enfraquecem o crédito e a atividade económica real, fornecendo evidências consistentes com o mecanismo de transmissão proposto.

Palavras-chave: choque da política monetária dos EUA; risco soberano; diferencial de rendimentos dos títulos do Estado; modelo de autorregressão vetorial de painel; abordagem da variável exógena.
Classificação JEL: E5; E52; E62; H6; H63.

Introduction

There is growing interest in how U.S. monetary policy affects sovereign bonds in emerging economies. Bowman et al. (2015) find that shifts in U.S. monetary policy significantly influence government bond markets in these economies. Similarly, Cavaca and Meurer (2021) document strong spillover effects on sovereign bonds in Brazil, Chile, Colombia, and Peru. Akinci and Queralto (2024) and Almahadin (2022) further emphasize the substantial impact of U.S. monetary policy on less developed economies, underscoring its global reach.

I hypothesize that an unexpected contractionary monetary policy shock in the United States increases sovereign risk in Latin American countries. This heightened risk reduces the market value of long-term sovereign bonds, significantly affecting local banks given their substantial exposure to these assets. As bond values decline, banks' net worth erodes, limiting their capacity to finance projects in the productive sector. Consequently, capital accumulation and industrial production decline. This mechanism aligns with the liquidity channel in the economic literature, in which disruptions to financial intermediation negatively affect broader economic activity.

Recent research provides extensive evidence on the global transmission of U.S. monetary policy. Camara (2025) disentangles pure policy shocks from information effects, showing that only the former generate global recessions and financial tightening, whereas the latter are associated with expansionary responses. Consistent with this, Degasperi et al. (2021) document that U.S. monetary tightenings induce worldwide recessions through both financial and commodity price channels, thereby constraining foreign central banks' policy autonomy. Earlier evidence from Canova (2005) shows that U.S. monetary shocks drive significant macroeconomic fluctuations across Latin America, mainly through financial linkages. Dedola et al. (2017) confirm that surprise U.S. tightenings lead to currency depreciations, output declines, and lower inflation across 36 economies, though with substantial heterogeneity unrelated to country characteristics. Vicondoa (2019) shows that both anticipated and unanticipated U.S. interest rate shocks exert quantitatively similar effects on emerging economies, effects that are amplified by tighter financial conditions. Together, these studies underscore the pervasive and multifaceted nature of U.S. monetary spillovers and the central role of financial channels in transmitting them globally.

Other empirical studies, such as Borrallo et al. (2016), examine the effects of U.S. unconventional monetary policy on Latin America. Similarly, Lastauskas and Nguyen (2024) analyze the impact of monetary policy on emerging economies. However, these studies do not estimate the relationship between U.S. monetary policy spillovers and sovereign risk in Latin America using Bauer and Swanson (2023)'s refined exogenous monetary policy shock. This chapter addresses this gap by incorporating U.S. monetary policy surprises ($mps^{\perp}$) as an exogenous shock into a panel vector autoregressive model (Paul, 2020). Furthermore, it leverages a recently developed, more robust *mps* dataset by Swanson and Jayawickrema (2023), thereby enhancing the precision and reliability of the monetary policy shock.

This study contributes to the literature on the relationship between local banks and sovereign risk, as examined by Brunnermeier et al. (2016) and Palmén (2020), among others. It also aligns with research on the macroeconomic effects of shocks to banks' balance sheets. In particular, it builds on the frameworks of Gertler and Kiyotaki (2010) and Gertler and Karadi (2011), which highlight how debt constraints stemming from contract enforcement limit banks' funding capacity, and on Bocola (2016), which emphasizes the role of the risk channel in these dynamics. However, this article extends the literature by directly linking sovereign risk to tighter U.S. monetary policy. The analysis demonstrates that unexpectedly tighter U.S. monetary policy lowers the market value of long-term sovereign bonds, thereby weakening banks' financial positions given their significant exposure to these assets. This monetary policy shock increases local lending rates, erodes net worth, and ultimately suppresses industrial production. These findings reveal a critical pathway through which U.S. monetary policy spillovers affect Latin American economies.

A related study by Di Giovanni et al. (2022) examines how the global financial cycle transmits to local credit markets. They find that easing global financial conditions lowers borrowing costs, with banks more integrated into international capital markets transmitting these conditions domestically. However, their analysis relies on the VIX, a forward-looking volatility index from the Chicago Board Options Exchange, as a proxy for global financial conditions, rather than employing the orthogonalized U.S. monetary policy surprise $mps^{\perp}$ as the transmission mechanism. While the VIX is indirectly influenced by U.S. monetary policy, it primarily reflects global market volatility rather than direct U.S. monetary policy shocks.

This study employs a panel vector autoregression (PVAR) approach, incorporating the $mps^{\perp}$ from Bauer and Swanson (2023) as an exogenous variable, following the specification of Paul (2020). After estimating the PVAR model, impulse response functions are derived to assess the effects of orthogonalized U.S. *mps* on key variables, including long-term government bond yield spreads, bank loan volumes, lending rates, and industrial production. To the best of my knowledge, this is the first study to apply a PVAR with an exogenous variable (VARX) approach (Paul, 2020), using the refined $mps^{\perp}$ from Bauer and Swanson (2023) in the context of Latin America. By explicitly linking sovereign risk to U.S. monetary policy shocks, this approach provides novel insights into how these shocks propagate through sovereign risk channels, influencing macroeconomic and financial variables in emerging economies.

Following Primiceri (2005) and Ramey (2016), this study examines the impact of the non-systematic component of U.S. Federal Reserve monetary policy surprises on three Latin American economies: Brazil, Chile, and Colombia. The analysis assesses how unexpected changes in U.S. monetary policy affect macroeconomic and financial conditions in these countries. The article is structured as follows: Section 2 reviews the relevant literature. Section 3 details the data sources and methodology. Section 4 outlines the econometric specification. Section 5 presents the empirical findings, and Section 6 presents the conclusions.

Literature Review

This section contributes to three related strands of literature. First, it builds on research examining the international spillovers of U.S. monetary policy. A large body of work documents that both conventional and unconventional U.S. monetary policy generate significant cross-border effects on financial markets and macroeconomic activity (Borrallo et al., 2016; Lastauskas & Nguyen, 2024). A key challenge in this literature is identifying exogenous monetary policy shocks, as conventional high-frequency measures may exhibit information effects (Bauer & Swanson, 2023). By employing the orthogonalized monetary policy surprise measure ($mps^{\perp}$) proposed by Bauer and Swanson (2023), this study seeks to improve the identification of causal spillover effects. Related work includes Di Giovanni et al. (2022), who analyze international spillovers using financial uncertainty measures rather than orthogonalized monetary policy shocks.

Second, this section reviews the literature on high-frequency monetary policy surprises and their effects on asset prices and macroeconomic outcomes. Key contributions include Kuttner (2001), Gurkaynak et al. (2005), Swanson (2021), and Bauer and Swanson (2023), who develop and refine measures of monetary policy surprises, as well as Gertler and Kiyotaki (2010), Gertler and Karadi (2015), Stock and Watson (2018), and Ramey (2016), who analyze the macroeconomic consequences of these shocks. Within this literature, the effects of monetary policy shocks on sovereign borrowing conditions are particularly relevant. Bocola (2016) and Palmén (2020) show that sovereign risk can play an important role in the transmission of monetary and financial disturbances.

Third, it contributes to the literature on U.S. monetary policy spillovers to emerging markets and Latin America. Existing evidence indicates that U.S. monetary tightening has substantial effects on economic activity, financial conditions, and capital markets in emerging economies (Hofmann & Takáts, 2015; Kalemli-Özcan, 2019; Coronado et al., 2020). For Latin America, Canova (2005) finds that U.S. monetary shocks account for a significant share of macroeconomic fluctuations, while Albagli et al. (2019) document strong spillovers to domestic bond markets. More recently, Degasperi et al. (2021) and Camara (2025) show that U.S. monetary tightening produces global contractions and tighter financial conditions, although the magnitude and direction of spillovers depend critically on whether monetary policy surprises are purged of information effects. This finding underscores the importance of the identification strategy proposed by Bauer and Swanson (2023).

Despite these advances, the literature has paid limited attention to the relationship between U.S. monetary policy spillovers and sovereign risk in Latin America, particularly when using refined measures of exogenous monetary policy shocks. This study addresses that gap by incorporating orthogonalized monetary policy surprises ($mps^{\perp}$) from Bauer and Swanson (2023) into a panel VARX framework following Paul (2020). The analysis employs the extended high-frequency monetary policy dataset developed by Swanson and Jayawickrema (2023), covering 1988–2019 and incorporating both FOMC announcements and Federal Reserve Chair communications.

The article extends prior work by jointly analyzing industrial production, bank lending, lending rates, and sovereign bond yield spreads. This broader framework is particularly relevant for Latin America, where sovereign risk and financial conditions have historically played a central role in macroeconomic fluctuations (Kehoe et al., 2020). Consistent with the emphasis of Primiceri (2005) and Ramey (2016) on identifying the unexpected component of monetary policy, the analysis focuses on the non-systematic component of U.S. monetary policy shocks. By combining orthogonalized monetary policy surprises with a PVAR (VARX) framework and a broad set of macroeconomic and financial indicators, this study provides new evidence on how U.S. monetary policy is transmitted to sovereign risk and economic activity in Latin America.

