SCHOOL OF ECONOMICS AND MANAGEMENT

Impact of U.S. Monetary Policy on Bond Spreads in Emerging Market Economies: A Comprehensive Analysis

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May 2023

Abstract

This paper examines the impact of U.S. monetary policy on sovereign bond spreads in emerging market economies under the period of Unconventional Monetary Policy (UMP). Applying a Fixed effects and Pooled Mean Group method on monthly data from 2009-2020 it shows evidence that changes in spreads can be attributed to an elevated probability of emerging markets being unable to repay loans, arising from shifts in liquidity conditions resulting from monetary policy actions implemented in the U.S. The results are heterogenous across different economies, contingent upon their unique macroeconomic and financial characteristics. It is imperative for central banks to consider these characteristics when formulating and implementing UMP to attain the desired outcomes and address specific challenges in each context.

Department of Economics

NEKP01

Master Essay II (15 credits)

June 2023

Contents

Introduction:

The aim of this paper is to expand the understanding of the impact of U.S. monetary policy on sovereign bond spreads in emerging market economies under the period of Unconventional Monetary Policy (UMP).

This work follows the common framework from previous studies considering the influence of additional country-specific fundamentals and capital market indicatives over the sovereign bond spreads. There is a strong dependance of emerging market economies and movements in the U.S. economy derived from the global integration of economies and specifically global capital markets.

As documented in (Vivek & Cerisola, 2001), the changes in U.S. monetary policy before 2008 and interest rate spreads of emerging markets had moved in the same direction. The tightening of U.S. monetary policy reflects in a substantial increase of spreads. The theoretical and empirical point of view stated from this paper reflects that, changes in U.S. interest rates, or likewise in global liquidity conditions, would be expected to influence positively country risk and sovereign spreads.

In the aftermath of the 2008 global financial crisis, central banks turned to unconventional monetary policies (UMP) as interest rates had reached the so called Zero Lower Bound. UMP policies are considered important contingency tools for stabilization, as they can be implemented quickly and flexibly. In contrast, fiscal policy is often perceived as slow and unwieldy.

As defined in the work of (Neely & Karson, 2021) conventional monetary policy primarily acts on current and near-term expected short-term interest rates to influence prices and economic activity through various channels that mostly function through asset prices. Unconventional monetary policies are those that directly influence long-term yields and exchange rates, push short rates below zero, explicitly create incentives for lending, and/or confront financial frictions by purchasing types of assets.

Central banks exert influence over long-term yields by purchasing large quantities of long-term bonds through three main channels: duration risk, liquidity, and signaling. The efficiency of these policies varies across economies, depending on macroeconomic and

financial characteristics. For example, economies with strong preferences for bonds of particular maturities may be more responsive to policies that reduce the supply of such bonds in the hands of the public (illiquidity channel), thereby making market participants more willing to hold the remaining supply even at lower yields.

In the US, the Federal Reserve made the first asset purchase in November 2008, mainly focusing on mortgage-backed securities (MBS). The aim of this policy action was to reduce the yields on the MBS market by reducing the quantity of such assets and provide a source of liquidity for that specific market.

The situation in Europe and Japan differs from that in the US due to their intermediation conditions. In these economies, where bank intermediation dominates, central banks alter bank lending programs instead. The Bank of Japan (BOJ) and the European Central Bank (ECB) encourage bank lending by taking away the fixed quantity bid for banks.

Regarding emerging market and developing economies (EMDEs), it is notable that many of them had policy rates that were above zero when they implemented asset purchase programs. These economies are known to be heavily reliant on the performance of the US economy due to their increased integration into the global economy. The inflow of capital into EMDEs has been largely driven by the implementation of sound macroeconomic policies and broad structural reforms, but it has also been influenced by changing conditions in developed economies that have incentivized investors to diversify their portfolios to include assets in developing countries.

This study makes a significant contribution to the existing literature by investigating the implications of sovereign spreads during the Zero Lower Bound period following the 2008 financial crisis. To the best of our knowledge, no prior research has simultaneously explored the analysis of these two distinct forms of monetary policy.

Literature review

The work of (Kamin & von Kleist, 1999) provides a theoretical framework that examines the impact of U.S. interest rates on emerging market bond spreads, considering factors such as credit ratings, maturity, and currency denomination. Their findings reveal significant regional disparities in spreads among developed economies. In the case of emerging economies, the study emphasizes that long-term trends carry greater significance than short-term fluctuations in explaining market spreads.

(Vivek & Cerisola, 2001) describe the theoretical channels in which changes in the U.S, policy interest rate led to increase in emerging market spreads. Since emerging markets bonds are riskier (measured by a probability of default), the yield on emerging market bonds would have to rise more than any risk-free rate.

The empirical findings from the studies conducted (Kamin & von Kleist, 1999) as well as (Eichengreen & Mody, 1998) during the 1990s present less conclusive evidence, with some results indicating insignificance or a negative impact of rising U.S. interest rates on spreads. However, it is important to note, as highlighted by (Vivek & Cerisola, 2001) , that these findings are sensitive to the nature of the data employed in the analysis.

