SPILLOVERS FROM U.S. MONETARY POLICY TO EMERGING MARKETS: THE ROLE OF FUNDAMENTALS

A Master's Thesis

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To Sevgi

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The Graduate School of Economics and Social Sciences
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by

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I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Economics.

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ABSTRACT

SPILLOVERS FROM U.S. MONETARY POLICY TO EMERGING MARKETS: THE ROLE OF FUNDAMENTALS

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August 2024

The impact of U.S. monetary policy on emerging markets (EMEs) has long been a subject of significant academic and policy interest. This thesis explores the heterogeneity of these spillovers and the role of macroeconomic fundamentals in shaping them by employing an event study methodology utilizing high-frequency data. I use a broad set of emerging markets that span from 2000 to 2022. It reveals that spillovers are not uniform but vary across countries and time periods, influenced significantly by factors such as reserve adequacy and current account balances. The study underscores the importance of robust economic fundamentals in enhancing resilience against external monetary shocks.

The findings suggest that policymakers in emerging markets should prioritize strengthening macroeconomic fundamentals to weaken adverse spillover effects. This includes maintaining robust fiscal and monetary policies, ensuring adequate foreign exchange reserves, and fostering stable financial markets.

Keywords: Emerging market economies; Financial spillovers; Economic fundamentals ;Vulnerability index

ÖZET

A.B.D. PARA POLİTİKALARININ GELİŞEN PİYASALARA YANSIMALARINDA İKTİSADİ TEMELLERİN ROLÜ

Cançı, Muhammet Ali
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Ağustos 2024

ABD para politikasının gelişmekte olan piyasalara etkisi, uzun süredir önemli akademik ve politik ilgi konusu olmuştur. Bu tez, bu yansımaların heterojenliğini ve makroekonomik temellerin bu etkileri şekillendirmedeki rolünü, yüksek frekanslı veri kullanan bir olay çalışması metodolojisi ile incelemektedir. 2000-2022 dönemini kapsayan geniş bir gelişmekte olan piyasa seti kullanılmıştır. Çalışma, bu yayılma etkilerinin tekdüze olmadığını, ülkeler ve zaman dilimleri arasında farklılık gösterdiğini ve bu farklılıkların önemli ölçüde rezerv yeterliliği ve cari işlemler dengesi gibi faktörlerden etkilendiğini ortaya koymaktadır. Araştırma, güçlü ekonomik temellerin dış para şoklarına karşı dayanıklılığı artırmadaki önemini vurgulamaktadır.

Bulgular, gelişmekte olan piyasalardaki politika yapıcıların olumsuz yayılma etkilerini hafifletmek için makroekonomik temelleri güçlendirmeye öncelik vermeleri gerektiğini önermektedir. Bu, güçlü maliye ve para politikalarının sürdürülmesi, yeterli döviz rezervlerinin sağlanması ve istikrarlı finansal piyasaların teşvik edilmesini içermektedir.

Anahtar Kelimeler: Gelişmekte olan ekonomiler; Finansal yansıma etkileri; Ekonomik temeller; Kırılganlık endeksi

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CHAPTER 1

INTRODUCTION

When the U.S. economy sneezes, do emerging markets catch a cold? This question has been answered as a yes in many different studies Albagli et al. (2019); Bauer and Neely (2014); Hesse and Frank (2009). However, spillovers (responses of emerging market economies (EME) on the U.S. monetary policy) are heterogeneous at various dimensions. While some studies such as Engler et al. (2023); Ahmed et al. (2021) explain the difference with the cause of the shock, others attribute it to the fundamental macroeconomic signals of the economy Ahmed et al. (2017); Hoek et al. (2022).

In this thesis, I explore the diverse effects of U.S. monetary policy on different economies. I focus on three main questions: (1) How do asset prices in emerging markets respond to U.S. monetary policies? (2) How do the macroeconomic fundamentals of emerging markets affect their susceptibility to these spillovers? (3) How significant are their trade ties with the U.S. in influencing these effects?

Examining the impact of monetary shocks in the United States on the dynamics of emerging market economies involves the application of an event study methodology utilizing high-frequency data. The initial step in the empirical analysis is estimating spillover rates from the United States to emerging markets by utilizing the Estimated Dependent Variable (EDV) model employing Feasible Generalized Least Squares while controlling for the relationship between

spillover rates and macroeconomic fundamentals. I first assess the spillover rates with an event study by using Federal Open Market Committee (FOMC) shocks or the Dollar Index (DXY). The identification approach adopted focuses on a specific time window of approximately 30 minutes around the FOMC meeting, where the monetary policy shock is the source of the spillover effect. When using FOMC shocks, my identification strategy is based on the assumption that error terms are orthogonal to the shocks. When I use U.S. bond yields and the DXY as the source of the spillover, I lack such orthogonality since accessing minute by minute or tick data for all emerging market would not be feasible. Therefore, it is not possible to use the same identification strategy. To make up for this, I increase my sample size and ensure the data is stationary as well as the absence of simultaneity. I also assess the heterogeneous responses across EMEs and years based on the macroeconomic fundamentals of the EMEs and changes in those fundamentals. By including time-varying heterogeneity in my model, I make a novel contribution to the literature.

The dataset consists of daily data from 2000-2022[1] for the broad set of emerging market countries (Argentina, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Czechia, Egypt, Hungary, India, Indonesia, Israel, Kazakhstan, Mexico, Moldova, Pakistan, Paraguay, Peru, Philippines, Poland, Russia, South Africa, South Korea, Thailand, Turkey, Ukraine) and U.S. It also includes annual data from emerging markets to identify vulnerabilities.

The main findings of this study are that there is a strong relationship between the U.S. monetary policy and emerging market asset prices, which I conclude as the spillovers from U.S. monetary policy to EMEs. These spillovers are heterogeneous in both time and country dimensions, and they could be explained by using the relative macroeconomic strength of the economy on average or at the

[1]For detailed data appendix see Table A.1 in Appendix A

time. Reserve adequacy and Current Account Balance (CAB) are the leading explanatory variables among those.

The remaining part of this thesis is structured as follows: In Chapter 2, I introduce a comprehensive review of the relevant literature currently available. In Chapter 3, I explain my data and methodology used in this thesis in detail. I present and discuss the results in Chapter 4. Finally Chapter 5 concludes.

CHAPTER 2

LITERATURE REVIEW

This study is part of the broad literature investigating external shocks on EMEs. In this chapter, I will discuss some of the critical contributions to literature that have enabled me to explore further and develop this thesis. Some early contributions to the literature include (Kim, 2001; Canova, 2005; Ehrmann and Fratzscher, 2009; Hausman and Wongswan, 2011). A number of papers use the VAR strategy for the analysis, including (Degasperi et al., 2020; Arteta et al., 2022).

Canova (2005) utilizes sign restrictions to identify U.S. shocks and treats them as exogenous to Latin American economies. Their study constructs posterior estimates for individual and average effects of U.S. monetary shocks on Latin American countries between 1980-2002. They experiment with a multivariate t-distribution to account for heteroskedastic VAR errors without altering the results presented. The author employs theoretical restrictions based on Dynamic Stochastic General Equilibrium (DSGE) models to identify shocks, focusing on zero constraints on the impact and long-run multipliers of variables. The analysis involves a two-step approach: orthogonalizing innovation vectors first and then examining their economic interpretations based on theoretical restrictions. They concluded that U.S. monetary shocks significantly impact Latin American economies, causing notable fluctuations, whereas real demand and supply shocks

from the U.S. do not have a similar effect. The analysis differentiates between countries with floating exchange rates and those with currency boards, finding that while their output responses to U.S. shocks are similar, their inflation and interest rate responses diverge.

Bauer and Neely (2014) studies the signaling effects of Large-Scale Asset Purchase (LSAP) announcements on international yields, illustrating how U.S. asset purchase programs influence foreign central bank policies and interest rates. Utilizing discrete-time affine Gaussian models, it examines the relationship between U.S. monetary policy and foreign interest rates, highlighting the impact of LSAPs on asset prices through signaling and portfolio balance effects. The research emphasizes the significance of unconventional policy announcements by the Federal Reserve, employing daily zero-coupon yield data from 1995 to 2013 to assess the effects in an out-of-sample context. Specifically, the study uses discrete-time affine Gaussian models where risk factors follow a first-order Gaussian VAR, incorporating models such as PC-RW and PC-UR for effective monthly Treasury yield forecasts. Although the research initially considers four risk factors, it opts for more parsimonious three-factor models due to superior out-of-sample forecasting performance. Additionally, the models impose restrictions on risk adjustment to reduce statistical uncertainty and soften small-sample bias in VAR parameter estimates.

Mishra et al. (2014) investigates the market reactions in 21 EMEs to the 2013-14 Federal Reserve's announcements on tapering asset purchases, focusing on the interplay between macroeconomic fundamentals, financial structures, and policy stances prior to these announcements. It reveals that countries with robust macroeconomic fundamentals, deeper financial markets, and binding macroprudential policies experienced fewer adverse effects, such as smaller currency depreciation and lesser increases in government bond yields. However, the prices of the stocks in the EMEs were less sensitive to such fundamentals.

Additionally, the study reveals that the characteristics of trade links with China influenced market responses that explain the major economies' effect on the U.S. spillovers, specifically signifying that favorable trade links can reduce negative effects and neutralize any bad news emanating from China and only after that the fall of stock markets is kept finite.

Aizenman et al. (2016) The study explores the impact of economic fundamentals on sovereign credit default swap (CDS) spreads in emerging markets during the period from 2004 to 2012, which includes the global financial crisis of 2008-2009. This time frame is crucial for understanding how emerging markets withstand or succumb to global financial shocks. The research carefully analyzes the influence of critical economic indicators like inflation, state fragility, external debt, volatility in commodity trade terms, trade openness, and the fiscal balance-to-GDP ratio on sovereign CDS spreads. It reveals a dynamic interplay between these economic factors and sovereign risk, showing that their importance in the valuation of sovereign risk changes over time. The study highlights that before the crisis, trade openness and state fragility were significant factors; during the crisis, the focus shifted to the external debt-to-GDP ratio and inflation, and after the crisis, inflation and the public debt-to-GDP ratio became more outstanding. Additionally, the research compares sovereign spreads between Asian and Latin American countries, finding that Asian countries generally faced lower sovereign spreads, a gap that expanded during and after the crisis. This detailed analysis emphasizes the changing landscape of sovereign risk in emerging markets, shaped by a mix of external and internal economic elements across different periods.

Góes et al. (2017) adds to the understanding of how advanced countries' monetary policies, especially unconventional ones in the U.S. during 2010-2013, impact bond markets in emerging economies. They utilize the Vector Error Correction Model (VECM) for this analysis and offer evidence on the short

and long-term dynamics of local-currency sovereign bond yields in Brazil and Mexico, extending previous findings on the role of country fundamentals in market reactions to Federal Reserve announcements. Their research addresses the gap in empirical evidence regarding the determinants of emerging markets' local-currency sovereign bond yield dynamics, which is crucial for government financing. They also review the impact of U.S. unconventional monetary policies on emerging markets' asset prices, including the effects of FED quantitative easing measures on global portfolio flows and asset prices. It highlights the importance of domestic and external factors, including the U.S. 10-year bond yield, in influencing the dynamics of emerging markets' local-currency bond yields.

Iacoviello and Navarro (2019) analyzes the spillovers of higher U.S. interest rates on economic activity in 50 advanced and emerging economies in this study, demonstrating varied responses influenced by exchange rate regimes, trade openness, and vulnerability index. It reveals that GDP in foreign economies experiences declines comparable to those in the U.S., with emerging economies facing larger drops. The research highlights that trade openness and exchange rate regimes significantly affect advanced economies, while vulnerability is crucial for emerging economies. Utilizing a large dataset spanning over 50 years and 50 countries, the study explores the effects of U.S. monetary shocks, emphasizing the role of exchange rates, trade, and financial channels in response to changes in U.S. interest rates. The paper employs a methodology that estimates the response of an economy to a monetary shock by interacting identified shocks with exposure measures, standardizing exposure variables, constructing logistic transformations, and re-centering variables to interpret coefficients as deviations from median levels of exposure. This approach includes constructing interaction terms, orthogonalizing exposure measures, and estimating the average international spillover of higher U.S. interest rates. U.S. monetary shocks are identified by regressing the federal funds rate sample controls and using the residuals as

identified shocks.

Kearns et al. (2019) intersects with multiple strands of literature, notably examining the response of foreign asset prices to monetary policy shocks, primarily focusing on major central banks like the Federal Reserve and the ECB. This research broadens the existing scope by including a wider range of central banks from both advanced and emerging market economies. This approach fills a notable gap in existing literature, which typically concentrates more narrowly on emerging markets and specific asset types. Moreover, it enhances my understanding of the global effects of quantitative easing (QE). This is especially important given the mixed findings of previous studies on the spillover effects from major central banks' QE policies. By using a comprehensive, high-frequency dataset, the study investigates the transmission channels of these spillovers, aiming to offer a detailed analysis of the factors that influence interest rate movements across a diverse group of economies. The findings suggest that financial openness plays a crucial role, with economies that have stronger financial connections to the United States or the euro area experiencing more significant spillovers, particularly at the longer end of the yield curve.

Tillmann et al. (2019) studies by recognizing the profound effects of the U.S. Federal Reserve's unconventional monetary policies, such as QE and forward guidance, which were introduced to combat the 2008 financial crisis. These policies significantly increased global liquidity, impacting emerging economies. They discuss the challenges these economies face due to these spillover effects, such as eased monetary conditions, a rise in asset prices, and heightened concerns over financial stability. The study stresses the importance of fully understanding these spillovers to craft effective policy responses. In response, many central banks and regulators in emerging markets have implemented monetary tightening and/or macro-prudential measures. Their research makes four significant contributions to the body of knowledge on monetary policy spillovers: The magnitude

and direction of spillover effects on domestic equity returns, exchange rate changes, and bond yield fluctuations vary across different regimes, displaying no uniform pattern of spillovers. Additionally, the study found no systematic increase in spillovers following the global financial crisis. This suggests that the impact of U.S. monetary policy on global markets can be unpredictable and does not necessarily intensify in the aftermath of major economic disturbances. By accounting for the possibility that policy shocks may transmit asymmetrically, the research discovered that a tightening of U.S. monetary policy has a more pronounced impact on emerging financial markets compared to an easing policy. This finding underscores the importance of recognizing that monetary tightening and easing in the United States can lead to significantly asymmetric spillover effects. This aspect of the discussion highlights the critical need for emerging market policymakers to consider the varied impacts of U.S. monetary policies in their strategic responses.

The study by Degasperi et al. (2020) on the global transmission of U.S. monetary policy employs a comprehensive methodological approach to examine its wide-reaching effects across the world. This research uses a harmonized dataset covering the years 1990 to 2018, which includes data from 30 countries—comprising both advanced and emerging economies—and 31 variables split between the U.S. and global metrics. By using a bilateral VAR model, the study works on the economic dynamics at the individual country level, highlighting the different ways U.S. monetary policy influences the global economic landscape. The research incorporates asymmetric priors within Bayesian dynamic models to tackle the issues of parameter uncertainty and multicollinearity, which sharpens the analysis of how U.S. policy shocks are transmitted. Furthermore, it opts for a median group estimator rather than a mean group estimator to reduce the influence of outliers, ensuring a more accurate and representative evaluation of the data. The findings indicate that financial channels are more influential than traditional demand and exchange rate mechanisms in mediating

the impacts of U.S. monetary policy. Interestingly, the study also reveals that flexible exchange rates do not completely protect domestic economies from international spillovers. This is due to the significant role played by movements in risk premia, which limit the effectiveness of central banks in managing policy impacts along the yield curve. These insights suggest that while traditional monetary policy tools may sometimes be inadequate, unconventional measures aimed at influencing financial conditions and the entire yield curve might prove to be more efficacious. The methodological innovations in this research significantly enhance my understanding of the dominant influence of financial channels in the transmission of U.S. monetary policy across different global economies, providing valuable perspectives on effective policy formulation.

Ahmed et al. (2021) studies the importance of both the sources of shocks and the vulnerabilities of EMEs in understanding the transmission of U.S. monetary policy changes. This study contributes both theoretical and empirical results in the literature. This approach is distinct from other studies that might only highlight the sources of shocks without a detailed analysis of vulnerabilities. Utilizing a calibrated two-country New Keynesian model, the paper incorporates financial frictions, partly dollarized balance sheets, and imperfectly anchored inflation expectations to model the spillover effects. This methodological framework allows for a comprehensive quantification of impacts on real macroeconomic variables, setting it apart from other research that may focus solely on financial spillovers. They find that higher U.S. interest rates, when driven by stronger U.S. aggregate demand, can have modestly positive effects on EMEs with strong fundamentals. However, these effects turn adverse for EMEs with vulnerabilities. In contrast, U.S. monetary tightening motivated by a more hawkish policy stance is shown to slow down economic activity across all EMEs.

di Giovanni et al. (2022) contributes to discussions on how movements in the Volatility Index (VIX), as a proxy for the Global Financial Cycle (GFC),

affect cross-border capital flows, asset prices, and credit growth, engaging with works by Forbes and Warnock (2012), Blanchard et al. (2015), and others who have used aggregate cross-country data to explore these effects. It complements models that emphasize the risk-taking channel during the boom phase of the GFC, where low interest rates in the U.S. lead to increased liquidity and more dollar funding across borders. They find an increasing share of local currency borrowing versus foreign currency borrowing, aligning with models that predict a fall in the Uncovered Interest Parity (UIP) risk premium and a rise in local currency borrowing following favorable shocks. It provides evidence on the transmission mechanism of financial constraint relaxation during the GFC, differing from the standard "higher asset prices-higher collateral-more borrowing" channel and focusing on lower interest rates facilitating borrowing without changing "hard" collateral constraints. They add to the literature on the international transmission of shocks, particularly focusing on the role of foreign banks and U.S. monetary policy in channeling bank flows across borders, and contrast with existing literature by focusing on the receiving side of domestic banks' borrowing from foreign banks and global investors over the GFC.

Arteta et al. (2022) studies the impacts of U.S. interest rate changes on emerging and developing economies (EMDEs), differentiating the effects based on the nature of the rate changes—whether they stem from inflation expectations, policy reactions, or real economic activity. Their comprehensive analysis, utilizing a variety of empirical models including a sign-restricted Bayesian VAR and panel local projection models, finds that U.S. interest rates driven by inflation expectations and policy reactions (particularly the latter) significantly tighten financial conditions in EMDEs, leading to reduced investment and consumption and prompting EMDE governments to cut spending to improve budget balances. By contrast, interest rate rises due to real economic activity generally coincide with benign or even beneficial impacts on these economies. This understanding emphasizes the critical role of the underlying causes of interest rate

changes in determining their international spillover effects, marking a significant contribution to the literature on monetary policy spillovers.

The study by Boeck and Mori (2023) investigates the evolving nature of international monetary policy by building on earlier research that employs time-varying parameter models to analyze monetary decisions in major economies such as the U.S., U.K., and euro area. This connection emphasizes the paper's innovative approach to exploring the dynamic aspects of global economic interactions. Previous findings have investigated the international effects of U.S. monetary policy shocks, particularly examining the periods before and after the 1990s. A notable shift was identified in these studies: U.S. monetary tightening before the 1990s led to a decline in global industrial production, while tightening after the 1990s seemed to unexpectedly boost production abroad. This shift highlighted a change in how U.S. monetary policy influenced the global economy. However, unlike previous studies that segmented samples to analyze shifts in international transmission channels, Boeck and Mori (2023) utilizes a time-varying parameter vector auto-regressive (TVP-VAR) model. This choice provides an exploration of the dynamics within the post-1990s period, offering new insights into how global economic activities respond to U.S. policy tightening today. Contrary to earlier findings suggesting a positive impact on global production, Boeck's results indicate an increasing negative impact of U.S. policy tightening on global economic activity. This suggests a significant evolution in the international transmission mechanism of U.S. monetary policy over time. This study not only connects with but also significantly advances my understanding of the intricate and changing relationships in global monetary policy dynamics.

Ahmed et al. (2017) assesses the impact of international financial shocks on EMEs, particularly during the taper-tantrum episode of 2013 and other significant financial stress episodes since the mid-1990s. This includes an analysis of how economic fundamentals influence the resilience of EMEs to such shocks. It

highlights the differentiation among EMEs based on their economic fundamentals during the 2013 taper-tantrum episode, showing that EMEs with relatively better economic fundamentals experienced less deterioration in their financial markets. The research also explores the role of large private capital inflows and exchange rate appreciation prior to the taper tantrum in exacerbating financial conditions in EMEs, even after accounting for economic fundamentals. The paper extends its analysis to include differentiation based on fundamentals during other significant episodes of financial stress, such as the global financial crisis of 2008, the European sovereign crisis in 2011, and China's financial market stresses in 2015, indicating a pattern of increasing importance of economic fundamentals over time. They finally have a strong positive relation with the vulnerabilities and the depreciation index they have created. I also utilize their idea for the vulnerability index with some adjustments. While they are using the fundamentals for the previous terms before the GFC, I am creating two different indices. One of them takes the sample average, while the other one varies throughout the years.

Hoek et al. (2022) addresses the conventional wisdom that increases in U.S. interest rates generally have adverse effects on emerging markets. This premise sets the stage for a deeper investigation into the diverse impacts of rate hikes, depending on their underlying causes. It highlights the importance of distinguishing between rate hikes driven by U.S. economic growth and those prompted by FED policy adjustments or inflationary pressures. This distinction is crucial for understanding the differential spillover effects on EMEs' financial markets. Their research utilizes financial asset price movements around FOMC announcements and U.S. employment reports to categorize the sources of rate changes. This approach is grounded in the literature on FED "information" effects, which helps in differentiating between growth and monetary shocks. By analyzing the co-movements of Treasury yields and U.S. equity prices, the paper interprets positive correlations as indicators of growth shocks and negative correlations

as signs of monetary shocks. This methodology allows for an estimation of the distinct effects these shocks have on EME asset prices. They also discuss how the impact of U.S. rate hikes is amplified in EMEs with greater macroeconomic and financial vulnerabilities. This insight underscores the importance of internal conditions within EMEs in moderating the effects of external financial shocks.

Engler et al. (2023) use the event study approach to show that not only monetary policy news but also U.S. economic news have spillovers on the emerging markets. They discuss the mechanisms through which spillovers occur, such as trade links, financial market integration, and investor sentiment. They use the U.S. economic news shocks from the Gürkaynak et al. (2020) data and show the difference between the effect of the U.S. monetary policy shock and U.S. economic news shocks as well as pandemic news during the COVID-19 era. The study finds that the news about U.S. employment news has the strongest effect, followed by the pandemic-era COVID-19 vaccine news.

My work is closely related to the studies which control for the vulnerabilities (Ahmed et al., 2017; Engler et al., 2023; Hoek et al., 2022). However, the time-varying heterogeneity of the spillovers has not been well studied within the event study approach. My contribution to the literature is that by utilizing the time-varying heterogeneity of the spillovers through EDV methodology, I can see the effect of vulnerabilities in both time and country dimensions.

CHAPTER 3

DATA AND METHODOLOGY

3.1 Data

In this section, I explain the data that is used in my analysis. Initially, I explain the asset prices that have been used to assess the spillovers; after that, I define the fundamentals that are used in order to create the vulnerability index. In this section, I discuss not only the descriptive statistics and data sources but also the rationale for selecting the specific data.

3.1.1 Spillovers

To investigate the spillover effects, this study will utilize a diverse dataset to capture the intricate responses of these markets. I have chosen to analyze daily frequency data on as many financial instruments from emerging markets as possible. These are currencies, local currency bond yields, and Credit Default Swaps (CDS). These instruments are pivotal in measuring foreign investor sentiment, understanding domestic economic conditions, and gauging perceived credit risk within these economies, providing a detailed perspective on how external shocks influence these regions.

In addition to emerging market data, this study also considers U.S. government

bonds and the Dollar Index (DXY) as essential indicators. U.S. government bonds, known globally for their safety and liquidity, offer insights into the global risk appetite and influence financial markets worldwide through their yield movements. The DXY measures the strength of the U.S. dollar against a basket of major currencies. Those are Euro (0.576), Japanese Yen (0.136), Great British Pound 0.119, Canadian Dollar (0.091), Swedish Krona$()0.042$ and Swiss Franc $(0.036)$with the relative wieght given inside the pranthesis and calculated with following equation :

$$\text{DXY } = 50.14348112 \times \text{ EURUSD }^{-0.576} \times \text{ USDJPY }^{0.136} \times \text{ GBPUSD }^{-0.119} \times \text{ USDCAD }^{0.091} \times \text{ USDSEK }^{0.042} \times \text{ USDCHF }^{0.036} \tag{3.1}$$

and acts as a barometer for the dollar's economic standing globally. A stronger DXY typically correlates with capital outflows from emerging markets, impacting their financial stability and broader economic conditions.

The connection between the DXY, U.S. government bonds, and financial instruments in emerging markets is one of my main focuses. One example of that would be a stronger U.S. dollar, as indicated by a rising DXY, which generally makes U.S. assets more appealing, potentially leading to capital outflows from emerging markets. This outflow can depreciate local currencies, elevate bond yields, and increase CDS spreads due to heightened risk perceptions. Additionally, shifts in U.S. bond yields can redirect global capital flows, either attracting investments back to the U.S. or pushing them towards higher-yielding assets in emerging markets, thus affecting their economic stability. The effect of the emerging market can also be seen in different asset prices. While the EMEs that use floating exchange rate regimes according to Ilzetzki et al. (2019) might see the effect of an increase in the global risk appetite in their currencies, others need to adjust the bond yields to keep their currencies pegged.

Finally, to assess the impact of FOMC meetings on the EMEs, I will use the

Gürkaynak Sack Swanson (GSS) data (Gürkaynak et al., 2005)[1]. This dataset is particularly valuable as it isolates the unexpected component of FOMC decisions within a 30-minute window surrounding the announcement. By doing that, I was able to assess the effect of the shock component. The identifying assumption in using the GSS data is that within this narrow window, no other significant news events occur that could influence the financial conditions in the emerging markets. This ensures that the monetary policy shock is orthogonal to the error term. This orthogonality is crucial for accurately estimating the impact of FOMC decisions. However, this technique is not directly applicable to emerging markets due to time zone differences and lack of high-frequency data. Market reactions in these economies are not always immediate and can be influenced by trading hours. To address this, I will adjust my analysis to consider a 2-day window around the FOMC announcements. This adjustment allows me to capture the delayed responses and ensures that the spillover effects are accurately measured.

3.1.1.1 Foreign Exchange

The U.S. dollar's dominance in global trade invoicing means that changes in U.S. monetary policy can lead to significant expenditure-switching effects between countries, impacting foreign exchange rates. The global financial cycle, driven by U.S. monetary policy, acts as a transmitter of financial shocks across borders. Since the dollar dominates the global financial system, changes in U.S. policy can lead to substantial fluctuations in foreign exchange markets (Boeck and Mori, 2023). Moreover, when the U.S. tightens monetary policy, the appreciation of the dollar negatively impacts the balance sheets of global financial intermediaries. This leads to lower leverage and disrupts cross-border financial intermediation, affecting foreign exchange rates (Kalemli-Özcan, 2019).

[1]I want to thank Refet Gürkaynak for kindly providing me with his dataset on Federal Open Market Committee shocks.

3.1.1.2 Credit Default Swap

Changes in monetary policies by the FED can lead to significant spillovers to the CDS spreads of emerging market economies. These policies influence global liquidity and risk perceptions, which in turn affect the credit risk spreads of emerging markets (Walerych and Wesołowski, 2021). Economic news and monetary policy changes in the United States have a substantial impact on emerging markets. U.S. demand, monetary policy, and financial shocks are critical drivers of the dynamics and fluctuations in emerging market economies, leading to changes in CDS spreads (Engler et al., 2023).

3.1.1.3 Government Bonds

I am expecting U.S. monetary policy surprises to significantly affect yields on local currency bonds in emerging markets. These effects primarily work through term premia rather than expected future short-term interest rates. Also, U.S. economic news and monetary policy changes have substantial impacts on emerging markets. These shocks can lead to changes in the yields of local currency government bonds as investors reassess risk and return profiles. Also, it is used to peg the currency of the EMEs on the dollar. To prevent the appreciation or deprecation of the local currency, bond yields are utilized (Engler et al., 2023).

3.1.1.4 Dollar Index

The DXY is influenced by U.S. monetary policy and economic news. When the Federal Reserve tightens monetary policy or when there is positive economic news from the U.S., the DXY tends to appreciate. This appreciation can lead to capital outflows from emerging markets as investors seek higher returns in the U.S., thereby increasing borrowing costs and putting pressure on emerging

market currencies and financial conditions.

3.1.1.5 FOMC Shocks

The spillover from FOMC shocks. to emerging markets occurs due to informational effects and financial flows. The Federal Reserve's disclosure of information during FOMC announcements impacts exchange rates, leading to unexpected strengthening of emerging economies' currencies against the U.S. dollar. Different U.S. monetary policy shocks have varying effects on emerging markets' financial flows and macroeconomic performance, influencing equity indexes and aggregate fluctuations. Ignoring these information shocks can bias inferences on key frictions in small open economy models, highlighting the importance of considering such spillovers in analyzing the interrelation of global financial markets (Camara, 2021).

The descriptive statistics, which encompass mean and standard deviations, for EMEs at the country level, are comprehensively presented in Table 3.1. This table provides detailed insights into the average asset prices across emerging markets. Conversely, the data pertaining to the United States is organized on a yearly basis and can be found in Table 3.2. This table offers a clear overview of the U.S. asset prices, allowing for a comparative analysis between the emerging markets and the U.S. across different time periods. By examining these tables, readers can gain a thorough understanding of the asset price trends and statistical variations in both emerging markets and the United States.