Data and Measurement

The monthly monetary policy surprise measure proposed by Bauer and Swanson (2023) is used to assess the impact of monetary policy surprises on financial and macroeconomic variables in Latin America. Key variables include industrial production, bank loan volumes, lending rates, and sovereign bond yield spreads.

3.1 Panel Data Properties

Before estimation, Fisher-type panel unit root tests based on the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) statistics were conducted. The results indicate that lending rates, industrial production cycles, and bank lending cycles are stationary at levels under both tests. Sovereign yield spreads also show evidence of stationarity, although the results are somewhat weaker under the ADF specification. Overall, the findings support treating the variables as stationary and estimating the PVAR model in levels. Since the variables are not integrated into order one, panel cointegration tests are not required (see Table 1).

Table 1. Fisher-Type Panel Unit Root Tests

Variable	ADF (Z-statistic)	PP (Z-statistic)
Spread	–1.311 (0.096)	–1.844 (0.033)
LR	–1.947 (0.026)	–1.786 (0.037)
IP Cycle	–2.367 (0.009)	–3.420 (0.000)
Loans Cycle	–2.287 (0.011)	–3.788 (0.000)

Note. Fisher-type panel unit root tests based on Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) procedures following Maddala and Wu (1999) and Choi (2001). The null hypothesis is that all panels contain a unit root. Reported values are inverse normal (Z) statistics, with p-values reported in parentheses. Spread: sovereign yield spreads; LR: lending rates; IP Cycle: the cyclical component of industrial production; Loans Cycle: the cyclical component of bank lending constructed using the Christiano–Fitzgerald filter.

Source: Own elaboration.

3.2 Cross-Sectional Dependence

Given the common exposure of Latin American economies to global financial conditions and U.S. monetary policy, cross-sectional dependence is formally assessed using Pesaran's (2015) cross-sectional dependence test applied to the residuals of fixed-effects panel regressions for each endogenous variable.

The results strongly reject the null hypothesis of cross-sectional independence across all variables, including sovereign yield spreads, lending rates, industrial production, and bank lending. This evidence confirms substantial global co-movement among countries in the sample.

This dependence is consistent with the presence of unobserved global factors, particularly U.S. monetary policy shocks and international financial cycles. To address this issue, the empirical specification explicitly includes orthogonalized U.S. monetary policy surprises and U.S. sovereign yields as exogenous regressors in the PVAR framework. These variables capture a major source of cross-country variation and mitigate concerns that the estimated dynamics are driven by omitted global factors rather than by country-specific responses (see Table 2).

Data for these variables are drawn from Latin American central banks, fiscal authorities, national statistics offices, and the FRED St. Louis database.[1] The industrial production index is a seasonally adjusted series that combines real total production, real total sales, and total employment. Bank loan volumes represent the total gross loan portfolio, measured in billions of local currency. Lending rates reflect the weighted average of consumer, preferential, ordinary, and treasury credit rates.

Table 2. Cross-Sectional Dependence Test (Pesaran CD)

Variable	CD statistic	p-value
Spread	5.030	0.0000
LR	6.573	0.0000
IP Cycle	10.360	0.0000
Loans Cycle	−3.892	0.0001

Note. The table reports Pesaran (2015) cross-sectional dependence (CD) tests applied to residuals from fixed-effects panel regressions for each endogenous variable. The null hypothesis is cross-sectional independence. Spread: sovereign yield spreads; LR: lending rates; IP Cycle: the cyclical component of industrial production; Loans Cycle: the cyclical component of bank lending. The results indicate strong and statistically significant cross-sectional dependence across all variables.

Source: Own elaboration.

Because the home bias variable was unavailable, a proxy was used. For Brazil and Colombia, the proxy is the share of total long-term sovereign bonds held by domestic banks, measured monthly in billions of local currency (for

1 Given the data limitations of the 10-year sovereign yield variable, I could not include important countries such as Mexico and Argentina in this study.

Chile, in USD). The period from January 2003 to December 2018 was selected for five key reasons. First, many Latin American countries experienced relatively stable economic conditions and monetary policy frameworks during this period, creating a conducive environment for meaningful analysis. Second, the 2008 global financial crisis is included, a critical event for understanding the effects of monetary policy shocks. Third, the consistency and availability of data ensure a robust and reliable analysis. Fourth, this period allows for the integration of refined measures of monetary policy shocks from Swanson and Jayawickrema (2023). Finally, the ongoing process of financial and economic globalization during these years makes it possible to analyze the international spillover effects of U.S. monetary policy.

Table 3 presents summary statistics for long-term sovereign bond yield spreads in Latin American countries and for ten-year U.S. government bond returns. The government bond yield spread reflects sovereign bond returns for Brazil, Chile, and Colombia relative to U.S. government bond returns over the sample period. Column (1) shows the sample average government bond yield spread of 5.93 percent for the three South American countries, while columns (2)-(4) present the statistics for each nation, revealing considerable differences among the countries. Brazil exhibits the highest annual overall government bond yield spread at 9.35 percent, with this higher volatility associated with greater risk. Chile has the lowest and safest sovereign bond yield spread at 2.36 percent, while Colombia shows a relatively moderate government bond yield spread of 6.07 percent. Column (5) displays the long-term U.S. sovereign bond returns, with an average of 3.17 percent.

Table 3. Latin American Sovereign Bond Yield Spread and U.S. Bond Return, 2003–2018

Year	Latin America	Brazil	Chile	Colombia	United States
2003	10.13	17.04	2.19	11.17	4.01
2004	8.38	13.15	1.92	10.06	4.27
2005	7.75	14.24	1.75	7.26	4.29
2006	4.99	9.27	1.35	4.36	4.79
2007	4.59	6.90	1.48	5.41	4.62
2008	7.14	9.92	3.27	8.22	3.66
2009	5.00	6.37	2.40	6.21	3.25
2010	5.38	7.86	3.03	5.25	3.21
2011	5.70	8.64	3.18	5.30	2.78
2012	4.89	6.05	3.62	5.01	1.80
2013	4.70	7.01	2.95	4.14	2.35
2014	5.25	9.06	2.19	4.51	2.54
2015	6.74	12.18	2.34	5.71	2.13

Continúa

Year	Latin America	Brazil	Chile	Colombia	United States
2016	6.64	11.29	2.56	6.06	1.84
2017	4.32	6.60	1.91	4.44	2.33
2018	3.22	3.98	1.58	4.08	2.91
Mean	5.93	9.35	2.36	6.07	3.17
Std. Dev.	3.79	3.67	0.73	2.16	1.01
Min.	0.58	1.50	0.58	2.69	1.50
Max.	24.73	24.73	3.99	12.22	5.11
Observations	576	192	192	192	192

Note. Summary statistics for ten-year government bond yield spreads over the period 2003–2018. Column (1): Average across the three Latin American countries; Columns (2)-(5): Statistics for Brazil, Chile, Colombia, and the United States, respectively. The spread is calculated as the difference between each Latin American country's sovereign bond yield and the U.S. risk-free government bond yield.

Source: Author's calculations based on data from Latin American central banks and national fiscal and statistical authorities.

Table 4 presents summary statistics for macroeconomic and financial variables. Industrial production is measured by the industrial production index at 2014 constant prices. By contrast, bank loan volume is measured in nominal terms and corresponds to the outstanding stock of bank credit reported by national authorities. Thus, while the industrial production index reflects real economic activity, the volume of bank loans captures nominal changes in credit aggregates.

In the top panel, bank loan volume indicates the financial resources available to the corporate sector. Columns (1)-(3) present statistics for each nation, highlighting heterogeneity across these three countries. Bank loans are expressed in local currencies. In the middle panel, the lending rate shows the interest rate paid by the corporate sector to financial institutions. Columns (1)-(3) display the statistics for each nation, showing that Chile has the most competitive overall lending rate of 8.19 percent. Brazil has the highest interest rate (19.33 percent), while Colombia has a relatively average medium lending rate of 13.13 percent. In the bottom panel, the industrial production index tracks the economy's dynamics. Column (1) displays the overall industrial production index of 94.55 percent for Brazil, Chile, and Colombia.

Table 4. Summary Statistics of Macroeconomic and Financial Variables

Variable	Brazil (1)	Chile (2)	Colombia (3)
Bank loan volume			
Mean	4.002.386	89.208	204.594
Std. Dev.	2.086.949	41.234	121.312
Min.	1.427.372	30.787	49.645
Max.	7.168.548	168.548	434.913

Continúa

Variable	Brazil (1)	Chile (2)	Colombia (3)
Lending rate			
Mean	19.33	8.19	13.13
Std. Dev.	4.65	1.92	2.20
Min.	12.78	4.73	8.69
Max.	33.89	15.14	17.77
Industrial production index			
Mean	93.19	94.71	95.74
Std. Dev.	7.29	8.39	9.68
Min.	77.68	71.84	70.52
Max.	104.99	112.64	110.80
Observations	192	192	192

Note: Summary statistics for bank loan volumes, lending rates, and the industrial production index over the period 2003–2018. Columns (1)-(3): Brazil, Chile, and Colombia, respectively. Industrial production is measured as an index at constant 2014 prices, while bank loan volume is reported in nominal terms.