In order to overcome these limitations, the work of (Baskaya, et al., 2017) use disaggregated data, particularly transaction-level data on bank credit to estimate the impact of capital inflows on lending.

The extensive empirical literature evaluates the effects of unconventional monetary policy (UMP) in advanced economies (AEs), which focuses on financial factors and macro factors. One notable discovery is that the implementation of quantitative easing (QE) operates through various channels, exerting unique impacts on specific assets, subject to the composition of the QE program in terms of policy type, program execution details, and economic conditions.

The work of (Rudebusch, 2018) and (Bauer & Neely, 2014) described the implementation of the Fed UMP after the 2008 financial crisis and it effects in the U.S. economy. It states how the Federal Reserve uses forward guidance to influence longer-term bond yields and financial asset prices. By providing information on future short-term interest rates, the Fed aims to

lower expectations of future rates, decrease longer-term yields, and ease financial conditions. Additionally, it describes the use of Fed QE, and the effects on interest rates through a **demand-supply channel or portfolio balance effect.**

This works is aligned with other studies as (krishnamurthy & vissing-jorgensen, 2011) in which they studied the channels in which this the portfolio balance effect is driven by its influence in asset prices, risk premia and expectations of future short-term interest rates.

Another key finding is the presented evidence that QE has unique impacts on specific assets, based on the composition of the asset purchasing program that is viewed in terms of policy type, program execution details, and economic conditions. The work of (Gagnon, et al., 2011) detailed the case in November of 2008 where the Federal Reserve announced purchases of housing agency debt and agency mortgage-backed securities (MBS) of up to $600 billion aiming to provide greater support to mortgage lending and housing markets and improve conditions in private credit markets.

In addition to this channel, literature found a **Market Functioning channel or Liquidity channel**. (Gagnon, et al., 2011), (krishnamurthy & vissing-jorgensen, 2011) described this channel as an effect on the prices of longer-term assets if the presence of the Federal Reserve as a consistent and significant buyer in the market enhances market functioning and liquidity, meaning that providing an ongoing source of demand for longer-term assets, the LSAPs may have allowed dealers and other investors to take larger positions in these securities or to make markets in them more actively, knowing that they could sell the assets if needed to the Federal Reserve.

In addition to those two channels the work of (krishnamurthy & vissing-jorgensen, 2011) complements the analysis of channel transmission of UMP by extending for **the Duration Risk Channel**, which involves purchasing long-term Treasuries, agency debt, or agency MBSs to reduce duration risk in the hands of investors and, **the Safety Channel**, based on the presence of a significant clientele for long-term safe assets, this evidence is supported with the work of (Hanson & Stein, 2015).

UMP in the Euro Area

The work of (FRATZSCHER, et al., 2016) presented empirical evidence of the effects of the European Central Bank (ECB) on the financial market from 2007 to 2012. Using daily data on a broad range of assets finds that ECB policies boosted equity prices and lowered bond market fragmentation in the euro area. Spillovers to advanced economies and emerging markets included a positive impact on equity markets and confidence.

They classified transmission channels relevant to the UMP for ECB. The channels included the **Confidence, Bank credit risk, Sovereign credit risk and international portfolio balance**.

Another study for the ECB from (van den End, 2019) show that the effects of QE though the **liquidity channel and safe asset channel** lead to higher sovereign bond spreads in the euro area. They used a panel regression model estimated for individual euro area countries.

(Afonso & Tovar Jalles, 2019) studied the determinants of sovereign bond yields spreads in the Euro area from 1999 to 2016 using a country-by-country and panel setups. They found that QE measures implemented by the ECB in the aftermath of the crisis are relevant in the channels of **the bid-ask spread** (liquidity measure), **the VIX** (international risk measure), **fiscal developments** (debt ratios and budget balance ratios), **rating developments** (credit risk), **Real Effective Exchange Rate** (REER), and **economic growth.**

UMP and Macroeconomic effects

The last research lead to the relevance of UMP and its implications on macroeconomic outcomes. The work of (Nsafoah & Serletis, 2020) studies the effects of monetary policy including the period of UMP and its effects over key macroeconomic variables and interest rate spreads. They focused on the effects of monetary policy uncertainty applying a multivariate GARCH-in-Mean structural VAR model. Their findings are that monetary policy uncertainty negatively affects real output growth and the policy rate and positively affects interest rate spreads.

In this topic the paper of (MacDonald, 2017) used a Bayesian structural vector autoregressive model for Canada in which the main finding is that under unconventional monetary policy output increased by 0.13 percent, and estimates the effects of US UMP showing that US unconventional monetary policy increased Canadian output by 1.2 percent on average. It

supports the theoretical framework that domestic UMP has effects on output and the exitance of strong spillovers from foreign UMP in a small open economy.

