

The Determinants of Local Currency Credit Spread: Evidence From Emerging Markets

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ABSTRACT

This thesis investigates the determinants of local currency credit spread (LCCS) in emerging markets, with an emphasis on understanding how sovereign risk associated with local currency debts is influenced by both local and global economic factors. Utilizing a dynamic factor model, the study comprehensively analyzes data spanning from 2007 to 2021 across nine diverse emerging economies: Brazil, Hungary, Indonesia, Mexico, the Philippines, Poland, Russia, South Africa, and Turkey. This period, marked by significant global financial shocks, provides a robust context for examining the predictive power of the model. Furthermore, the thesis explores the macroeconomic fundamentals behind the weak co-movement in the LCCS compared to the foreign currency credit spread (FCCS). While inflation emerged as the main source of this dispersion, short-term debt, current account deficit, and financial markets index, a measure of how developed financial markets are in terms of their depth, access, and efficiency, are also important characteristics for the deterioration of local currency credit spread dynamics. The findings demonstrate that LCCS in emerging markets are shaped not only by traditional measures of default risk but also by a broader array of economic and political uncertainties, thus providing an insight for policymakers, investors, and analysts to make more informed decisions based on a deeper understanding of the diverse economic landscapes.

ÖZET

Bu tez, gelişmekte olan piyasalarda yerel para birimi kredi marjı belirleyicilerini incelemekte olup, yerel para birimi borçları ile ilişkilendirilen ülke riskinin hem yerel hem de küresel ekonomik faktörler tarafından nasıl etkilendiğini araştırmaktadır. Dinamik faktör modeli kullanarak, çalışma 2007’den 2021’e kadar Brezilya, Macaristan, Endonezya, Meksika, Filipinler, Polonya, Rusya, Güney Afrika ve Türkiye’de verileri kapsamlı şekilde analiz etmektedir. Önemli küresel finansal şoklar içeren bu dönem, modelin tahmin gücünü incelemek için sağlam bir bağlam sunmaktadır. Ayrıca tez, gelişmekte olan piyasalarda yerel para birimi kredi marjlarının birlikte hareketinin döviz cinsi kredi marjlarına göre zayıf olmasının makroekonomik temellerini araştırmaktadır. Enflasyon bu ayrışmanın ana kaynağı olarak ortaya çıkmışken, kısa vadeli borç, cari açık ve finansal piyasalar endeksi, finansal piyasaların derinlik, erişim ve verimlilik açısından ne kadar gelişmiş olduğunu ölçen gösterge, yerel para birimi kredi marjı dinamiklerinin bozulmasında önemli etmenlerdir. Bulgular, yerel para birimi kredi marjının gelişmekte olan piyasalarda sadece geleneksel iflas riski ölçümleri tarafından değil, aynı zamanda daha geniş bir ekonomik ve siyasi belirsizlikler dizisi tarafından şekillendirildiğini göstererek, politika yapıcılar, yatırımcılar ve analistler için çeşitli ekonomik koşullarda daha bilinçli kararlar almaları için bir içgörü sağlamaktadır.

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CHAPTER I

INTRODUCTION

In recent decades, developing countries have captured the attention of international investors, driven by their dynamic, fast-growing economies and potential for substantial returns. However, these opportunities are accompanied by considerable risks. Exchange rate fluctuations and credit risks can often hinder investors from realizing the returns they anticipate in emerging markets. Higher credit risk, for example, can result in mark-to-market losses on bond investments and even trigger default events. The impact of a default event not only affects investors, as the government is unable to repay its debt, but also leads to an increase in systemic risks in the global financial system.

The growing importance of credit risk is evident in the sharp rise in global debt over the past five decades Mengue Bidzo (2018) [1]. Initially, developing countries began issuing debt in foreign currencies, but over time they diversified their debt structures by introducing local currency-denominated bonds. As these bonds typically provide higher returns than those issued by developed countries, there has been a growing emphasis on decomposing bond returns into several risk categories.