Source: Author's calculations based on data from Latin American central banks and national fiscal and statistical authorities.

Table 5 presents summary statistics for Latin American bank loan volumes. The bank loans reflect the funding capacity for Brazil, Chile, and Colombia over the sample period. Column (1) shows the sample average bank lending of 4.002.386 billion Brazilian Reals. Column (2) presents statistics for Chile, which, on average, has 89.208 billion Chilean pesos, while Colombia shows a value of 204.595 billion pesos.

Table 5. Latin American Annual Bank Loan Volumes, 2003–2018

Year	Brazil	Chile	Colombia
2003	1.485.185	31.512	52.164
2004	1.475.767	35.132	58.688
2005	1.540.391	40.720	66.546
2006	1.829.445	48.334	83.478
2007	2.197.185	57.454	109.251
2008	2.544.150	69.421	132.106
2009	2.832.877	71.737	147.027
2010	3.341.591	75.938	158.492
2011	3.929.931	86.033	188.996
2012	4.590.047	98.502	222.822
2013	5.137.905	109.104	252.982
2014	5.624.314	119.542	288.733
2015	6.129.217	131.251	328.076
2016	6.709.648	142.506	368.039
2017	7.239.193	149.388	395.165
2018	7.431.327	160.756	420.945
Mean	4.002.386	89.208	204.594
Std. Dev.	2.145.549	42.362	124.664

Continúa

Year	Brazil	Chile	Colombia
Min.	1.475.767	31.512	52.164
Max.	7.431.327	160.756	420.945
Observations	192	192	192

Note. Annual bank loan volumes for Brazil, Chile, and Colombia in 2003–2018, together with summary statistics. Columns (1)-(3): Brazil, Chile, and Colombia, respectively. Values are reported in local currency units according to the original central bank series.

Source: Author's calculations based on data from Latin American central banks and national fiscal and statistical authorities.

Table 6 presents the home bias ratio. It shows an approximation of local banks' holdings of total long-term sovereign debt, as the available information does not distinguish between local and international banks holding long-term government debt. However, branches of foreign banks in those countries lend and invest domestically, so they have an operating pattern similar to domestic banks. Table 6 provides summary statistics and annual data on the monthly share of total long-term sovereign bonds held by local banks from January 2003 to December 2018, expressed as a share of total debt for (1) all banks, (2) Brazilian banks, (3) Chilean banks, and (4) Colombian banks.

The summary statistics indicate that, on average, 68.3 percent of long-term sovereign bonds were held by domestic financial institutions in Brazil, Chile, and Colombia during the sample period. For this analysis, and owing to data availability constraints across countries, all domestically held sovereign bonds are attributed to the banking sector as a proxy for banks' exposure to public debt. This simplifying assumption should be interpreted with caution, as a share of these long-term government securities is also held by pension and severance funds, insurance companies, and other financial institutions. Despite this limitation, the measure provides a consistent indicator of domestic sovereign debt absorption across countries and over time. Furthermore, home bias shows a clear upward trend, rising from 57.0 percent in 2003 to 61.8 percent in 2018, suggesting an increasing reliance on domestic investors in sovereign debt markets over the sample period.

Table 6. Share of Long-Term Sovereign Bonds Held Domestically (Attributed to Banks for Measurement Purposes), 2003–2018

Year	All banks	Brazilian banks	Chilean banks	Colombian banks
2003	0.570	0.631	0.575	0.505
2004	0.576	0.626	0.557	0.544
2005	0.589	0.623	0.525	0.620

Year	All banks	Brazilian banks	Chilean banks	Colombian banks
2006	0.590	0.645	0.472	0.651
2007	0.603	0.657	0.480	0.672
2008	0.647	0.666	0.585	0.690
2009	0.687	0.685	0.705	0.670
2010	0.736	0.713	0.795	0.706
2011	0.743	0.712	0.807	0.709
2012	0.749	0.696	0.832	0.718
2013	0.749	0.684	0.842	0.722
2014	0.745	0.679	0.840	0.717
2015	0.600	0.714	0.800	0.654
2016	0.609	0.727	0.792	0.639
2017	0.628	0.752	0.805	0.650
2018	0.618	0.753	0.787	0.671
Mean	0.683	0.691	0.700	0.659
Std. Dev.	0.093	0.054	0.137	0.061
Min.	0.460	0.611	0.460	0.487
Max.	0.850	0.808	0.850	0.783

Note. Annual shares of long-term government bonds held by domestic banks (home bias) in 2003–2018. Column (1): Average share across Brazil, Chile, and Colombia. Columns (2)-(4): Country-specific values. The variable is measured as the proportion of outstanding sovereign bonds held by resident banking institutions.

Source: Author's calculations based on data from Latin American central banks and national fiscal and statistical authorities.

Figure 1 plots sovereign bond spreads (left axis) alongside the logarithm of the VIX index (right axis) over 2003–2018. The series show substantial co-movement, particularly during periods of heightened global financial uncertainty. Spreads decline steadily from the early 2000s until the onset of the Global Financial Crisis, after which both spreads and market volatility increase markedly, with the VIX reaching its highest levels during 2008–2009. Following the crisis, spreads generally trend downward, though they remain sensitive to fluctuations in global risk sentiment, as reflected in periodic increases in the VIX. The figure also highlights notable heterogeneity across spread measures, with the Brazil and Colombia series displaying greater volatility than the Chile series. Overall, the graph suggests a positive association between sovereign risk premia and global financial uncertainty, consistent with the view that adverse shifts in international risk appetite contribute to wider sovereign bond spreads.

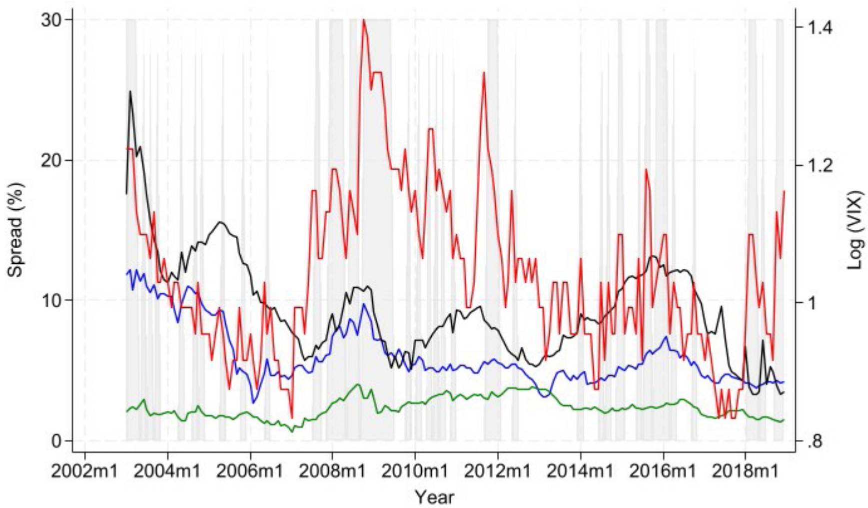

Figure 1. Evolution of the VIX Index, January 2003–December 2018.

Note. Red line, right axis: Forward-looking volatility index of the Chicago Board Options Exchange. The other lines represent Brazilian, Colombian, and Chilean government bond yield spreads (blue line: Colombia; green line: Chile; and black line: Brazil, left axis).

Source: Own elaboration based on FRED St. Datasets.

3.3 Latin American Business Cycle Characteristics: The Christiano–Fitzgerald Band-Pass Filter

To extract business-cycle fluctuations from industrial production and bank lending, I use the Christiano–Fitzgerald (2003) band-pass filter. Given the monthly frequency of data, the filter decomposes each series into trend and cyclical components:

$$Y_t = \tau_t + c_t \ (1)$$

Where τ_t denotes the trend component and C_t the cyclical component. Following the business cycle literature, the filter is calibrated to retain fluctuations with periodicities between 12 and 48 months. The resulting cyclical component is used in the empirical analysis.

3.4 The Hodrick–Prescott (HP) Filter

As a robustness check, I also extract cyclical fluctuations using the Hodrick–Prescott (HP) filter. The HP filter decomposes a time series into trend and cyclical components:

$$Y_t = \tau_t + c_t \quad (2)$$

The trend component is obtained by solving

$$\min_{\tau_t}\left[\sum_{t=1}^{T}(y_t-\tau_t)^2+\lambda\sum_{t=2}^{T-1}((\tau_{t+1}-\tau_t)-\tau_t-\tau_{t+1}))^2\right] \quad (3)$$

Where λ is the smoothing parameter. For monthly data, I follow Ravn and Uhlig (2002) and set λ = 129.600. The cyclical component obtained from this filter is used to assess the robustness of the baseline results based on the Christiano–Fitzgerald filter.