	Country									
	Argentina	Bolivia	Brazil	Bulgaria	Chile	China	Colombia	Costa Rica	Czechia	Egypt
N	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)
CDS	1,481.53 (1,535.22)	. (.)	341.43 (484.20)	160.22 (26.87)	74.31 (42.48)	67.38 (39.64)	192.76 (127.15)	. (.)	49.05 (11.4)	. (.)
FX	0.26 (0.26)	0.14 (0.01)	0.39 (0.13)	0.61 (0.08)	0.17 (0.03)	0.14 (0.02)	0.04 (0.01)	0.20 (0.04)	0.04 (0.01)	0.15 (0.06)
GOV1Year	. (.)	. (.)	9.88 (3.31)	1.02 (1.55)	3.70 (2.07)	2.55 (0.67)	5.55 (2.17)	. (.)	2.05 (1.84)	14.79 (2.84)
GOV5Year	. (.)	. (.)	10.72 (2.54)	3.03 (2.15)	4.16 (1.30)	3.13 (0.55)	6.93 (2.02)	. (.)	2.31 (1.59)	15.29 (1.74)
GOV10Year	. (.)	. (.)	11.2 (2.16)	3.82 (2.11)	4.85 (1.05)	3.5 (0.54)	7.22 (1.83)	. (.)	3.18 (1.79)	15.9 (1.52)
FX_regime										
0	8,395 (100.00%)	7,300 (87.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	7,300 (87.00%)	0 (0.00%)	8,395 (100.00%)	2,190 (26.10%)	8,395 (100.00%)
1	0 (0.00%)	1,095 (13.00%)	8,395 (100.00%)	8,395 (100.00%)	8,395 (100.00%)	1,095 (13.00%)	8,395 (100.00%)	0 (0.00%)	6,205 (73.90%)	0 (0.00%)

	Country									
	Hungary	India	Indonesia	Israel	Kazakhstan	Mexico	Moldova	Pakistan	Paraguay	Peru
N	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)	8,395 (10.0%)
CDS	186.18 (58.57)	121.14 (52.78)	178.51 (109.60)	. (.)	196.24 (14.29)	132.76 (67.79)	1,481.54 (1,535.22)	. (.)	. (.)	140.38 (83.77)
FX	0.00 (0.00)	0.02 (0.00)	0.09 (0.02)	0.26 (0.03)	0.01 (0.00)	0.08 (0.02)	14.44 (2.90)	0.01 (0.00)	0.19 (0.04)	0.31 (0.03)
GOV1Year	4.61 (3.68)	6.65 (1.61)	7.04 (2.34)	2.22 (2.26)	. (.)	5.72 (1.92)	. (.)	. (.)	. (.)	2.95 (1.96)
GOV5Year	5.52 (3.02)	7.31 (1.29)	8.19 (2.43)	3.27 (2.55)	. (.)	6.24 (1.38)	. (.)	10.28 (2.41)	. (.)	4.01 (1.48)
GOV10Year	5.81 (2.41)	7.56 (1.28)	8.44 (2.24)	3.98 (2.29)	. (.)	6.95 (1.13)	. (.)	10.91 (1.98)	. (.)	5.42 (1.47)
FX_regime										
0	0 (0.00%)	2,037 (24.30%)	0 (0.00%)	0 (0.00%)	8,395 (100.00%)	0 (0.00%)	8,395 (100.00%)	7,300 (87.00%)	0 (0.00%)	0 (0.00%)
1	8,395 (100.00%)	6,358 (75.70%)	8,395 (100.00%)	8,395 (100.00%)	0 (0.00%)	8,395 (100.00%)	0 (0.00%)	1,095 (13.00%)	8,395 (100.00%)	8,395 (100.00%)

	Country								
	Philippines	Poland	Russia	South Africa	South Korea	Thailand	Turkey	Ukraine	Total
N	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	67,160 (100.00%)
CDS	184.22 (143.57)	77.18 (12.88)	298.83 (74.24)	179.62 (81.27)	69.08 (61.85)	84.21 (52.76)	362.62 (241.67)	422.89 (876.47)	198.44 (296.22)
FX	0.02 (0.00)	0.29 (0.05)	0.03 (0.01)	0.11 (0.03)	0.09 (0.01)	0.03 (0.00)	0.55 (0.34)	0.12 (0.07)	0.15 (0.21)
GOV1Year	4.99 (3.30)	. (.)	7.64 (3.02)	. (.)	3.15 (1.80)	2.21 (1.08)	13.03 (5.21)	39.03 (36.30)	9.07 (15.77)
GOV5Year	6.79 (3.57)	. (.)	8.07 (2.03)	8.37 (1.59)	3.62 (1.88)	2.94 (1.16)	12.92 (4.49)	. (.)	6.85 (4.15)
GOV10Year	7.53 (3.72)	. (.)	8.31 (1.75)	9.06 (1.56)	3.55 (1.54)	3.61 (1.23)	11.65 (3.82)	. (.)	6.99 (3.66)
FX_regime									
0	0 (0.00%)	0 (0.00%)	3,163 (37.70%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	8,395 (100.00%)	11,558 (17.20%)
1	8,395 (100.00%)	8,395 (100.00%)	5,232 (62.30%)	8,395 (100.00%)	8,395 (100.00%)	8,395 (100.00%)	8,395 (100.00%)	0 (0.00%)	55,602 (82.80%)

Table 3.1: Emerging Markets: Asset Price at Country Level

	Year							
	2000	2001	2002	2003	2004	2005	2006	2007
N	365 (12.50%)	365 (12.50%)	365 (12.50%)	365 (12.50%)	365 (12.50%)	365 (12.50%)	365 (12.50%)	365 (12.50%)
ED4	0.02 (0.03)	-0.06 (0.17)	-0.05 (0.08)	-0.02 (0.10)	0.01 (0.10)	0.02 (0.05)	0.01 (0.05)	-0.02 (0.08)
DXY	109.49 (4.66)	115.16 (2.78)	111.22 (5.37)	95.92 (3.87)	87.53 (2.71)	87.15 (3.00)	86.42 (2.22)	80.79 (2.81)
US-1 Year	6.11 (0.19)	3.49 (0.89)	2.00 (0.38)	1.24 (0.11)	1.89 (0.49)	3.62 (0.48)	4.94 (0.21)	4.53 (0.61)
US-5 Year	6.16 (0.44)	4.56 (0.38)	3.82 (0.70)	2.97 (0.35)	3.43 (0.34)	4.05 (0.25)	4.75 (0.23)	4.43 (0.46)
US-10 Year	6.03 (0.39)	5.02 (0.29)	4.61 (0.54)	4.01 (0.35)	4.27 (0.27)	4.29 (0.18)	4.80 (0.24)	4.64 (0.30)

	Year							
	2009	2010	2011	2012	2013	2014	2015	2016
N	365 (12.50%)	365 (12.50%)	365 (12.50%)	365 (12.50%)	365 (12.50%)	365 (12.50%)	365 (12.50%)	365 (12.50%)
ED4	-0.02 (0.07)	-0.01 (0.03)	0.00 (0.04)	0.01 (0.02)	-0.00 (0.01)	0.00 (0.05)	-0.02 (0.05)	-0.02 (0.06)
DXY	80.79 (4.17)	81.35 (2.83)	76.70 (2.01)	80.68 (1.39)	81.52 (1.31)	82.64 (3.23)	96.59 (1.92)	96.88 (2.41)
US-1 Year	0.47 (0.10)	0.32 (0.07)	0.18 (0.07)	0.18 (0.02)	0.13 (0.02)	0.12 (0.03)	0.32 (0.13)	0.61 (0.11)
US-5 Year	2.20 (0.35)	1.93 (0.48)	1.52 (0.53)	0.76 (0.13)	1.17 (0.34)	1.64 (0.09)	1.53 (0.14)	1.34 (0.26)
US-10 Year	3.26 (0.39)	3.22 (0.47)	2.78 (0.63)	1.80 (0.21)	2.35 (0.41)	2.54 (0.20)	2.14 (0.17)	1.84 (0.29)

	Year					
	2018	2019	2020	2021	2022	Total
N	365 (20.00%)	365 (20.00%)	365 (20.00%)	365 (20.00%)	365 (20.00%)	1,825 (100.00%)
ED4	0.01 (0.02)	-0.07 (0.03)	. (.)	. (.)	. (.)	-0.02 (0.04)
DXY	92.96 (2.60)	96.69 (0.93)	95.73 (3.17)	92.47 (1.92)	103.80 (5.19)	96.33 (5.11)
US-1 Year	2.33 (0.28)	2.05 (0.39)	0.37 (0.49)	0.10 (0.07)	2.80 (1.39)	1.53 (1.29)
US-5 Year	2.75 (0.17)	1.95 (0.39)	0.53 (0.42)	0.86 (0.23)	3.00 (0.83)	1.82 (1.09)
US-10 Year	2.91 (0.16)	2.14 (0.40)	0.89 (0.35)	1.45 (0.18)	2.96 (0.71)	2.07 (0.91)

Table 3.2: United States Asset Prices by Years.

3.1.2 Vulnerabilities

To assess the vulnerability of emerging markets, I adapted the framework from (Ahmed et al., 2017) to my selected sample of emerging economies. Their study demonstrates a clear relationship between specific macroeconomic variables and the depreciation index, which informed the selection of my variables. Given the constraints in data availability, I couldn't include all emerging markets. Therefore, my analysis focuses on a relative list tailored to the available data. I constructed a vulnerability index based on key macroeconomic fundamentals. These fundamentals include the current account balance, total reserves over short-term debt and over GDP, general government net debt, inflation, and bank credits to the private sector. The choice of these variables is grounded in their demonstrated relationship with emerging market depreciations, as observed in their study. By utilizing data from 2000 to 2022, I aim to capture a comprehensive view of the vulnerabilities and potential spillovers in emerging markets, ensuring that my findings are robust and reflective of underlying economic conditions. I will create two different indexes. One of them varies only through countries, meaning that it is a 1×28 matrix while the other index is created in order to capture the time heterogeneity of the results; hence, it becomes a 23×28 matrix[2].

To further refine my analysis, I included trade data that is obtained from Boz et al. (2022) to examine the volume of international trade with the United States. This inclusion helps differentiate whether the observed spillover effects are due to inherent vulnerabilities or are merely reflections of financial ties with the United States.

For robustness, I also explored the alternative explanations for the observed

[2]Some of the fundamentals are missing for some of the markets hence the matrices have missing entries.

spillovers, such as the proportion of transactions conducted by the U.S. relative to the total transactions of each country. This was analyzed using OEC trade data to compare the ratio of imports from the U.S. to the total imports of the EMEs. This step ensures a comprehensive examination of potential drivers behind the spillover effects, distinguishing genuine economic vulnerabilities from mere transactional occurrences.

3.1.2.1 Inflation

We use the annual inflation data from the International Monetary Fund (IMF). Inflation can significantly influence spillover effects in emerging markets, primarily through its impact on currency risk. High inflation rates within emerging markets often lead to the depreciation of the local currency as it diminishes the real purchasing power. This depreciation increases the currency risk, making investments in these markets less attractive to foreign investors, who seek to avoid the potential losses from currency devaluation. Moreover, when there is positive economic news or robust performance in the U.S. markets, investors typically re-calibrate their portfolios towards more stable and lucrative options, often favoring assets denominated in stronger currencies. Consequently, emerging markets with high inflation rates experience more pronounced negative spillovers, as the heightened currency risk deters investment and magnifies the impact of external economic shifts, pushing capital away from these vulnerable economies towards more stable environments. This dynamic underscores how inflation interplays with currency risk to amplify the sensitivity of emerging markets to economic conditions in the United States.

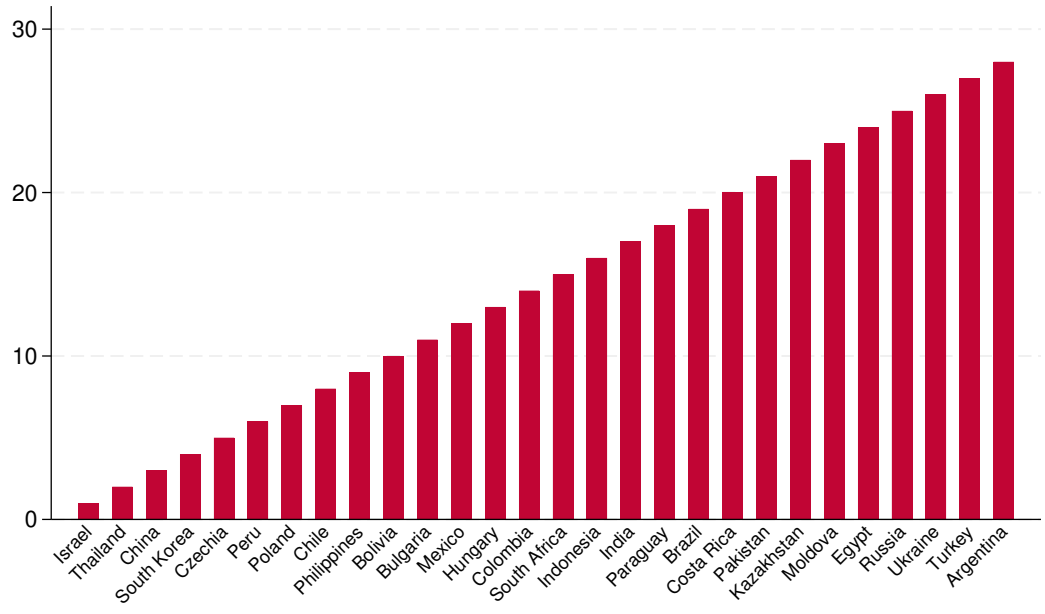

Figure 3.1: Average Inflation ranking

3.1.2.2 Current Account Balance

I use the World Bank Current Account Balance data as a percentage of the GDP. Current account deficits can signal underlying economic vulnerabilities, increasing the risk of sudden stops in financing. Deficits arising from the fundamentals, such as failures in financial regulation or fiscal mismanagement, highlight structural weaknesses that reduce national savings and fuel unsustainable credit booms. These deficits necessitate painful adjustments, if not addressed, with potential distortions. The risk of sudden stops in financing, where foreign lenders abruptly cease support, becomes particularly concerning. Experience has shown that these episodes often lead to large financial disruptions, including rapid currency depreciation, increased interest rates, and significant output declines. Large current account deficits, particularly in countries with extensive cross-border financial linkages, raise systemic risk. Cross-border resolution processes are often poor and are likely to remain so for some time, affecting other countries due to the extent and complexity of these financial linkages. This situation

is akin to the risks posed by large financial institutions. Individual countries typically do not fully account for these risks, highlighting the need for prudential measures to manage and ease the systemic risk associated with large current account deficits. In summary, current account deficits introduce a spectrum of risks that can destabilize an economy. These risks necessitate careful monitoring and management to soften potential adverse effects, emphasizing the role of prudential measures in addressing systemic risks (Blanchard and Milesi-Ferretti, 2012).

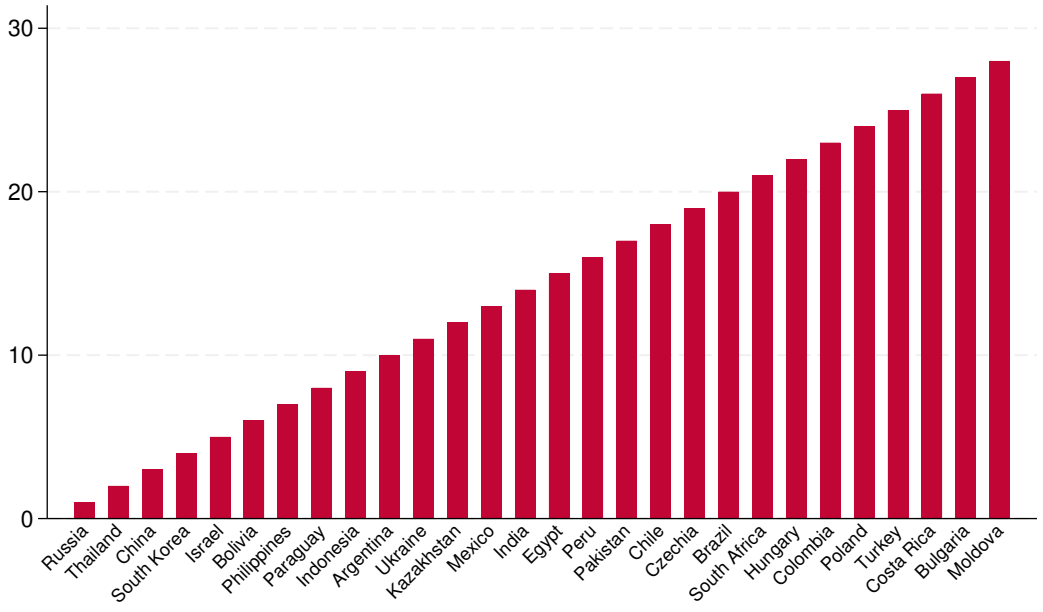

Figure 3.2: Average CAB ranking

3.1.2.3 Reserves

I utilize the reserves to GDP ratio, which includes gold holdings, with data sourced from the World Bank to assess an economy's financial robustness and capacity to respond to economic shocks. Reserves act as a buffer against financial market volatility. Countries with higher reserves can better absorb shocks from international monetary policy changes, reducing the spillover rate. Reserves can

also be used to control excessive credit growth. In economies with shallow financial markets, high reserves can prevent the destabilizing effects of speculative capital inflows, which are often triggered by unconventional monetary policies in developed countries (Kara, 2016). Adequate reserves help maintain currency stability. When reserves are sufficient, central banks can intervene in foreign exchange markets to stabilize their currency, modifying the impact of external monetary policy changes (Fic, 2013). The higher reserves also create a positive perception on the investors about the flexibility of the EME to control for the shocks.

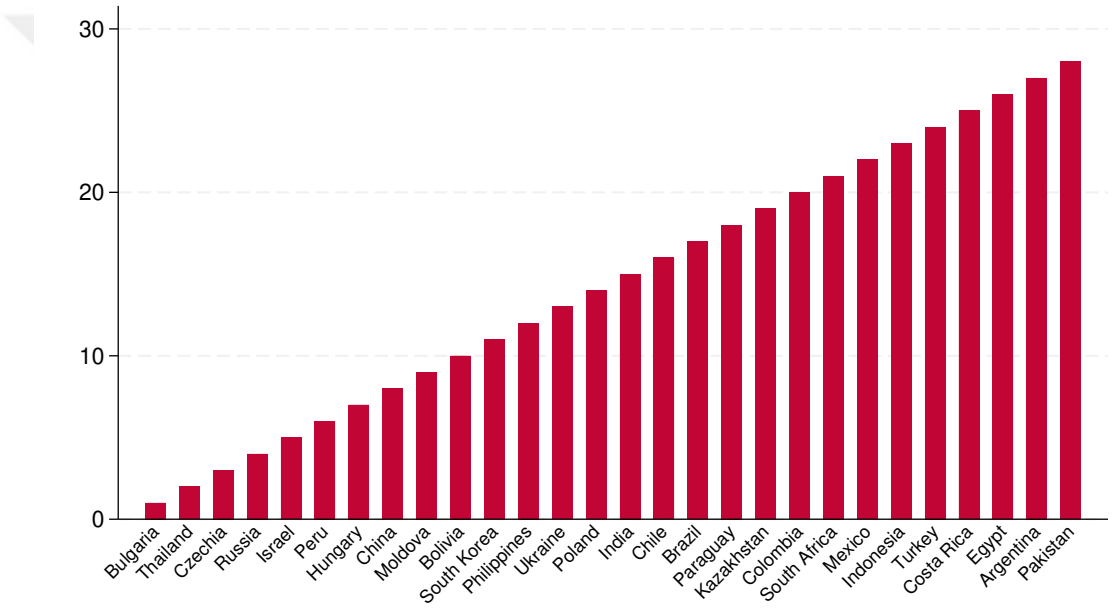

Figure 3.3: Average Reserves Over GDP ranking

3.1.2.4 Short-term Debt

We use the ratio of reserves to short-term debt obtained from the IMF. The data uses the Greenspan-Guidotti rule. A high short-term debt-to-reserve ratio indicates that a country has significant short-term liabilities relative to its reserves. This can strain liquidity management, making the country more vulnerable to

external shocks and increasing the spillover rate (Kara, 2016). Countries with high short-term debt relative to reserves may face reduced market confidence. Investors might perceive these countries as riskier, leading to capital outflows in response to foreign monetary policy changes, thereby amplifying spillovers (Engler et al., 2023). Countries with lower reserves relative to short-term debt have less flexibility in responding to external shocks. This limited policy space can increase the spillover rate as the country struggles to remediate the impact of foreign monetary policy changes (Syed et al., 2019).

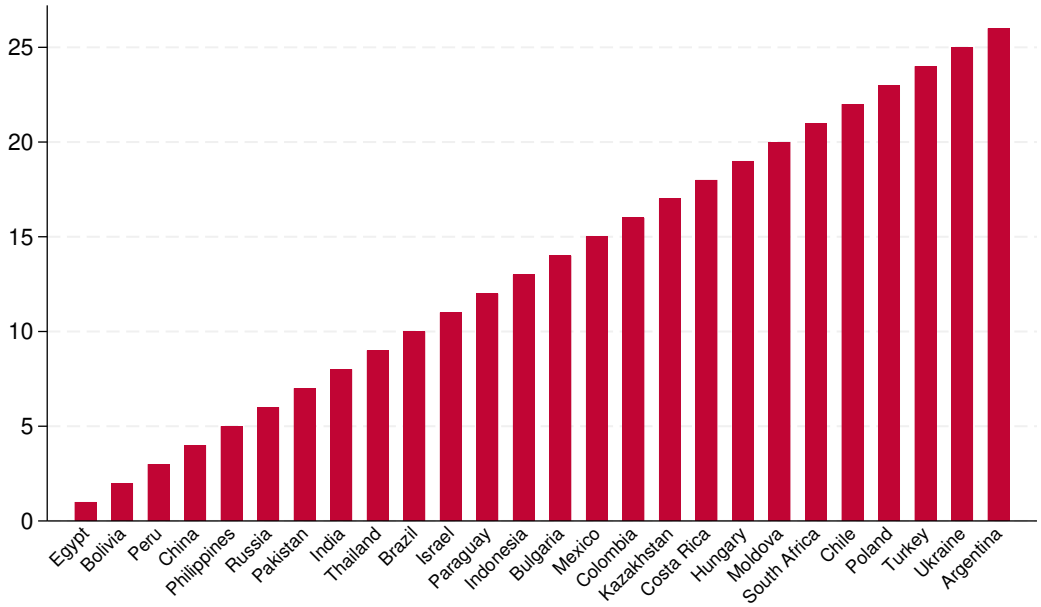

Figure 3.4: Average Reserves Over STD ranking

3.1.2.5 Government Debt

I use the annual central government debt-to-GDP ratio taken from the IMF. High government debt-to-GDP ratios can undermine market confidence in a country's financial stability. This lack of confidence can lead to increased volatility and susceptibility to external shocks, thereby amplifying spillover effects (Fic, 2013). The government debt is not a direct indicator of the spillover rates but rather an

indirect effect. It affects the spillovers through the risk channel. Governments with higher debts with respect to their GDPs are less likely to be able to respond when there is a market risk in the private sector. Therefore, there are expected to be higher spillover rates when the central government debt is higher with respect to the market's GDP.

> Net lending $(+)$/ borrowing $(-)$ is calculated as revenue minus total expenditure. This is a core Government Finance Statistics (GFS) balance that measures the extent to which the general government is either putting financial resources at the disposal of other sectors in the economy and nonresidents (net lending) or utilizing the financial resources generated by other sectors and nonresidents (net borrowing). This balance may be viewed as an indicator of the financial impact of general government activity on the rest of the economy and nonresidents[3].

3.1.2.6 Private Sector Credit

I used World Bank data on monetary sector credit to the private sector by banks. I believe that credit growth in emerging market countries significantly increases their financial risk due to the following factors. The rapid expansion of credit, often driven by the need for high investment returns, can lead to excessive borrowing and leverage, particularly in the corporate sector. This trend is compounded by the migration of credit from regulated banks to less transparent private credit markets. The opacity of private credit markets poses substantial risks, as these markets have not yet faced severe economic downturns at their current scale. This creates the potential for delayed loss realization,

[3](GFSM 2001, paragraph 4.17). Note: Net lending (+)/borrowing (-) is also equal to net acquisition of financial assets minus net incurrence of liabilities.

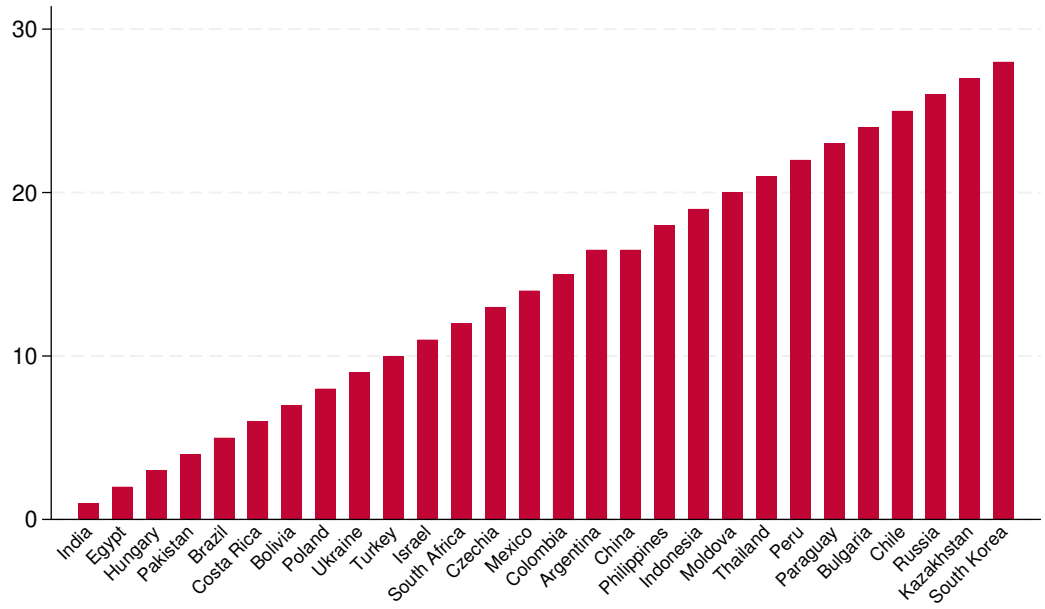

Figure 3.5: Average Government Debt ranking

spikes in defaults, and significant valuation markdowns. Additionally, increased exposure of pensions and insurers to private credit and the proliferation of semi liquid investment vehicles further amplify systemic vulnerabilities. As these investments become integral to the financial system, their systemic importance grows, increasing the likelihood of macro-critical disruptions. Furthermore, the rapid growth of private credit, combined with the pressure to deploy capital and competition from banks, can lead to the deterioration of underwriting standards and weakened covenants, heightening the risk of future credit losses (International Monetary Fund, 2024).

3.1.2.7 Trade Currency

I use the trade invoicing data that is provided from Boz et al. (2022). When trade is predominantly invoiced in a single currency, such as the U.S. dollar, it creates asymmetries in trade dynamics. This can lead to higher output spillovers as expenditure-switching effects between countries are nullified, amplifying the

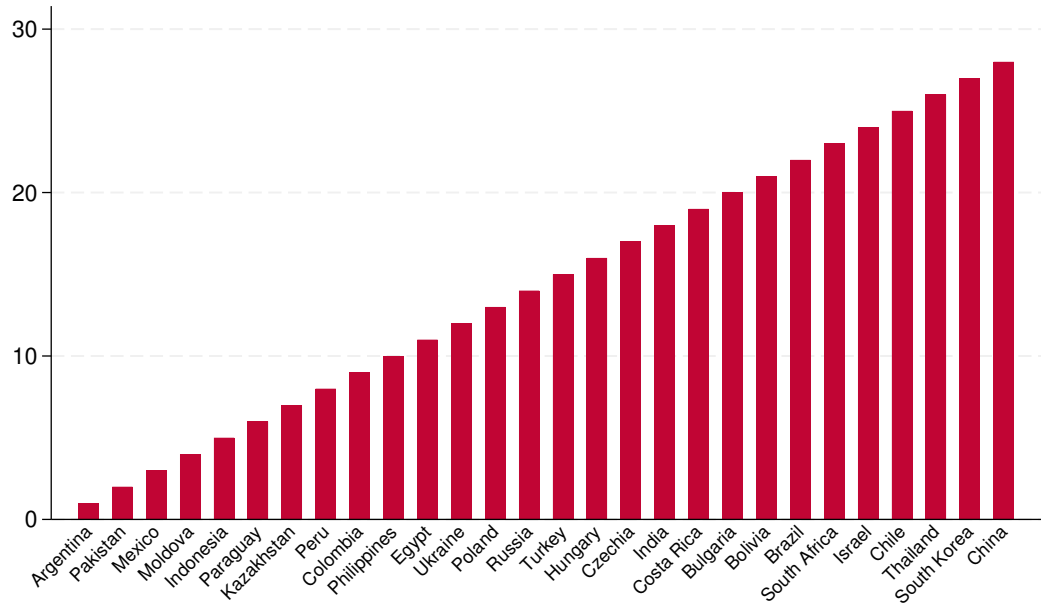

Figure 3.6: Average Credit ranking

impact of monetary policy changes in the dominant currency economy. The integration of global value chains means that adjustments in trade due to currency fluctuations are not uniform. Dominant-currency economies experience different trade adjustments compared to regional economies, leading to asymmetric spillover effects (Boeck and Mori, 2023). In a world with increasing spillovers, policies in the Rest of the World (RoW) need careful calibration in response to the time-varying output and inflation effects of U.S. policies. The rising spillovers likely lead to a rise in domestic repercussions, necessitating a nuanced approach to policy-making. Moreover, trade currency shows the need for the U.S. Dollar; hence, anything that affects the dollar would affect the EMEs(Gopinath et al., 2020; Gopinath, 2015).

3.1.2.8 Foreign Trade

Imports and Exports with the U.S. channel work through global trades where the stronger trades with the U.S. economies would imply that there is a stronger

pass-through from the U.S. economy to EMEs. Higher levels of trade integration are associated with more significant international spillover effects. Countries with greater trade integration tend to experience more substantial economic downturns following contractionary U.S. policy shocks, indicating that trade currency plays a crucial role in the transmission of these shocks. Compared to their total foreign trade (Gaulier and Zignago, 2010).