UMP and Developing economies (EMDEs)

Despite the less focus on the impact of UMP on developing economies. There are few studies as the (Bhattarai, et al., 2021). They applied a Bayesian panel VAR to estimate the international spillover effects of US QE on EMEs. Their findings suggest that an expansionary US QE shock has significant effects on financial variables in EMEs. They addressed that this effect comes through the channels of **exchange rate appreciation**, a reduction in **long-term bond yields**, a **stock market boom**, and an increase in **capital inflows** to these countries. They assessed the impact on low-frequency macroeconomic variables that policy makers focus on, such as output, consumer prices, and external balances, as well as ascertaining the dynamic spillover effects of such policies.

The work of (Tillmann, 2016) used a Qual VAR is estimated that integrates binary information of QE announcements for the US and EMEs. They conclude that QE has significant effects on EME's financial conditions and plays a sizable role in explaining capital inflows, equity prices and exchange rates.

The effects of asset purchases in emerging market economies have been widely studied, with a seminal paper by (Arslan, et al., 2020) being regarded as the canonical work in this area. Arslan and colleagues examined the impact of asset purchases in response to the sudden outflows of capital and increase in bond yields caused by the COVID pandemic, with a focus on rectifying **market dysfunctionality and liquidity in domestic bond markets**. Their findings suggest that unlike in advanced economies, asset purchase programs in EMEs do not primarily aim to provide monetary stimulus or credit support, but rather to address market dislocations arising from investor risk aversion.

In a recent study by (Rebucci, et al., 2022), the authors analyze the effects of quantitative easing (QE) announced by 21 central banks during the COVID pandemic in March and April 2020. Specifically, they focus on the impact of QE on government bond yields and bilateral US dollar exchange rates using a GVAR model. Their findings suggest that QE is effective in advanced economies, but for emerging economies, the impact of QE on bond yields is much stronger and its transmission to exchange rates is qualitatively different than in

advanced economies. This indicates that the transmission mechanism of QE varies across different types of economies.

Following this study case, (Sever, et al., 2020) analyzed the effects of purchase programs announcements in emerging market central banks on domestic financial markets. They found that these asset purchase announcements lowered bond yields, did not lead to a **depreciation of domestic currencies**, and did not have much effect on **equities**.

Overall, the studies conducted provide valuable insights into the effects of monetary policy, specifically asset purchases and quantitative easing, in response to the COVID-19 pandemic. They suggest that asset purchase programs in emerging market economies primarily aim to address market dislocations arising from investor risk aversion, rather than to provide monetary stimulus or credit support as in advanced economies. Their findings highlight the importance of initial conditions and the design and communication of policy measures in determining their effectiveness.

Additionally, QE is effective in advanced economies, its transmission mechanism varies in emerging economies, where its impact on bond yields is much stronger and its transmission to exchange rates is qualitatively different.

Taking into account these studies that the effectiveness of monetary policy in response to crises is not universal, and that tailored policy responses are necessary to address the unique characteristics of different economies. These findings have important implications for the careful design at evaluating the effects of monetary policy.

Variables and Data

Following the framework (Bellas, et al., 2010) the selection of variables that explain the spread levels for the selected countries as:

- FED Balance Sheet
- FED Securities
- Liquidity
- External debt/GPD
- Short-term reserves/reserves
- General gov. debt / GDP
- Fiscal balance/GDP
- Primary balance/GDP
- Current Account/GDP
- Trade Openness Index
- 3 Month U.S. treasury bill
- 10-year U.S. gov. bond yield

The conceptual framework proposed in this study examines the influential factors behind sovereign bond spreads, focusing on macroeconomic fundamentals. These fundamentals include the risk-free rate, represented by the 3 Month U.S. treasury bill, as well as variables such as External debt, General debt, Fiscal balance, and primary balance, which constitute the stock of debt. Moreover, the study incorporates variables that serve as proxies for unconventional monetary policy (UMP), such as Quantitative Easing (QE), represented by the Federal Reserve Balance Sheet, Securities held outright, and liquidity measures.

Debt ratios are also included as indicators of each country's gross financing needs. It is anticipated that these variables will positively impact sovereign spreads, as higher financing needs imply greater compensation for risk. Additionally, the analysis incorporates trade openness as a factor that can influence trade surplus and the probability of external default. Consequently, both the current account and trade openness variables are expected to exhibit negative signs in relation to sovereign spreads.

The analysis utilizes a dataset spanning from January 2009 to January 2020, covering 23 countries. The primary focus is on the dependent variable, the secondary market spread, as reported by JP Morgan in the form of the Emerging Markets Bond Index (EMBI). This index incorporates sovereign and quasi-sovereign instruments, which are guaranteed by the sovereign, and includes only those instruments that meet specific liquidity criteria in their trading.

The spread of an individual instrument, or bond, is determined by calculating the premium paid by an emerging market in comparison to a U.S. government bond with similar maturity characteristics. Subsequently, a country's spread index is derived by averaging the spreads of all eligible bonds, weighted by the market capitalization of each instrument.

Table 1 presents country-specific debt ratios and fiscal conditions, which have been extracted from the IMF Global Data Source Fiscal Space Measures. The Trade Openness index utilized in this analysis is sourced from the World Bank Development Indicators. Additionally, the Monetary Policy Indicators and liquidity conditions employed in the study are obtained from the Federal Reserve.