The top panel on the right of Figure 2 shows the level of credit extended by the financial sector to the corporate sector in Brazil, Chile, and Colombia. On average, the bank loan growth rate was about 0.97 percent, with a standard deviation of 1.10 percent. The minimum and maximum values were -4.41 percent and 4.62 percent, respectively, reflecting variability in credit provision across the three countries.

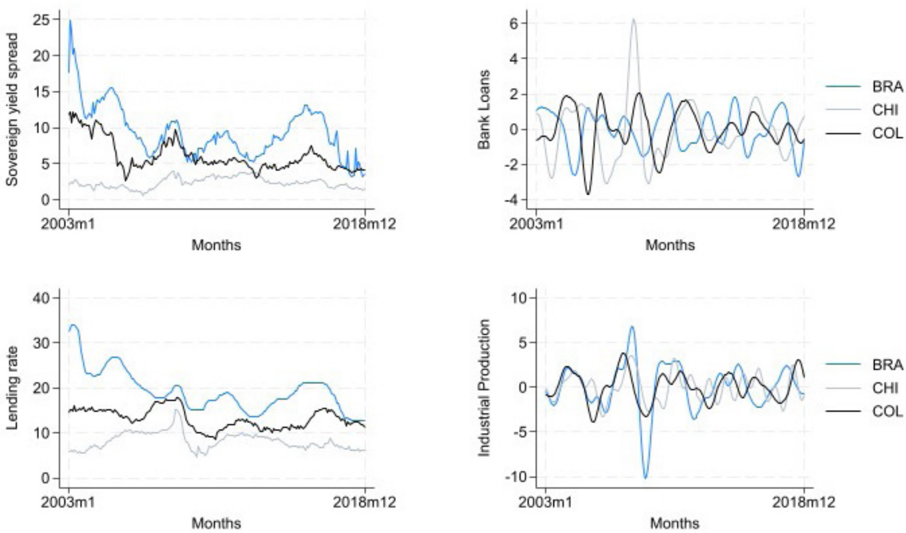

Figure 2. Latin American financial and macroeconomic variables.

Note. Industrial production and the logarithm of bank loans are reported as cyclical components derived using the Christiano–Fitzgerald (2003) filter.

Source: Own elaboration based on Latin American central banks and national fiscal and statistics authorities.

The bottom panel on the left of Figure 2 shows the financial sector lending rate, which reflects the commercial interest rate charged to the corporate sector for credit in Brazil, Chile, and Colombia. On average, this rate was about 13.55 percent, with a standard deviation of 5.55 percent. The observed minimum and maximum values were 4.73 percent and 33.89 percent, respectively, highlighting significant variability in lending conditions across the region.

The bottom panel on the right side of Figure 2 presents the industrial production index, showing its performance from January 2003 to December 2018. As described below, industrial production and bank loans are filtered using the Christiano–Fitzgerald (2003) filter. On average, the index for the three nations stood at approximately 4.54, with a standard deviation of 0.09. The minimum and maximum observed values were 4.25 and 4.72, respectively. This average value indicates a positive trend, reflecting a steady increase in production over time and suggesting an overall improvement in industrial activity throughout the analyzed period.

The global financial crisis led to a substantial decline in production levels worldwide, and Latin American economies were no exception. As shown in Figure 2, industrial production experienced a sharp downturn during 2008-2009, underscoring the crisis's significant impact on the region.

3.5 Measuring Exogenous U.S. Monetary Policy Shocks

Bauer and Swanson (2023) conduct a comprehensive reassessment of the high-frequency identification methodology for extracting monetary policy surprises from financial markets around Federal Open Market Committee (FOMC) meetings. Their study evaluates the exogeneity, empirical performance, and interpretive validity of conventional surprise measures introduced in seminal contributions such as Gurkaynak et al. (2005) and formalized for macroeconomic applications by Nakamura and Steinsson (2018). The authors identify substantial limitations in the traditional approach and propose an improved measure of monetary policy surprise that is orthogonal to publicly available macro-financial conditions, thereby addressing long-standing endogeneity concerns.

The conventional monetary policy surprise, denoted mps_t, is derived from abrupt, unexpected movements in short-term interest rate futures within narrow event windows around FOMC policy announcements. The method's identifying assumption is that, within these windows, all market movements reflect newly revealed information about monetary policy. However, a growing literature shows that these surprises exhibit systematic predictability using information known before the announcement, including labor market releases, financial market behavior, and macroeconomic conditions. This predictability violates the orthogonality condition required to use surprises as external instruments in structural estimation, undermining the credibility of many empirical applications. Bauer and Swanson (2023) provide direct evidence of this problem and offer a methodology to correct it.

A key strength of their analysis is the use of the comprehensive dataset from Swanson and Jayawickrema (2023), covering 1988–2019. This dataset expands the sample of announcements and broadens the definition of monetary policy communication. In total, it includes 322 FOMC announcements, encompassing both scheduled and unscheduled decisions, and 880 speeches, testimonies, and press conferences by the Federal Reserve Chair, of which 295 speeches are classified as containing substantive monetary policy news.

This enriched dataset substantially increases statistical power and enables a more robust assessment of how monetary policy information is transmitted through various channels, including both formal announcements and public communication by the Federal Reserve Chair. The monthly *mps* time series includes random zero observations because FOMC meetings do not occur in some months. Finally, other forms of monetary policy information are also released during the month, such as speeches by FOMC members, which are not considered in Paul's (2020) analysis.

Following Nakamura and Steinsson (2018), the unadjusted monetary policy surprise is constructed from the first principal component of intraday changes in the first four Eurodollar futures contracts, ED1 to ED4. These contracts span short- to medium-term expectations for future policy rates and jointly capture both the surprise change in the current policy target and the revision in the expected path of policy. Using a principal component ensures that the extracted factor reflects the common movement attributable to monetary policy news, filtering out idiosyncratic contract-level noise. The factor is then rescaled so that one unit corresponds to a 1-percentage-point change in the ED4 rate, enabling interpretation in basis points and comparability across studies.

The precise definition of the intraday window is essential to the validity of the identification strategy. Bauer and Swanson (2023) follow the conventions established by Swanson and Jayawickrema (2023), using a narrow window around the release of monetary information to minimize contamination from other news. For each FOMC announcement, the surprise is measured as the change in futures rates over a 30-minute window:

$$[t - 10 \ minutes, \ t + 20 \ minutes]$$

Where t denotes the exact timestamp of the announcement. The start of the window is set 10 minutes before the announcement to capture any market anticipation or information leakage, while keeping the window tight enough to exclude other events. The end of the window extends 20 minutes after the announcement to allow financial markets to immediately absorb and process the information.

Before 1994, the FOMC did not issue explicit statements, so market participants inferred policy decisions from open market operations. In these cases, Swanson and Jayawickrema construct effective announcement windows that begin when the market first learns of a policy change. This occasionally results in multiple informational windows on consecutive days. Bauer and Swanson (2023) retain these carefully classified windows to ensure comparability across the early period.

For Federal Reserve Chair speeches and testimonies, information release occurs over a longer interval. Thus, the corresponding windows are longer, approximately 90 minutes for speeches and up to 210 minutes for congressional testimonies. When these events overlap with macroeconomic data releases, the window is split or trimmed to avoid conflating monetary policy news with unrelated macroeconomic announcements. This adjustment ensures that the extracted surprises reflect only the monetary content of the speech.

Using this enhanced dataset, the authors document substantial *ex ante* predictability of the unadjusted monetary policy surprise. Specifically, six preannouncement variables explain a significant portion of its variation:

1. Nonfarm payroll surprises;
2. Employment growth;
3. S&P 500 index;
4. Slope of the yield curve;
5. Commodity prices;
6. Treasury skewness.

These predictors capture key dimensions of the macro-financial environment and are known before announcements, implying that mps_t incorporates a Federal Reserve response to the state of the economy, thereby violating the assumption that surprises should reflect only unexpected policy information.

Equation 4 defines the unadjusted *mps*, which serves as a key exogenous control variable in the econometric specification. U.S. long-term sovereign bond returns are also included as an exogenous variable, further enhancing the analysis of cross-border financial effects.

$$mps_t = a + \beta' X_{t-} + \epsilon_t \quad (4)$$

Where mps_t denotes an unadjusted measure of monetary policy surprise, correlated with financial and macroeconomic variables available before the FOMC declaration; t indexes FOMC announcements and Federal Reserve Chair speeches in the sample; β' are the regression coefficients; X_t corresponds to the six predictors listed above; and ϵ_t is the residual. The second measure of Bauer and Swanson (2023) is the orthogonalized $mps^{\perp}$. This U.S. monetary policy surprise measure, which removes the bias associated with available macroeconomic and financial data before FOMC announcements, is constructed by Bauer and Swanson (2023), following Nakamura and Steinsson (2018), using the first principal component of the variation in the first four quarterly Eurodollar futures contracts ED1–ED4.