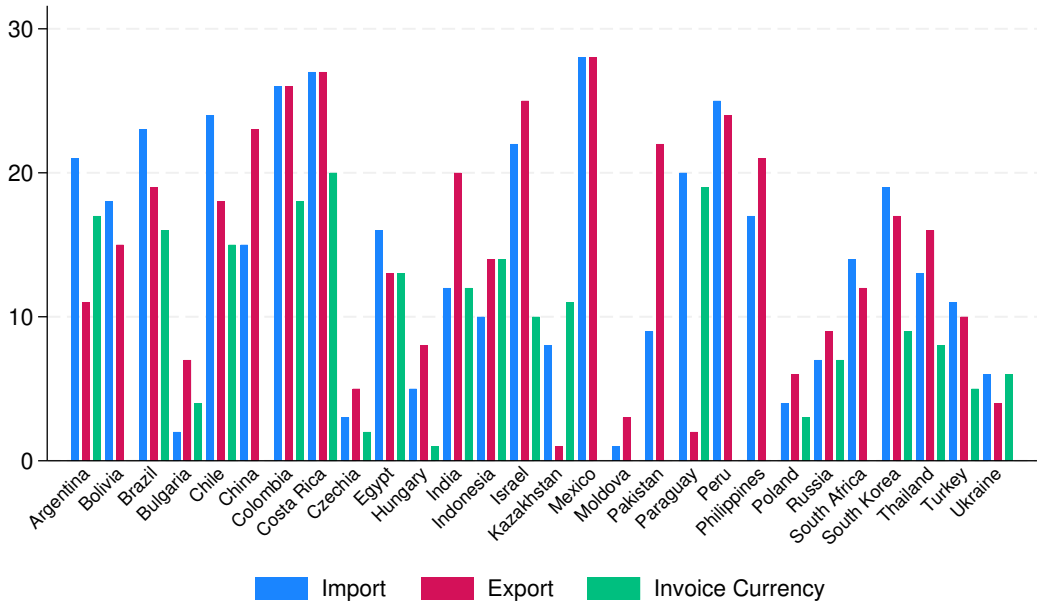

Figure 3.7: Ranking of the Trade Variables

	Country									
	Argentina	Bolivia	Brazil	Bulgaria	Chile	China	Colombia	Costa Rica	Czechia	Egypt
N	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)
CAB	0.13 (3.25)	1.71 (5.63)	-2.15 (1.79)	-4.43 (7.62)	-1.90 (3.62)	3.24 (2.60)	-3.02 (1.82)	-3.91 (1.58)	-2.05 (2.41)	-1.29 (2.79)
Reserves	6.93 (2.08)	24.03 (15.26)	13.98 (7.16)	38.58 (16.24)	14.10 (3.08)	24.89 (10.30)	12.31 (4.19)	9.75 (3.28)	36.40 (23.20)	8.80 (2.72)
Short Term Debt	0.47 (0.16)	4.06 (2.56)	2.18 (0.99)	1.85 (0.98)	0.92 (0.20)	3.68 (1.43)	1.57 (0.41)	1.25 (0.49)	. (.)	4.21 (2.10)
Inflation	20.53 (18.38)	4.12 (2.98)	6.42 (2.55)	4.17 (3.96)	3.61 (2.29)	2.17 (1.65)	5.04 (2.22)	6.58 (4.36)	2.91 (2.98)	9.46 (5.39)
Government Debt	-2.68 (3.28)	-3.95 (4.72)	-4.68 (2.58)	-0.40 (2.04)	-0.27 (3.74)	-2.68 (2.51)	-2.70 (2.01)	-4.07 (2.06)	-2.77 (2.39)	-7.30 (3.06)
Credit	13.60 (3.03)	50.06 (14.21)	50.93 (15.29)	48.08 (16.93)	73.78 (7.88)	135.77 (25.26)	36.13 (11.31)	45.66 (10.53)	43.49 (9.55)	37.28 (11.61)
	Country									
	Hungary	India	Indonesia	Israel	Kazakhstan	Mexico	Moldova	Pakistan	Paraguay	Peru
N	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)
CAB	-2.99 (4.60)	-1.29 (1.55)	0.28 (2.48)	2.51 (1.94)	-1.03 (3.31)	-1.14 (1.08)	-8.11 (4.24)	-1.80 (2.62)	0.45 (2.92)	-1.67 (2.08)
Reserves	25.04 (10.09)	16.03 (4.79)	11.16 (2.83)	26.37 (12.39)	13.18 (4.99)	11.31 (4.28)	24.84 (12.94)	5.01 (1.58)	13.58 (6.72)	25.34 (9.96)
Short Term Debt	1.13 (0.38)	2.33 (0.58)	1.89 (0.38)	2.15 (0.90)	1.53 (0.56)	1.76 (0.56)	1.01 (0.36)	2.90 (2.21)	1.95 (0.76)	3.69 (1.43)
Inflation	4.76 (3.32)	6.07 (2.24)	6.06 (3.17)	1.56 (1.70)	8.47 (3.27)	4.73 (1.56)	9.46 (7.21)	7.84 (4.08)	6.12 (3.21)	2.94 (1.57)
Government Debt	-4.74 (2.35)	-8.37 (1.90)	-1.69 (1.44)	-3.42 (2.51)	1.05 (4.24)	-2.73 (1.15)	-1.61 (1.76)	-4.73 (2.12)	-0.57 (2.30)	-0.91 (2.47)
Credit	42.34 (9.74)	45.35 (8.24)	28.09 (4.47)	68.69 (3.80)	31.16 (11.83)	19.44 (5.50)	25.01 (6.62)	17.45 (3.14)	30.42 (13.51)	33.70 (10.59)
	Country									
	Philippines	Poland	Russia	South Africa	South Korea	Thailand	Turkey	Ukraine		
N	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)		
CAB	1.11 (2.72)	-3.13 (2.22)	6.34 (3.77)	-2.15 (2.34)	3.06 (2.08)	3.26 (3.97)	-3.35 (2.45)	-0.38 (5.06)		
Reserves	20.91 (7.87)	19.15 (5.85)	28.18 (12.65)	11.53 (4.59)	22.00 (4.47)	36.57 (14.44)	11.06 (3.12)	19.75 (9.78)		
Short Term Debt	3.23 (1.40)	0.85 (0.20)	3.22 (1.07)	0.96 (0.26)	. (.)	2.21 (0.59)	0.67 (0.07)	0.53 (0.22)		
Inflation	3.97 (1.80)	3.25 (3.29)	10.09 (5.13)	5.52 (1.91)	2.46 (1.28)	2.05 (1.91)	18.88 (18.34)	12.59 (10.37)		
Government Debt	-1.92 (2.02)	-3.86 (1.92)	0.88 (3.63)	-3.01 (2.38)	1.23 (1.40)	-0.93 (2.46)	-3.66 (3.21)	-3.76 (2.95)		
Credit	36.73 (8.17)	41.24 (13.22)	41.52 (13.17)	61.37 (4.56)	130.67 (22.37)	104.08 (12.30)	42.31 (19.88)	37.65 (18.79)		

Table 3.3: Average Macroeconomic Fundamentals Across Countries

	Country									
	Argentina	Bolivia	Brazil	Bulgaria	Chile	China	Colombia	Costa Rica	Czechia	Egypt
N	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)
EXPORT	7.86 (2.11)	10.85 (4.24)	14.95 (5.18)	2.78 (1.42)	14.18 (2.43)	19.19 (2.18)	35.30 (6.38)	36.68 (3.89)	2.36 (0.44)	8.67 (2.85)
IMPORT	14.54 (2.85)	10.43 (3.49)	17.95 (2.91)	1.55 (0.75)	19.23 (2.16)	8.60 (0.93)	28.95 (2.94)	42.19 (3.58)	1.93 (0.49)	9.71 (4.18)
Trade Currency	97.12 (0.34)	. (.)	95.53 (1.59)	38.63 (6.46)	94.43 (1.14)	. (.)	98.76 (0.49)	99.52 (0.48)	14.20 (1.05)	89.16 (0.79)
	Country									
	Hungary	India	Indonesia	Israel	Kazakhstan	Mexico	Moldova	Pakistan	Paraguay	Peru
N	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)	8,395 (10.00%)
EXPORT	3.57 (1.30)	15.06 (2.67)	10.56 (1.59)	33.61 (3.94)	1.25 (0.87)	78.54 (3.64)	2.25 (1.49)	17.56 (4.82)	2.16 (0.76)	19.31 (5.37)
IMPORT	2.02 (0.54)	6.24 (1.10)	5.20 (1.42)	16.91 (3.64)	4.84 (0.97)	59.96 (5.28)	1.51 (0.62)	5.17 (1.34)	13.13 (2.52)	20.84 (1.59)
Trade Currency	11.65 (2.17)	86.49 (1.23)	93.38 (0.87)	85.05 (2.99)	86.12 (2.39)	. (.)	. (.)	. (.)	98.81 (0.47)	. (.)
	Country									
	Philippines	Poland	Russia	South Africa	South Korea	Thailand	Turkey	Ukraine		
N	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)	8,395 (12.50%)		
EXPORT	16.46 (5.06)	2.37 (0.44)	4.00 (0.98)	8.15 (1.65)	13.61 (3.14)	13.53 (3.29)	5.61 (2.18)	2.29 (0.88)		
IMPORT	10.17 (3.78)	1.99 (0.39)	3.80 (0.91)	7.01 (1.72)	11.28 (2.78)	6.50 (1.47)	5.61 (0.99)	2.63 (0.84)		
Trade Currency	. (.)	21.21 (6.01)	76.52 (7.92)	. (.)	84.98 (1.34)	80.58 (2.99)	45.17 (2.74)	74.67 (1.53)		

Table 3.4: Emerging Market Trades With U.S.

3.2 Methodology

In this section, I will explain the methodologies that is used throughout the study. First, I explain how I calculate the spillover rates against different shocks. Second, I will explain how I set the vulnerability index to assess the relationship between the spillover rates and the vulnerabilities. Finally, I explain the methods that I use for assessing the relationship between vulnerabilities and spillovers.

3.2.1 Spillovers

To assess the spillovers, I use the event study approach as used in the Hoek et al. (2022); Engler et al. (2023); di Giovanni et al. (2022). Consequently, the following simple regression model will be applied to analyze the data

$$y_{c,t+1} - y_{c,t-1} = \alpha_c + \beta s_t + \varepsilon_{c,t+1} \tag{3.2}$$

In the above model, y represents the CDS, FX, and BOND prices for the EMEs, and s is the shock component of the FOMC announcement. I am taking the percentage change in the 2-day window for the currency part. For the CDS and bond yields, I take the 1-day difference. This regression covers the sample period of 2000-2019. Since the FOMC shock is orthogonal to the error term, I will apply OLS. Not all countries in my sample use the floating exchange rate regime, and they do not always use the same regime. Hence, I use the exchange rate classification to understand when they use a floating regime to be affected by the FOMC announcements. For this purpose the classification from Ilzetzki et al. (2019) become a helpful source for my study. However, I also use currencies that are pegged to EURO instead of USD since they are also affected by the shock component. By doing so, I make sure that I can see the response of the currencies in the free market. This allows me to see the response of the emerging markets to the FOMC announcement in a short window. The difference in these

responses will be my main interest, and I will examine the reasons for these differences. From that regression, I have achieved the following results. As can be seen from the responses, I can say that not all EMEs react similarly to the shock of the monetary policy during the FOMC meeting. My main objective is to understand these differences and see how much of these differences can be explained by the vulnerabilities of those markets. For the FOMC shocks, I use the euro-dollar rate four quarters ahead to make sure I capture both paths, a target factor that is mentioned in Gürkaynak et al. (2005). I also showed the results to differentiate between target and path factors by using MPS monetary policy shock and FF4 Future Forward four quarters ahead. By doing so, I will be able to understand if there is a difference from the source of the shock. That is to say, I want to see if target and path factors have different effects on emerging markets' asset prices.

$$y_{c,t+1} - y_{c,t-1} = \alpha_c + \beta s_{1,t} + \delta s_{2,t} + \varepsilon_{c,t+1} \tag{3.3}$$

These shocks will give me the average spillovers from 2000-2019 for data availability. It consists of the FOMC shocks on the emerging markets on FOMC meeting days.

We also conduct the analysis for the daily U.S. economic spillovers on the EMEs. For that, I use U.S. sovereign bonds and DXY. I have the following regression model from this analysis.

$$Y_{c,t+1} - Y_{c,t} = \alpha_{c,y} + \beta_{c,y}(X_{t+1} - X_t) + \varepsilon_{c,t} \tag{3.4}$$

In the above regression, subscript c, y shows the country and year. The dependent variable Y is the asset prices from the EMEs, and X is either U.S. sovereign bonds or DXY. In this part two day time window will not be necessary for the emerging market responses. I take the one-day difference with the opening

price. That way, the time difference is covered for all the EMEs[4]. By doing so I can analyze the spillovers of the U.S. sovereign bonds and dollar index on the EMEs CDS spreads, government bonds and currency. This analysis is conducted for each year and for each country individually. Hence, depending on the data availability, I will see changes in the country's spillover rates each year.

For this analysis, several identification assumptions were meticulously addressed. Stationarity was ensured by applying the first differences to the data. The absence of serial correlation in the errors was confirmed with the Durbin-Watson test[5] yet if the confirmation is not possible, robust standard errors are used. The model also avoided endogeneity issues as there was no evidence of reverse causality or simultaneity, making instrumental variable techniques unnecessary. While the presence of serial auto correlation in the error terms affects the efficiency of OLS estimates, the coefficients remain unbiased and consistent. To address potential concerns, I employ heteroskedasticity and auto correlation consistent (HAC) standard errors to obtain valid inferences. Additionally, OLS estimates are presented as a benchmark for comparison with more sophisticated methods. Given the theoretical foundation of my model and practical limitations, I believe that OLS provides a meaningful and interpretable set of initial estimates. The model also avoided endogeneity issues as there was no evidence of reverse causality or simultaneity, making instrumental variable techniques unnecessary. Heteroskedasticity was managed by using robust standard errors. Structural breaks within a year were absent[6], though periodic checks over the entire

[4]China is the farthest from the U.S. in terms of the time difference, with Beijing being 15 hours ahead of San Francisco. This means that when the markets close at 5:00 PM in San Francisco, the markets in Beijing have not yet opened. As a result, the one-day time difference encompasses all the emerging markets and their responses.

[5]For exchange rate responses, auto correlation is not confirmed.

[6]There are more than 300 observations in each analysis. Only a small sample of them has structural breaks within them, which could be ignored in a large sample

sample period were conducted to maintain robustness. Proper lag selection was ensured to capture the dynamic relationships accurately, and with a single independent variable, multicollinearity was not a concern. These rigorous checks and methodological choices provide a strong foundation for the validity of the analysis, ensuring that the estimated effects are reliable and credible.

3.2.2 Vulnerabilities

To assess the vulnerabilities, I utilize the Ahmed et al. (2017) vulnerability index. This index is designed to summarize the relative strength of EMEs' macroeconomic fundamentals. It aggregates information from multiple macroeconomic variables to provide a comprehensive measure of vulnerability, addressing the problem of limited degrees of freedom in multivariate regressions. The index is based on six key macroeconomic variables that are crucial in shaping financial market responses. These variables include metrics such as gross government debt-to-GDP and current account balance-to-GDP ratios. For each macroeconomic variable, countries are ranked from 1 to N (the number of countries in the sample), with higher rankings indicating greater vulnerability. For the current account balance as a percentage of GDP, reserves including gold as a percentage of GDP, reserves as a percentage of short-term debts, and net government debt, I assigned 1 to the highest value and 28 to the lowest value. For inflation and monetary sector credit to the private sector by banks, I used 1 for the lowest value and 28 for the highest value. This process ensures that the index reflects the relative vulnerabilities of countries at a given point in time. After ranking, I calculate the arithmetic average of the ranks for each country. It is important to notice that there will be two different indices at the end. One of them would have a time dimension that varies across time, while the other one is stagnated at the time and only varies through markets.

This index is also created for the average vulnerabilities. To achieve this, I first calculate the averages of each macroeconomic fundamental across years for each country. This gives me a ranking from 1 to 28 without a time dimension. After that, I applied the same procedure as mentioned above. Following part will explain the methods that is used to create the index in a rigorous form.

Let C be the set of EMEs in my sample and M be the macroeconomic fundamentals that I use in my model.

The rank of any emerging market $c \in C$ for macroeconomic fundamental $v \in \{$CAB, Reserves, Government Debt, Reserves over Short-Term Debt$\}$ is:

$$\text{rank}_c(v) = 1 + \sum_{j \in C} \mathbb{1} \left(\frac{1}{23} \sum_{y=2000}^{2022} v_{c,y} < \frac{1}{23} \sum_{y=2000}^{2022} v_{j,y} \right), \tag{3.5}$$

and for macroeconomic fundamental $v \in \{$Inflation, Private Sector Credit$\}$ is:

$$\text{rank}_c(v) = 1 + \sum_{j \in C} \mathbb{1} \left(\frac{1}{23} \sum_{y=2000}^{2022} v_{c,y} > \frac{1}{23} \sum_{y=2000}^{2022} v_{j,y} \right). \tag{3.6}$$

The index is calculated by the following:

$$\text{Index}_c = \frac{1}{|M|} \sum_{m \in M} \text{rank}_c(v) \tag{3.7}$$

The rank of any emerging market $c \in C$ for macroeconomic fundamental $v \in \{$CAB, Reserves, Government Debt, Reserves over Short-Term Debt$\}$ at year $y \in \{2000, \ldots, 2022\}$ is:

$$\text{rank}_{c,y}(v) = 1 + \sum_{j \in C} \mathbb{1} \left(v_{c,y} < v_{j,y} \right), \tag{3.8}$$

and for macroeconomic fundamental $v \in \{$Inflation, Private Sector Credit$\}$ is:

$$\text{rank}_{c,y}(v) = 1 + \sum_{j \in C} \mathbb{1} \left(v_{c,y} > v_{j,y} \right). \tag{3.9}$$

The index is calculated by the following:

$$\text{Index}_{c,y} = \frac{1}{|M|} \sum_{m \in M} \text{rank}_{c,y}(v) \tag{3.10}$$

Index_c is fixed in time; hence it only varies across countries. However, $\text{Index}_{c,y}$ varies through time as well as through countries.

I also use these fundamentals individually to differentiate the marginal effects of each of them on spillover. By examining each macroeconomic variable independently, I can identify the specific contributions and impacts of different fundamentals on the vulnerability index. This approach allows me to determine which variables have the most significant influence on financial market responses, thereby providing a clearer understanding of the underlying drivers of vulnerability. Additionally, I analyze the average for the sample period as well as for each year to capture the effect of any changes in vulnerability on the spillover.

Using both individual variables and averages alongside the aggregated indices allows me to compare and contrast different methodologies for assessing vulnerabilities. While the aggregated indices provide a general measure, the individual variables and averages offer insights into specific vulnerabilities and their direct impacts on financial market stability. This comprehensive approach ensures that I capture both the broad and nuanced aspects of macroeconomic vulnerabilities in Emerging Market Economies, facilitating a more detailed and reliable assessment of spillover effects.

I use the same approach for the dominant trade currency and for the import and export shares of the U.S. By incorporating these additional variables, I aim to capture the broader economic interactions and dependencies that influence vulnerability. The dominant trade currency, typically the U.S. dollar, plays a crucial role in shaping financial stability, as fluctuations in its value can have

significant implications for trade balances and debt servicing costs. Similarly, the import and export shares with the U.S. provide critical insights into trade dependencies and exposure to economic shifts in the U.S. economy. By analyzing these variables individually and through averages, I can better understand their specific impacts on macroeconomic stability and identify the channels through which the U.S. economic conditions influence emerging markets. This comprehensive analysis allows me to capture a more detailed and nuanced picture of the vulnerabilities faced by Emerging Market Economies in relation to their trade and currency dependencies.

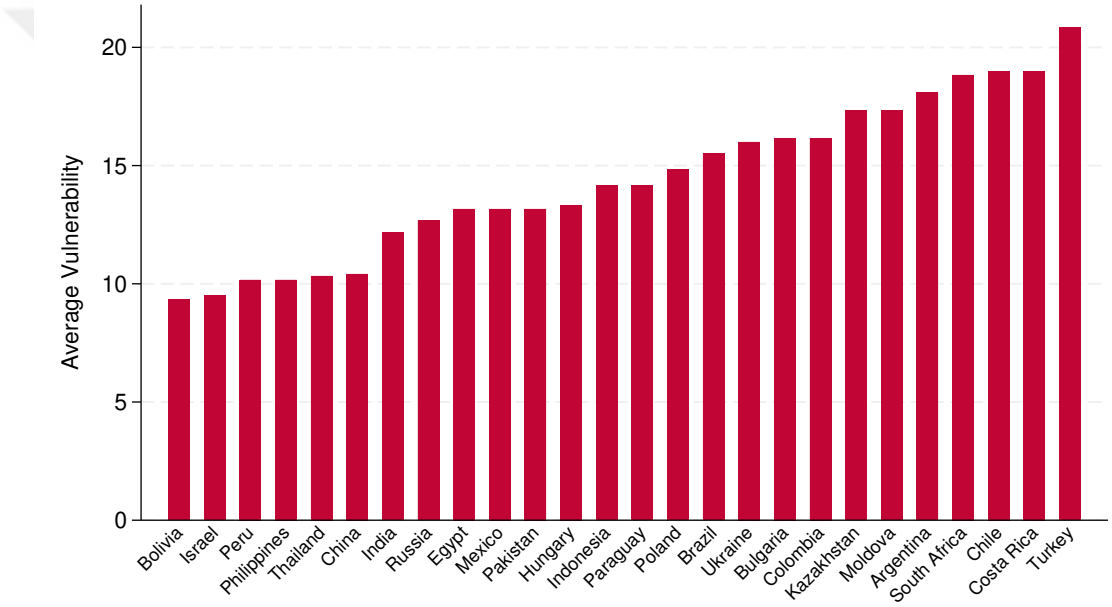

Figure 3.8: Vulnerability Index

3.2.2.1 Example of Turkey

As it can be seen in the Figure 3.8, I can see the average vulnerability index for the sample period. On average, Turkey has been the most vulnerable country among my sample. In Figure 3.9, I am able to see how this vulnerability has changed over the years and how much it varies. These figures illustrate the dynamic nature of vulnerability across different years and how adjacent

countries' vulnerability levels have evolved over time. This comparison provides valuable insights into the temporal shifts and regional trends in vulnerability.

In recent years, Turkey's macroeconomic fundamentals have deteriorated significantly compared to my sample. This decline is particularly evident in key indicators such as inflation, government debt, and foreign reserves. The persistent rise in inflation has eroded purchasing power and undermined economic stability, while increasing government debt has heightened fiscal vulnerabilities. Additionally, the depletion of foreign reserves has exacerbated external vulnerabilities, making the economy more susceptible to global shocks. These adverse trends underscore Turkey's growing challenges in maintaining economic resilience, highlighting a contrast with other countries in my sample that have managed to sustain more robust macroeconomic fundamentals.

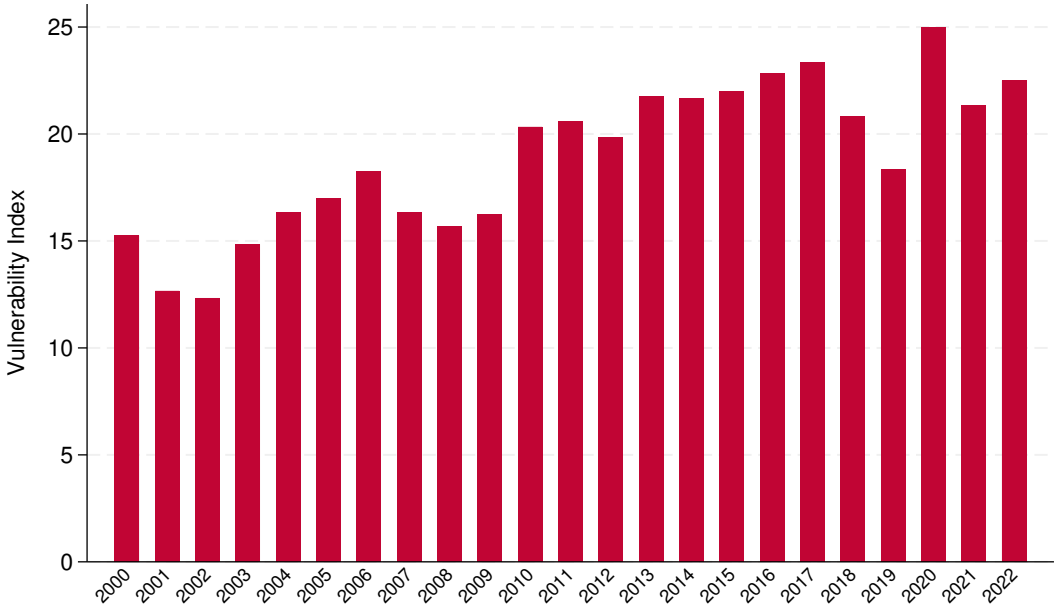

Figure 3.9: Vulnerability Index for Turkey

3.2.3 Affect of Vulnerabilities

In my model, the spillover rates vary by country and year characteristics. The subsequent step in the hierarchical regression model is to explain the variation of the regression coefficients $\beta_{c,y}$ or β_c by incorporating explanatory variables at the country and year levels. After assessing the vulnerabilities, I continue with the following regression equations.

$$\begin{aligned} \hat{y}_{cy} &= \hat{\alpha}_{cy} + \hat{\beta}_{cy} \Delta X_{c,y,t} \\ \hat{\beta}_{cy} &= \kappa_y + \gamma_y v_{cy} + u_{cy} \end{aligned} \tag{3.11}$$

$$\begin{aligned} \hat{y}_{c} &= \hat{\alpha}_{c} + \hat{\beta}_{c} s_{c,t} \\ \hat{\beta}_{c} &= \kappa + \gamma v_{c} + u_{c} \end{aligned} \tag{3.12}$$

In this regression model, I use the $\beta_{c,y}$ coefficients estimated from the first regression analysis. These coefficients represent the spillover effects that were determined in the initial phase of my analysis. By regressing these estimated coefficients on the vulnerabilities of emerging markets, I aim to understand the relationship between market vulnerabilities and the extent of spillover effects.

It is important to note that the $\beta_{c,y}$ are not observed; hence, I use a good estimator of β in the form of $\hat{\beta} = \beta + (X'X)^{-1}X'\varepsilon$ or we can say $\hat{\beta} = \beta + \phi$ where ϕ is the sampling errors vector coefficients are EDV[7], meaning that they are subject to estimation error, which can increase their variance. Even if $E(\varepsilon\varepsilon') = \sigma^2 I$, the error variance in the second stage regression analysis remains heteroskedastic. Consequently, ordinary least squares estimates are inefficient (Hanushek, 1974). This additional variance must be considered to ensure the

[7]Several studies have been conducted for the EDV literature and its efficiency while dealing with the heteroskedasticity Jusko and Shively (2005); Lewis and Linzer (2005); Saxonhouse (1976); Hanushek (1974)

robustness and accuracy of my regression results (Lewis and Linzer, 2005). Ignoring this aspect could lead to biased or inconsistent estimates, affecting my conclusions' reliability.

Two-step estimation with large panel datasets involves first estimating vectors of individual-specific coefficients. In the second stage, these estimated coefficients are used as the dependent variable. To address potential heterogeneity issues in the second stage, one can weigh all independent observations by the inverse of the variance of the dependent variable derived from the first stage estimation. However, this method requires modification if the dependent variable in the second stage is a non-linear function of the estimated coefficients (Hornstein and Greene, 2012). This approach allows me to model the variability in the $\beta_{c,y}$ coefficients more accurately by considering the randomness in the estimated dependent variables. By doing so, I can account for the increased variance and obtain more precise estimates of the relationship between vulnerabilities and spillover effects. This method enhances my analysis's reliability and helps draw more robust conclusions about the factors influencing spillover effects in emerging markets.

$$\hat{y}_{cy} = \hat{\alpha}_{cy} + \hat{\beta}_{cy} \Delta X_{c,y,t} \tag{3.13}$$

$$\hat{\beta}_{cy} = \kappa_y + \gamma_y v_{cy} + u_{cy} \tag{3.14}$$

According to Jusko and Shively (2005), one effective method is to weight the observations by the inverse of the variance of the dependent variable, which is derived from the first stage estimation. This approach lessens heteroskedasticity by ensuring that observations with higher variance (less precise estimates) have less influence on the regression results. Since I have a good estimator of the $\mathrm{Var}\,(u_c) = \omega_c^2$ I can use the Feasible Generalized Lest Square (FGLS) to apply the weighting correctly, the variance of the estimated coefficients $\hat{\beta}_c$ and $\hat{\beta}_{c,y}$ is

computed details can be founded in Appendix B the result is as follows:

$$w_c = \frac{1}{\sqrt{\omega_c^2 + \hat{\sigma}^2}} \tag{3.15}$$

$$w_{cy} = \frac{1}{\sqrt{\omega_{cy}^2 + \hat{\sigma}^2}} \tag{3.16}$$

After that, I will repeat the main regression. And will achieve asymptotically efficient estimates. Where $\hat{\sigma}^2$ is the unbiased estimation of the variance of the error term u_{cy} from the second stage regression, and $(X'X)^{-1}$ is the inverse of the matrix of explanatory variables. For non-linear functions of the estimated coefficients, additional adjustments are required. As per Lewis and Linzer (2005), if the dependent variable in the second stage is a non-linear function of the estimated coefficient, the variance of this function must be estimated and used for weighting. Details of the method can be found in the appendix. By applying these techniques, I can ensure that the second-stage regression accounts for the increased variability and potential heteroskedasticity, leading to more accurate and reliable estimates.

By using the EDV strategy, I will be able to assess the time and country-level variation without losing valuable information on the results. Heterogeneity in both dimensions will generously contribute to my results. This strategy will help me to make a novel contribution to the literature by providing me with efficient estimations of the relations between the fundamentals and emerging market asset price response to the U.S. monetary policies.

3.2.3.1 OLS With Interaction Term Compared to Multi Level Model

While using OLS with an interaction term

$$Y_{c,t+1} - Y_{c,t} = \alpha + \beta_1 \left(X_{t+1} - X_t\right) + \beta_2 v_{c,y} + \beta_3((X_{c,t+1} - X_{c,t}) \times v_{c,y}) + \varepsilon_{c,t} \tag{3.17}$$

The prediction then would become

$$\Delta\hat{Y} = \alpha + \beta_1 \left(X_{t+1} - X_t\right) + \beta_2 v_{c,y} + \beta_3 \left(\left(X_{t+1} - X_t\right) \times v_{c,y}\right) \tag{3.18}$$

That could be written as

$$\Delta\hat{Y} = \left(\alpha + \beta_2 v_{c,y}\right) + \left(\beta_1 + \beta_3 v_{c,y}\right)\left(X_{t+1} - X_t\right) \tag{3.19}$$

From there, we have simple slope and intercept terms as follows.

$$\begin{aligned} \omega_0 &= \alpha_{c,y} + \beta_2 v_{c,y} \\ \omega_1 &= \beta_1 + \beta_3 v_{c,y} \end{aligned} \tag{3.20}$$

When using the two-step approach

$$\begin{aligned} \Delta Y &= \alpha_{c,y} + \beta_{1,c,y}\left(X_{t+1} - X_t\right) + \varepsilon_{c,t} \\ \alpha_{c,y} &= \kappa_0 + \gamma_0 v_{c,y} + u_0 \\ \beta_{1,c,y} &= \kappa_1 + \gamma_1 v_{c,y} + u_1 \end{aligned} \tag{3.21}$$

This can be written as:

$$\begin{aligned} \Delta Y = &\left(\kappa_0 + \gamma_0 v_{cy} + \kappa_1\left(X_{t+1} - X_t\right) + \gamma_1\left(X_{t+1} - X_t\right) v_{c,y}\right) \\ &+ \left(u_0 + u_1\left(X_{t+1} - X_t\right) + \varepsilon_{c,t}\right) \end{aligned} \tag{3.22}$$

Then, the estimation will be written as follows:

$$\Delta\hat{Y} = \kappa_0 + \kappa_1\left(X_{t+1} - X_t\right) + \gamma_0 v_{c,y} + \gamma_1\left(X_{t+1} - X_t\right) v_{cy} \tag{3.23}$$

Hence, OLS with interaction term and multilevel analysis differ in their nature (Bauer and Curran, 2005)

It is important to note that Ordinary Least Squares (OLS) is not efficient in this context due to the nature of the composite error term:

$$\varepsilon_{c,t}^{OLS} = \left(u_0 + u_1\left(X_{t+1} - X_t\right) + \varepsilon_{c,t}^{EDV}\right). \tag{3.24}$$

This term violates the standard assumptions of homoskedasticity and the absence of serial correlation. Specifically, the errors are dependent (clustered)

within each group because they include u_0, which is common to all individuals within a group. Additionally, the errors exhibit heteroskedasticity since their variance depends on u_1, which varies across groups and is also influenced by $X_{c,t}$(Oshchepkov and Shirokanova, 2020).

Both the model with interactions and the EDV model yield consistent estimates of intercepts and slopes. However, (Lewis and Linzer, 2005, p.347) caution against using the interaction model because it "assumes, almost certainly incorrectly, that there would be no residual in a regression of individual level coefficients on the country-level variables." (Bryan and Jenkins, 2016, p.6) also advocate for the two-step EDV model, highlighting its three key advantages: 1) it "demonstrates how a small number of countries can impact the reliability of estimates"; 2) its "estimates are unbiased (with correct standard errors) and can thus be used as a benchmark for other methods"; and 3) it "naturally leads to a graphical summary of country-level variations in outcomes," where one plot the country intercepts obtained in step 1 against group-level explanatory variables v (Cheah, 2009).

Various analysis concludes that OLS with interaction terms, even with clustering and heteroskedasticity robust error terms, are less efficient than using EDV in multi-level analysis(Bauer and Curran, 2005; Oshchepkov and Shirokanova, 2020; Cheah, 2009; Bryan and Jenkins, 2016; Steenbergen and Jones, 2002; Robson and Pevalin, 2016; Asparouhov and Muthén, 2021; Arend and Schäfer, 2019).

The important part to focus on in the multilevel analysis is that true population parameters are never observed; hence, I use the estimation that is observed with the sample. Therefore the model utilizes $\hat{\beta} = \beta + (X'X)^{-1}X'\varepsilon$ or we can say $\hat{\beta} = \beta + \phi$ where ϕ is the sampling errors vector. From there, our equation will be:

$$\hat{\beta} = \kappa + \gamma v_{c,y} + (\phi + u) \tag{3.25}$$

In Lewis and Linzer (2005), the Monte Carlo analysis that is conducted over 200.000 repetition shows that the FGLS is more efficient than using OLS with White robust standard errors and Efron standard errors. Therefore, using OLS for two-step regression, even with heteroskedasticity, robust standard errors are open to type 1 errors in some cases.

In Appendix D I also have provided the results that uses the Equation 3.17. Majority of the results are similar when there is no more heteroscedasticity or they can be cluster at correct level. Double clustering results might varying a little more since the violations of the Gauss-Markov assumptions are even more in that case. This also gives another point for my methodology to produce correct results. Also it can be understood that our dataset when we are using the GSS data as the source of our shocks are not violating Gauss-Markov assumptions but when we use the daily data instead of intra-day data the violations are higher yet the results are statistically closer.

CHAPTER 4

RESULTS & DISCUSSIONS

This chapter presents the spillovers of U.S. monetary policy. I identify these spillovers both from FOMC days and by using high-frequency data from other dates. I demonstrate how these results change with macroeconomic fundamentals and through the trade channel.

4.1 FOMC Shocks

In the Table 4.1, I see the OLS results that are obtained by using equation 3.1; I can deduce two main results from these results. Firstly, the FOMC shocks have a definite effect on emerging markets, indicating that monetary policy decisions in the United States have significant spillover effects on these economies. This finding underscores the association of global financial markets and the sensitivity of emerging markets to external monetary influences. Secondly, the shocks are not uniform across all EMEs. This variability suggests that the impact of FOMC decisions is influenced by country-specific factors such as economic structure, policy frameworks, and market conditions. Understanding these nuances is crucial for developing tailored strategies that reduce the adverse effects of such external shocks on individual emerging markets.