The data sources and characteristics are described in table 1 followed by summary statistics in table 2.

Table 1. Description of Variables

Variable	Description	Unit	Frequency	Interpolation	Source
EMBIG	Premium paid by an emerging market over a U.S. government bond with comparable maturity features.	Basis Points	Monthly	No	Global Economic Monitor (GEM) J.P. Morgan
FED Balance Sheet	Total Assets held by the Federal Reserve	Millions of dollars	Daily	Yes	Federal Reserve Recent balance sheet trends
FED Securities	Securities Held Outright by the Federal Reserve	Millions of dollars	Daily	Yes	Federal Reserve Recent balance sheet trends
Liquidity	All Liquidity Facilities	Millions of dollars	Daily	Yes	Federal Reserve Recent balance sheet trends
External debt/GPD	Stock of external debt % of GDP	Millions of dollars	Yearly	Yes	IMF Fiscal Space Measures
Short-term reserves/reserves	Government debt less 12 months maturity % of tottal	Millions of dollars	Yearly	Yes	IMF Fiscal Space Measures
General gov. debt / GDP	Total government debt % of GDP	Millions of dollars	Yearly	Yes	IMF Fiscal Space Measures
Fiscal balance/GDP	Fiscal balance % of GDP	Millions of dollars	Yearly	Yes	IMF Fiscal Space Measures
Primary balance/GDP	Primary balance % of GDP	Millions of dollars	Yearly	Yes	IMF Fiscal Space Measures
Current Account/GDP	Current Account as % GDP	Millions of dollars	Yearly	Yes	IMF
Trade Openness Index	Trade Balance as % of GDP	Millions of dollars	Yearly	Yes	World Development Indicators (World Bank)
3 Month U.S. treasury bill	3-Month Treasury Bill Secondary Market Rate	Percent	Monthly	No	Federal Reserve Economic Data
10 year U.S. gov. bond yield	U.S. Treasury Securities at 10-Year Constant Maturity	Percent	Daily	Yes	Federal Reserve Economic Data

Table 2. Summary Statistics by Country (Mean)

	Chile	South Africa	Indonesia	Mexico	Poland	Argentina	Belize	Colombia	Hungary	Philippines	Overall (Mean)
EMBIG	157.77	278.03	257.89	274.64	133.92	1,058.05	1,023.81	215.79	247.97	182.32	430.71
External debt/GPD	0.56	0.38	0.31	0.40	0.64	0.43	0.67	0.34	1.43	0.27	0.61
Short-term reserves/reserves	4.88	6.44	1.99	8.60	5.35	5.81	0.10	2.91	16.15	4.91	6.11
General gov. debt / GDP	0.19	0.45	0.29	0.49	0.52	0.65	0.76	0.46	0.76	0.45	0.56
Fiscal balance/GDP	-2.01	-5.09	-2.26	-3.45	-4.47	-3.96	-2.74	-3.44	-4.23	-2.10	-3.49
Primary balance/GDP	-1.80	-2.16	-0.73	-0.20	-2.46	-1.91	-0.29	-1.28	-1.11	0.15	-0.81
Current Account/GDP	-3.00	-1.69	-0.82	-0.46	-2.48	-0.62	-4.34	-3.43	-0.15	1.79	-2.83
Trade Openness Index	64.60	52.94	43.37	69.36	92.53	32.78	98.09	36.67	159.83	63.57	76.25
3 Month U.S. treasury bill	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
10-year U.S. gov. bond yield	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59
FED Balance Sheet											14,551,019
FED Securities											12,819,400
Liquidity											664,446

Table 2. Summary Statistics

	Chile	South Africa	Indonesia	Mexico	Poland	Argentina	Belize	Colombia	Hungary	Philippines	Over
EMBIG	157.77	278.03	257.89	274.64	133.92	1,058.05	1,023.81	215.79	247.97	182.32	
External debt/GPD	0.56	0.38	0.31	0.40	0.64	0.43	0.67	0.34	1.43	0.27	
Short-term reserves/reserves	4.88	6.44	1.99	8.60	5.35	5.81	0.10	2.91	16.15	4.91	
General gov. debt / GDP	0.19	0.45	0.29	0.49	0.52	0.65	0.76	0.46	0.76	0.45	
Fiscal balance/GDP	-2.01	-5.09	-2.26	-3.45	-4.47	-3.96	-2.74	-3.44	-4.23	-2.10	
Primary balance/GDP	-1.80	-2.16	-0.73	-0.20	-2.46	-1.91	-0.29	-1.28	-1.11	0.15	
Current Account/GDP	-3.00	-1.69	-0.82	-0.46	-2.48	-0.62	-4.34	-3.43	-0.15	1.79	
Trade Openness Index	64.60	52.94	43.37	69.36	92.53	32.78	98.09	36.67	159.83	63.57	
3 Month U.S. treasury bill	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	
10 year U.S. gov. bond yield	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	
FED Balance Sheet											
FED Securities											
Liquidity											

Method.