To address this endogeneity, Bauer and Swanson (2023) construct an orthogonalized measure by regressing the raw surprise on the six predictors and subtracting the fitted component. Equation 5 defines the adjusted or orthogonalized $mps_t^{\perp}$:

$$mps_t^{\perp} = mps_t - \hat{a} - \hat{\beta}' X_{t-} \quad (5)$$

By construction, $mps_t^{\perp}$ is orthogonal to publicly observable macro-financial data and therefore satisfies the exogeneity requirement for identification. This measure isolates the truly unexpected component of monetary policy shocks, the component not attributable to the Federal Reserve's systematic response to incoming economic information.

Event study results show that asset price reactions to monetary announcements are nearly identical whether using the unadjusted mps_t or the orthogonalized $mps_t^{\perp}$. This finding indicates that financial markets respond to the full content of the announcement, including both the unexpected component and the predictable component based on the Federal Reserve's reaction function.

In contrast, macroeconomic estimates from structural VAR and local projections differ markedly. Using the unadjusted surprise yields muted and sometimes counterintuitive responses, such as the price puzzle, because part of mps_t reflects systematic policy responses to favorable or unfavorable economic news. The orthogonalized measure, however, yields larger and more plausible effects: contractionary monetary policy leads to declines in output, tighter financial conditions, and lower inflation, consistent with conventional macroeconomic theory.

Finally, Bauer and Swanson (2023) interpret the source of predictability not as an information effect, in which the Federal Reserve reveals private information about the economy, but as a consequence of imperfect public knowledge of the Federal Reserve's reaction function. Market participants systematically underestimate the extent to which the Federal Reserve responds to macroeconomic news. Thus, the predictable component of mps_t reflects the Federal Reserve's systematic response to economic conditions, not the revelation of new information about the state of the economy. The orthogonalized surprise removes this channel, isolating a purer measure of monetary shocks.

To sum up, Bauer and Swanson (2023) provide an essential refinement for high-frequency identification of monetary policy. Their orthogonalized $mps^{\perp}$ corrects for predictable policy responses, restores exogeneity, and substantially enhances the empirical credibility of studies that rely on monetary policy shocks to estimate causal effects. Let us move on to the next section.

Econometric Specification

I adopt the framework introduced by Paul (2020) to identify the impact of monetary policy shocks in a panel VAR model. Paul uses high-frequency monetary policy surprises as a proxy to identify structural monetary policy shocks. This is accomplished by incorporating the surprises as an exogenous variable within a panel vector autoregressive model. With this new methodology, it is possible to study the impact of monetary policy on macroeconomic and financial variables. The macroeconomic literature does not recommend directly including observations of monetary policy surprises because of the predictability of *mps* (Romer & Romer, 2004; Ramey, 2016; Melosi, 2017; Nakamura & Steinsson, 2018; Bauer & Swanson, 2023). In this context, the impulse response functions obtained through this *mps* will be biased. Paul (2020) uses surprises related to short-term rates and regular FOMC meetings, excluding unscheduled FOMC meetings to avoid bias.

However, using such a short-term rate does not guarantee that the identified shock and *mps* are uncorrelated. Paul (2020) notes that although the effect of monetary policy is measured over a small window after the FOMC announcement, this window may contain trading noise and news unrelated to monetary policy, which can introduce measurement error. The structural monetary policy shocks are obtained by directly incorporating the monetary policy proxy $mps^{\perp}$ into a vector autoregression model as an exogenous variable. Paul (2020) calls this the exogenous variable approach (VARX).

This new VARX methodology by Paul (2020) allows us to obtain the true relative impulse response functions with time-varying parameters, following Primiceri (2005), who developed a time-varying structural vector autoregressive methodology. The variance–covariance matrix of the model's errors and coefficients is allowed to change over time to capture shifts in monetary policy, its structure, and its interaction. Primiceri (2005) found that i) both systematic and non-systematic monetary policy have evolved over the past forty years; specifically, the systematic response of interest rates to inflation and unemployment has generally become more aggressive, though with notable fluctuations; ii) this shift has had minimal impact on the broader economy. By contrast, external, non-policy shocks appear to have played a more significant role than interest rate policies in driving episodes of high inflation and unemployment in recent U.S. economic history.

Paul (2020) found that prior to the 2007–2009 financial crisis, the responses of stock and house prices to monetary policy shocks were notably weaker than the reaction of output. Paul (2020) analytically demonstrates that the exogenous variable framework provides evidence of true relative impulse responses through consistent estimates. I will now consider the empirical results.

Empirical Findings

Spread Estimation Through Panel Regressions

I begin with panel regressions for the 10-year government bond yield *Spread* to empirically assess the impact of Bauer and Swanson's (2023) orthogonalized monetary policy surprise $mps^{\perp}$ on Latin American countries' sovereign risk. Panel regressions are estimated with country fixed effects and robust standard errors. I initially estimate the following model:

$$Spread_{it} = a + \gamma_i + \beta_1 \sum_{s=1}^{12} Spread_{it-s} + \beta_2 mps_t^{\perp} + \beta_3 (hb_{it} - \overline{hb}_{it}) mps_t^{\perp} + \beta_4 hb_{it} + \beta_5 Fedfunds_t + \epsilon_{it} \quad (6)$$

Where *Spread* is the monthly long-term sovereign bond yield spread for Brazil, Chile, and Colombia; a is a constant term; γ_i is a country fixed effects; $Spread_{t-12}$ depicts the twelve lags of *Spread*; $mps^{\perp}$ is Bauer and Swanson's (2023) orthogonalized monetary policy surprise; HB x $mps^{\perp}$ is the home bias-$mps^{\perp}$ interaction, which measures the impact of contractionary U.S. monetary policy shocks on the share of total long-term government bonds held by Latin American banks, measured through each country HB value minus the average value of HB multiplied by the $mps^{\perp}$. $FEDFUNDS_t$ is the Taylor rule U.S. monetary policy federal funds rate, and ϵ_{it} is the error term.

Table 7 reports the results of panel regressions based on Equation 6. Columns (1) and (2) examine the relationship between the orthogonalized monetary policy shock, $mps^{\perp}$, and Latin American sovereign bond yield spreads under alternative specifications. In column (1), the estimated coefficient on $mps^{\perp}$ is positive (0.843), suggesting that tighter U.S. monetary policy is associated with higher sovereign risk. The coefficient on home bias is negative (-0.631), indicating that a larger domestic absorption of government bonds is associated with lower sovereign spreads. However, neither coefficient is statistically significant at conventional levels.

Column (2) extends the specification by including the U.S. federal funds rate. The estimated coefficient on $mps^{\perp}$ remains positive and of similar magnitude (0.846), while the home bias coefficients and the federal funds rate remain negative. As in column (1), none of these coefficients are statistically significant.

Table 7. Monetary Policy Shock on Latin American Long-term Sovereign Bond Yield Spread, 2003–2018

Variable	(1) Spread	(2) Spread
$mps\perp$	0.843	1.007
	(0.598)	(0.828)
Home Bias	−0.631	−0.754
	(0.527)	(0.647)
Federal funds rate		−0.013
		(0.016)
Interaction home bias × $mps\perp$		5.867
		(6.401)
Observations	540	540
R-squared	0.930	0.930
Country fixed effects	Yes	Yes

Note. This table presents panel regression estimates from Equation (1). All specifications include twelve lags of the dependent variable (not shown). Country fixed effects and robust standard errors are used throughout.

These findings do not provide strong statistical support for the main hypothesis that U.S. monetary policy shocks directly increase sovereign risk through the sovereign-bank nexus. In particular, the coefficient on $mps^{\perp}$ is not statistically significant across any specification, and the expected positive relationship between home bias and sovereign spreads is not observed.

Nevertheless, a negative home bias coefficient is not unprecedented in the literature. Palmén (2020) reports a negative home bias response in Ireland, while finding positive responses in Spain, Portugal, and Italy. The Latin American evidence therefore suggests that the relationship between domestic sovereign bond holdings and sovereign risk may depend on country-specific institutional and financial market characteristics. One possible interpretation is that domestic banks may act as stabilizing investors during periods of external financial tightening, absorbing government debt when foreign investors withdraw from domestic bond markets. Under this mechanism, greater home bias may help reduce sovereign spreads rather than amplify them.

Accordingly, the results in Table 7 should be interpreted as suggestive evidence of the role of domestic sovereign bond holdings in shaping sovereign risk, rather than as definitive statistical confirmation of the proposed transmission mechanism. The panel vector autoregressive analysis in the following section provides additional evidence on the dynamic interactions among U.S. monetary policy shocks, sovereign risk, and domestic financial variables.

5.2 Panel VARX

Panel vector autoregressive (PVAR) estimations were performed across the three Latin American nations, Brazil, Chile, and Colombia, over the sample period from January 2003 to December 2018. PVAR is an econometric blueprint in which K variables are specified as linear functions of p of the past values (own lags); the p lags of other $K - 1$ variables; and exogenous variables. As mentioned earlier, these latter variables approximate structural monetary policy shocks, following the framework outlined by Paul (2020).