VARIABLES	(1) Brazil	(2) Bulgaria	(3) Chile	(4) Colombia	(5) Czechia	(6) Hungary	(7) India	(8) Indonesia	(9) Israel	(10) Mexico	(11) Paraguay	(12) Peru	(13) Philippines	(14) Poland	(15) Russia	(16) SouthAfrica	(17) SouthKorea	(18) Thailand	(19) Turkey
Exchange Rate	-4.87**	-5.76***	-5.06***	-4.50**	-5.65***	-7.10***	-5.02***	-3.53**	-2.54*	-3.46**	1.00	-0.85*	-3.96***	-5.35***	-11.25**	-5.61**	-6.02***	-2.52***	-4.37***
	(1.97)	(1.78)	(1.61)	(1.82)	(1.68)	(2.09)	(1.25)	(1.55)	(1.48)	(1.40)	(1.10)	(0.50)	(0.64)	(1.36)	(4.53)	(2.20)	(1.89)	(0.58)	(1.58)
Constant	0.02	-0.02	-0.02	0.07	-0.02	0.04	-0.05	0.05	0.14**	-0.07	-0.03	0.04	0.00	-0.08	0.01	-0.03	-0.01	-0.00	0.04
	(0.12)	(0.08)	(0.10)	(0.10)	(0.12)	(0.12)	(0.07)	(0.06)	(0.07)	(0.10)	(0.05)	(0.04)	(0.04)	(0.11)	(0.17)	(0.14)	(0.09)	(0.05)	(0.10)
Observations	162	162	162	162	118	162	116	162	162	162	162	162	162	162	89	162	162	162	162
R-squared	0.05	0.12	0.08	0.05	0.11	0.10	0.14	0.08	0.04	0.04	0.01	0.01	0.19	0.07	0.11	0.05	0.11	0.07	0.05

VARIABLES	(1) Argentina	(2) Brazil	(3) Bulgaria	(4) Chile	(5) China	(6) Colombia	(7) Czechia	(8) Hungary	(9) India	(10) Indonesia	(11) Kazakhstan	(12) Mexico	(13) Moldova	(14) Peru	(15) Philippines	(16) Poland	(17) Russia	(18) SouthAfrica	(19) SouthKorea	(20) Thailand	(21) Turkey	(22) Ukraine
CDS	98.80	163.26*	6.20	3.63	19.24*	86.42***	-0.33	-1.96	2.52	92.12*	-4.87	35.46**	98.80	59.05***	46.41*	1.02	11.18	25.08**	32.85	25.12	55.81***	-6.93
	(107.37)	(97.98)	(6.39)	(8.85)	(10.91)	(20.21)	(0.33)	(10.77)	(7.45)	(52.99)	(4.99)	(16.00)	(107.37)	(16.65)	(24.60)	(5.97)	(11.79)	(10.41)	(25.57)	(16.44)	(17.69)	(27.47)
Constant	7.74	-4.44	-0.45	0.20	-0.35	0.54	-0.02	-1.59*	0.54	-1.69	-0.31	0.18	7.74	0.75	-1.39	-0.19	0.63	-0.18	-1.08	-0.56	0.97	-4.28
	(12.76)	(4.07)	(0.41)	(0.35)	(0.49)	(0.81)	(0.02)	(0.83)	(0.46)	(1.52)	(0.32)	(0.53)	(12.76)	(0.73)	(1.05)	(0.48)	(1.27)	(0.74)	(0.99)	(0.58)	(1.27)	(5.41)
Observations	118	147	56	137	137	137	56	56	46	123	56	147	118	131	143	56	56	158	144	143	158	56
R-squared	0.00	0.03	0.01	0.00	0.04	0.25	0.01	0.00	0.00	0.06	0.01	0.09	0.00	0.15	0.04	0.00	0.00	0.04	0.02	0.04	0.06	0.00

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.1: Response of FOMC Shocks

After seeing the spillovers, I now analyze the differences between these spillovers with respect to vulnerabilities. In Apnnedix C, the whole range of responses is available. In Table 4.2, I will discuss some of the findings that I observed from my analysis.

	(1)	(2)	(3)	(4)
ED4	Index	Reserves of STD	Import	Trade Currency
Exchange Rate	-0.23**	-0.13*	0.14***	0.22**
	(0.09)	(0.07)	(0.05)	(0.10)
Constant	-0.67	-2.28*	-6.13***	-6.49***
	(1.49)	(1.22)	(0.62)	(0.84)
Observations	17	17	19	15
R-squared	0.11	0.12	0.02	0.31
	Index	Reserves of STD	Import	Export
CDS			1.34**	1.67***
			(0.58)	(0.46)
Constant			-4.34**	-8.67***
			(1.77)	(2.28)
Observations			22	22
R-squared			0.47	0.56
	Index	Reserves of STD	Import	Export
1 Year Bond	0.09**	0.03***		
	(0.03)	(0.01)		
Constant	-1.06**	-0.31*		
	(0.40)	(0.31)		
Observations	17	17		
R-squared	0.27	0.24		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.2: Response of FOMC Shocks

Dependent variables are responses of exchange rate, CDS, or 1-year local currency bonds on FOMC shocks. Independent variables are the average vulnerability index, average rank of reserves as a ratio of short-term debt, average rank of import ratio with U.S., and average rank of USD invoice currency.

When I check the effect of the FOMC shock on the currency depreciation, I find that my findings are in line with the literature Ahmed et al. (2017), Hoek et al. (2022), Engler et al. (2023), higher vulnerabilities cause markets to suffer more from the U.S. monetary shocks. Between those fundamentals, reserve adequacy is a deciding factor. Higher reserves relative to short-term debt provide a significant buffer for emerging markets, enabling them to better withstand external financial shocks, especially those originating from U.S. monetary policy changes. This buffer helps stabilize the local economy by providing liquidity

during periods of capital outflows or financial stress. One rank increase in the average vulnerability index will cause a currency to depreciate 0.23 percentage point more in case of a one basis point shock from the FOMC meeting. This value is 0.13 percentage points for the rank of the reserve adequacy. Emerging markets with higher reserves relative to short-term debt are less vulnerable to sudden stops in capital flows and currency depreciation, making them less likely to experience severe financial distress when the U.S. tightens its monetary policy. Additionally, a higher reserves/short-term debt ratio signals to global investors that the country is financially stable and capable of meeting its short-term obligations even in case of outside shocks. This increased confidence can lessen the negative impact of U.S. monetary policy spillovers, as investors are less likely to withdraw funds from these markets during periods of U.S. monetary tightening. Moreover, the Greenspan-Guidotti rule, which suggests that countries should hold reserves equal to their short-term external debt, helps lower risk perceptions among international investors, reducing the sensitivity of capital flows and credit spreads in emerging markets to U.S. monetary policy changes. Higher reserves also enable interventions in foreign exchange markets to stabilize the local currency, helping manage exchange rate volatility that might arise from U.S. monetary policy actions, thereby reducing the overall impact of such spillovers. Furthermore, with adequate reserves, emerging markets have more flexibility to implement counter-cyclical monetary and fiscal policies, allowing them to better manage the domestic economic impact of U.S. monetary policy changes, further insulating them from adverse spillovers. By maintaining a higher reserves/short-term debt ratio, emerging markets can effectively ease the adverse effects of U.S. monetary policy spillovers, ensuring greater economic stability and resilience.

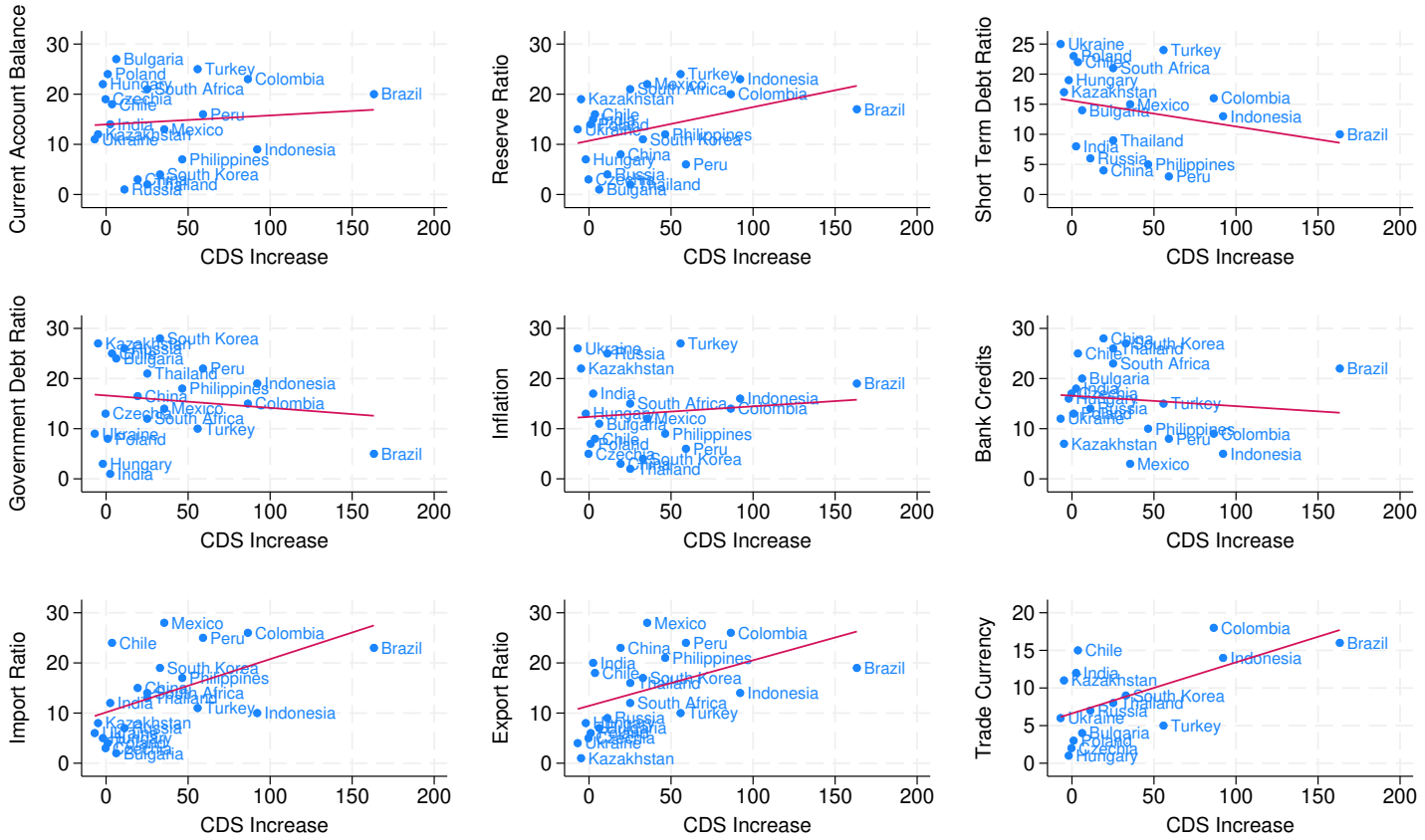

Figure 4.1: CDS Response on FOMC Shocks

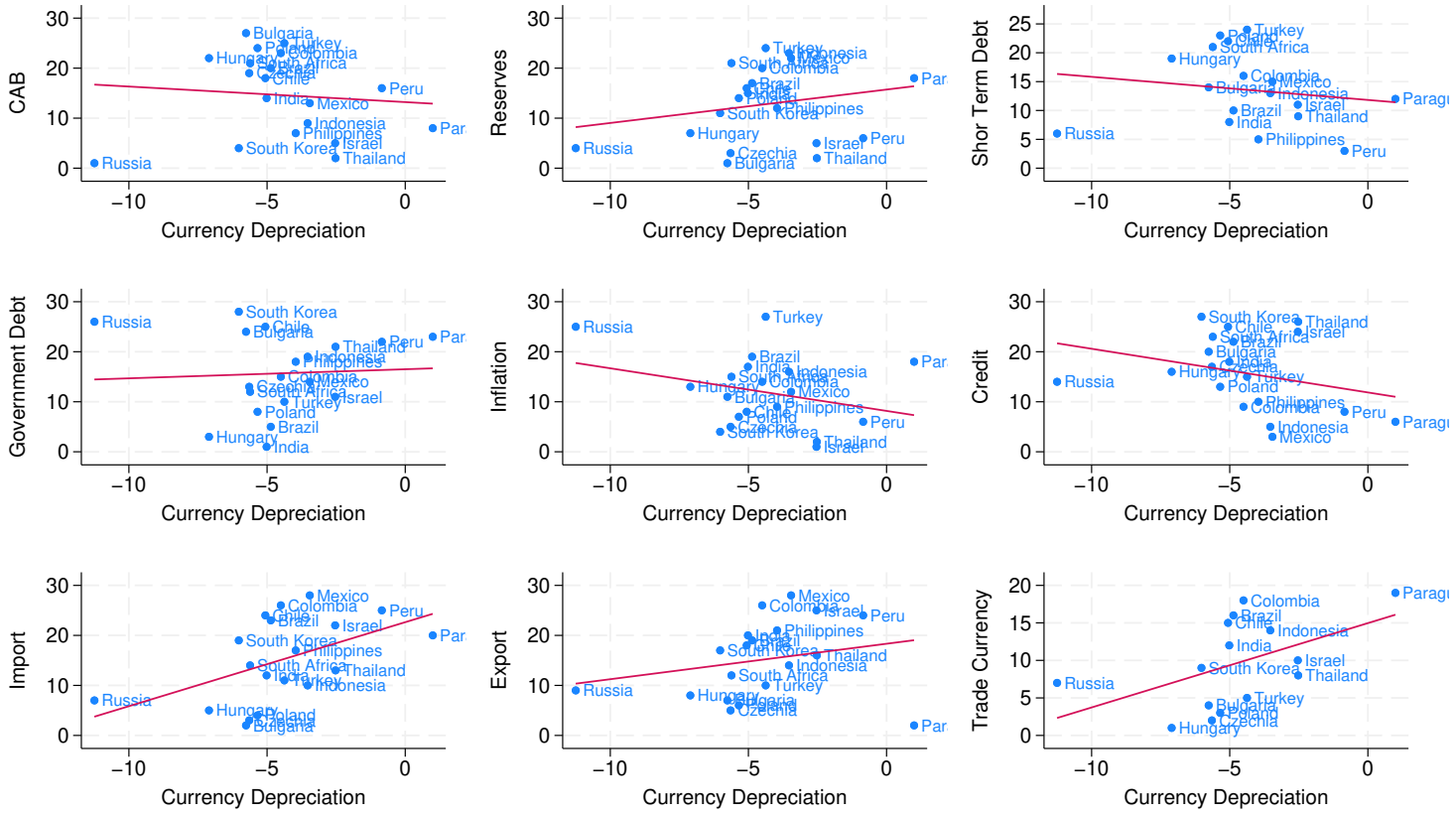

Figure 4.2: Currency Response on FOMC Shocks

For the import ratio and dominant trade currency, my findings show an inverse relation, such as a higher import share with the U.S. decreasing the rate of spillovers for the exchange rate. However, this relation is only in currency spillovers, which makes me want to investigate the relation further. I use U.S. export data from OECD[1] for Brazil, India, Mexico, South Korea, and Turkey and realized that the correlation has an inverse causation. Currency depreciation during the FOMC announcement leads to a decrease in imports from the U.S. for the next month.

	Brazil	India	Mexico	Korea	Turkey
Brazil	-0.07				
India		0.16			
Mexico			0.32		
Korea				0.11	
Turkey					0.17

Table 4.3: Correlation table for the imports and currency changes.

The responses of Credit Default Swaps (CDS) to Federal Open Market Committee (FOMC) shocks reveal that increasing trade relations amplify spillover rates. Specifically, a higher trade ratio with the USA intensifies the CDS spillovers on emerging markets from U.S. monetary policy. This is because countries that are less open to trade experience stronger spillovers from U.S. policy. The research indicates that countries with smaller gross U.S. dollar liabilities and higher financial development experience more pronounced effects from U.S. monetary policy easing. This suggests that the level of trade exposure to the USA significantly influences the extent to which emerging markets are impacted by U.S. monetary policy decisions, leading to increased CDS spillovers in these economies. A one-rank increase in the import and export ratio with the USA will increase the FOMC shock on CDS spreads by 1.34 and 1.67 basis points,

[1]Organization for Economic Co-operation and Development, International Merchandise Trade Statistics: Exports: Commodities for Turkiye [XTEXVA01TRM667S], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/XTEXVA01TRM667S, July 28, 2024.

respectively, in response to 1 basis point shocks from the FOMC. Even though Crespo Cuaresma et al. (2019) suggests that globalization decreases spillover risk when one of the trade partners is predominant, it increases the risks reflected in the CDS spreads. This indicates that while globalization generally eases risks, heavy reliance on a single major trade partner, such as the USA, can heighten financial vulnerabilities in emerging markets. Thus, the interplay between trade exposure and financial development plays a crucial role in determining the impact of U.S. monetary policy on CDS spillovers.

Higher U.S. interest rates typically lead to higher yields on government bonds in emerging markets as investors demand greater returns to compensate for increased risk. An increase in U.S. interest rates can trigger capital outflows from emerging markets, with investors seeking higher returns in the U.S. This outflow can result in a sell-off of government bonds, driving up their yields while decreasing their prices. FOMC shocks also cause the depreciation of local currencies in emerging markets. This depreciation raises the cost of servicing foreign-denominated debt, negatively impacting government bond prices and increasing yields (Tillmann et al., 2019). Specifically, a one-rank increase in the vulnerability index leads to a 0.09 percentage point increase in bond yields, while the effect of reserve adequacy is 0.03 percentage points. My findings are inline with the Engler et al. (2023),Hoek et al. (2022),Arteta et al. (2022).

4.2 Daily Spillovers

While the results in Table4.2 show me the immediate response of emerging markets to FOMC shocks, providing insight into the short-term volatility and adjustments in these economies, Table4.3 extends this analysis by offering the results for the yearly responses of emerging markets. This broader temporal perspective captures the cumulative and potentially more enduring effects of

U.S. monetary policy changes on emerging markets. By examining the yearly data, I can identify trends, patterns, and the longer-term impact of these shocks, which is crucial for understanding how emerging markets adapt over time to U.S. monetary policy adjustments. This comprehensive analysis not only highlights the immediate market reactions but also sheds light on the sustained economic adjustments and policy responses in emerging markets, thereby providing a more robust and nuanced contribution to the existing literature. This dual approach of analyzing both immediate and yearly responses allows for a deeper understanding of the dynamic interactions between U.S. monetary policy and emerging market economies, underscoring the importance of both short-term and long-term perspectives in economic research.

	(1)	(2)	(3)
DXY	Index	CAB(% GDP)	Reserves of STD
Exchange Rate	-0.03***	-0.01***	-0.03***
	(0.01)	(0.00)	(0.00)
Constant	-0.08***	-0.31	-0.07
	(0.09)	(0.05)	(0.04)
Observations	378	427	381
R-squared	0.04	0.05	0.21
CDS	0.16***	0.09**	0.11**
	(0.08)	(0.04)	(0.04)
Constant	-0.41	0.51	0.44
	(0.98)	(0.46)	(0.43)
Observations	340	375	342
R-squared	0.00	0.01	0.01

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.4: Response of DXY Shocks

Dependent variables are responses of exchange rate, CDS, or 1 Year on DXY. Independent variables are vulnerability index, rank of reserves as a ratio of short-term debt, and rank of current account balance as a percentage of GDP.

For a one-rank change in the vulnerability index, the response of the exchange rate to a one-percentage-point change in the DXY is -0.03 percentage points.

This indicates that as the vulnerability index increases by one rank, the exchange rate depreciates by an additional 0.03 percentage points in response to a one-percentage-point appreciation in the DXY. Similarly, for the current account balance, the exchange rate response is -0.01 percentage points. This suggests a slightly less pronounced effect, where a one-rank increase in the current account balance vulnerability leads to a 0.01 percentage point depreciation in the exchange rate for a one-percentage-point change in the DXY. In terms of reserve adequacy, the exchange rate response is -0.03 percentage points, indicating a more substantial impact. A one-rank increase in reserve adequacy vulnerability results in a 0.03 percentage point depreciation in the exchange rate for a one-percentage-point change in the DXY, reflecting the critical role of reserves in buffering against external shocks.

For the Credit Default Swap (CDS) spreads, the values are more pronounced. A one-rank change in the vulnerability index results in a 0.16 basis point change in the CDS spread. This significant impact highlights the sensitivity of credit risk perceptions to overall economic vulnerabilities. For the current account balance, the effect is 0.09 basis points, indicating that a one-rank increase in current account vulnerability leads to a 0.09 basis point increase in CDS spreads. This underscores the importance of a stable current account balance in maintaining investor confidence. Lastly, for reserve adequacy, the effect is 0.11 basis points, suggesting that vulnerabilities in reserve adequacy lead to a 0.11 basis point increase in CDS spreads. This further emphasizes the importance of adequate reserves in mitigating credit risk and maintaining financial stability in emerging markets.

When the current account balance of an emerging market improves, it potentially signifies an increase in exports relative to imports, leading to a net inflow of foreign currency. One possible explanation is that the enhancement in trade balance strengthens the emerging market's currency, reduces inflationary pressures,

and boosts purchasing power, thereby making the economy more resilient to external shocks. A higher current account surplus could diminish reliance on foreign capital, which might lessen the impact of U.S. interest rate changes and financial conditions. This reduced dependency on external borrowing can be due to lowered vulnerability to capital flight and shifts in investor sentiment driven by U.S. economic policies. Additionally, a stronger current account balance often leads to an accumulation of foreign exchange reserves, providing a buffer against sudden changes in capital flows and exchange rate volatility. These reserves enable better currency management and financial system stability, which further insulate the economy from U.S. economic fluctuations. Moreover, a healthier current account balance allows for greater monetary policy independence, enabling the focus on domestic conditions rather than reacting to U.S. monetary policy changes. This autonomy can be due to more effective management of inflation, growth, and employment, thereby reducing the influence of U.S. spillovers. Therefore, by improving their current account balance, emerging markets can enhance economic resilience and decrease exposure to U.S. economic spillovers through strengthened currency, lower foreign capital dependency, increased foreign reserves, and greater monetary policy flexibility.

The results strongly support the conclusion that strong macroeconomic fundamentals significantly dampen the spillover effects from U.S. monetary policy on EMEs. Countries with relatively strong fundamentals, such as higher reserve adequacy, stable current account balances, are better equipped to shield their financial markets from the adverse impacts of external shocks. Among these factors, reserve adequacy consistently emerges as a critical determinant in reducing spillover effects across various economic conditions. Adequate reserves act as a buffer, enabling countries to maintain liquidity during periods of financial distress, manage exchange rate volatility, and sustain investor confidence, all of which are essential in dampening the transmission of U.S. monetary policy changes to EMEs. The results also support that relative vulnerabilities of the

EMEs are important determinant since the discrimination against EMEs by the investors are based on their perception of the risk relative to what they assume as the risk free U.S. financial markets. The drawbacks based on the macroeconomic fundamentals are not only caused by the foreign investors but also by the locals when they perceive higher risks they choose to invest in more stable economies.

The methodology I utilized also allows me to capture the time-varying heterogeneity of the spillovers, revealing that the responses of emerging markets to U.S. monetary policy shocks fluctuate across different years. This variation can be largely attributed to changes in global risk appetite, which tends to drawbacks and flow in response to broader economic conditions, geopolitical events, and shifts in investor sentiment. During periods of heightened global risk aversion, emerging markets may experience more pronounced spillover effects as investors retreat to safer assets, intensified capital outflows and currency depreciation. Conversely, in times of increased risk tolerance, the impact of U.S. monetary policy on EMEs may be more subdued as global investors are more willing to engage with higher-risk assets. This dynamic interplay between global risk appetite and spillover effects underscores the importance of considering temporal factors in analyzing the vulnerability of emerging markets to external shocks. By accounting for these time-varying factors, my methodology enables a more nuanced understanding of the complex and evolving nature of spillovers, offering valuable insights for policymakers and investors alike.

In addition to macroeconomic fundamentals, the analysis reveals that over-reliance on a single trade partner significantly amplifies financial risks for emerging markets. In a way, this reliance can be considered as a vulnerability for an emerging market. This vulnerability is particularly evident in the response to CDS spreads, which tend to widen in countries where trade is predominantly concentrated within a single nation, such as the United States. The heightened risk reflects the potential for substantial economic disruption if the trade rela-

tionship deteriorates or if the dominant trade partner experiences economic instability. This finding underscores the importance of trade diversification in enhancing financial stability and reducing exposure to external shocks. However, it is important to note that it is not globalization in trade that increases the vulnerability in my analysis but having a single trade partner dominating the majority of the foreign trade. By diversifying their trade partnerships, emerging markets can better insulate themselves from the negative spillover effects associated with concentrated trade dependencies.

Regardless of the results of the analysis my methodology allowed me to capture the effect of time characteristic change in the U.S. spillovers on emerging markets without losing any information about country characteristics. My approach gives consistent and efficient results under certain assumptions, which I have strong evidence that are met in my analysis(Jusko and Shively, 2005). By utilizing the time characteristics effect, I contribute novely to the findings of Ahmed et al. (2017); Hoek et al. (2020); Engler et al. (2023) and also see the long time effects. While the method that I have used is superior in capturing the time and country-level heterogeneity, it lacks in providing strong evidence in causal relations.

CHAPTER 5

CONCLUSION

In this study, I examined the role of macroeconomic fundamentals in the spillovers from U.S. monetary policy to a broad set of emerging markets, employing an event study method with high-frequency data. My investigation focused on the changes in currency depreciation, CDS spreads, and local currency bond yields in response to the FOMC announcements. By leveraging the heterogeneity inherent among different countries, I utilized annual macroeconomic fundamental data to elucidate the relationship between these fundamentals and spillover rates. Moreover, my research extended beyond FOMC announcements to consider spillover rates between bond yields and from the Dollar Index to CDS spreads and currency depreciation. Controlling the entire available time period allowed me to capture insights into both country-level and time-varying heterogeneity. This comprehensive approach enabled me to better understand spillovers during periods of varying global risk appetite. This approach makes my study a novel contribution to literature.

My methodology involved an event study approach, utilizing high-frequency data to capture immediate market reactions to U.S. monetary policy changes. By focusing on currency depreciation, CDS spreads, and bond yields, I was able to provide an understanding of market responses and their difference. The natural heterogeneity among countries enriched my dataset, allowing me to identify

differential spillover effects across nations. By incorporating annual macroeconomic fundamental data, I correlated these differences with the strength of economic fundamentals.

The findings of this study reveal strong evidence that markets with stronger macroeconomic fundamentals exhibit greater resilience to both FOMC announcements and GFC. However, I could not find any strong spillovers from U.S. government bond yields to emerging markets local currency bond yields. This resilience underscores the crucial role of robust economic fundamentals in lessening the adverse effects of external monetary shocks. My results also differentiate between the macroeconomic fundamentals. I found that while reserve adequacy is a strong driver of the spillovers, credit growth and inflation are not deterministic factors of the spillovers, neither on the CDS spreads nor on the currency depreciation. Additionally, my results indicate that spillover rates on the currency depreciation are primarily driven by financial channels rather than trade channels, with stronger spillovers causing fluctuations in trade activities. The influence of trade channels was comparatively weaker, suggesting that financial interconnections play a more significant role in transmitting U.S. monetary policy changes to emerging markets. Although financial channels were the primary conduits for spillovers, I observed that stronger spillovers had consequential effects on trade activities.

My findings have significant policy implications for emerging markets. Policymakers should prioritize strengthening macroeconomic fundamentals to enhance resilience against external monetary shocks. This includes maintaining robust fiscal and monetary policies, ensuring adequate foreign exchange reserves, and fostering stable financial markets. By doing so, emerging markets can better shield themselves from the adverse effects of global financial turbulence.

The results of this study, while explaining the variation in the spillovers on

emerging markets, do not fully explain the transmission mechanism from fundamentals to spillover rates. Future research should extend the analysis over a longer time period and focus on fewer emerging markets that provide monthly data. This would allow for the application of a time-varying parameter Bayesian vector auto-regressive approach to better understand the causation.

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APPENDIX A

Table A.1: Summary of Variables, Descriptions, and Sources

Variable	**Description**	**Frequency**	**Source**
Current Account Balance	%GDP	Annual	World Bank
Total Reserves	%GDP	Annual	World Bank
Short Term Debt	%Reserves	Annual	World Bank
Government Net Debt	%GDP	Annual	IMF
Inflation	Annual	Annual	IMF
Credit	%GDP	Annual	World Bank
Import	% of Total	Annual	CEPII
Export	% of Total	Annual	CEPII
Trade Currency	% of Total	Annual	Gita Gopinath
Exchange Rate	Local Currency	Daily	Investing.com
CDS	Basis Point	Daily	Bloomberg
DXY	Index	Daily	FRED
Bond Yields	% Points	Daily	Investing.com Bloomberg
FOMC Shocks	Basis Point	Short Window	Refet Gürkaynak

Table A.2: List of Countries

Argentina	Bolivia	Brazil	Bulgaria
Chile	China	Colombia	Costa Rica
Czechia	Egypt	Hungary	India
Indonesia	Israel	Kazakhstan	Korea
Mexico	Moldova	Pakistan	Paraguay
Peru	Philippines	Poland	Russian Federation
South Africa	Thailand	Turkiye	Ukraine

APPENDIX B

Calculate residuals from the OLS regression:

$$\hat{\varepsilon}_{cy} = y_{cy} - \beta_i' X_{cy} \tag{B.1}$$

The expectation of the sum of squared residuals from this OLS regression can be written as:

$$\mathrm{E}\left(\sum_{cy} \hat{\varepsilon}_{cy}^2\right) = \mathrm{E}\left(\varepsilon'\varepsilon\right) - \mathrm{tr}\left(\left(X'X\right)^{-1} X'\Omega X\right) \tag{B.2}$$

The variance-covariance matrix of the vector of regression residuals ε :

$$\Omega = \begin{bmatrix} \sigma^2 + \omega_{cy1}^2 & 0 & \cdots & 0 \\ 0 & \sigma^2 + \omega_{cy2}^2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & \cdots & \cdots & \sigma^2 + \omega_{cyN}^2 \end{bmatrix} \tag{B.3}$$

$$\begin{aligned} \mathrm{E}\left(\sum_{cy} \varepsilon_{cy}^2\right) &= \mathrm{E}\left[\sum_{cy} \left(\epsilon_{cy}^2 + u_{cy}^2 + 2\epsilon_{cy} u_{cy}\right)\right] \\ &= \mathrm{E}\left[\sum_{cy} \epsilon_{cy}^2\right] + \mathrm{E}\left[\sum_{cy} u_{cy}^2\right] + 0 \\ &= NY\sigma^2 + \sum_{cy} \omega_{cy}^2 \end{aligned} \tag{B.4}$$

$$\Omega = \sigma^2 I + \boldsymbol{G} \tag{B.5}$$

where I is an $ny \times ny$ identity matrix and Ω is an $ny \times ny$ diagonal matrix with ω_{cy}^2 as the cy th diagonal element.

The expectation of the Sum of Squared Residuals with Ω :

$$\begin{aligned}
\mathrm{E}\left(\sum_{cy}\hat{\varepsilon}_{cy}^{2}\right) &= NY\sigma^{2}+\sum_{cy}\omega_{cy}^{2}-\operatorname{tr}\left(\left(X'X\right)^{-1}X'\left(\sigma^{2}I+\Omega\right)X\right)\\
&= NY\sigma^{2}+\sum_{cy}\omega_{cy}^{2}-\sigma^{2}\operatorname{tr}\left(\left(X'X\right)^{-1}X'X\right)-\operatorname{tr}\left(\left(X'X\right)^{-1}X'\Omega X\right)\\
&= Y(N-k)\sigma^{2}+\sum_{cy}\omega_{cy}^{2}-\operatorname{tr}\left(\left(X'X\right)^{-1}X'\Omega X\right)
\end{aligned} \tag{B.6}$$

Unbiased Estimator for σ^2 :

$$\hat{\sigma}^{2}=\frac{\sum_{cy}\hat{\varepsilon}_{cy}^{2}-\sum_{cy}\omega_{cy}^{2}+\operatorname{tr}\left(\left(X'X\right)^{-1}X'\Omega X\right)}{N-k} \tag{B.7}$$

Given this estimator for σ^2, construct a set of weights w_{cy} such that:

$$w_{cy}=\frac{1}{\sqrt{\omega_{cy}^{2}+\hat{\sigma}^{2}}} \tag{B.8}$$

When I do not take time dimension into account, I still apply the same procedure. This time, I have variation only at the country level.