To fully understand the impact of sovereign risk, which is the main driver of government bond returns, it is crucial to explore various aspects associated with credit derivatives. Among these, credit default swaps (CDS) are particularly valuable for evaluating and measuring country risk premia especially on foreign currency (FC) debt, and serve as an important indicator of risk appetite in the bond market. Nevertheless, in emerging markets, defaults on local currency bonds governed under domestic law do not qualify as credit events that activate CDS contracts. Therefore, sovereign CDS provides an inadequate representation of the risk associated with emerging market sovereigns.

Traditionally, investors have relied on credit ratings provided by agencies, but the recent global financial crises have raised doubts about the reliability of these ratings. Credit ratings often lag behind real-time market conditions and fail to fully capture the performance of governments and companies. This has led to a growing interest in dynamic approaches that offer more timely assessments of sovereign risk Loffler (2005) [2].

Assessing credit risk for local currency debt presents a unique challenge. Government defaults on domestic debt are rare, and predicting such events in emerging markets requires analyzing factors like governance frameworks, debt maturity profiles, inflation rates, and rollover risk Dullien et al. (2020) [3]. To gain a better understanding of the relationships between these factors, researchers investigate how economic indicators such as public debt levels, current account deficit levels, and gross domestic product (GDP) can impact local currency risks.

Du and Schreger (2016) [4] propose an alternative approach to overcome the limitations of traditional rating-based methods and provide real-time market expectations by utilizing daily data from cross-currency swaps and sovereign bonds to calculate the local currency credit spread (LCCS). While this approach offers a real-time view of market expectations, LCCS measurements can vary significantly across countries, occasionally showing negative values, which suggests a negative probability of default and cheaper insurance.

This thesis employs a comprehensive methodology to examine sovereign risk in emerging markets using local currency credit spread measure. It addresses several research questions, notably the lack of examination regarding the predictability of local currency credit spreads through local and global factors in previous studies. Furthermore, it explores the empirical relationship between foreign currency credit spreads (FCCS) and local currency credit spreads (LCCS) in emerging economies, an area that has yet to be thoroughly investigated.

I use a dataset spanning from 2007 to 2021 to capture diverse economic conditions

and major global financial events, including the 2008 global financial crisis, the 2011 European debt crisis, and the COVID-19 pandemic. This wide-ranging timeframe allows for a thorough evaluation of local currency sovereign risk under various stress scenarios. I select nine countries, including Brazil, Hungary, Indonesia, Mexico, the Philippines, Poland, Russia, South Africa, and Turkey, which represent a diverse mix of emerging markets with varying geographical and political risks, trade balances, and debt positions.

To thoroughly analyze the factors affecting local currency credit spreads, I apply a dynamic factor model approach. These models have gained increasing importance in recent years, thanks to advancements in computing power and the availability of larger datasets. Factor models provide an effective solution to common challenges faced by traditional econometric methods, such as parameter uncertainty and multicollinearity.

The analysis of credit spreads in emerging markets requires a deep understanding of macroeconomic fundamentals. Factors such as financial and economic indicators, inflation rates, and political stability significantly influence credit spreads. However, my findings reveal that these effects vary across different markets, underscoring the importance of recognizing each country's unique characteristics. The dynamic factor model offers valuable insights by allowing for the categorization of countries based on their distinct attributes.

To examine the impact of factors such as economic conditions, governance structures, and financial systems on credit spreads, I employ panel regression analysis. It is particularly effective for emerging markets studies, as it integrates both time series and cross-sectional variations. By broadening the scope of my analysis, I ensure that unobserved variables specific to each country do not solely influence the results.

This thesis contributes to the existing literature by examining the factors influencing local currency credit spreads in emerging markets, addressing country-specific predictability over time, short-term variations using panel data, and long-term trends alongside country-specific characteristics.

I organize the remainder of this study as follows: Chapter II includes previous studies on credit spreads. Chapter III explains the calculations and assumptions regarding LCCS. Chapter IV analyses the predictability of the local currency credit spread, and Chapter V examines the characteristics that affect the source of credit spread dispersion in emerging markets.