Given the nature of the time series data considered in this study, it may be appropriate to integrate the vector autoregressive approach with the panel data model to examine the impact of U.S. monetary policy on endogenous variables in Latin American nations. Such integration helps minimize issues associated with long-run series in VARs and specific heterogeneity in panel models (Yang & Lee, 2021). Following the logic of the VAR model, except for the exogenous orthogonalized $mps^{\perp}$, unadjusted mps in Bauer and Swanson's (2023) U.S. monetary policy surprise measures, and *USSovereignyield*, this panel VAR analysis considered all variables as endogenous (Sims, 1980). Formally, for the panel VAR model, we know that given N countries (three Latin American) $c = 1,\ldots,N$ and $t = 1,\ldots,T$, where t is the period from January

2003 to December 2018. Thus, a panel vector autoregressive model of order p with an exogenous variable is set up in Equation 7 as follows:

$$y_{it} = v + \gamma_i + A_1 \sum_{s=1}^{s=3} y_{it-s} + \beta_1 mps_{t\ t}^{\perp} + \beta_2 mps + \beta_3 USSovereignyield_t + u_{it} \quad (7)$$

Where y_{it} is a K X 1 random vector of endogenous variables: industrial production, bank loans, lending rate, and sovereign bond yield spread; y_{t-s} is the lag of endogenous variables; A_1 is a K X K matrices of parameters; γ_i is a fixed effect capturing unobserved heterogeneity across Latin American countries; β_n is a K X M matrix of coefficients; v is a K X 1 constant term, and u_t is white noise, $E(u_t) = 0$, $E(u_t u_t') = \Sigma$, $E(u_t u_s') = 0$ for $t \neq s$. Following Paul's (2020) VARX framework, the model treats the orthogonalized U.S. monetary policy surprise measure $mps^{\perp}$ proposed by Bauer and Swanson (2023), the unadjusted monetary policy surprise (MPS) measure, and the U.S. sovereign yield as exogenous variables.

To formally establish the transmission mechanism, this study further examines sovereign risk as the key channel through which U.S. monetary policy shocks affect real activity in Latin America. Specifically, the analysis extends the baseline PVARX framework to assess dynamic interlinkages among sovereign spreads, bank lending, and industrial production following an exogenous monetary policy tightening. To account for cross-country heterogeneity, the analysis acknowledges that the transmission of U.S. monetary policy shocks is not uniform across Latin American economies. Heterogeneous impulse responses across the three nations suggest that structural and institutional characteristics may shape the strength and direction of spillovers. Differences in financial depth, exchange rate regimes, and sovereign debt structures can mitigate or amplify the impact of external shocks on domestic activity in Brazil, Chile, and Colombia.

I now present the results of the panel VAR using Bauer and Swanson's (2023) orthogonalized $mps^{\perp}$ measure. The model specification uses three lags, selected based on information-criterion tests. The impulse response functions are reported with 68 percent confidence intervals, reflecting the relatively small monthly dataset. The impulse responses are reported for a one-standard-deviation contractionary U.S. monetary policy shock $mps_t^{\perp}$. These responses are shown in Figure 3.

The unadjusted Bauer and Swanson (2023) *mps* and U.S. long-term sovereign bond returns are used as control variables. Figure 3 reports the impulse responses of Latin American macroeconomic and financial variables to a one-standard-deviation contractionary U.S. monetary policy shock, identified using the orthogonalized monetary policy surprise measure from Bauer and Swanson (2023).

Following the shock, industrial production and bank lending decline persistently, reaching their peak contraction about seven to nine months later. In contrast, lending rates rise on impact and remain above their pre-shock levels for several months, indicating tighter domestic credit conditions. Sovereign bond yield spreads also rise immediately after the shock and remain elevated throughout the horizon, suggesting higher sovereign risk premia. Overall, the results support the existence of a financial transmission channel through which tighter U.S. monetary policy raises sovereign risk and borrowing costs, reduces bank lending, and ultimately weakens real economic activity in Latin American economies.

After a one-standard-deviation U.S. monetary policy shock, industrial production declines by approximately 0.13 index points at its trough, while bank lending falls by about 0.07 percent after eight months. At the same time, lending rates rise by roughly 0.06 percentage points, reflecting tighter domestic credit conditions. Sovereign bond yield spreads also rise by about 0.12 percentage points on impact and remain elevated throughout the horizon, suggesting an increase in sovereign risk premia. Overall, these findings support the existence of a financial transmission channel through which U.S. monetary policy shocks affect real and financial conditions in Latin American economies.

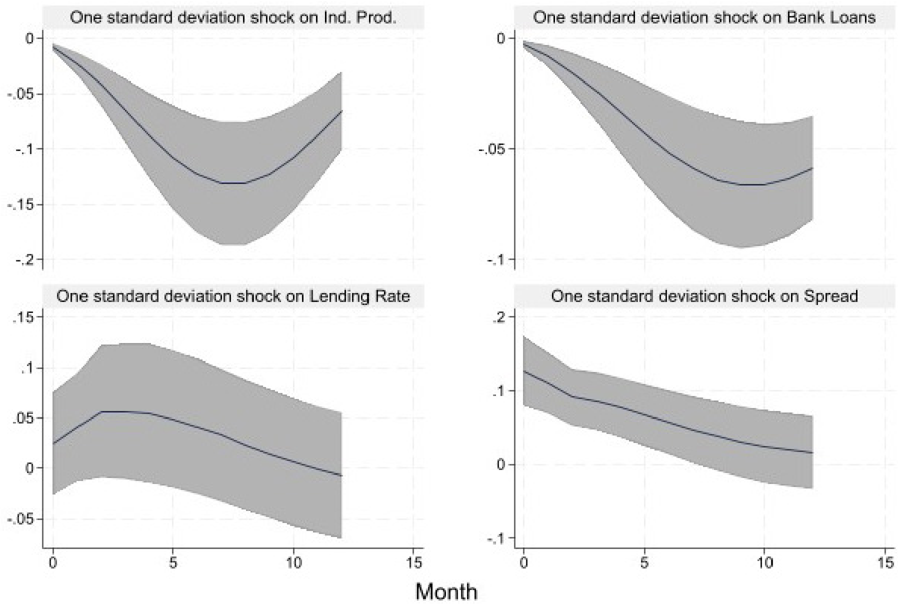

Figure 3. Dynamic Response of Macroeconomic and Financial Variables to a One-Standard-Deviation Using the Christiano–Fitzgerald Filter, January 2003–December 2018

Note. Industrial production and bank loans are reported as cyclical components extracted using the Christiano–Fitzgerald filter. The upper panels display the responses of industrial production and bank loans, while the lower panels display the responses of lending rates and sovereign bond yield spreads. Shaded areas indicate 68 percent confidence intervals. The panel VAR is estimated with three lags and includes the unadjusted monetary policy surprise mps_t and U.S. sovereign yield as exogenous variables.

Source: Own elaboration based on FRED St. Louis Datasets.

Many studies examine the impact of monetary policy by analyzing high-frequency changes in the interest rate following FOMC announcements (Romer & Romer, 2004; Coibion, 2012; Ramey, 2016; Paul, 2020; Kuttner, 2001; Bernanke & Kuttner, 2005; Gurkaynak et al., 2005; Swanson, 2021; Bauer & Swanson, 2023, among others). Theoretically, tightening monetary policy is associated with a decline in output. The results are consistent with this evidence.

The impulse response functions are reported with 68 percent confidence intervals rather than the more conventional 90 or 95 percent bands. This choice reflects both the relatively small sample size and the resulting limited statistical power of the estimation. The analysis relies on monthly data spanning January 2003 to December 2018, which, despite its relatively high frequency, yields a modest time dimension for estimating multi-variate models. In such settings, wider confidence intervals can obscure economically meaningful dynamics and may lead to an overly conservative interpretation of the results. Reporting 68 percent confidence intervals therefore provides a more informative depiction of the central tendency and uncertainty surrounding the estimated responses, while remaining transparent about the degree of statistical imprecision. This practice is well established in the empirical macroeconomic literature when samples are small or identification is demanding, and has been adopted, for example, by Canova (2005) and, more recently, by Palmén (2020), among others.

Figure 4 presents impulse response functions estimated with the Hodrick–Prescott filter for the sample period from January 2003 to December 2018, illustrating the dynamic responses of the long-term sovereign yield spread, bank loans, lending rates, and industrial production to a one-standard-deviation shock in $mps_t^{\perp}$. Consistent with the results obtained using the Christiano–Fitzgerald time series filter (Figure 3), an unexpected tightening of U.S. monetary policy leads to a persistent increase in the sovereign yield spread and lending rates, with an effect that is even larger than that estimated with the Christiano–Fitzgerald filter, alongside declines in industrial production. Overall, these findings confirm that contractionary U.S. monetary policy shocks raise sovereign risk and borrowing costs while dampening real economic activity across the region, although bank lending may not be precisely estimated.