The proposed model for sovereign spreads formalized in this paper is built on the previous work of (Ozge & Albert, 2019) and the followed extension of (Ahmed, et al., 2022).

The core of the proposed model is a two-country open-economy New Keynesian Model with imperfect financial markets. In these markets the agents are represented by banks that borrow from domestic households in the national currency.

To ensure a stable consumption pattern over time, the economy adopts a strategy known as consumption smoothing. During periods when domestic resources are scarce, the economy borrows from foreign sources. Conversely, when resources become abundant, it repays its debt. In these dynamics, foreign lenders analyze the economy's ability to generate adequate foreign exchange resources to meet its external obligations. Additionally, they evaluate the government's capacity to generate sufficient domestic resources to acquire the necessary foreign exchange for servicing its external obligations.

The start point relationship between sovereign spreads and U.S. monetary policy changes are fluctuations in country risk that influenced the probability of default on emerging market sovereign rates compared to the risk-free interest rates of equal maturities. This effect is illustrated as follows.

$$(1 + r) = p * (1 + i) + (1 - p) * 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where r represents the interest on risk-free asset and I represent the risky asset, while p is the probability of repayment on the risk asset.

The spread between rates is formalized then as the difference between the risky asset rate and the risk-free asset as follows.

$$S = (1 + r) * (1 - p)/p \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

The implications of this equation are that, in the presence of default risk, the interest rate on a risky asset will need to increase by a greater magnitude than any rise in the risk-free rate. This adjustment is necessary to provide adequate compensation to investors as taking the derivative with respect to r.

$$(1 - p)/p$$

The extension made from (Ozge & Albert, 2019) is that the framework includes a variable of financial distress I as an external financial condition that could ameliorate or amplify the probability of default. This is formalized as:

$$(1 + r) = (1 + i_t) * (1 - pI_t) + p\, I_t * 0$$

Implying that if $(1 - pI_t) > 0$ in the short run and 1 in the long run, allows for extraneous financial conditions to ameliorate or amplify the probability of default in the short run.

This idea is in line with the work stated in (Vivek & Cerisola, 2001), where changes in the emerging market spreads can also occur due to effects on the ability to repay loans. Is simplified as that a rise in U.S. rates tends to elevate the debt-service burdens of borrowing countries, thereby diminishing their ability to repay loans.

Moreover, as highlighted by (Kamin & von Kleist, 1999), an increase in U.S. rates has the potential to dampen investors' risk appetite, prompting them to reduce their exposure to risky markets. Consequently, this reduction in investor activity can lead to a decrease in available financial resources for borrowing countries. Thus, the probability of repayment will be as follows:

$$\frac{dS}{dr} = \left[\frac{(1-p)}{p}\right] - \left[\frac{(1-r)*p'}{p^2}\right] \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

The interpretation is as a rise in risk-free rate raises the spread due to an increase in risk of default and in risk-free rate in the second term.

The macroeconomic variables chosen for this model imply that changes and country specific characteristics directly affect the capacity of payment and increase or reduce the probability of payment of the risky asset so it will influence the fluctuations of sovereign emerging market economies spreads.

Empirical Framework.

This section describes the empirical approach that is used to estimate the effects of U.S. Unconventional Monetary Policy on Emerging Market Spreads. The data combines daily and yearly data into a monthly data by using linear interpolation as in previous papers (Ahmed, et al., 2022) (Ozge & Albert, 2019) (Tillmann, 2016).

Our approach considers the channels described in the work of (krishnamurthy & vissing-jorgensen, 2011) and (Bellas, et al., 2010). The macroeconomic variables that reflect the transmission channels (Duration, Liquidity, Lack of safety, Default Risk and Payment risk) as well as some important country specific macroeconomic conditions as Trade Openness index, Current Account, and time yields composition (short-term reserves).

Those macroeconomic variables are introduced as a composition in each country-specific characteristics that influence the rate of emerging market economies relative to the free-risk rate affecting the spreads.

The main determinants chosen for the empirical estimation for the sovereign emerging market spreads are; debt ratios (External debt/GPD, Short-term reserves/reserves & General gov. debt / GDP), the debt sustainability indicators (Fiscal balance/ GDP & Primary balance/ GDP), Openness measures (Trade openness index & Current Account balance) and monetary policy indicators of the U.S. as liquidity measures for the economy (3 Month U.S. treasury bill & 10 year U.S. gov. bond yield).

The EMBI spread is selected as the dependent variable in this paper due to its inherent benefits for analysis. As stated in (Vivek & Cerisola, 2001), secondary market sovereign spreads behave differently than launch spreads since they trade is based on current and expected developments in each country and in the global financial conditions affected by U.S. monetary policy. The impact of these variables is expected to positively influence country risk and thus increase sovereign spreads. The expected signs for impact over the dependent variable are summarized in table 3.