1.1 Hypotheses

In this section, I provide the primary hypotheses in this thesis to investigate the dynamics of Local Currency Credit Spread (LCCS) in emerging markets (EM). The hypotheses are rooted in previous research on bond return predictability, but they extend the analysis to focus on LCCS. The hypotheses consider both local and global factors and aim to understand how macroeconomic fundamentals and state-dependent conditions affect LCCS across different emerging markets countries.

Hypothesis 1: LCCS is predictable using a combination of local and global factors.

Hilscher and Nosbusch (2010) [5] and Ludvigson and Ng (2009) [6] demonstrate the predictability of excess returns on local currency bonds in both developed and emerging market economies. However, LCCS differs as it represents the real yield on local currency bonds after hedging for exchange rate risk. In this context, the primary objective of this hypothesis is to determine whether the predictability of LCCS exists in emerging markets and to identify the conditions under which it becomes more pronounced.

This hypothesis argues that LCCS is not random but can be systematically predicted by a set of local and global economic factors. Local factors are constructed to represent a broad range of economic conditions, while global factors comprise variables such as global interest rates, financial shocks, and investor sentiment. By combining these two sets of factors, it is expected that a comprehensive model captures the dynamics of

LCCS, facilitating more accurate predictions of sovereign risk in emerging markets.

Additionally, identifying the factors helps investors and policymakers understand the conditions under which local currency bonds become more or less attractive compared to foreign currency-denominated debt and offer predictable risk-adjusted returns.

Hypothesis 2: Macroeconomic factors not only influence short-term variation in LCCS within individual countries but also serve as a primary source of dispersion in LCCS across countries.

Du and Schreger (2016) [4] and Du and Schreger (2022) [7] show various findings on the impact of different local and global variables on LCCS. However, a detailed panel regression and diagnostics based on a set of macroeconomic characteristic variables are not present in the literature. In this context, there is a need for an empirical analysis that represents risk categories agreed upon by both financial experts and economists - covering country risk and default risk - to demonstrate the short-term and long-term effects on LCCS, which can be generalized for emerging markets.

This hypothesis builds on the notion that macroeconomic fundamentals play a dual role in shaping LCCS. First, they affect the short-term variation in LCCS within each country, as local economic conditions - such as inflation, debt levels, and fiscal policies - fluctuate over time. Second, macroeconomic factors explain the dispersion of LCCS across countries, as different emerging markets experience these factors in unique ways, leading to variation in credit spreads on a global scale.

For instance, a country with a high current account deficit or short-term debt burden might see a sharper increase in credit risk during periods of economic stress compared to a country with stronger fiscal fundamentals. Similarly, differences in inflation rates and financial market development can lead to divergent LCCS outcomes across countries.

By exploring the interactions between macroeconomic factors and LCCS both within and across countries, this hypothesis seeks to uncover the mechanisms that drive

these spreads. The findings will help clarify the extent to which local economic conditions shape the risk profiles of emerging market bonds, offering more precise insights for both investors and policymakers.

Hypothesis 3: The variation in LCCS is state-dependent, with inflation emerging as a significantly priced factor during periods of market turbulence

This hypothesis addresses the role of inflation as a state-dependent factor in driving LCCS variation. Du et al. (2020) [8] shows the relationship between inflation and LCCS in short-term. However, the stability of this relationship over time, as well as its sensitivity to crisis periods and varying market conditions, remains uncertain and requires further investigation.

This hypothesis builds on the idea that inflationary pressures exacerbate credit risk in times of uncertainty, particularly in emerging markets where inflation can quickly erode the real value of local currency bonds. The pricing of inflation risk during turbulent times is expected to have a strong influence on exchange rate and credit risk, as investors demand higher yields to compensate for the increased risk of holding local currency debt.