APPENDIX C

In Table C.1, For the first step independent variable, I used four-quarter ahead eurodollar bond shock from Gürkaynak et al. (2005). That shock is calculated by the 30-minute window around the FOMC announcements. For dependent variables, I use Emerging market currencies such as EMC/USD and CDS. I used a 2-day time window to account for the time zone differences in local currency and the day difference for the CDS spreads. I captured the years between 2000-2019. The coefficients that are obtained from the first step are used as independent variables for the second step. The independent variables in the second step are the average ranks of the macroeconomic fundamentals.

In table Table C.2, For the first step independent variable, I used four-quarter ahead euro-dollar bond shock from Gürkaynak et al. (2005). That shock is calculated by the 30-minute window around the FOMC announcements. For dependent variables, I use local currency bond yields from the emerging market. I captured the years between 2000-2019. The coefficients that are obtained from the first step are used as independent variables for the second step. The independent variables in the second step are the average ranks of the macroeconomic fundamentals.

VARIABLES	(1) CAB (%GDP)	(2) Reserves (% GDP)	(3) Reserves (% STD)	(4) Government Debt (%GDP)	(5) Inflation	(6) Credit (%GDP)	(7) Import	(8) Export	(9) Trade Currency
ED4 on CDS	-1.01**	1.23**	-1.08	0.65	1.09	-0.57	1.34**	1.67***	1.27
	(0.47)	(0.54)	(0.64)	(0.45)	(0.85)	(0.85)	(0.58)	(0.46)	(0.92)
Constant	19.18**	-3.89**	33.54***	-8.30	-5.46	9.89	-4.34**	-8.67***	-2.84
	(8.83)	(1.62)	(11.28)	(5.84)	(4.27)	(14.60)	(1.77)	(2.28)	(1.87)
Observations	22	22	20	22	22	22	22	22	16
R-squared	0.08	0.29	0.09	0.05	0.12	0.03	0.47	0.56	0.22
ED4 on FX	-0.09	0.03	-0.13*	0.06	-0.05	-0.11	0.14***	0.04	0.22**
	(0.06)	(0.07)	(0.07)	(0.07)	(0.08)	(0.07)	(0.05)	(0.10)	(0.10)
Constant	-2.90**	-4.49***	-2.28*	-5.13***	-3.52***	-2.40*	-6.13***	-4.71**	-6.49***
	(1.21)	(1.07)	(1.22)	(0.83)	(0.87)	(1.27)	(0.62)	(1.92)	(0.84)
Observations	19	19	17	19	19	19	19	19	15
R-squared	0.09	0.01	0.12	0.05	0.02	0.14	0.24	0.02	0.31

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C.1: Emerging Market CDS and Currency Responses on the FOMC Shock

VARIABLES	(1) CAB (%GDP)	(2) Reserves (% GDP)	(3) Reserves (% STD)	(4) Government Debt (%GDP)	(5) Inflation	(6) Credit (%GDP)	(7) Import	(8) Export	(9) Trade Currency
ED4 on 1 Year Bonds	0.01	0.01	0.03***	0.00	0.01	0.00	-0.02	-0.03*	-0.02
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	0.06	0.12	-0.31*	0.16	-0.06	0.14	0.44	0.55*	0.36**
	(0.30)	(0.26)	(0.15)	(0.26)	(0.19)	(0.32)	(0.27)	(0.26)	(0.16)
Observations	19	19	17	19	19	19	19	19	15
R-squared	0.02	0.01	0.24	0.00	0.03	0.00	0.05	0.17	0.04
ED4 on 5 Year Bonds	0.00	0.01	0.01	0.01	0.01	0.01	0.01	-0.02*	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	0.33*	0.26	0.27	0.16	0.23**	0.71**	0.17	0.34	0.13
	(0.16)	(0.15)	(0.19)	(0.17)	(0.11)	(0.25)	(0.19)	(0.20)	(0.13)
Observations	20	20	18	20	20	20	20	20	14
R-squared	0.00	0.02	0.02	0.07	0.04	0.19	0.05	0.00	0.05
ED4 on 10 Year Bonds	0.03	0.03	0.04	-0.01	0.03	-0.02	0.03*	0.00	0.04
	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.01)	(0.02)	(0.03)
Constant	0.03	0.09	-0.02	0.51	0.13	0.79	0.01	0.40	0.22
	(0.19)	(0.22)	(0.34)	(0.33)	(0.24)	(0.49)	(0.28)	(0.42)	(0.38)
Observations	20	20	18	20	20	20	20	20	14
R-squared	0.11	0.09	0.13	0.00	0.07	0.05	0.09	0.00	0.06

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C.2: Emerging Market Local Currency Bond Yields Responses on the FOMC Shock

VARIABLES	(1) CAB (%GDP)	(2) Reserves (% GDP)	(3) Reserves (% STD)	(4) Government Debt (%GDP)	(5) Inflation	(6) Credit (%GDP)	(7) Import	(8) Export	(9) Trade Currency
ED4 on CDS	-1.01**	1.23**	-1.08	0.65	1.09	-0.57	1.34**	1.67***	1.27
	(0.47)	(0.54)	(0.64)	(0.45)	(0.85)	(0.85)	(0.58)	(0.46)	(0.92)
Constant	19.18**	-3.89**	33.54***	-8.30	-5.46	9.89	-4.34**	-8.67***	-2.84
	(8.83)	(1.62)	(11.28)	(5.84)	(4.27)	(14.60)	(1.77)	(2.28)	(1.87)
Observations	22	22	20	22	22	22	22	22	16
R-squared	0.08	0.29	0.09	0.05	0.12	0.03	0.47	0.56	0.22
ED4 on FX	-0.09	0.03	-0.13*	0.06	-0.05	-0.11	0.14***	0.04	0.22**
	(0.06)	(0.07)	(0.07)	(0.07)	(0.08)	(0.07)	(0.05)	(0.10)	(0.10)
Constant	-2.90**	-4.49***	-2.28*	-5.13***	-3.52***	-2.40*	-6.13***	-4.71**	-6.49***
	(1.21)	(1.07)	(1.22)	(0.83)	(0.87)	(1.27)	(0.62)	(1.92)	(0.84)
Observations	19	19	17	19	19	19	19	19	15
R-squared	0.09	0.01	0.12	0.05	0.02	0.14	0.24	0.02	0.31

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C.3: Emerging Market CDS and Currency Responses on the FOMC Shock

In Table A.3, I can see the effect of the Dollar Index (DXY) on the CDS and the local currency exchange rate. I use panel data and run the first-step regressions for each country and each year. I use high-frequency data (daily) for 28 countries and 23 years. By using the first step results from each year and country, I run the second step regression. I use the Emerging markets ranking for each year from 2000-2022 and get a Country and Year dependent result.

In Table A.4, I can see the effect of the U.S. government bonds on the local currency bond yields. I use panel data and run the first-step regressions for each country and each year. I use high-frequency data (daily) for 28 countries and 23 years. By using the first step results from each year and country, I run the second step regression. I use the Emerging markets ranking for each year from 2000-2022 and get a Country and Year dependent result.

VARIABLES	(1) CAB (%GDP)	(2) Reserves (% GDP)	(3) Reserves (% STD)	(4) Government Debt (%GDP)	(5) Inflation	(6) Credit (%GDP)	(7) Import	(8) Export	(9) Trade Currency
DXY on CDS	0.09**	0.08**	0.11**	-0.03	0.06	-0.01	0.03***	0.02***	0.07***
	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.01)	(0.01)	(0.01)	(0.02)
Constant	0.51	0.68	0.44	2.30***	1.06**	1.49***	-0.24**	-0.12	-0.33**
	(0.46)	(0.52)	(0.43)	(0.66)	(0.46)	(0.26)	(0.10)	(0.08)	(0.13)
Observations	375	375	342	375	375	337	307	305	146
R-squared	0.01	0.01	0.01	0.00	0.00	0.00	0.05	0.02	0.09
DXY on FX	-0.01***	0.01***	-0.03***	0.01***	0.00	-0.01***	0.03***	0.03***	0.07***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Constant	-0.31***	-0.66***	-0.07	-0.70***	-0.55***	-0.38***	-1.01***	-0.94***	-1.09***
	(0.05)	(0.05)	(0.04)	(0.06)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)
Observations	427	427	381	426	427	425	405	405	235
R-squared	0.05	0.03	0.21	0.03	0.00	0.02	0.28	0.20	0.37

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C.4: Emerging Market CDS and Currency Responses on the DXY

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	CAB (%GDP)	Reserves (% GDP)	Reserves (% STD)	Government Debt (%GDP)	Inflation	Credit (%GDP)	Import	Export	Trade Currency
US 1 Year on LCU 1 Year Bonds	0.01	0.00	0.02	0.01	-0.00	-0.00	0.00	-0.00	-0.00
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.00)
Constant	0.03	0.07	-0.07	0.00	0.13	0.16	0.06	0.15	0.04
	(0.13)	(0.16)	(0.17)	(0.12)	(0.14)	(0.19)	(0.22)	(0.29)	(0.03)
Observations	340	340	286	340	340	338	321	321	199
R-squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U.S. 5 Year on LCU 5 Year Bonds	0.00	0.00	0.00	0.00	-0.00*	-0.00*	0.00***	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Constant	0.06***	0.07***	0.06***	0.06***	0.10***	0.12***	0.02	0.04*	0.08***
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)
Observations	363	363	311	363	363	361	344	344	196
R-squared	0.01	0.00	0.00	0.01	0.01	0.01	0.04	0.01	0.00
US 10 Year on LCU 10 Year Bonds	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Constant	0.01	0.01	0.02	0.01	0.00	0.01	-0.01	-0.02	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	363	363	311	363	363	361	344	344	192
R-squared	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C.5: Emerging Market Local Currency Bond Yields Responses on the U.S. Bonds

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
FX	Brazil	Bulgaria	Chile	Colombia	Czechia	Hungary	India	Indonesia	Israel	Mexico	Paraguay	Peru	Philippines	Poland	Russia	SouthAfrica	SouthKorea	Thailand	Turkey
MP1	-0.48	2.43	0.57	5.11**	-1.39	0.84	2.47	2.65	-1.17	4.37*	-1.72	-2.09**	3.68***	1.88	11.20	1.12	3.89*	0.17	1.94
	(2.86)	(2.04)	(2.21)	(2.46)	(2.46)	(2.76)	(1.89)	(1.61)	(1.57)	(2.26)	(1.33)	(0.98)	(1.08)	(2.57)	(10.99)	(3.31)	(2.20)	(1.19)	(2.40)
FF4	-3.93	-8.16***	-4.67	-9.11**	-4.41	-9.06**	-6.65**	-4.50*	-0.79	-6.26*	1.73	2.14	-7.50***	-7.67**	-19.85*	-5.12	-11.27***	-1.88	-4.94
	(4.10)	(2.92)	(3.16)	(3.52)	(3.54)	(3.95)	(2.82)	(2.31)	(2.25)	(3.24)	(1.90)	(1.41)	(1.54)	(3.68)	(10.99)	(4.74)	(3.15)	(1.71)	(3.44)
Constant	0.05	0.03	0.03	0.12	0.01	0.08	0.01	0.10	0.16**	-0.02	-0.05	0.05	0.04	-0.04	0.13	0.03	0.03	0.02	0.09
	(0.12)	(0.09)	(0.09)	(0.10)	(0.12)	(0.12)	(0.07)	(0.07)	(0.07)	(0.10)	(0.06)	(0.04)	(0.05)	(0.11)	(0.19)	(0.14)	(0.09)	(0.05)	(0.10)
Observations	162	162	162	162	118	162	116	162	162	162	162	162	162	162	89	162	162	162	162
R-squared	0.02	0.07	0.03	0.04	0.07	0.07	0.05	0.02	0.02	0.03	0.01	0.03	0.13	0.04	0.04	0.01	0.10	0.02	0.02

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
CDS	Argentina	Argentina	Brazil	Bulgaria	Chile	China	Colombia	Czechia	Hungary	India	Indonesia	Kazakhstan	Mexico	Moldova	Peru	Philippines	Poland	Russia	SouthAfrica	SouthKorea	Thailand	Turkey	Ukraine
MP1	-131.94	-131.94	386.97***	-1.38	-12.49	-17.60	-34.21	1.75	-4.99	1.91	-74.15	-1.11	-33.97**	-131.94	-67.44***	-9.30	-4.02	-20.03	-20.81	-21.70	-10.42	-21.22	41.44
	(355.14)	(355.14)	(142.79)	(30.36)	(9.69)	(15.51)	(24.69)	(1.33)	(59.12)	(30.97)	(54.96)	(20.12)	(16.75)	(355.14)	(21.02)	(34.62)	(33.38)	(97.26)	(17.82)	(34.35)	(18.59)	(29.57)	(397.16)
FF4	281.91	281.91	-63.57	13.54	26.92*	46.20**	138.67***	-2.06	-41.97	-10.12	191.92**	-24.56	91.32***	281.91	176.96***	67.61	-12.68	25.64	38.85	72.25	57.30**	54.83	-81.04
	(529.07)	(529.07)	(208.88)	(28.65)	(14.19)	(22.70)	(36.14)	(1.26)	(55.79)	(29.67)	(81.77)	(18.98)	(24.50)	(529.07)	(31.10)	(52.12)	(31.51)	(91.79)	(26.61)	(51.50)	(27.99)	(44.14)	(374.82)
Constant	6.72	6.72	-3.82	-0.47	0.18	-0.48	-0.02	-0.02	-1.72**	0.46	-2.49	-0.35	-0.05	6.72	0.37	-1.68	-0.25	0.58	-0.44	-1.29	-0.67	0.42	-4.41
	(12.91)	(12.91)	(5.15)	(0.41)	(0.34)	(0.54)	(0.86)	(0.02)	(0.80)	(0.45)	(1.96)	(0.27)	(0.60)	(12.91)	(0.73)	(1.26)	(0.45)	(1.32)	(0.81)	(1.25)	(0.68)	(1.35)	(5.40)
Observations	118	118	147	56	137	137	137	56	56	46	123	56	147	118	131	143	56	56	158	144	143	158	56
R-squared	0.00	0.00	0.09	0.01	0.03	0.03	0.13	0.06	0.02	0.00	0.05	0.04	0.10	0.00	0.22	0.02	0.01	0.00	0.01	0.02	0.04	0.01	0.00

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C.6: Response of FOMC Shocks With Target & Path Factor

VARIABLES	(1) Arithmetic	(2) Geometric	(3) Harmonic
Exchange Rate	-0.03***	-0.02***	-0.01**
	(0.01)	(0.01)	(0.01)
Constant	-0.08	-0.27***	-0.38***
	(0.09)	(0.07)	(0.05)
Observations	378	378	378
R-squared	0.04	0.02	0.01

VARIABLES	(1) Arithmetic	(2) Geometric	(3) Harmonic
CDS	0.16**	0.09*	0.03
	(0.08)	(0.05)	(0.06)
Constant	-0.41	0.86	1.70**
	(0.98)	(0.64)	(0.68)
Observations	340	340	340
R-squared	0.00	0.00	0.00

VARIABLES	(1) Arithmetic	(2) Geometric	(3) Harmonic
1 Year Bond	0.02	-0.01	-0.02
	(0.03)	(0.02)	(0.02)
Constant	-0.14	0.21	0.32*
	(0.36)	(0.21)	(0.17)
Observations	284	284	284
R-squared	0.00	0.00	0.00

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C.7: Emerging Market CDS Currency and Bond Yield Responses on the DXY. Including Arithmetic, Geometric and Harmonic Averages

VARIABLES	(1) Arithmetic	(2) Geometric	(3) Harmonic
Exchange Rate	-0.23**	-0.12	-0.04
	(0.09)	(0.09)	(0.09)
Constant	-0.67	-2.48*	-3.58***
	(1.49)	(1.29)	(1.14)
Observations	17	17	17
R-squared	0.11	0.05	0.01
CDS	(1) Arithmetic	(2) Geometric	(3) Harmonic
Index3_a	-2.06	-1.07	-0.43
	(1.29)	(1.07)	(1.00)
Constant	48.62**	31.28**	21.75**
	(19.47)	(13.12)	(9.85)
Observations	20	20	20
R-squared	0.09	0.04	0.01
1 Year Bond	(1) Arithmetic	(2) Geometric	(3) Harmonic
Index3_a	0.09**	0.06*	0.04**
	(0.03)	(0.03)	(0.02)
Observations	17	17	17
R-squared	0.27	0.18	0.18

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C.8: Emerging Market CDS Currency and Bond Yield Responses on the FOMC Shocks. Including Arithmetic, Geometric and Harmonic Averages

APPENDIX D

In this appendix I include the results that are calculated through OLS with interaction term by using clusters and robust standard errors. That is to show that in majority of the results the OLS with correct clusters and robust standard errors give similar results with the multilevel approach in my data set. This suggest that I do not have the problems that will cause either of the problems that can be resulted from using OLS.

VARIABLES	(1) Index	(2) CAB (%GDP)	(3) Reserves (% GDP)	(4) Reserves (% STD)	(5) Government Debt (%GDP)	(6) Inflation	(7) Credit (%GDP)	(8) Import	(9) Export	(10) Trade Currency
FX on ED4	-0.23**	-0.09	0.04	-0.13*	0.06	-0.05	-0.10	0.12***	0.05	0.20**
	(0.09)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.06)	(0.04)	(0.09)	(0.09)
Constant	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	2,635	2,915	2,915	2,635	2,915	2,915	2,915	2,915	2,915	2,267
R-squared	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07
CDS on ED4	1.20	1.48*	1.67**	-0.35	-2.44	2.33**	-1.52	1.17	0.40	5.55**
	(1.82)	(0.84)	(0.78)	(1.23)	(1.84)	(0.92)	(0.94)	(1.47)	(1.11)	(2.55)
Constant	0.32**	0.23*	0.22*	0.32**	0.23**	0.24**	0.24**	0.22*	0.22*	-0.14
	(0.13)	(0.11)	(0.12)	(0.13)	(0.11)	(0.11)	(0.11)	(0.11)	(0.12)	(0.15)
Observations	2,179	2,379	2,379	2,179	2,379	2,379	2,379	2,379	2,379	1,545
R-squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table D.1: Emerging Market CDS and Currency Responses on the FOMC Shock

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Index	CAB (%GDP)	Reserves (% GDP)	Reserves (% STD)	Government Debt (%GDP)	Inflation	Credit (%GDP)	Import	Export	Trade Currency
GOV1Year on ED4	0.17***	0.01	0.00	0.06	0.01	0.05**	-0.01	-0.02	-0.04*	-0.05
	(0.05)	(0.03)	(0.03)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
Constant	0.01***	0.00**	0.00*	0.01***	0.00**	0.00**	0.00*	0.00**	0.00**	0.01**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	1,685	1,996	1,996	1,685	1,996	1,996	1,996	1,996	1,996	1,614
R-squared	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.01
GOV5Year on ED4	0.02	-0.00	0.01	0.01	0.01	0.01	-0.02	0.00	-0.01	0.03
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Constant	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	1,793	2,083	2,083	1,793	2,083	2,083	2,083	2,083	2,083	1,558
R-squared	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
GOV10Year on ED4	0.06	0.01	0.03*	0.03	-0.01	0.02	-0.02	0.02	0.00	0.03
	(0.05)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
Constant	-0.00**	-0.00***	-0.00***	-0.00**	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	1,828	2,111	2,111	1,828	2,111	2,111	2,111	2,111	2,111	1,521
R-squared	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table D.2: Emerging Market local currency bond yields on the FOMC Shock

VARIABLES	(1) Index	(2) CAB (%GDP)	(3) Reserves (% GDP)	(4) Reserves (% STD)	(5) Government Debt (%GDP)	(6) Inflation	(7) Credit (%GDP)	(8) Import	(9) Export	(10) Trade Currency
FX on DXY	-0.03**	-0.02***	0.01	-0.04***	0.01	0.00	-0.01	0.03***	0.03**	0.07***
	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Constant	-0.06*	-0.02	-0.04*	-0.02	-0.02	-0.02	0.03	0.09*	0.07*	0.02
	(0.03)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.05)	(0.04)	(0.02)
Observations	57,707	65,187	65,187	58,167	65,037	65,187	64,877	61,780	61,780	35,749
R-squared	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.09	0.08	0.10
CDS on DXY	-0.46	-0.27	0.12	-0.31	0.17	-0.84	0.51	-0.02	-0.17	0.31*
	(0.60)	(0.35)	(0.47)	(0.40)	(0.16)	(0.51)	(0.33)	(0.14)	(0.15)	(0.16)
Constant	-0.27	0.63	0.75	0.84	-0.13	-0.32	-0.03	1.22	0.45	0.45
	(0.59)	(0.60)	(1.00)	(1.05)	(0.20)	(0.56)	(0.26)	(2.42)	(1.09)	(0.83)
Observations	67,329	74,320	74,320	67,741	74,320	74,320	73,908	69,788	67,847	34,720
R-squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table D.3: Emerging Market CDS and Currency Responses on the DXY Shock

VARIABLES	(1) Index	(2) CAB (%GDP)	(3) Reserves (% GDP)	(4) Reserves (% STD)	(5) Government Debt (%GDP)	(6) Inflation	(7) Credit (%GDP)	(8) Import	(9) Export	(10) Trade Currency
GOV1Year on US1Year	0.03	-0.02	-0.03	0.11	0.02	0.03	-0.07	-0.03	-0.09	-0.01
	(0.05)	(0.02)	(0.03)	(0.10)	(0.02)	(0.04)	(0.08)	(0.04)	(0.10)	(0.01)
Constant	0.17	0.04	0.12	0.04*	-0.05	0.04	0.18	-0.15	-0.10	0.00
	(0.16)	(0.04)	(0.10)	(0.02)	(0.07)	(0.02)	(0.17)	(0.18)	(0.12)	(0.01)
Observations	48,027	57,788	57,788	48,378	57,788	57,788	57,437	54,573	54,573	33,856
R-squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GOV5Year_d	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	0.01	0.00	-0.00
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Constant	-0.01**	-0.00***	-0.00	-0.00	-0.00*	-0.00**	-0.00	0.00	0.01	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	51,871	60,874	60,874	52,222	60,874	60,874	60,523	57,531	57,531	32,908
R-squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GOV10Year on US10Year	-0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	-0.00
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Constant	-0.01**	-0.00***	0.00	-0.00	-0.00	-0.00*	0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Observations	51,954	60,791	60,791	52,298	60,791	60,791	60,447	57,489	57,489	31,479
R-squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table D.4: Emerging Market local currency bond yields on the US bond yields

APPENDIX E

In this appendix, I explain the historical interactions between spillovers and fundamental economic factors, highlighting how these relationships have evolved over the years. By examining these trends, I aim to demonstrate the dynamic and time-varying effects of spillovers on fundamental economic variables. This analysis provides a deeper understanding of how spillovers can influence various aspects of the economy and how these influences can change in response to different economic conditions and periods. I will explore specific examples and data from different time periods to illustrate these evolving relationships and their broader implications for economic policy and strategy. These figures show the rankings on the y-axes and spillover coefficients from the OLS regression in the x-axes. This heterogeneity is the reason I need to utilize FGLS with a time-varying approach.

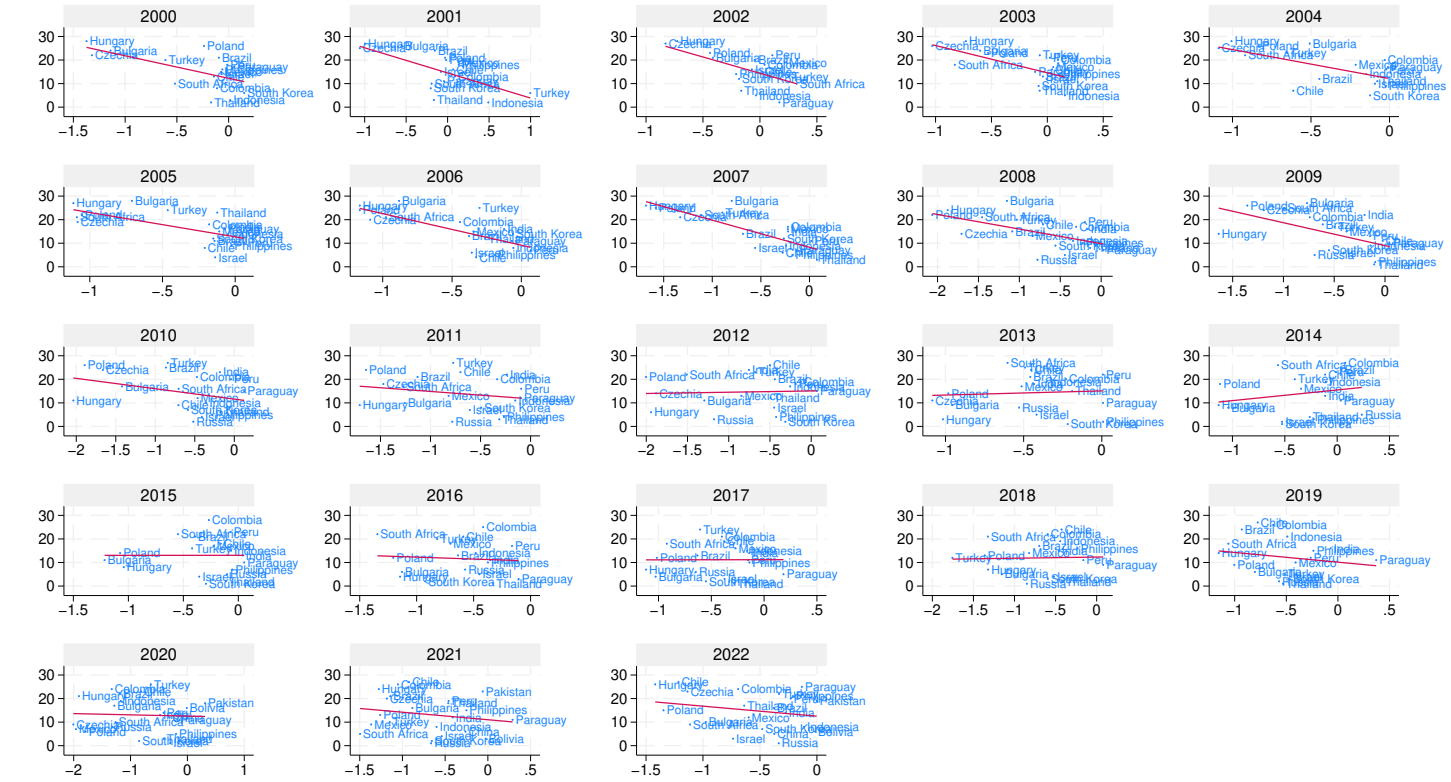

Figure E.1: Exchange rate response on DXY against Current Account Balance

On the x-axis, I have an exchange rate response on DXY on a daily basis based on percentage changes. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Current Account Balance. This graph shows the heterogeneous effect of the exchange rate responses over time.

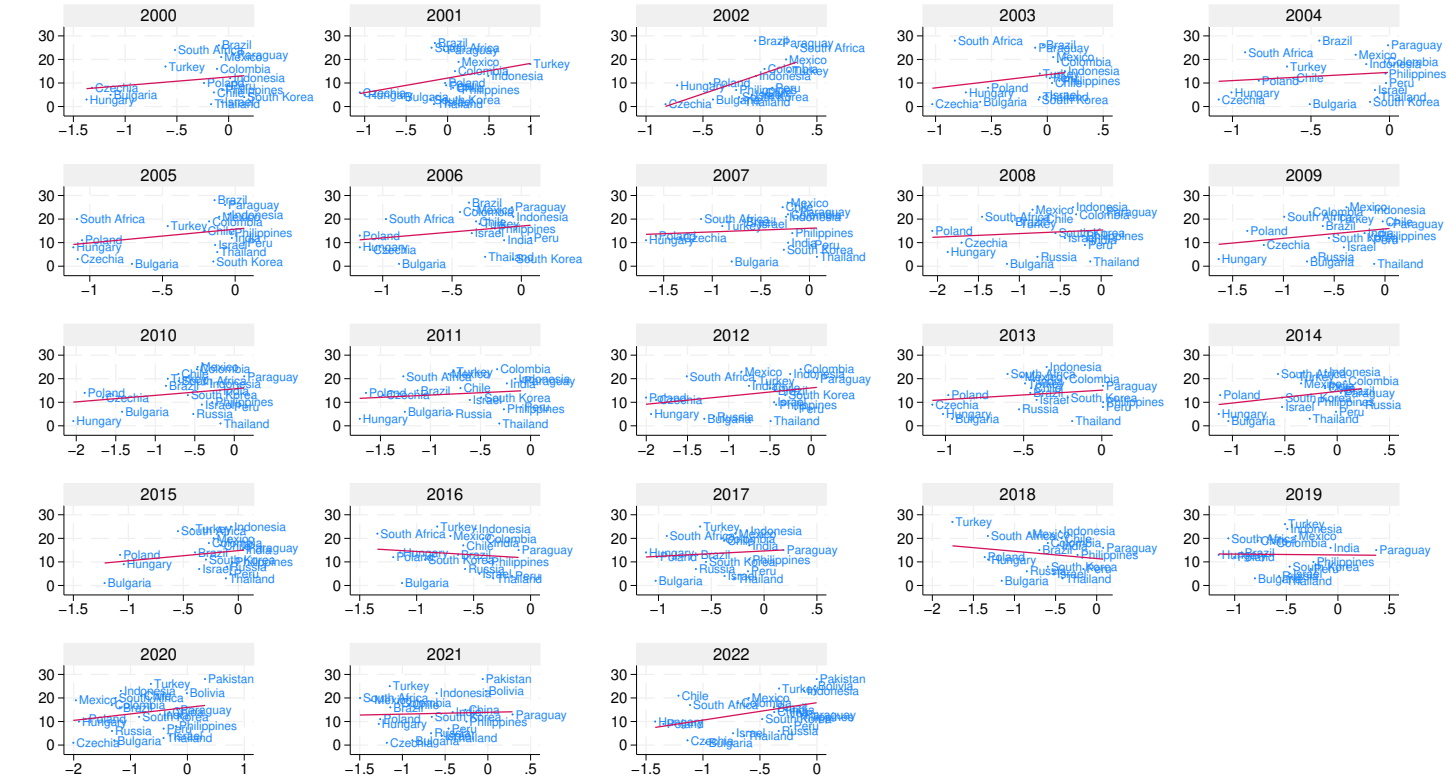

Figure E.2: Exchange rate response on DXY against Reserve Ratio

On the x-axis, I have an exchange rate response on DXY on a daily basis based on percentage changes. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Reserves as a percentage of GDP. This graph shows the heterogeneous effect of the exchange rate responses over time.