Table 3. Expected impact directions

	Effect	EMBIG
External debt/GPD	+	
Short-term reserves/reserves	+	
General gov. debt / GDP	+	
Fiscal balance/GDP	+	
Primary balance/GDP	+	
Current Account/GDP	-	
Trade Openness Index	-	
3 Month U.S. treasury bill	+	
10 year U.S. gov. bond yield	+	
FED Balance Sheet	-	
FED Securities	+	
Liquidity	-	

As stated in (Bellas, et al., 2010), many estimations about the determinants of EMBI spreads use a basic log fixed effects model for considering the long-run coefficients. The model is formally as:

$$log\ (EMBI)_{it} = \propto\ + \sum_{j=1}^{J} \beta_{1j} X_{jit} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

where the dependent variable is the logarithm of the EMBI index spreads, and the X are the macroeconomic variables and the UMP of the Federal Reserve measure in terms of Changes in the Balance Sheet, the number of securities held outright by Federal Reserve Banks and all Liquidity Facilities.

Following the framework of (Bellas, et al., 2010), the assumption that parameters vary across countries which is likely to be the case since the heterogeneity of our sample of 23 emerging market economies. The authors used the following dynamic panel data representation:

$$log\ (EMBI)_{it} = \mu_i + \lambda_i\ log\ (EMBI)_{it-1} + \sum_{j=1}^{J} \gamma_{1j} X_{jit} + \sum_{j=1}^{J} \gamma_{2j} X_{jit-1} + u_{it} \ldots . (5)$$

by rearranging the equation becomes the error correction equation represented as:

$$\triangle\ log(EMBI)_{it} = \phi_i\ [\ log(EMBI)_{it-1} - \alpha - \sum_{j=1}^{J} \gamma_{1j} X_{jit}] - \sum_{j=1}^{J} \gamma_{2ji} \triangle X_{jit-1} + u_{it}\ (6)$$

The assumption made for equation (6) is that the vector X includes all explanatory variables representing the long-term elasticities for country j to country I do not vary across countries.

Results

Results are presented for the two different approaches. Table 4 reports equation 4 for the Fixed effects estimation while Table 5 reports equation 6 for the PMG long-run estimation.

Fixed effects model

Departing from specification (1) in table 4 including all variables, the estimation reports significance for all three Unconventional Monetary Policy variables in the expected direction of impact over the EMBI spreads. Additionally, for the specific-country macroeconomic fundamentals, the coefficients of External Debt Ratio, Short-Term Reserves Ratio, General Government Ratio, Current Account and U.S. 10-year bonds yields presents statistical significance. The ones with no significance are the Fiscal Balance, Primary Balance, Trade Openness Index and U.S. 3-month treasury bill.

The variables that present a coefficient different from the expected direction are the Current Account Balance, the General Government ratio, and the U.S. 10-year bonds yields.

As suggested from the theoretical framework, the coefficient for the short-term reserves held by the Federal Reserve present significance among all the seven specifications. The relationships obtained are positive, which match with the expected results following that it represents each country's gross financing needs. The impact can be interpreted as greater financing needs will imply greater compensation for risk, thus an increase in sovereign spreads.

The coefficient of liquidity indicator by the Federal Reserve results constantly significant and positive. According to the theoretical framework a increase in liquidity will push Federal Reserve yields up relatively to other liquid assets resulting in an increase in the spreads. The results shown in table 4 reflect this relationship with a positive value in the liquidity indicator for all specifications.

All the different specifications included in the FE model suggest that fiscal characteristics play an important role in determining the spreads. The external debt ratio presented a constant significance with positive value. An increase of one percent on the external debt will imply an increase in 0.78 percentage points in the EMBI spread.

Furthermore, when considering each separately, the General Government Ratio, Fiscal Balance, and Primary Balance demonstrate a notable and statistically significant positive

effect. This aligns with the theoretical understanding that these variables contribute to the escalation of sovereign spreads by augmenting the likelihood of default payment for risky assets, as exemplified by the EMBI spread index.

This set of estimators in consistent with the theoretical framework when including all variables, however when excluding for those which can represent problems of collinearity as the three Federal Reserve Variables or Fiscal Balance and Primary Balance, the specification loses statistical significance and presents changes in the expected effects over the spreads.

As outlined in the theoretical framework, the discrepancies observed between the latest specification and the anticipated impacts can be attributed to the presence of heterogeneity arising from country-specific factors that are not adequately captured in the Fixed Effects dynamic equation. Consequently, the work proceeds with the implementation of the PMG (Pooled Mean Group) model to account for and address this heterogeneity.