An important caveat regarding the impulse response functions in Figures 3 and 4 is that beyond the 12-period horizon considered in the analysis, the confidence intervals do not fully converge to zero. This suggests that the effects of the shocks may persist beyond the reported horizon, and that convergence may therefore be observed only over a longer time span. Nevertheless, the estimated responses generally display the expected signs and are broadly consistent with the theoretical framework. However, the results reported in Figure 4 warrant a more cautious interpretation. In particular, when the Hodrick–Prescott filter is used, bank lending does not exhibit a statistically meaningful response to the monetary policy shock, raising concerns about the robustness of the empirical evidence supporting the proposed transmission mechanism. Consequently, while the findings provide some support for the underlying hypothesis, the absence of a clear lending response under this specification suggests that the results should be interpreted with caution and that further analysis using alternative horizons and filtering approaches may be warranted.

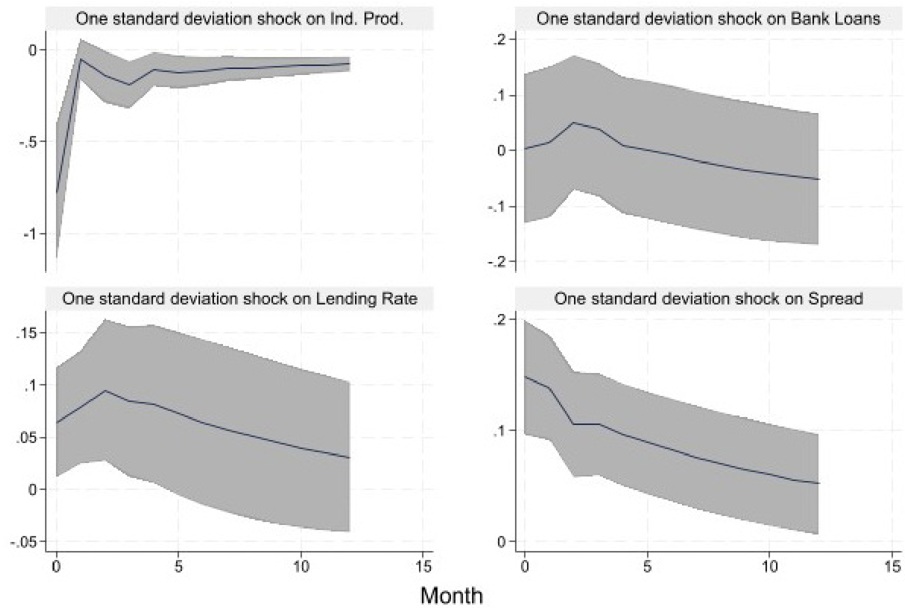

Figure 4. Dynamic Response of Macroeconomic and Financial Variables to a One-Standard-Deviation Using the Hodrick–Prescott Filter, January 2003–December 2018

Note. Industrial production and bank loans are reported as cyclical components extracted using the Hodrick–Prescott time-series filter. The upper panels display the responses of industrial production and bank loans, while the lower panels display the responses of lending rates and sovereign bond yield spreads. Shaded areas indicate 68 percent confidence intervals. The panel VAR is estimated with three lags and includes the unadjusted monetary policy surprise mps_t and U.S. sovereign yield as exogenous variables.

Source: Own elaboration based on FRED St.Louis Datasets.

Conclusions

This paper examines how U.S. monetary policy shocks affect sovereign risk and macroeconomic conditions in Latin America. Using the orthogonalized monetary policy surprise measure of Bauer and Swanson (2023) and a panel VAR with an external instrument, as in Paul (2020), I analyze the effects of a contractionary U.S. monetary policy shock on sovereign bond yield spreads, bank lending, lending rates, and industrial production.

The panel regression results are not significant. However, the panel VAR results indicate that unexpected U.S. monetary tightening increases sovereign bond yield spreads and domestic lending rates while reducing bank credit and industrial production. These findings support the existence of a sovereign risk channel through which external monetary shocks are transmitted to the real economy. Because domestic banks hold substantial quantities of sovereign bonds, declines in government bond prices weaken bank balance sheets and reduce credit supply, thereby amplifying the adverse effects of higher external interest rates on economic activity.

The main findings are robust to alternative methods for extracting business cycle fluctuations. Dynamic responses obtained using the Hodrick–Prescott filter are broadly consistent with those from the Christiano–Fitzgerald filter, although some differences appear in the estimated response of bank lending.

Several limitations should be acknowledged. First, the analysis focuses on Brazil, Chile, and Colombia, reflecting data availability and the objective of maintaining a relatively homogeneous sample. Consequently, the results may not generalize fully to other Latin American countries, particularly larger economies such as Mexico or those with markedly different sovereign risk characteristics, such as Argentina. Second, the sample ends in 2018 and therefore does not capture the COVID-19 period or the recent cycle of aggressive U.S. monetary tightening. Extending the analysis to include these episodes is an important avenue for future research.

Future research could also examine the role of sovereign bond market liquidity and secondary market trading in the transmission of external monetary shocks. Incorporating measures of sovereign bond market activity may provide additional evidence on how changes in sovereign risk affect bank balance sheets and domestic credit conditions. In addition, counterfactual exercises and forecast error variance decompositions could help quantify the relative importance of the sovereign risk channel in explaining fluctuations in credit and output. Such extensions would contribute to a deeper understanding of how global financial conditions shape macroeconomic outcomes in emerging economies.

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Conflict of interest

The author declares no conflict of interest.

Ethical considerations

There are no ethical considerations for the study.

Data availability

All Stata databases and code files are available whenever required.

Use of AI

The author used artificial intelligence tools, specifically ChatGPT, solely for proofreading purposes.

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Appendix

Robustness Check of Monetary Policy Shocks to Sample Period Variations

Table 8 describes and defines the variables used in this paper, namely industrial production, bank loan volumes, lending rate, sovereign bond yield, home bias, and foreign bias.

Table 8. Data Description and List of Variables

Variable name	Description	Unit	Frequency	Source
Industrial production	Volume of production	Index	Monthly	Latin American central banks and statistics offices
Loan volumes	Log of non-financial corporations' loan value	Billion (local currencies)	Monthly	Latin American central banks, fiscal, and statistics authorities
Lending rate	Interest rate for non-financial corporations	Percent	Monthly	Latin American central banks and statistics offices
Sovereign bond yield	Market yield on Latin American bonds in local currency at 10 years of maturity	Percent	Monthly	Latin American central banks and statistics offices
Swap rate	Market yield on U.S. Treasury securities at 10 years of maturity	Percent	Monthly	Federal Reserve Bank of St. Louis (FRED)
Home bias	Share of sovereign bonds held by local banks, measured in billions of local currency (Chile in USD)	Percent	Monthly	Latin American central banks
Foreign bias	Share of sovereign bonds held by foreign investors	Percent	Monthly	Federal Reserve Bank of St. Louis (FRED)

Source: Own elaboration.

As an additional robustness check, Figure 5 reports impulse response functions estimated with the Christiano–Fitzgerald band-pass filter over the sample period from January 2003 to November 2008, rather than to December 2018. The responses of bank loans, the lending rate, and the credit spread remain qualitatively and quantitatively similar to those in the baseline specification, reinforcing the stability of the financial transmission channel to an exogenous U.S. monetary policy shock identified using the Bauer and Swanson (2023) instrument. In contrast, industrial production shows a positive, statistically imprecise response over the medium horizon, deviating from the theoretically expected contractionary effect of a monetary tightening.

This result is likely driven by the shorter pre-crisis sample, which limits the number of tightening episodes and coincides with a period of strong global demand and accommodative financial conditions. Importantly, the widening confidence bands suggest that this response should be interpreted cautiously. Overall, although the real activity response is less robust in the truncated sample, the core financial dynamics remain unchanged, supporting the validity of the baseline findings.

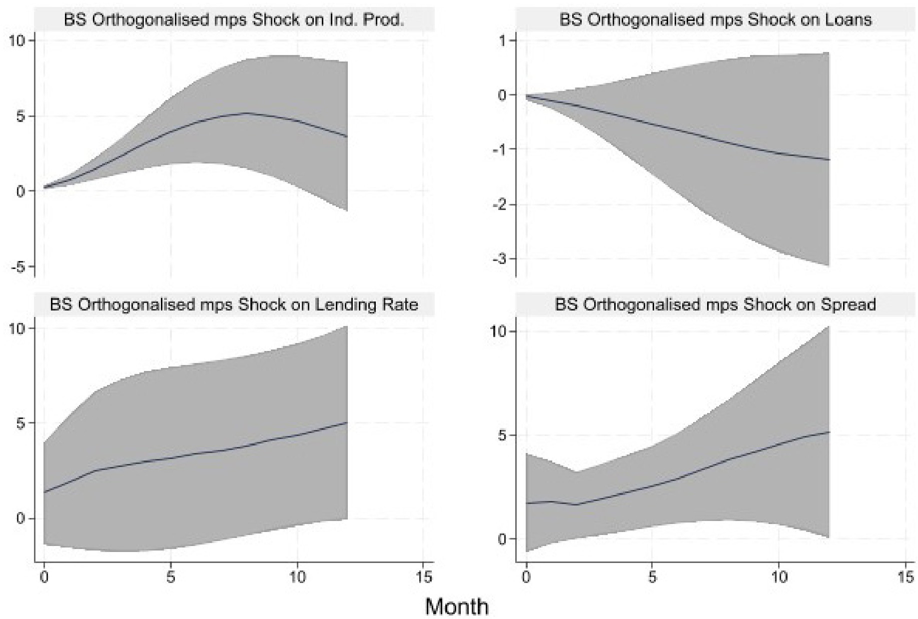

Figure 5. Robustness Check Using the Christiano–Fitzgerald Filter for the Sample 2003–2008

Note. Panel A (first row): Industrial production and bank loans. Panel B (second row): Lending rate and long-term government bond yield spread through panel VAR methodology. The shaded areas correspond to two-standard-deviation confidence bands using heteroscedasticity-robust standard errors. Three lags are used based on information criterion tests. The impulse response functions are reported using 68 percent confidence intervals.