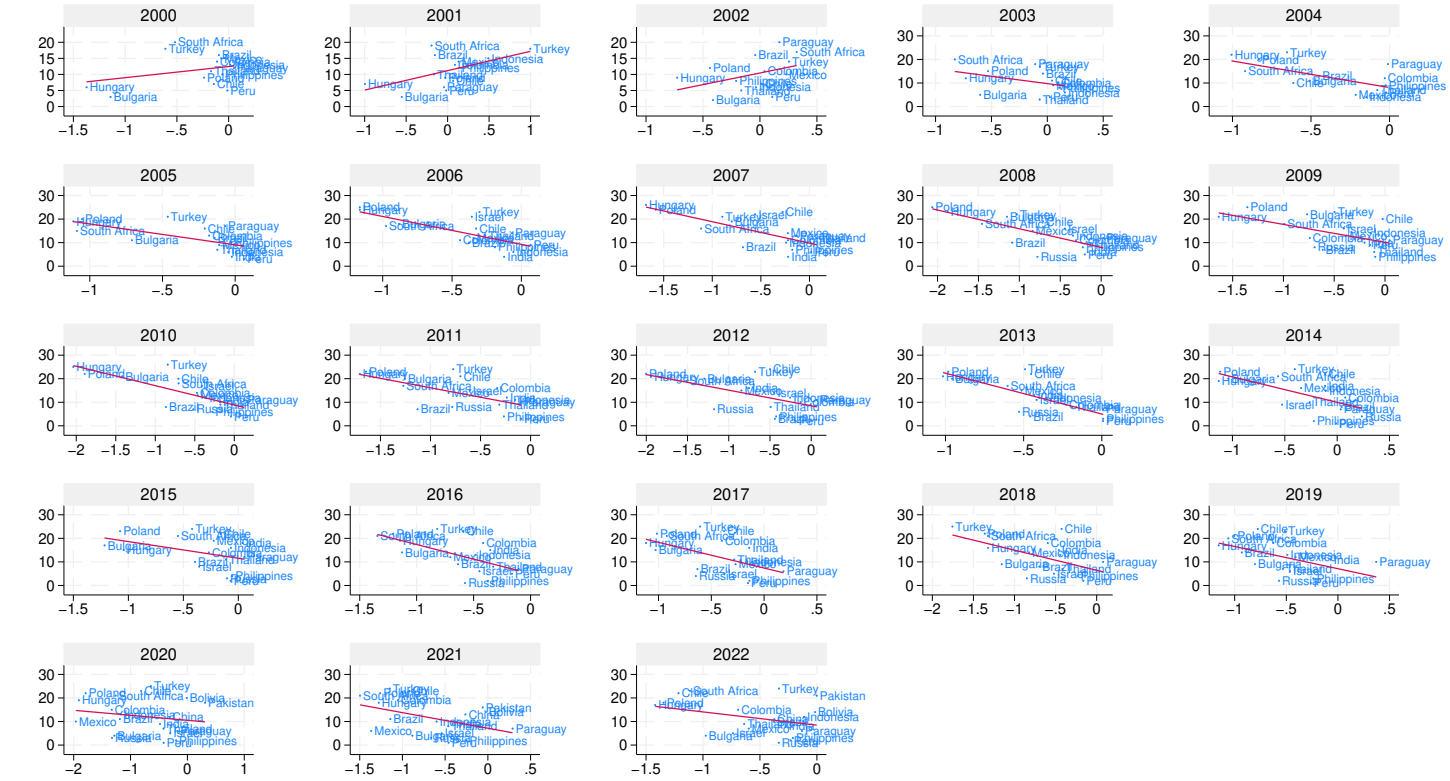

Figure E.3: Exchange rate response on DXY against Short Term Debt Ratio

On the x-axis, I have an exchange rate response on DXY on a daily basis based on percentage changes. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Reserves as a percentage of short-term debt (Greenspan-Guidotti Rule). This graph shows the heterogeneous effect of the exchange rate responses over time.

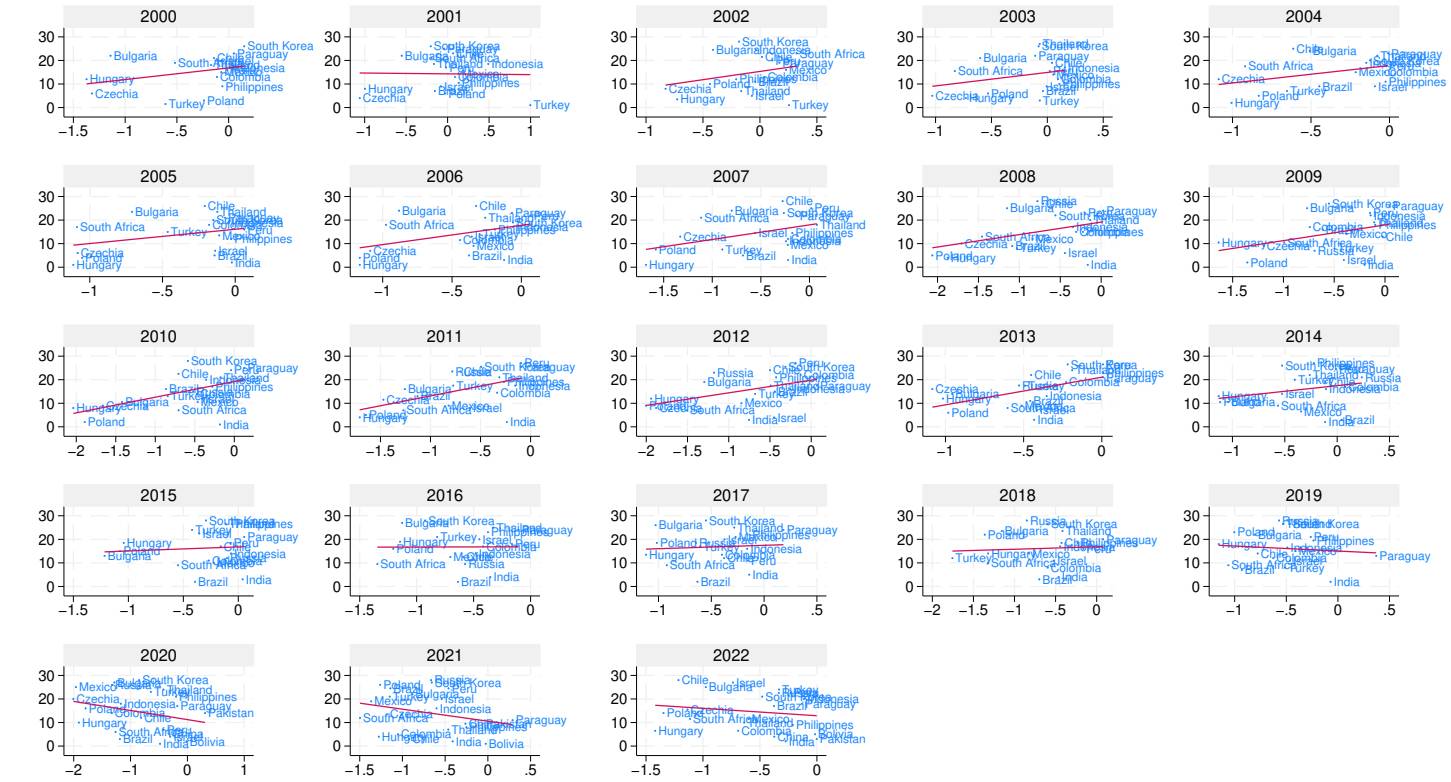

Figure E.4: Exchange rate response on DXY against Net Government Debt

On the x-axis, I have an exchange rate response on DXY on a daily basis based on percentage changes. Analysis conducted for each country and year. On the y axes, I have the yearly rank of the Government Net Debt (Lending(+), Borrowing(-)). This graph shows the heterogeneous effect of the exchange rate responses over time.

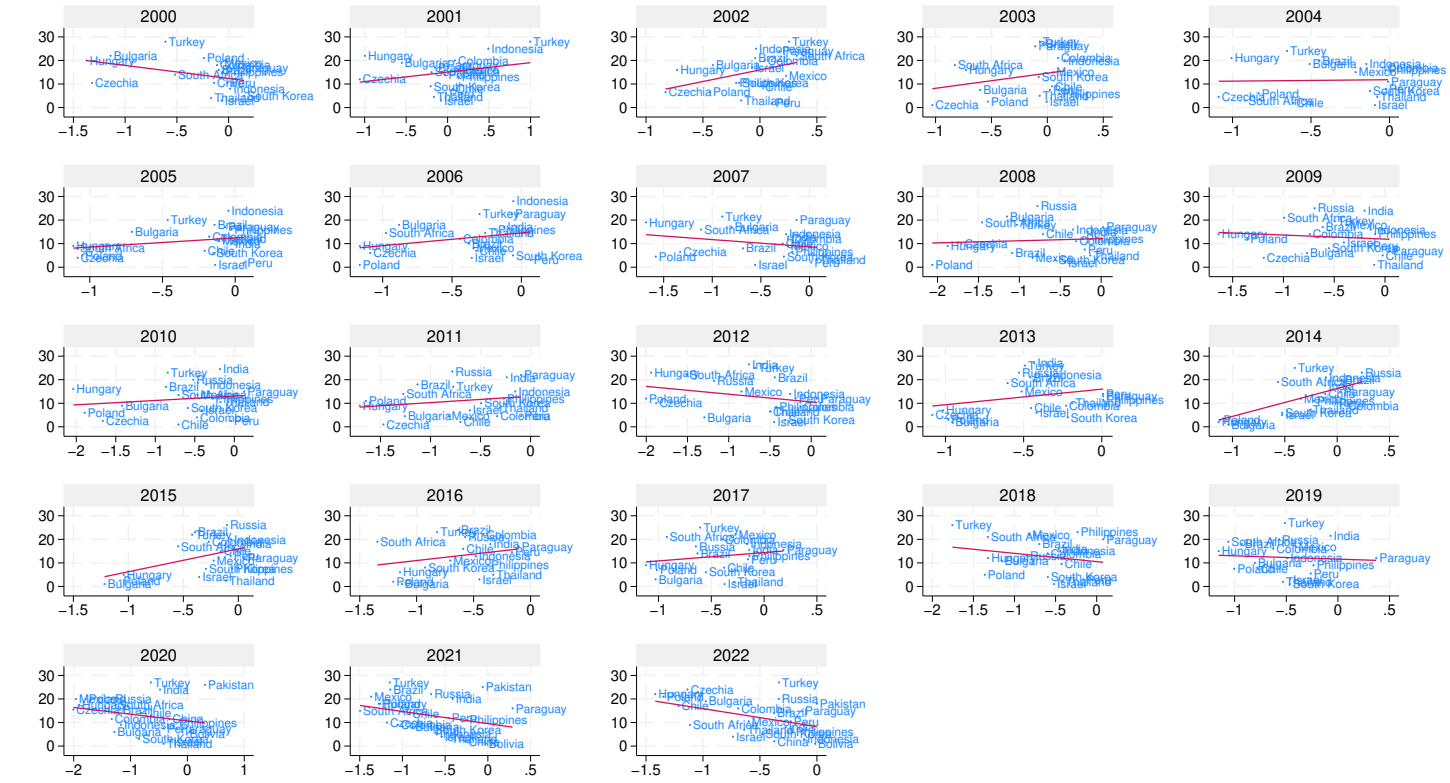

Figure E.5: Exchange rate response on DXY against Inflation

On the x-axis, I have an exchange rate response on DXY on a daily basis based on percentage changes. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the annual inflation as the average consumer price index changes from the previous year. This graph shows the heterogeneous effect of the exchange rate responses over time.

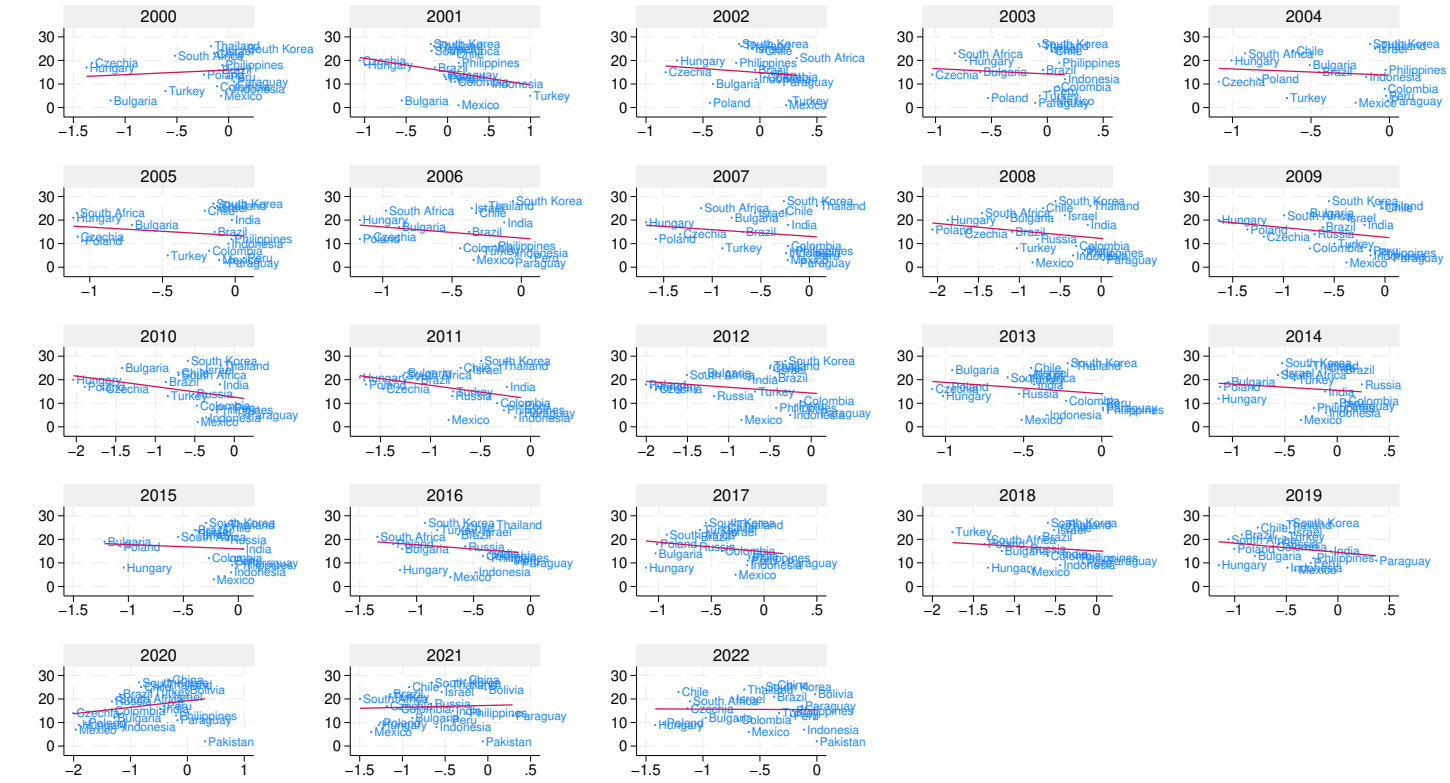

Figure E.6: Exchange rate response on DXY against Credit

On the x-axis, I have an exchange rate response on DXY on a daily basis based on percentage changes. Analysis conducted for each country and year. On the y axes, I have the yearly rank of the Monetary sector credit to the private sector as a percentage of GDP. This graph shows the heterogeneous effect of the exchange rate responses over time.

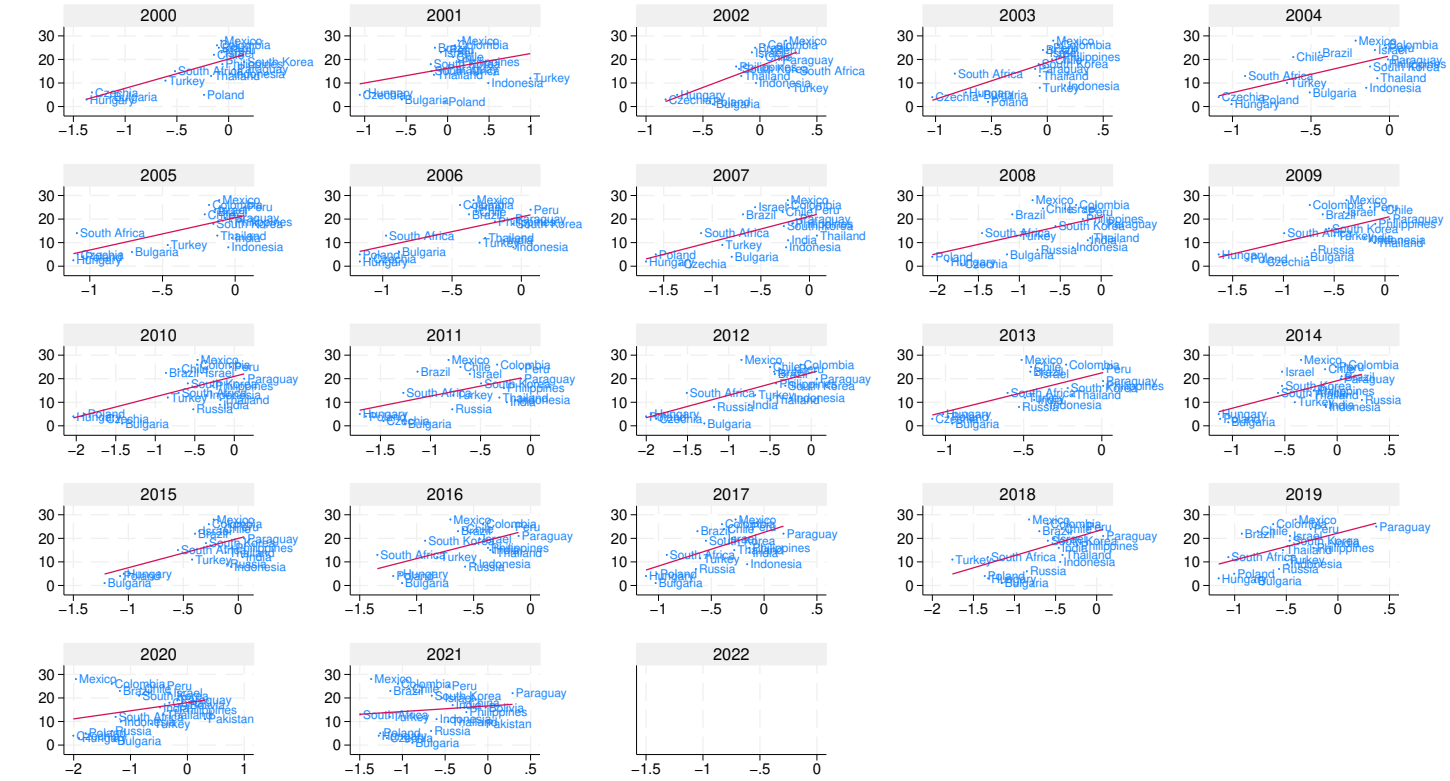

Figure E.7: Exchange rate response on DXY against imports

On the x-axis, I have an exchange rate response on DXY on a daily basis based on percentage changes. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the imports from the U.S. for each EME. This graph shows the heterogeneous effect of the exchange rate responses over time.

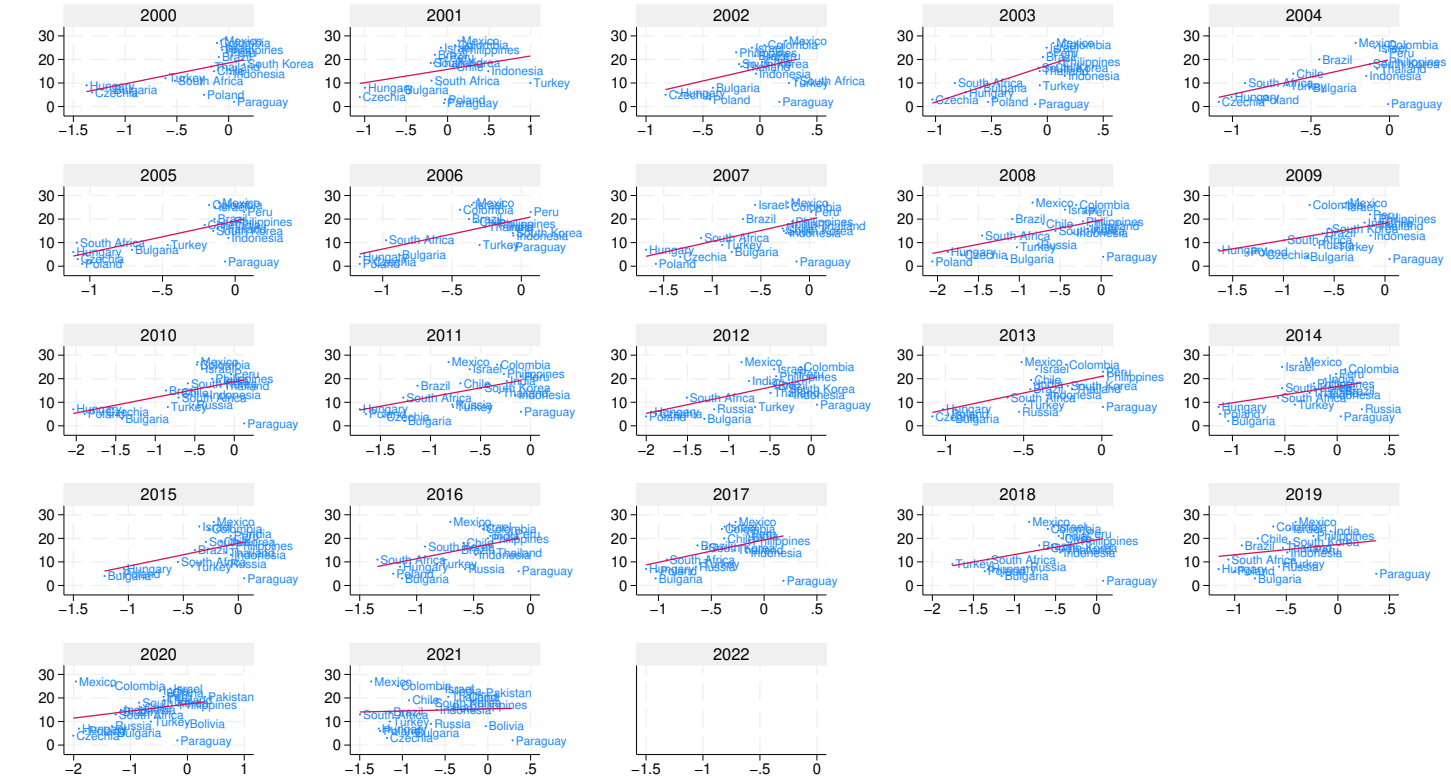

Figure E.8: Exchange rate response on DXY against Exports

On the x-axis, I have an exchange rate response on DXY on a daily basis based on percentage changes. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Exports to the U.S. for each EME. This graph shows the heterogeneous effect of the exchange rate responses over time.

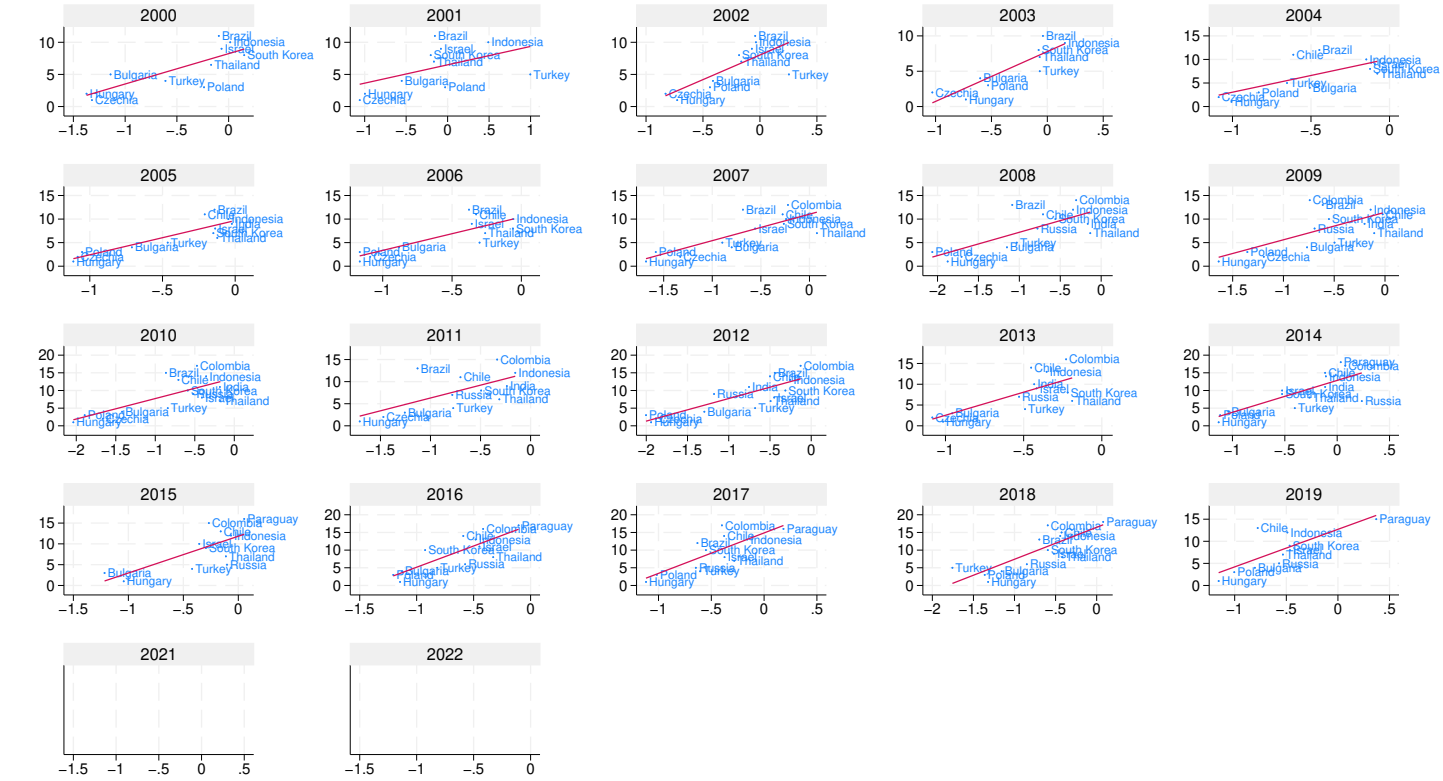

Figure E.9: Exchange rate response on DXY against Trade Currency

On the x-axis, I have an exchange rate response on DXY on a daily basis based on percentage changes. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the USD invoice share for each emerging market. This graph shows the heterogeneous effect of the exchange rate responses over time.

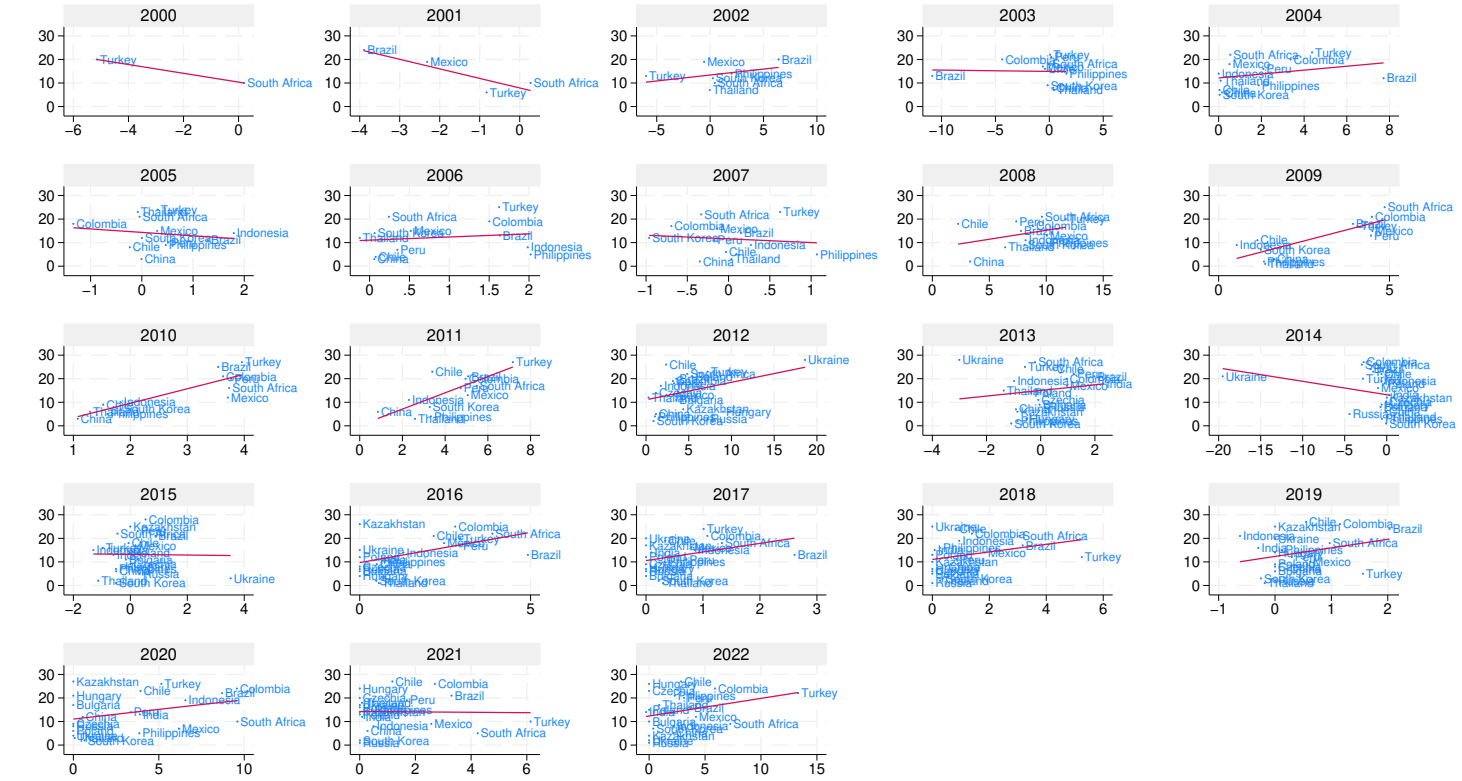

Figure E.10: CDS response on DXY against Current Account Balance

On the x-axis, I have CDS response on DXY on a daily basis. For CDS, I use the first difference, and for the DXY, I use percentage change. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Current Account Balance as a percentage of GDP. This graph shows the heterogeneous effect of the exchange rate responses over time.

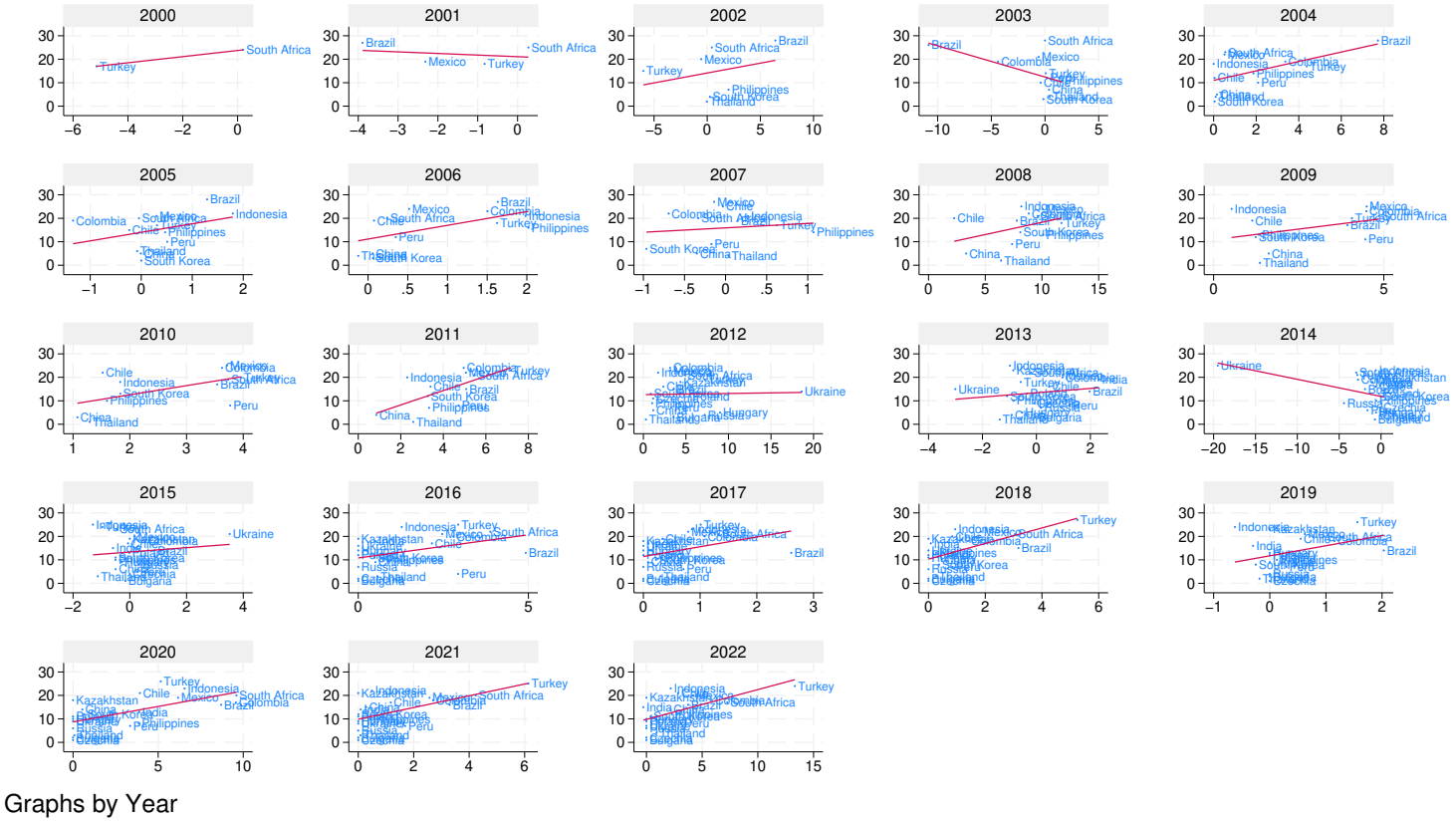

Figure E.11: CDS response on DXY against Reserve Ratio

On the x-axis, I have CDS response on DXY on a daily basis. For CDS, I use the first difference, and for the DXY, I use percentage change. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Reserves as a percentage of GDP. This graph shows the heterogeneous effect of the exchange rate responses over time.