CHAPTER II

LITERATURE REVIEW

Recent studies link sovereign risk to CDS, especially after 2008. The 2008 global financial crisis and the 2011 European debt crisis questioned the reliability of credit ratings, highlighting the need for more dependable indicators for sovereigns and corporations in financial markets. Pan and Singleton (2008) [9] examine CDS spreads in Mexico, Turkey, and Korea, noting the impact of geopolitical and credit diversities on these spreads. Remolona et al. (2008) [10] demonstrate that inflation and the Chicago Board Options Exchange (CBOE) Market Volatility Index (VIX) effectively forecast sovereign risk in 24 selected countries. Bhar et al. (2017) [11] inspect the European CDS market, focusing on iTraxx indices - iTraxx Europe, iTraxx Europe Hivol, and iTraxx Europe Crossover - over 5-year and 10-year periods. Ismailescu and Kazemi (2010) [12] study the impact of sovereign rating changes on CDS spreads in emerging markets, observing a more pronounced response to negative news than to positive updates. Longstaff et al. (2011) [13] utilize CDS data to highlight the common factors of credit risk and the influence of global factors in emerging markets. Similarly, Calvo et al. (1993) [14] report that U.S. economic trends significantly influence capital flows to Latin America. Furthermore, Nogues and Grandes (2001) [15] identify financial contagion and risk aversion as critical factors in country risk premiums. Diaz Weigel and Gemmill (2006) [16] examine foreign currency-denominated bonds from Latin America, noting that credit spreads are highly sensitive to regional factors such as stock market returns, volatility, and investor sentiment, as well as a variety of country-specific and global influences.

Measuring the sovereign risk premium is a crucial component in analyzing sovereign bond yields. CDS spreads act as indicators of credit quality by employing trading-based liquidity metrics such as bid-ask spreads and market depth, in contrast to euro area swap

rates, according to Beber et al. (2009) [17]. Similarly, Favero et al. (2010) [18] examine the impact of the US Treasury-Swap spread on global credit risk, using bid-ask spreads as a proxy for liquidity measures.

During the financial crisis, liquidity risk contributes more to the widening of sovereign spreads from trough to peak than credit risk. However, in the debt crisis, credit risk becomes a more significant factor. According to Schwarz (2018) [19], overall bond market liquidity generally overshadowed interbank spreads to a greater extent than credit risk in both scenarios. Reinhart (2002) [20] conduct a yield decomposition analysis, revealing how liquidity, credit risk factors, swap spreads, and term spreads affect bond pricing, noting that the impact of various shocks is time and state-dependent.

The absence of credit derivative instruments like CDS for LC debts restricts investors' ability to measure credit risk and anticipate market expectations. Defaults on domestic debt are infrequent for sovereigns, making it challenging to evaluate potential default events in emerging markets. Debt crises and default risks are typically linked to governance, debt maturity, inflation, and roll-over risk. Countries with better historical inflation records and stronger legal frameworks tend to have a higher concentration of local bond issuance and a lower reliance on foreign-currency-denominated bonds, as indicated by Reinhart and Rogoff (2011) [21]. A consistent policy response by the government can diminish the debt stock and mitigate or shorten a crisis, particularly with longer debt maturity Cole and Kehoe (2000) [22]. To manage increasing default risk, policymakers prefer borrowing long-term to circumvent short-term risks. If it's not feasible to increase the long-term debt stock, another approach is to transfer private sector debt to public debt, offering domestic lenders more attractive incentives and returns than foreign lenders Broner et al. (2013a) [23]. During times of crisis, the credibility of legal institutions has a greater impact on interest rate spread than roll-over risk. Bocola (2016) [24] observed that during the 2008 - 2012 debt crisis, the Outright Monetary Transaction (OMT) program functioned as a bailout package, mitigating the negative effects of roll-over risk on interest rate spreads and borrowing costs. Central banks can shape the yield curve through

effective communication of monetary policy decisions Leombroni et al. (2021) [25].

In contrast to the sovereign debt crisis in euro area countries, developing countries must strictly adhere to fiscal policies to establish sustainable public debt D’Erasmus et al. (2016) [26]. These countries face numerous challenges in avoiding self-fulfilling debt crises, further complicated by factors like unemployment, economic growth, current account deficits, and debt balances. One strategy for managing or delaying self-fulfilling debt is to use inflation credibility to inflate away LC debt unless a lack of commitment to reducing inflation leaves the country vulnerable to rollover crises Aguiar et al. (2013) [27], Ottonello and Perez (2019) [28]. As noted by Lee (2022) [29], increased exchange rate volatility leads emerging economies to prefer a greater share of foreign currency-denominated external borrowing. However, if developing countries engage in excessive foreign currency borrowing, deviating from the optimal exchange rate composition, they face risk-sharing issues with foreign investors who demand higher risk premiums Broner et al. (2013b) [30]. Similarly, Du et al. (2020) [8] argue that when a country fails to meet inflation commitments, foreign investors seek higher yields for local currency debt, thus increasing the government’s need for FC borrowing and limiting optimal debt management.