Table 4. Fixed Effects Estimators

Dep. Variable	logEMBIG	logEMBIG	logEMBIG	logEMBIG	logEMBIG	logEMBIG	logEMBIG
Estimator	PanelOLS	PanelOLS	PanelOLS	PanelOLS	PanelOLS	PanelOLS	PanelOLS
No. Observations	1633	1633	1633	1633	1633	1633	1633
Cov. Est.	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered
R-squared	0.6171	0.4128	0.5394	0.5943	0.5941	0.5941	0.3881
FED Balance Sheet	0.5232***	-0.4053***		0.5793***	0.5405***	0.5405***	-0.3416***
	(0.0831)	(0.0566)		(0.0837)	(0.133)	(0.133)	(0.0481)
FED Securities	-0.6470***		-0.4949***	-0.6362***	-0.6148***	-0.6148***	
	(0.0604)		(0.0372)	(0.0597)	(0.0792)	(0.0792)	
Liquidity	0.0586***			0.0575***	0.0623***	0.0623***	
	(0.0067)			(0.0062)	(0.0078)	(0.0078)	
External debt/GPD	0.7838**	0.8472**	0.8014**	1.0447***	1.0426***	1.0426***	0.9519***
	(0.3576)	(0.4037)	(0.3788)	(0.3031)	(0.3032)	(0.3032)	(0.291)
Short-term reserves/r	0.0276**	0.0260*	0.0269**	0.0343*	0.0343*	0.0343*	0.0328*
	(0.014)	(0.0138)	(0.0122)	(0.0177)	(0.0178)	(0.0178)	(0.0174)
General gov. debt / G	1.2068***	0.941	1.3502**				
	(0.452)	(0.5939)	(0.5285)				
Fiscal balance/GDP	0.0465	0.0041	0.0393	0.0208**	0.0211**	0.0211**	
	(0.0482)	(0.0567)	(0.0531)	(0.0097)	(0.0096)	(0.0096)	
Primary balance/GDI	0.0003	0.0158	0.0017				-0.002
	(0.045)	(0.0505)	(0.048)				(0.0122)
Current Account/GDI	-0.0215*	-0.0108	-0.017	-0.0259**	-0.0260**	-0.0260**	
	(0.0117)	(0.0139)	(0.0121)	(0.0118)	(0.0118)	(0.0118)	
Openess	-0.0055	-0.0064*	-0.0058*	-0.0049	-0.0049	-0.0049	-0.0064
	(0.0035)	(0.0037)	(0.0032)	(0.0039)	(0.0039)	(0.0039)	(0.0045)
3 Month U.S. treasury	-0.044	-0.2207***	-0.1689***	-0.0177			-0.1973***
	(0.0354)	(0.0288)	(0.0295)	(0.0352)			(0.029)
10 year U.S. gov. bon	-0.0762**	-0.0963***	-0.1382***	-0.0811***	-0.0858***	-0.0858***	-0.0944***
	(0.0308)	(0.0289)	(0.0311)	(0.0306)	(0.0276)	(0.0276)	(0.0311)
Effects	Entity	Entity	Entity	Entity	Entity	Entity	Entity

Std. Errors reported in parentheses

Pooled Mean Group effects.

As mentioned in the previous section, the utilization of the PMG (Panel Mean Group) model provides several advantages, particularly in allowing for variations in short-run parameters across countries within our sample. The equation (6) represents the estimated model using this approach. By contrasting it with the Fixed Effect model, the effects obtained through this empirical method align more closely with the predicted outcomes outlined in the theoretical framework.

The main important difference is that by allowing this dynamic specification (1) including all variables match with the theoretical framework previously specification. The impact of Current Account Balance and Trade Openness is negative, the liquidity indicators from UMP as quantitative easing present a positive effect, and the debt balances effects also reported positive.

Highlights the significance of the Federal Reserve UMP variables, the Short-Term Reserves ratio, the General Government Debt ratio, the Fiscal Balance, the Trade Openness Index and the 3 Month U.S. treasury bill.

Liquidity channel:

The coefficient of liquidity indicator by the FED remains constantly significant and positive. The coefficients for the 3 Month U.S. treasury bill are negative while the ones for the 10-year U.S. gov. bond yield are negative but non-significant. This can be interpreted as that a tightening in liquidity conditions tended to reduce sovereign spreads.

In the theoretical perspective of the influence of the macroeconomic variables over the probability of default risk payment, in specification (7) is worth mentioning that the external debt ratio presented a positive but insignificant effect. However, the Short-term reserves ratio and the General government ratio are significant with negative and positive effects respectively.