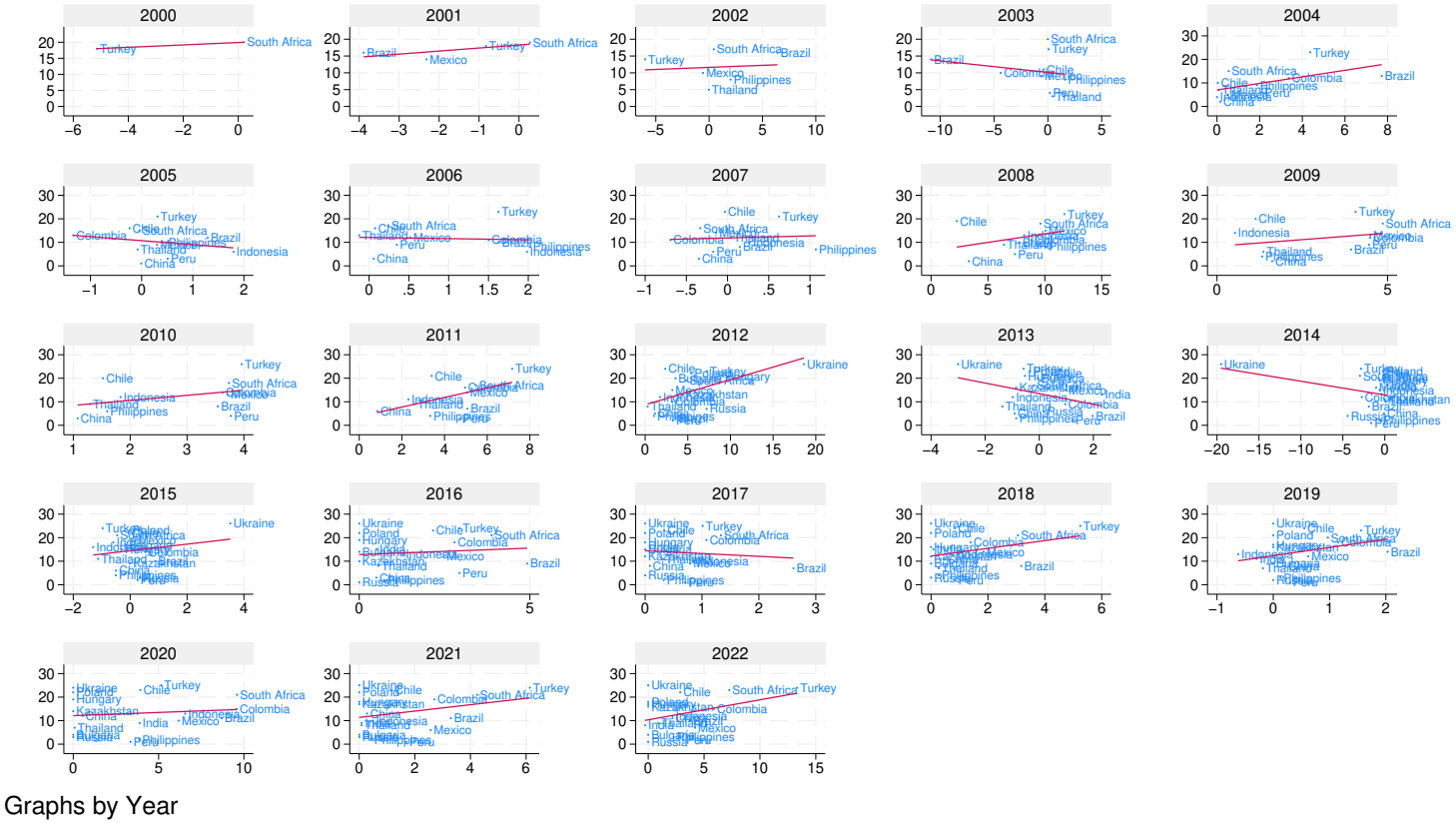

Figure E.12: CDS response on DXY against Short Term Debt Ratio

On the x-axis, I have CDS response on DXY on a daily basis. For CDS, I use the first difference, and for the DXY, I use percentage change. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Reserves as a percentage of short-term debt (Greenspan-Guidotti Rule). This graph shows the heterogeneous effect of the exchange rate responses over time.

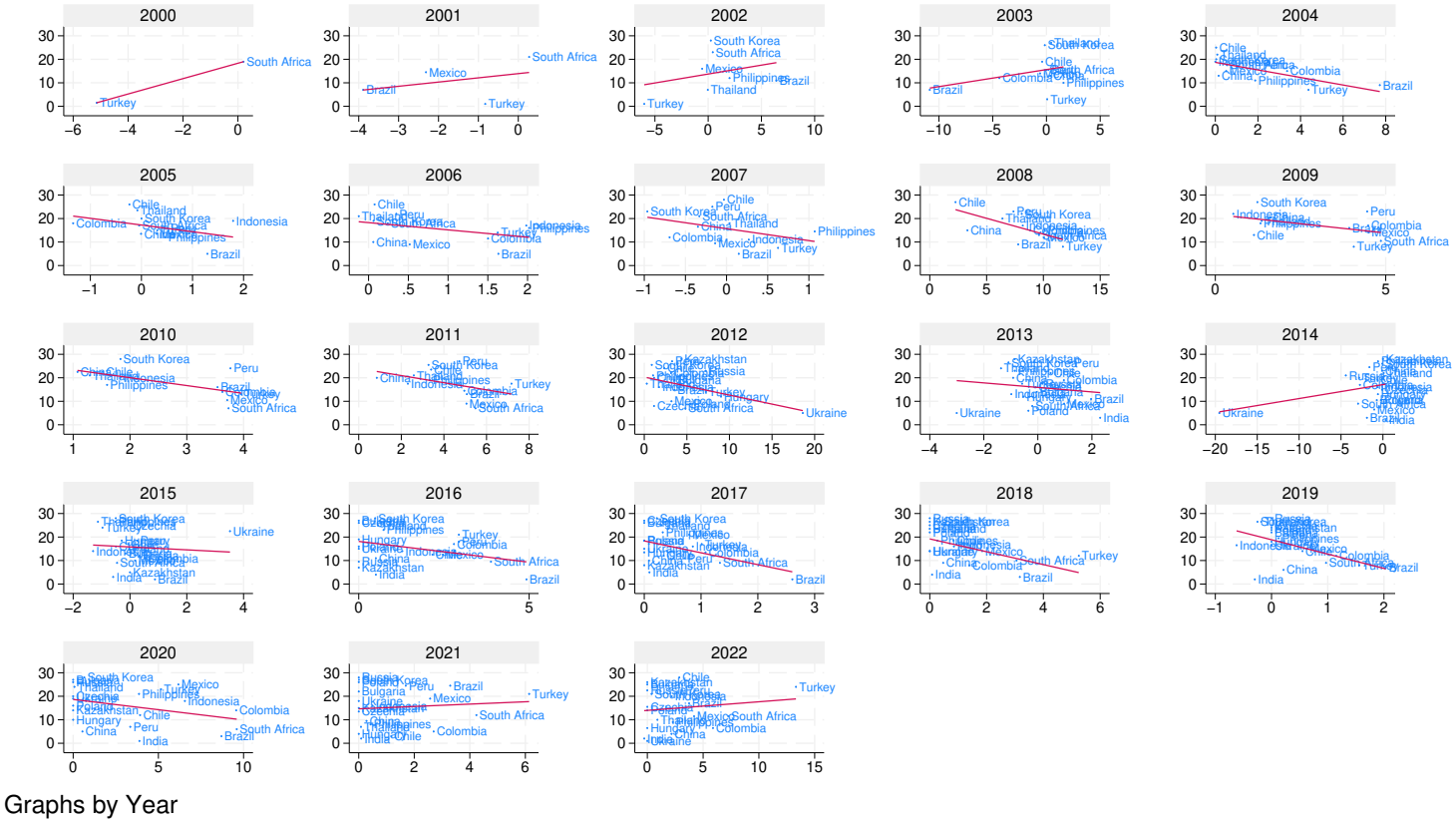

Figure E.13: CDS response on DXY against Net Government Debt

On the x-axis, I have CDS response on DXY on a daily basis. For CDS, I use the first difference, and for the DXY, I use percentage change. Analysis conducted for each country and year. On the y axes, I have the yearly rank of the Government Net Debt (Lending(+), Borrowing(-)). This graph shows the heterogeneous effect of the exchange rate responses over time.

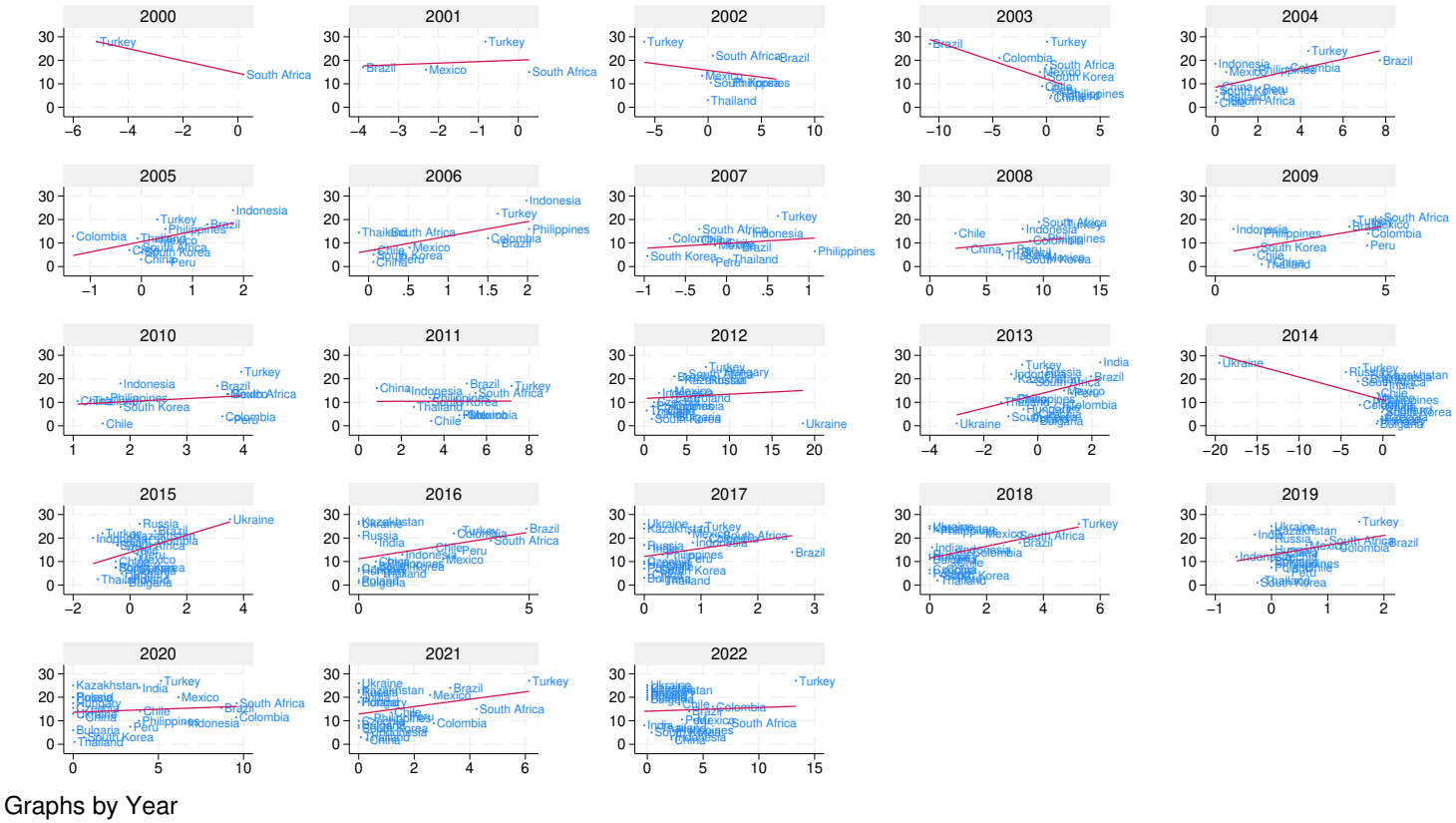

Figure E.14: CDS response on DXY against Inflation

On the x-axis, I have CDS response on DXY on a daily basis. For CDS, I use the first difference, and for the DXY, I use percentage change. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the annual inflation as the average consumer price index changes from the previous year. This graph shows the heterogeneous effect of the exchange rate responses over time.

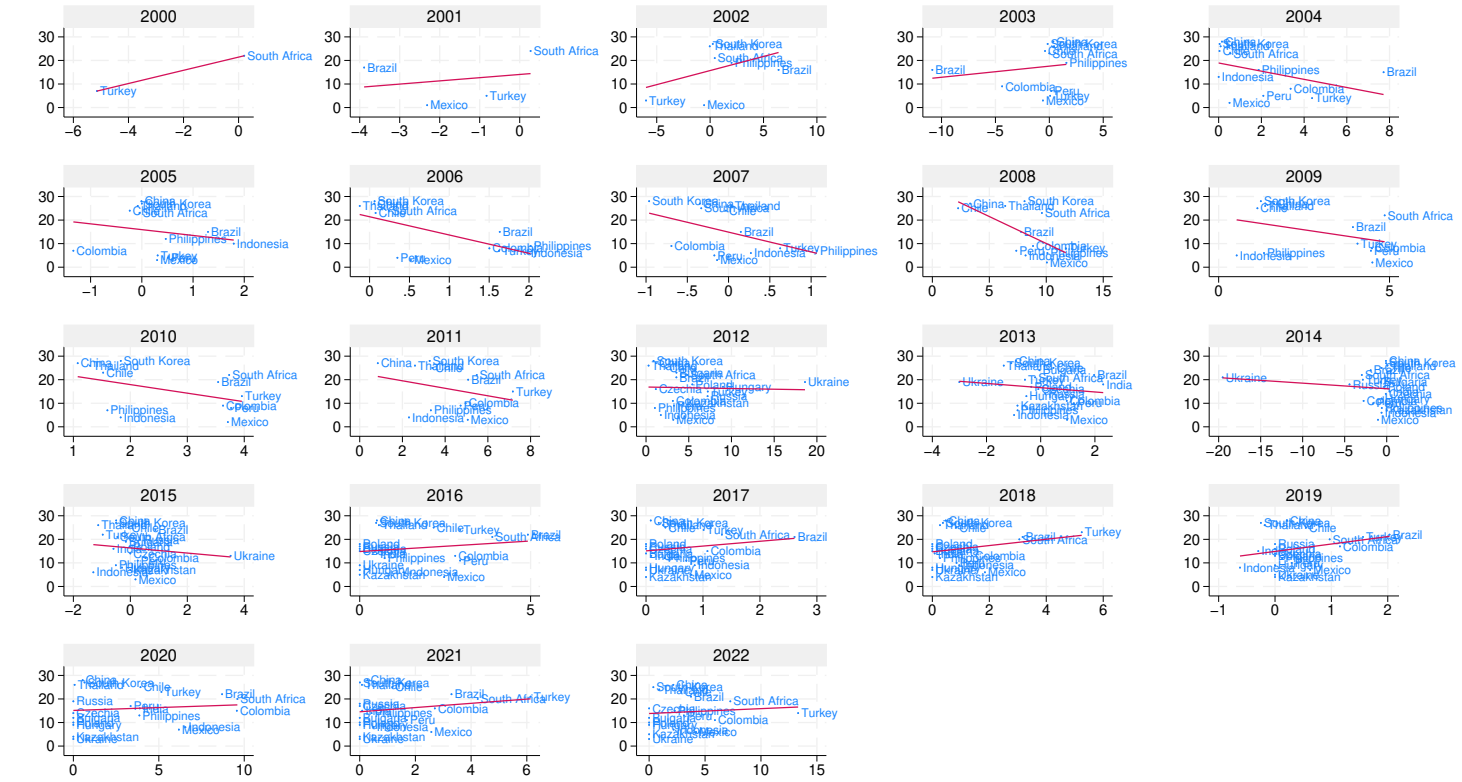

Figure E.15: CDS response on DXY against Credit

On the x-axis, I have CDS response on DXY on a daily basis. For CDS, I use the first difference, and for the DXY, I use percentage change. Analysis conducted for each country and year. On the y axes, I have the yearly rank of the Monetary sector credit to the private sector as a percentage of GDP. This graph shows the heterogeneous effect of the exchange rate responses over time.

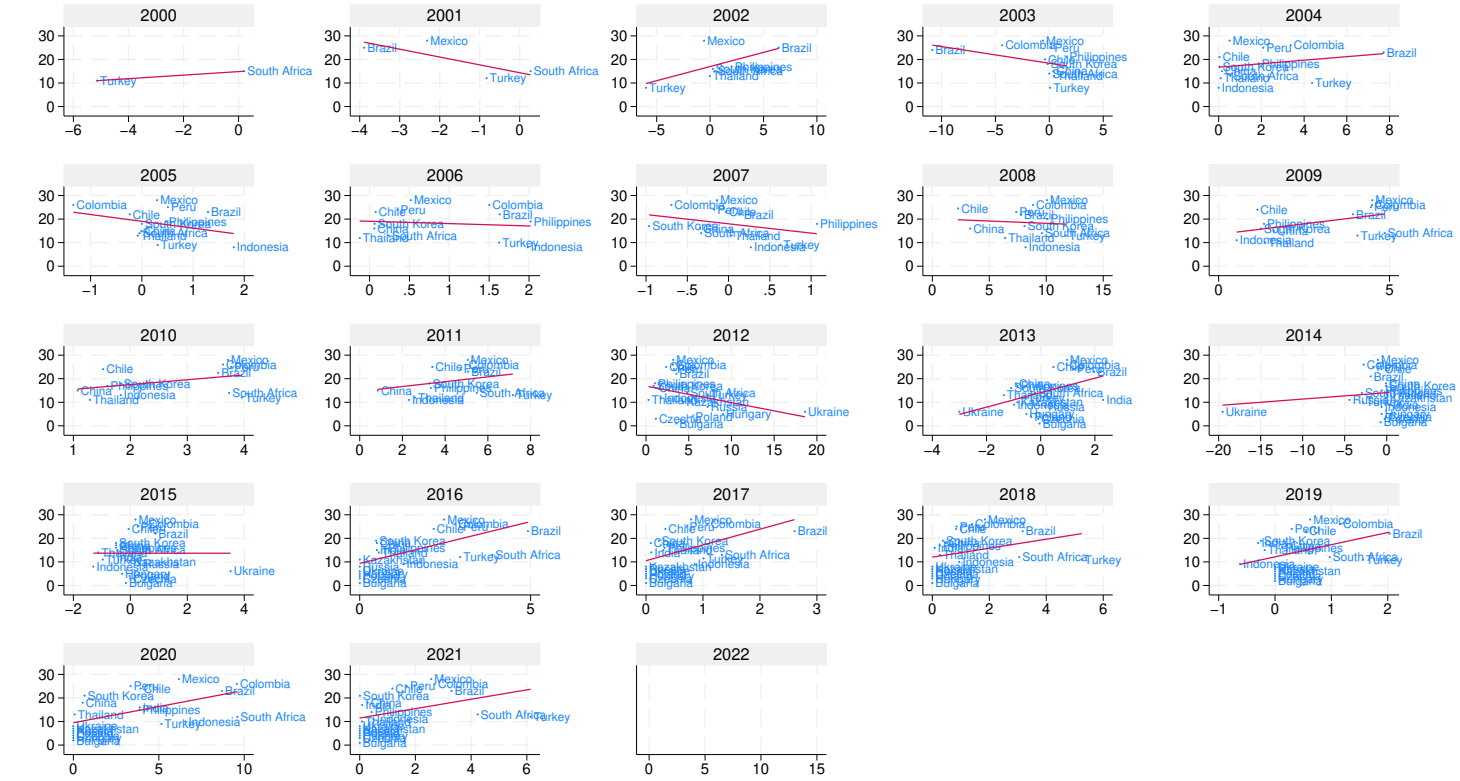

Figure E.16: CDS response on DXY against Import

On the x-axis, I have CDS response on DXY on a daily basis. For CDS, I use the first difference, and for the DXY, I use percentage change. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the imports from the U.S. for each EME. This graph shows the heterogeneous effect of the exchange rate responses over time.

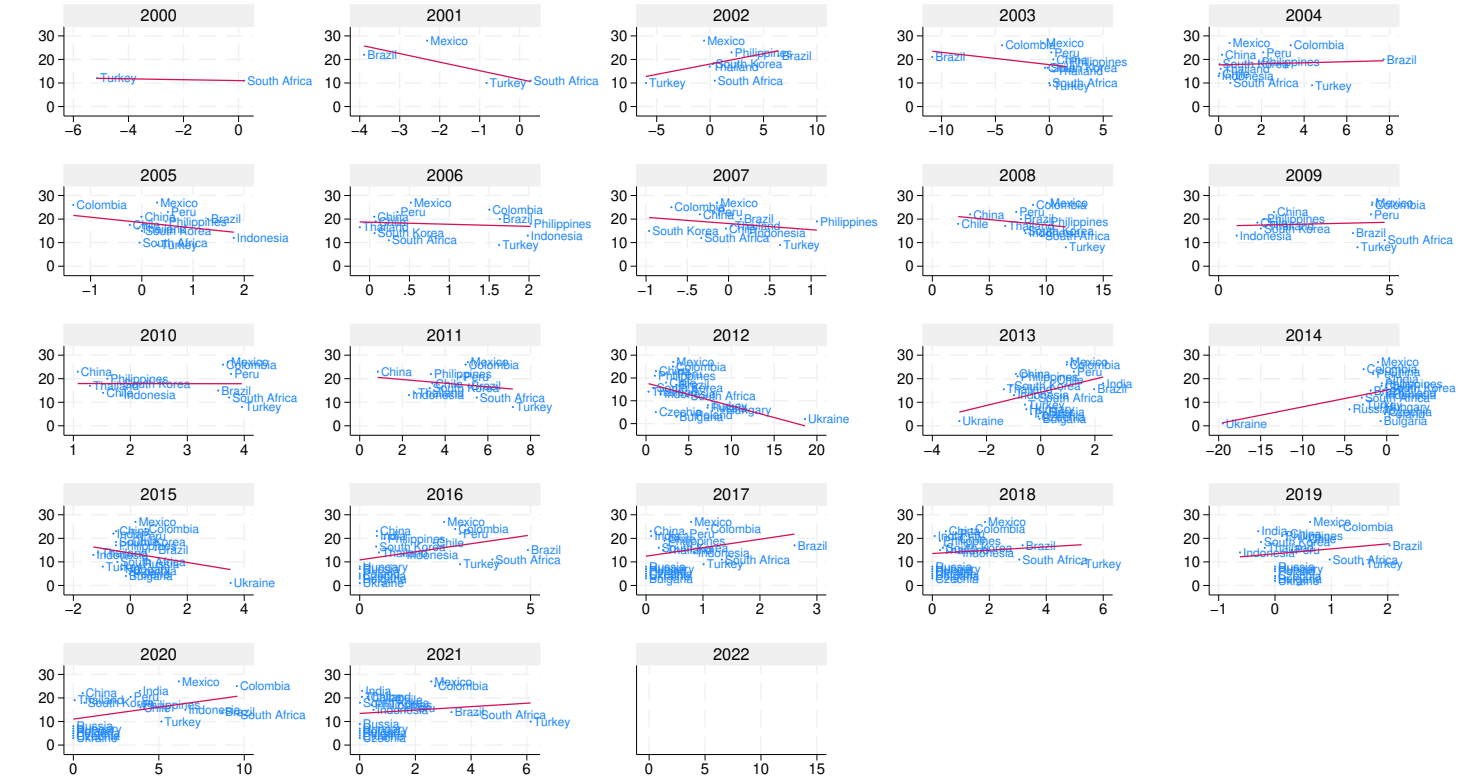

Figure E.17: CDS response on DXY against Export

On the x-axis, I have CDS response on DXY on a daily basis. For CDS, I use the first difference, and for the DXY, I use percentage change. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Exports to the U.S. for each EME. This graph shows the heterogeneous effect of the exchange rate responses over time.

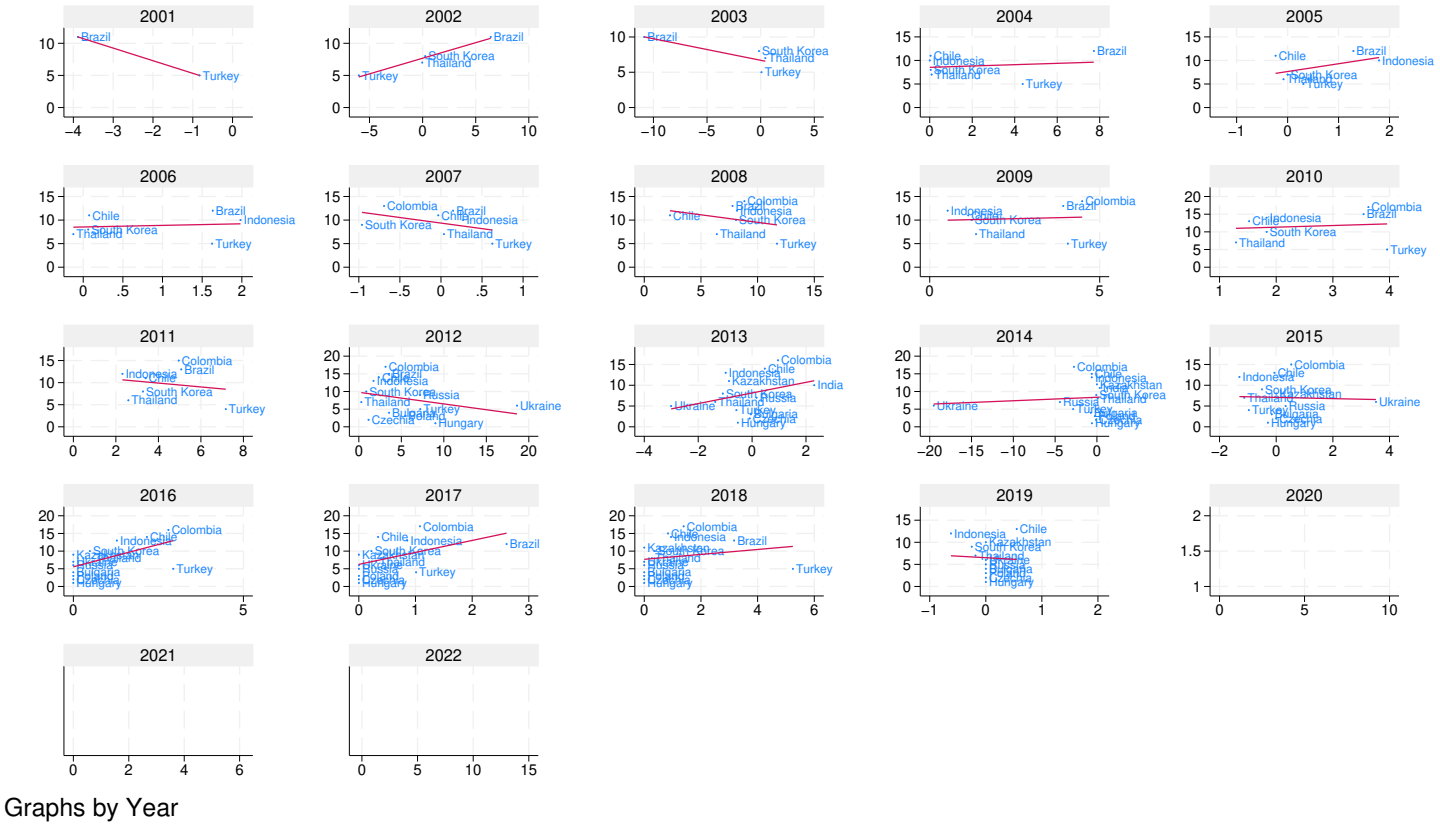

Figure E.18: CDS response on DXY against Trade Currency

On the x-axis, I have CDS response on DXY on a daily basis. For CDS, I use the first difference, and for the DXY, I use percentage change. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the USD invoice share for each emerging market. This graph shows the heterogeneous effect of the exchange rate responses over time.

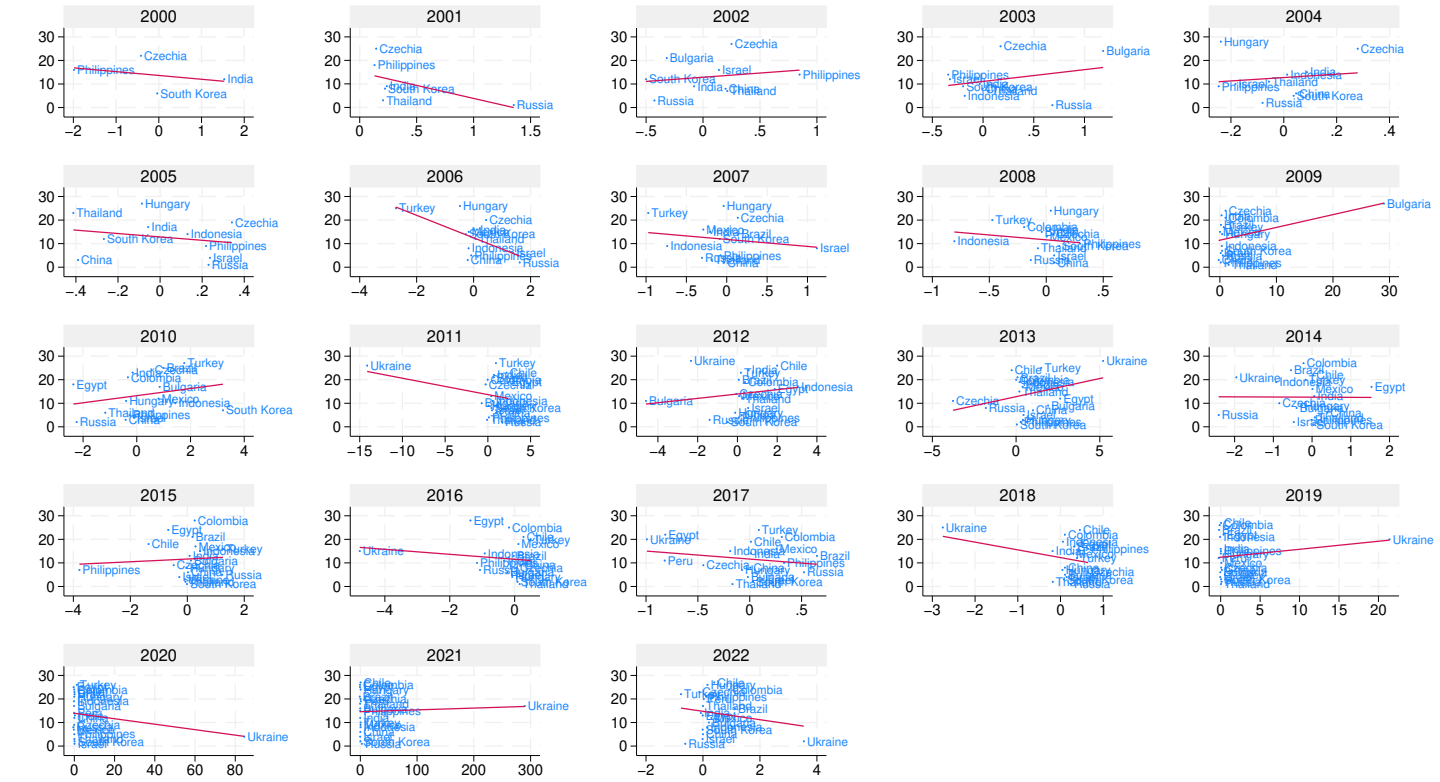

Figure E.19: 1 Year Sovereign Bond response to U.S. 1 Year Bond against Current Account Balance

On the x-axis, I have 1-year local currency bond yields in response to U.S. 1-year bond yields. For both bond yields, I used the first difference. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Current Account Balance as a percentage of GDP. This graph shows the heterogeneous effect of the exchange rate responses over time.