Source: Own elaboration based on FRED St. Louis Datasets.

Figure 6 presents another robustness check using impulse response functions estimated with the Christiano–Fitzgerald band-pass filter over an alternative sample period, from December 2008 to December 2015. When the estimation window is adjusted, the response of industrial production becomes negative and persistent following the exogenous U.S. monetary policy shock, consistent with standard theoretical predictions of a contractionary tightening. At the same time, the responses of bank loans, the lending rate, and the credit spread remain qualitatively consistent with the baseline results, showing a gradual tightening of credit conditions and a sustained increase in borrowing costs.

However, bank loans show a slight increase over the first five months, followed by a decline that brings them marginally below zero by the twelfth month. Although uncertainty increases at longer horizons, as reflected in wider confidence intervals, the overall dynamics of both real activity and financial variables are preserved. Taken together, these findings suggest that the baseline results are not driven by sample-specific features and provide further support for the robustness of the identified monetary transmission mechanism.

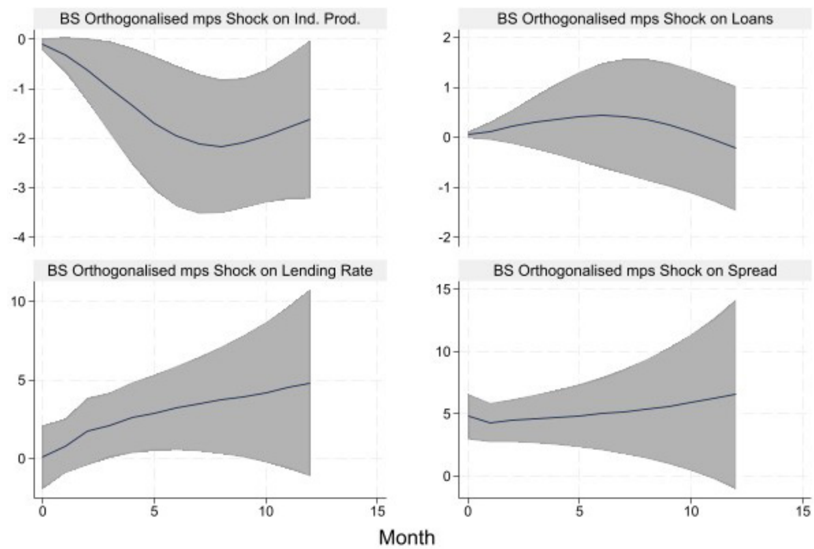

Figure 6. Robustness Check Using the Christiano–Fitzgerald Filter for the Sample 2008–2015

Note. Panel A (first row): Industrial production and bank loans. Panel B (second row): Lending rate and long-term government bond yield spread through panel VAR methodology. The shaded areas correspond to two-standard-deviation confidence bands using heteroscedasticity-robust standard errors. Three lags are used based on information criterion tests. The impulse response functions are reported using 68 percent confidence intervals. Source: Own elaboration based on FRED St. Louis Datasets.

Figure 7 reports impulse response functions obtained using the Christiano–Fitzgerald band-pass filter over the sample period from December 2008 to December 2018. Following the orthogonalized U.S. monetary policy shock, industrial production shows a pronounced, persistent decline, consistent with a contractionary transmission to real economic activity. In contrast, the responses of bank loans, the lending rate, and the credit spread are more muted and estimated with greater uncertainty, particularly at longer horizons, as reflected in wider confidence intervals. This pattern likely reflects increased volatility and structural changes in financial markets during the post-Global Financial Crisis period, which may attenuate the estimated credit responses. Nonetheless, the direction of the responses remains broadly consistent with the baseline specification. Overall, these results indicate that although the magnitude and precision of the financial variables are sensitive to the inclusion of the post-crisis period, the negative response of real activity to the identified monetary policy shock is robust.

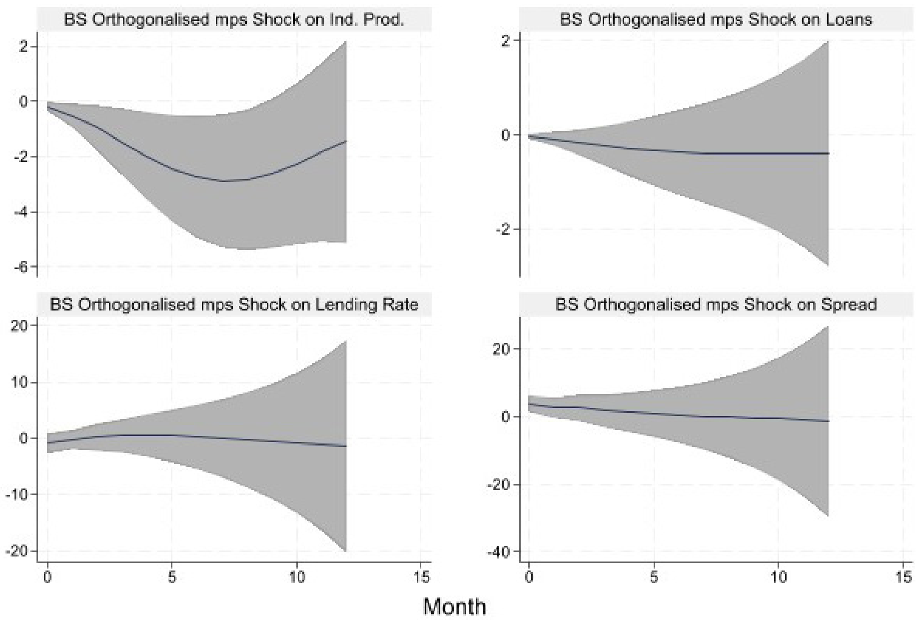

Figure 7. Robustness Check Using the Christiano–Fitzgerald Filter for the Sample 2008–2018

Note: Panel A (first row): Industrial production and bank loans. Panel B (second row): Lending rate and long-term government bond yield spread through panel VAR methodology. The shaded areas correspond to two-standard-deviation confidence bands using heteroscedasticity-robust standard errors. Three lags are used based on information criterion tests. The impulse response functions are reported using 68 percent confidence intervals.

Source: Own elaboration based on FRED St. Louis Datasets.

The robustness of the baseline results is assessed by re-estimating the impulse response functions with the Christiano–Fitzgerald band-pass filter over alternative sample periods. The objective is to evaluate the sensitivity of the estimated monetary transmission mechanism to changes in the estimation window, particularly around the Global Financial Crisis.

We first restrict the sample to the pre-crisis period, spanning January 2003 to November 2008. The corresponding impulse responses indicate that the effects of the exogenous U.S. monetary policy shock on bank loans, the lending rate, and the credit spread remain qualitatively and quantitatively similar to those in the baseline specification, supporting the stability of the financial transmission channel. By contrast, industrial production shows a positive and statistically imprecise response over the medium horizon, deviating from the theoretically expected contractionary effect of a monetary tightening. This result is likely attributable to the limited number of tightening episodes in the truncated sample and to the macroeconomic environment preceding the crisis, characterized by strong global demand and accommodative financial conditions. The wide confidence bands further suggest that this response should be interpreted with caution.

To assess whether this result is driven by the specific pre-crisis window, we next consider an alternative sample that shifts the estimation period forward. Under this specification, industrial production responds negatively and persistently to the monetary policy shock, consistent with standard theoretical predictions. At the same time, the responses of bank loans, the lending rate, and the credit spread remain broadly consistent with the baseline dynamics, showing a gradual tightening of credit conditions and higher borrowing costs. Although uncertainty increases at longer horizons, the restoration of the expected sign for real activity indicates that the earlier positive response is not a robust feature of the data but rather sample-specific.

Finally, we extend the sample to cover the post-crisis period, from January 2008 to December 2018. During this period, industrial production shows a pronounced and persistent decline following the identified monetary policy shock, reinforcing the robustness of the contractionary real effects. However, the responses of financial variables are more muted and estimated with greater uncertainty, particularly at longer horizons. This pattern likely reflects heightened volatility and structural changes in financial markets in the aftermath of the Global Financial Crisis, which may reduce the precision of the estimated credit responses. Nevertheless, the direction of these responses remains broadly consistent with the baseline specification.

Taken together, these robustness checks suggest that although the magnitude and statistical precision of the impulse responses are sensitive to the chosen sample period, the core transmission mechanism characterized by contractionary effects on real activity and tighter financial conditions following an exogenous U.S. monetary policy shock remains intact.