Table 5. Pooled Mean Group Estimations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Variable	logEMBIG	logEMBIG	logEMBIG	logEMBIG	logEMBIG	logEMBIG	logEMBIG
Estimator	PooledOLS	PooledOLS	PooledOLS	PooledOLS	PooledOLS	PooledOLS	PooledOLS
No. Observations	1633	1633	1633	1633	1633	1633	1633
Cov. Est.	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered	Clustered
R-squared	0.9901	0.9882	0.9875	0.9864	0.9863	0.9855	0.9889
R-Squared (Within)	0.4554	0.1744	0.0674	0.4785	0.4748	0.3985	0.3372
FED Balance Sheet	0.9474***	0.1905***		1.0640***	0.9775***	0.2423***	0.1095***
	(0.0801)	(0.0387)		(0.0693)	(0.0986)	(0.0286)	(0.0267)
FED Securities	-0.8085***		0.1645***	-0.7674***	-0.6993***		
	(0.0569)		(0.037)	(0.0503)	(0.0753)		
Liquidity	0.0509***			0.0467***	0.0667***	0.1024***	0.1257***
	(0.009)			(0.008)	(0.0112)	(0.0105)	(0.0108)
External debt/GPD	0.1246	0.1825	0.2209	0.3753	0.368	0.5173	0.1787
	(0.2422)	(0.2734)	(0.2742)	(0.4046)	(0.4029)	(0.3963)	(0.303)
Short-term reserves/reser	-0.0476***	-0.0494***	-0.0522***	-0.0125	-0.0124	-0.0127	-0.0545***
	(0.0153)	(0.0158)	(0.0154)	(0.0215)	(0.0215)	(0.0219)	(0.0175)
General gov. debt / GDP	2.3865***	2.2942***	2.5180***				1.7358***
	(0.525)	(0.5906)	(0.5823)				(0.3887
Fiscal balance/GDP	0.1294*	0.095	0.1062	-0.0005	0.0005	0.019	
	(0.0738)	(0.084)	(0.0879)	(0.0201)	(0.0198)	(0.0145)	
Primary balance/GDP	-0.0759	-0.0673	-0.0822				
	(0.0694)	(0.0775)	(0.0807)				
Current Account/GDP	-0.0049	0.0017	0.0058	-0.0191	-0.0197		
	(0.0153)	(0.0158)	(0.0165)	(0.013)	(0.0128)		
Openness	-0.0058**	-0.0061**	-0.0064**	-0.0056*	-0.0055*	-0.0066**	-0.0052**
	(0.0025)	(0.0027)	(0.0027)	(0.0032)	(0.0032)	(0.0029)	(0.0025)
3 Month U.S. treasury bill	-0.1083*	-0.3443***	-0.3562***	-0.0678			0.0596
	(0.0602)	(0.0436)	(0.0437)	(0.0542)			(0.0479
10 year U.S. gov. bond yi	-0.0238	0.0563*	0.1017***	-0.0424	-0.0474		
	(0.0343)	(0.0331)	(0.0326)	(0.0446)	(0.0418)		

Std. Errors reported in parentheses

Conclusion.

The aim of this paper is to expand the understanding about the impact of U.S. monetary policy on sovereign bond spreads in emerging market economies under the period of Unconventional Monetary Policy (UMP). The paper follows the models from (Ahmed, et al., 2022) (Arslan, et al., 2020) (Vivek & Cerisola, 2001) & (Bellas, et al., 2010), extending the analysis to a longer period of time from 2009 to 2020 and for a greater number of countries (23).

This paper uses the JP Morgan EMBI index as the variable for assessing spreads in emerging market economies within the theoretical framework. According to this framework, changes in spreads can be attributed to an elevated probability of emerging markets being unable to repay loans, arising from shifts in liquidity conditions resulting from monetary policy actions implemented in the U.S. By considering this theoretical perspective, the study provides an analytical framework for understanding the dynamics of spread changes and their underlying drivers in emerging market economies.

The empirical approach is extended by combining the framework in (Bauer & Neely, 2014) and (Vivek & Cerisola, 2001) using a regression over the log EMBI, and controlling for the fixed effects in the short-term of macroeconomic conditions for each county.

This paper incorporates a dynamic specification for capturing short-run changes through the implementation of a Pooled Group Mean model. The empirical results align closely with the anticipated effects derived from the underlying theoretical framework. This study makes a valuable contribution to the existing literature as it examines a specific time period encompassing a diverse range of countries, a gap that has not been extensively explored in previous research.

The overall findings of this paper affirm the significance of Unconventional Monetary Policies (UMP) as a crucial tool for central banks during economic crises. However, the effectiveness of these policies varies across different economies, contingent upon their unique macroeconomic and financial characteristics. It is imperative for central banks to consider these characteristics when formulating and implementing UMP to attain the desired outcomes and address specific challenges in each context.

This research sheds light on the importance of tailored approaches to UMP implementation, emphasizing the need for central banks to account for country-specific factors. By understanding the heterogeneity and diverse responses across economies, central banks can enhance the efficacy of their policies and better navigate the complexities of economic crises. These findings have implications for policymakers, providing insights into how UMP from the U.S. affects sovereign spreads in emerging markets economies.

Further Research.

Moving forward, there is ample room for further research to expand upon these findings. One potential question is to explore the period of Conventional Monetary Policies (CMP) and their effects on emerging market spreads. By incorporating a comprehensive analysis of both UMP and CMP, researchers can gain a more empirical understanding for the determinats of spreads.

Moreover, future research could delve deeper into the specific channels through which monetary policy actions affect emerging market spreads. This could involve investigating the role of exchange rates, capital flows, or other financial variables in transmitting the effects of monetary policy on these economies.

By continuing to explore and deepen our understanding of the interplay between conventional and unconventional monetary policies, researchers can contribute to the development of more effective policy frameworks for emerging market economies. This knowledge will assist policymakers in making informed decisions and implementing measures that promote stability, growth, and resilience in these vital sectors of the global economy.

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