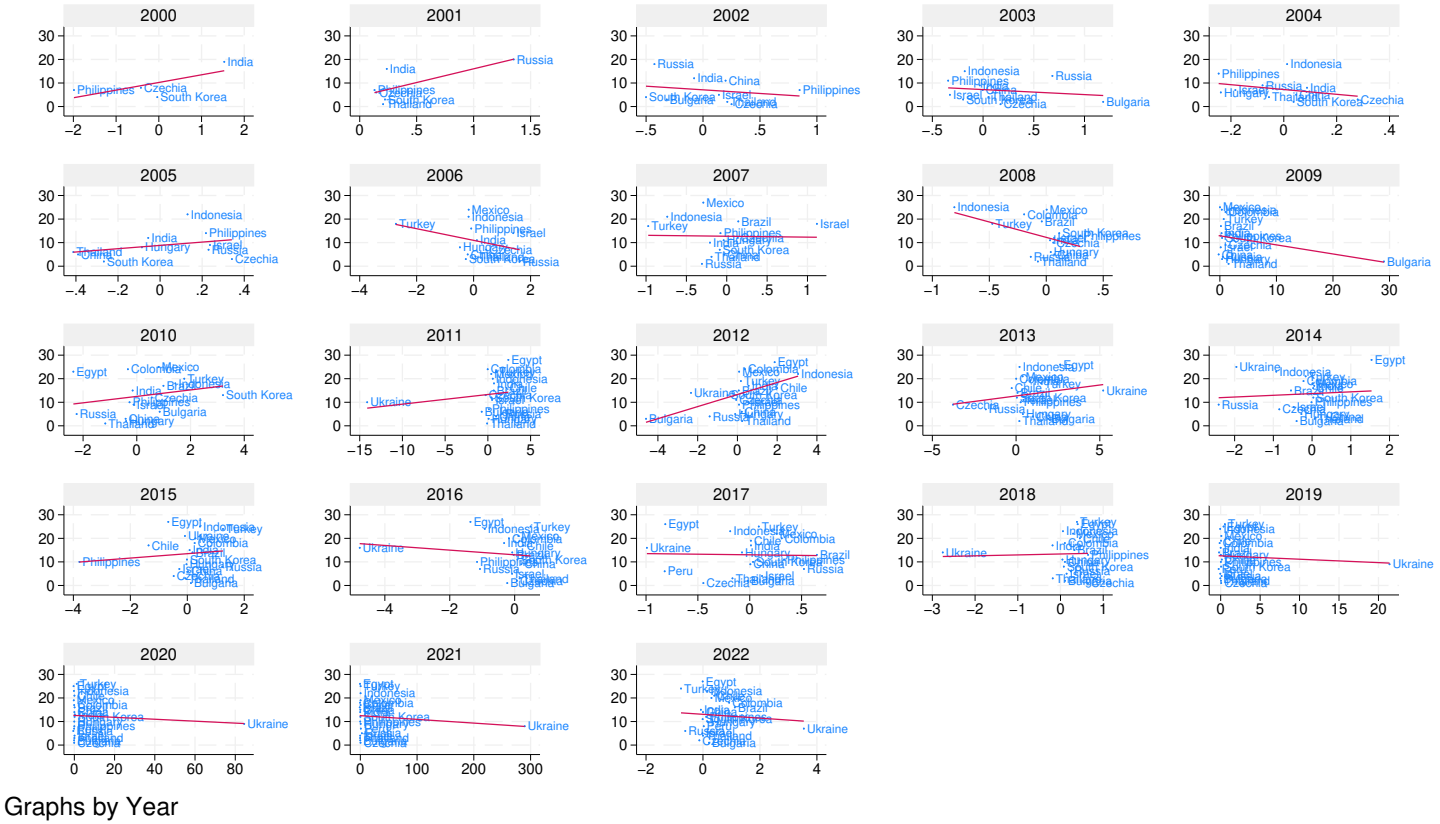

Figure E.20: 1 Year Sovereign Bond response to U.S. 1 Year Bond against Reserve Ratio

On the x-axis, I have 1-year local currency bond yields in response to U.S. 1-year bond yields. For both bond yields, I used the first difference. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Reserves as a percentage of GDP. This graph shows the heterogeneous effect of the exchange rate responses over time.

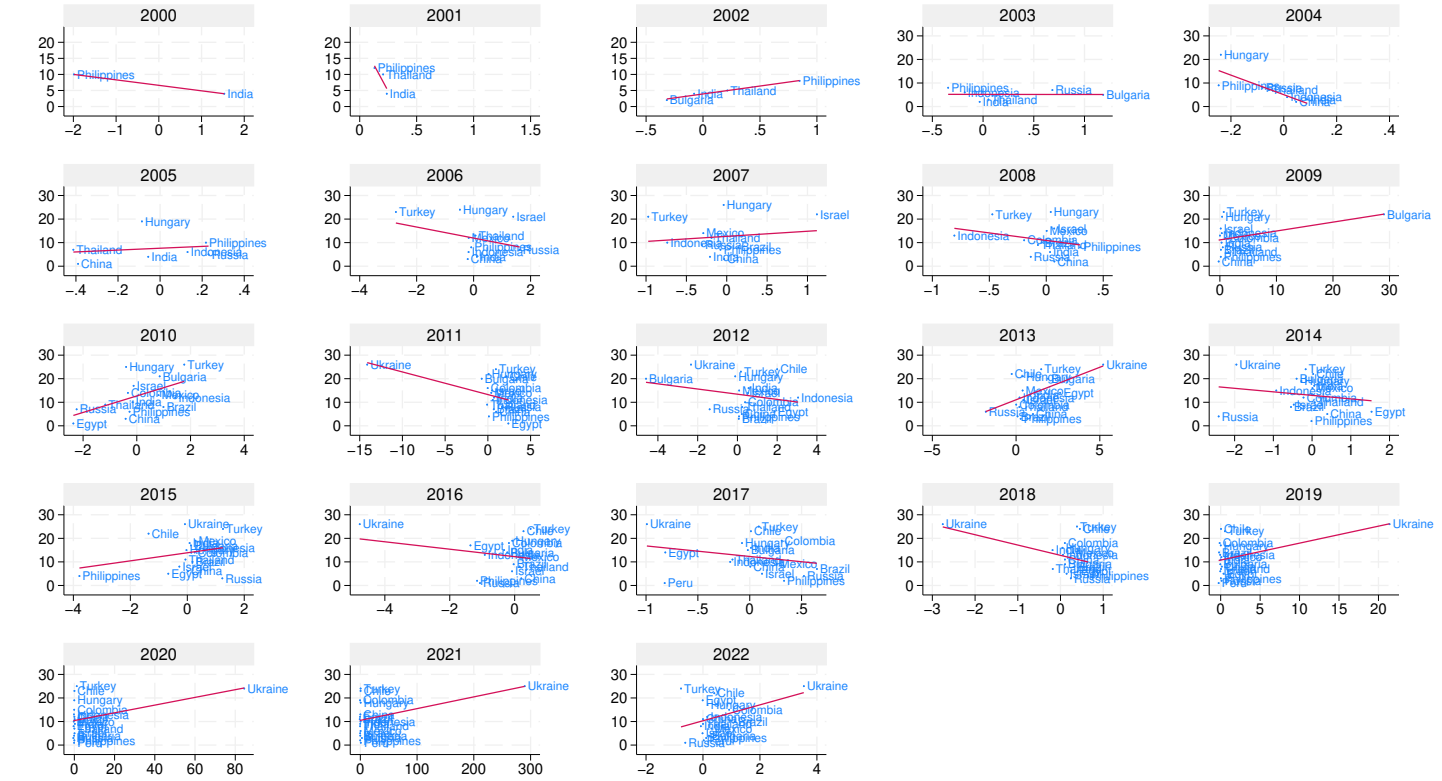

Figure E.21: 1 Year Sovereign Bond response to U.S. 1 Year Bond against Short Term Debt Ratio

On the x-axis, I have 1-year local currency bond yields in response to U.S. 1-year bond yields. For both bond yields, I used the first difference. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Reserves as a percentage of Short Term Debt (Greenspan-Guidotti Rule). This graph shows the heterogeneous effect of the exchange rate responses over time.

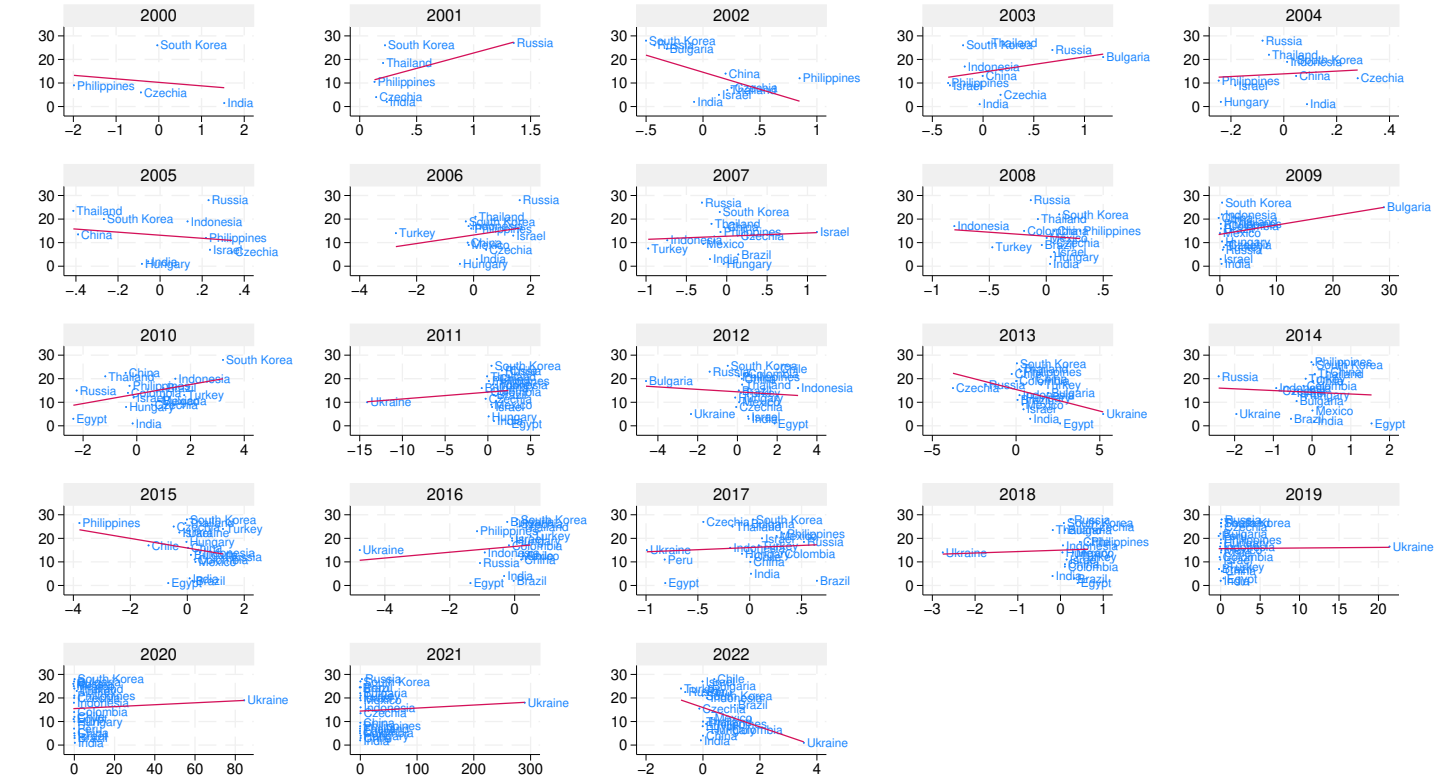

Figure E.22: 1 Year Sovereign Bond response to U.S. 1 Year Bond against Net Government Debt

On the x-axis, I have 1-year local currency bond yields in response to U.S. 1-year bond yields. For both bond yields, I used the first difference. Analysis conducted for each country and year. On the y axes, I have the yearly rank of the Government Net Debt (Lending(+), Borrowing(-)). This graph shows the heterogeneous effect of the exchange rate responses over time.

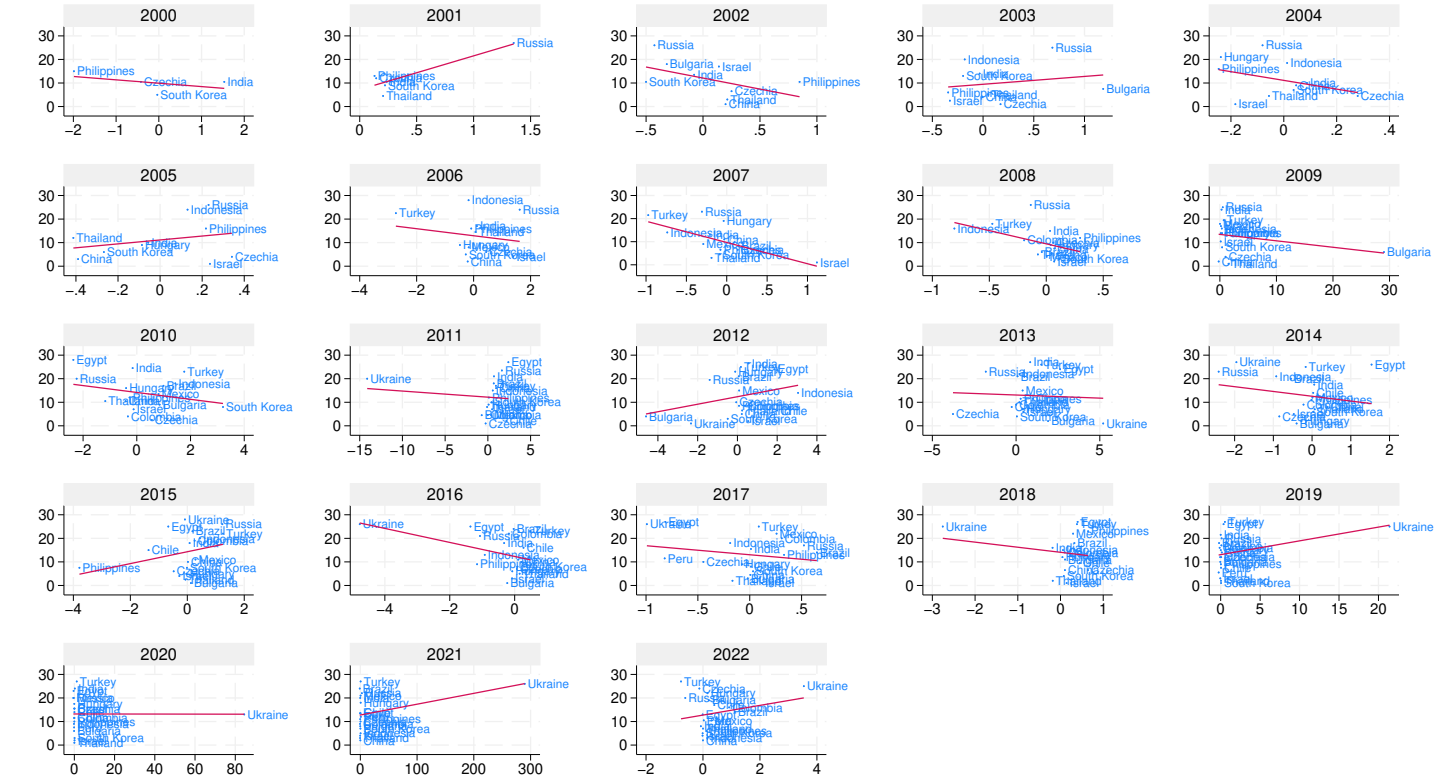

Figure E.23: 1 Year Sovereign Bond response to U.S. 1 Year Bond against Inflation

On the x-axis, I have 1-year local currency bond yields in response to U.S. 1-year bond yields. For both bond yields, I used the first difference. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the annual inflation as the average consumer price index changes from the previous year. This graph shows the heterogeneous effect of the exchange rate responses over time.

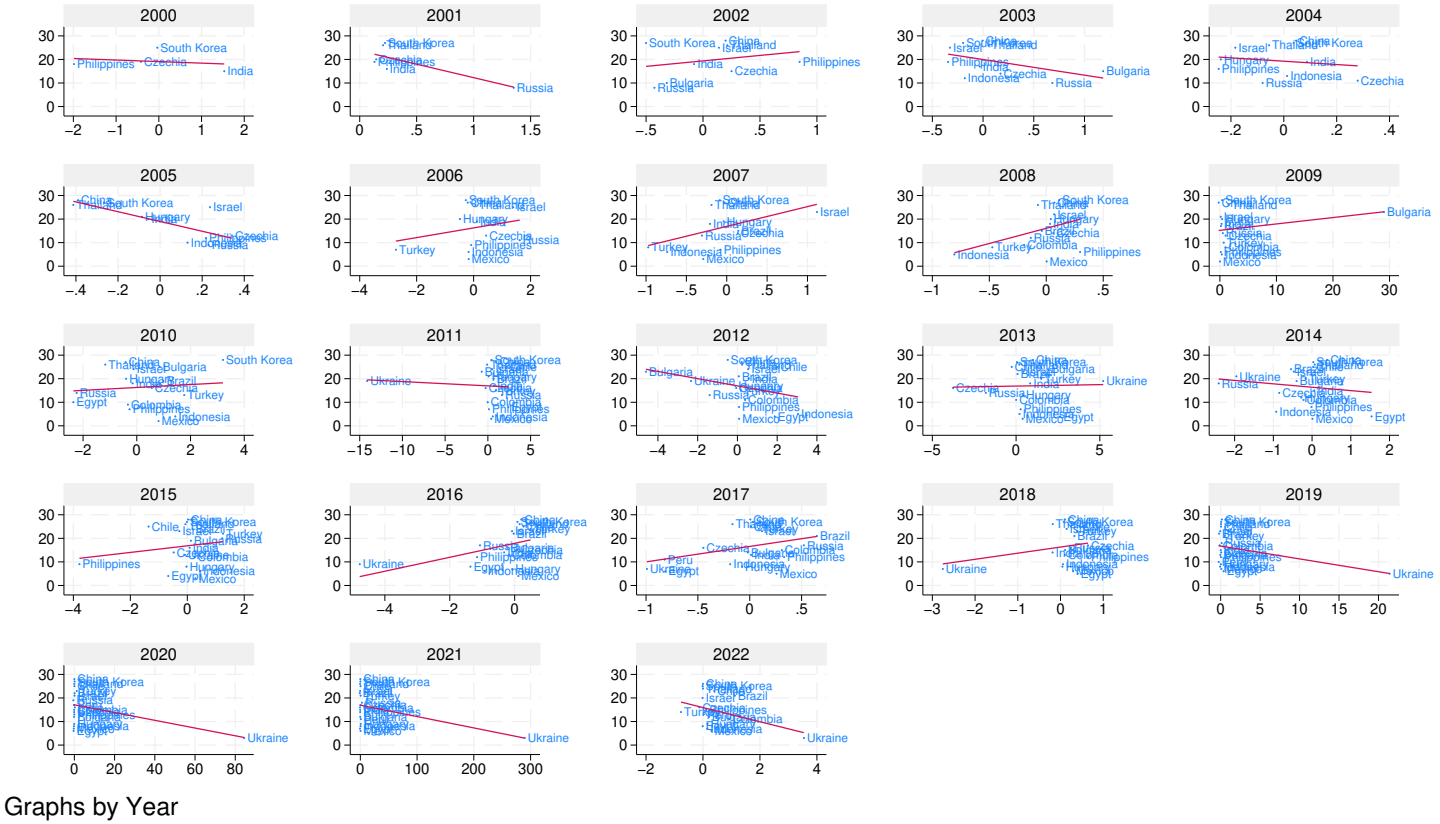

Figure E.24: 1 Year Sovereign Bond response to U.S. 1 Year Bond against Credit

On the x-axis, I have 1-year local currency bond yields in response to U.S. 1-year bond yields. For both bond yields, I used the first difference. Analysis conducted for each country and year. On the y axes, I have the yearly rank of the Monetary sector credit to the private sector as a percentage of GDP. This graph shows the heterogeneous effect of the exchange rate responses over time.

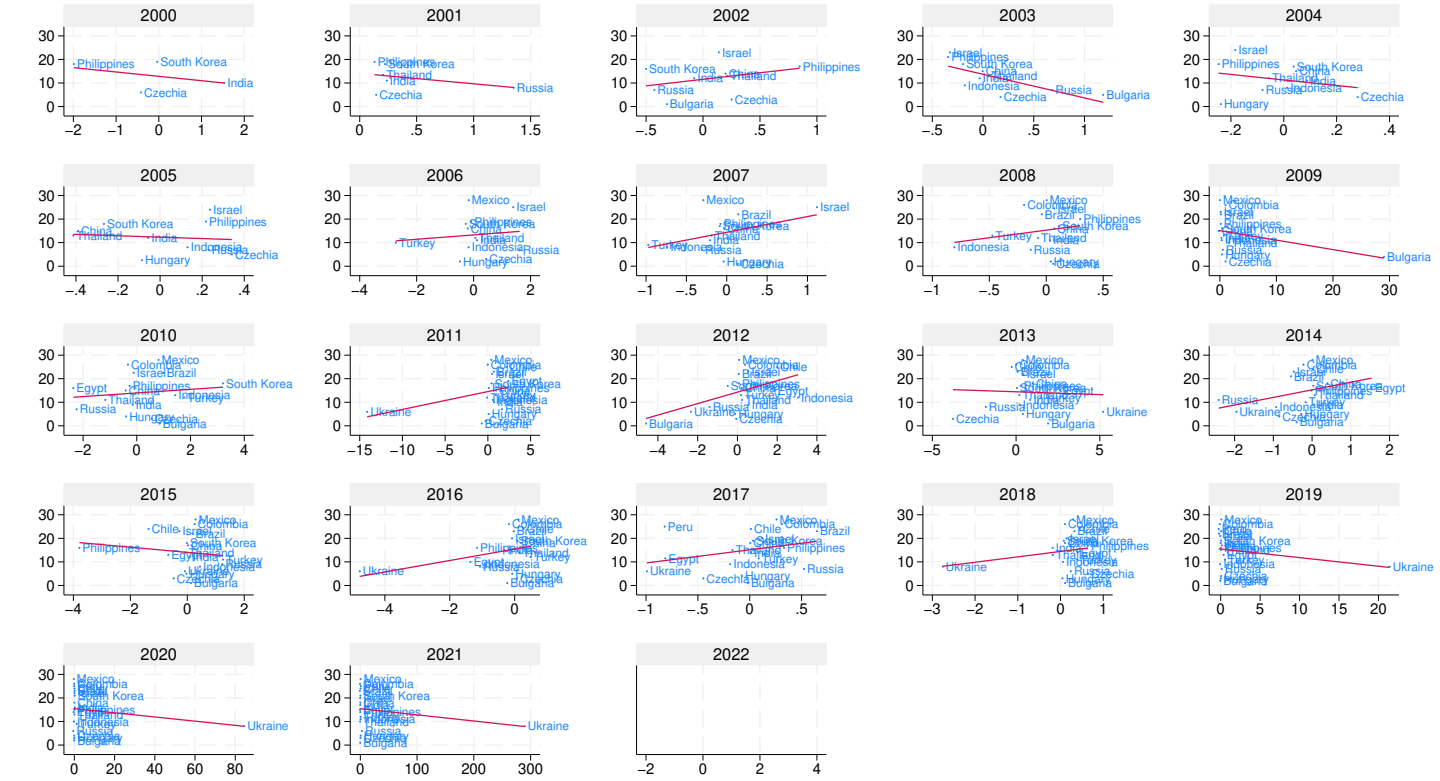

Figure E.25: 1 Year Sovereign Bond response to U.S. 1 Year Bond against import

On the x-axis, I have 1-year local currency bond yields in response to U.S. 1-year bond yields. For both bond yields, I used the first difference. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the imports from the U.S. for each EME. This graph shows the heterogeneous effect of the exchange rate responses over time.

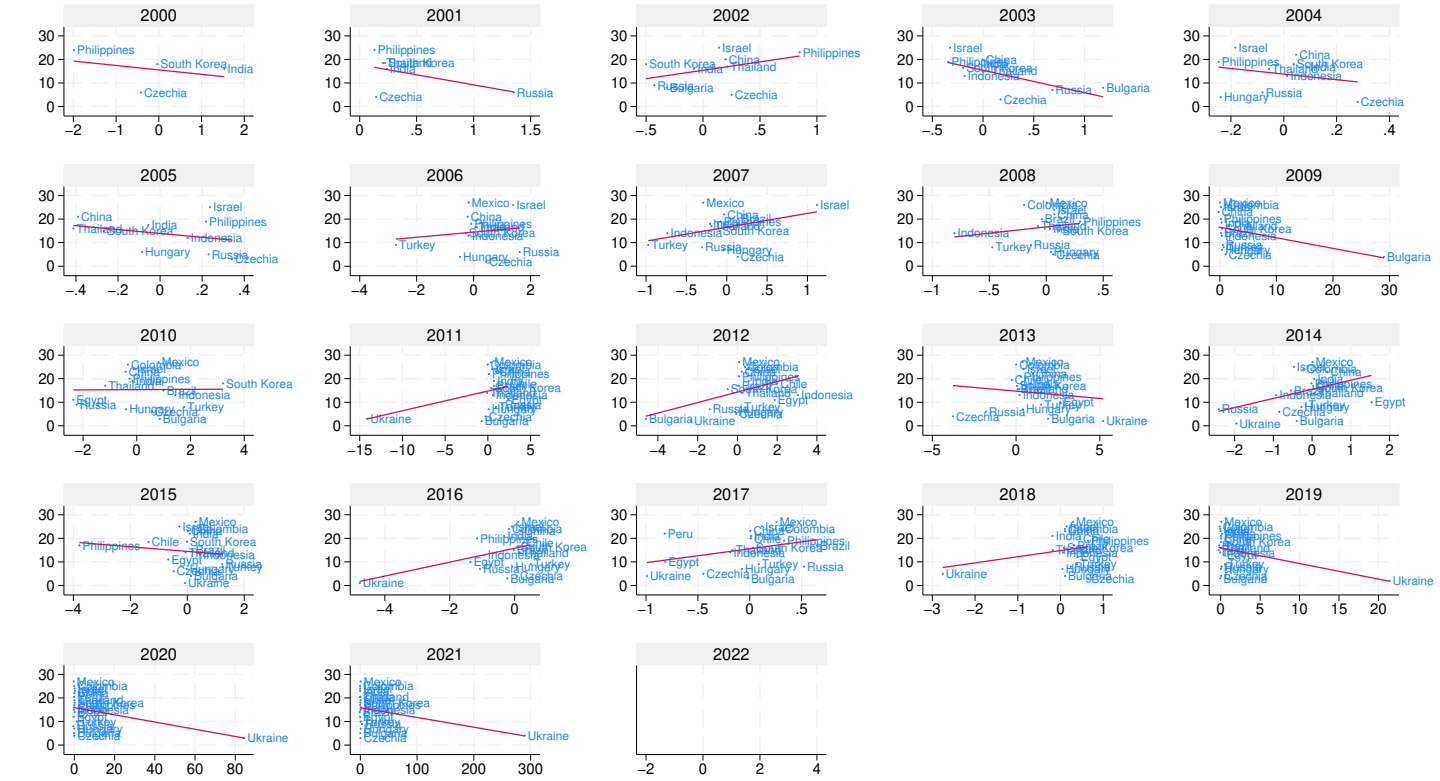

Figure E.26: 1 Year Sovereign Bond response to U.S. 1 Year Bond against Export

On the x-axis, I have 1-year local currency bond yields in response to U.S. 1-year bond yields. For both bond yields, I used the first difference. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the Exports to the U.S. for each EME. This graph shows the heterogeneous effect of the exchange rate responses over time.

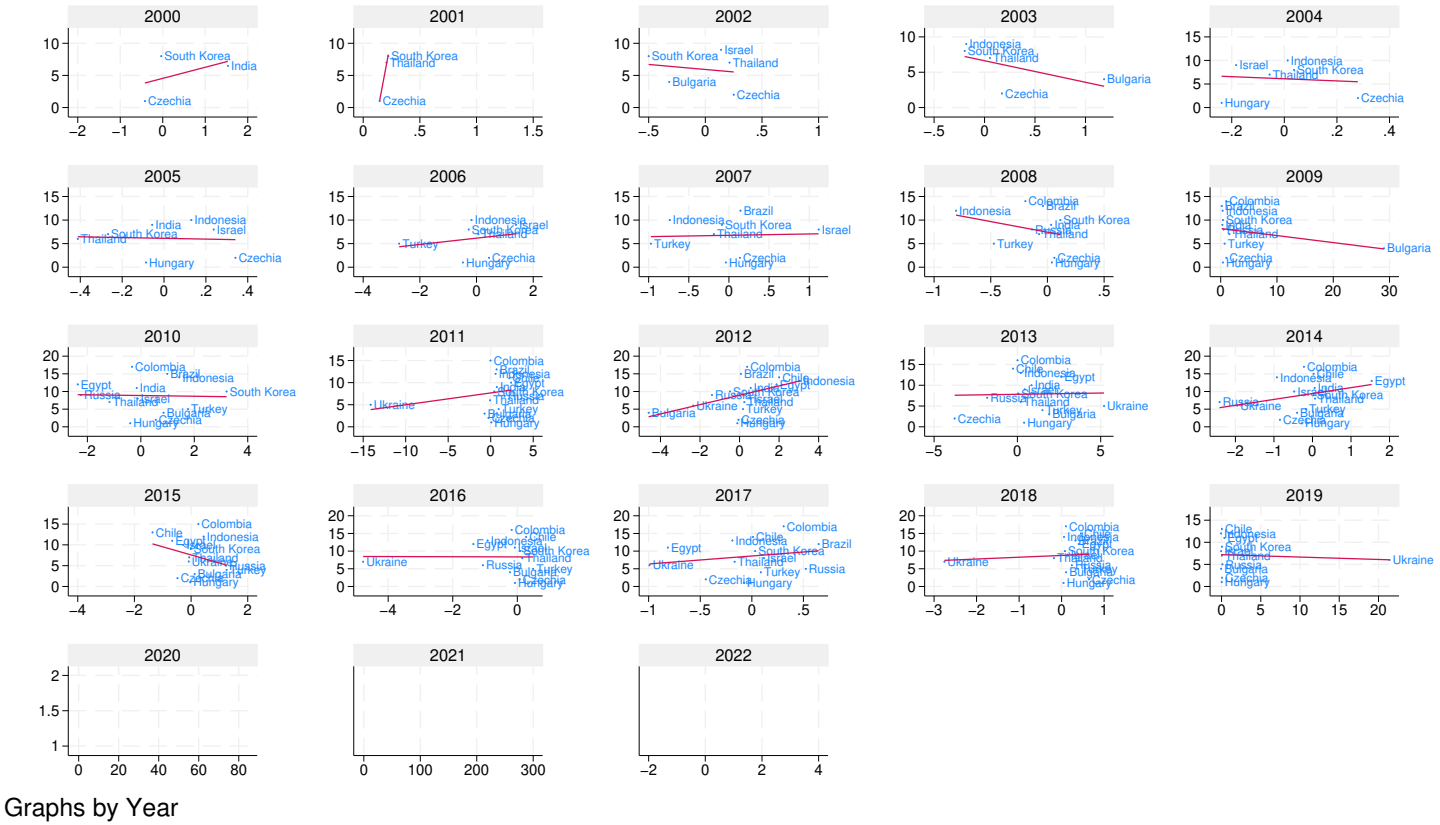

Figure E.27: 1 Year Sovereign Bond response to U.S. 1 Year Bond against Trade Currency

On the x-axis, I have 1-year local currency bond yields in response to U.S. 1-year bond yields. For both bond yields, I used the first difference. Analysis conducted for each country and year. On the y-axis, I have the yearly rank of the USD invoice share for each emerging market. This graph shows the heterogeneous effect of the exchange rate responses over time.