Policy uncertainty is one of the biggest sources of risk for bond risk premiums and capital inflows. Capital inflows to emerging economies are highly responsive to changes in US and EU policy uncertainty, as well as domestic policies. While increased policy uncertainty in the US economy negatively affects bond and equity capital inflows to emerging economies, uncertainty on the EU side generally increases capital inflows to the equity market, albeit with a non-linear effect depending on country-specific characteristics, as noted by Gauvin et al. (2013) [31]. Policy uncertainty also significantly influences local currency. According to Abid (2020) [32], economic policy uncertainty accurately predicts local currency movements in the short, medium, and long terms for five emerging economies (Brazil, Mexico, Chile, South Korea, and India). Eusepi and Preston (2012) [33] suggest that enhancing the consistency and stability of policies is

achievable by aligning expectations around monetary and fiscal policy, although market expectations may diminish as debt levels stabilize. Table 1 summarizes key literature on FC and LC sovereign risk, mostly focusing on emerging markets.



Table 1: Related Literature on Local Currency Credit Spread

Authors	Country/Region	Data	Sample Period	Methodology
Du and Schreger (2022) [7]	14 Emerging Market Economies (EMEs)	Sovereign, Corporate and Total Debt in Local Currency (LC)	2003 - 2017	Panel Fixed Effects Regression
Meyer-Cirkel and Huertas (2021) [34]	81 Emerging & Developed Market Economies	Probability of Default with Sectoral Wealth	2000 - 2019	Logistic Regression
Chernov et al. (2021) [35]	Asian-Pacific Countries	Bond Risk Premiums & Macroeconomic Factors & Exchange Rates	1998 - 2019	Panel VAR
So et al. (2019) [36]	16 Emerging Market Economies (EMEs)	Local Currency Sovereign Bond Returns	2007 - 2018	Conditional Asset Pricing Model
Lee (2022) [29]	16 Emerging Market Economies (EMEs)	Bond Risk Premiums	2004 - 2018	Panel Fixed Effects Regression
Aizenman et al. (2013) [37]	8 Emerging Market Economies	Sovereign Bond Issuance	1970 - 2018	Probit Model[42]
Gadanecz et al. (2014) [38]	20 Emerging Market Economies (EMEs)	Local Currency Sovereign Bond Yields	2005 - 2013	Panel Fixed Effects Regression
Amstad et al. (2020) [39]	73 Emerging Market Economies (EMEs)	Foreign and local currency ratings	1995 - 2015	Panel Multinomial Ordered Regression
Arellano et al. (2020) [40]	8 Emerging Market Economies (EMEs)	Inflation & EM Bond Spread	2004 - 2019	NK-Default Model
Hale et al. (2020) [41]	30 Emerging & Developed Market Economies	Sovereign Bond Issuance	1995 - 2013	Linear Regression
Hilscher and Nosbusch (2010) [5]	31 Emerging Market Economies (EMEs)	Sovereign Spread	1994 - 2007	Linear Regression
Lane and Shambaugh (2010) [42]	117 Emerging & Developed Market Economies	Asset- and Liability-Weighted Exchange Rates	1994 - 2004	Panel Fixed Effects Regression
Longstaff et al. (2011) [13]	26 Emerging & Developed Market Economies	Credit Default Swap	2000 - 2007	Panel Regression
Uribe and Yue (2006) [43]	7 Emerging Market Economies (EMEs)	Real Gross Domestic Output & Sovereign Spread	1994 - 2001	Vector Autoregression
Fang et al. (2022) [44]	95 Emerging & Developed Market Economies	Sovereign Debt & Investor Holdings & Yields & Sovereign Spread	1991 - 2018	Panel Fixed Effects Regression
Jeanneret and Souissi (2016) [45]	100 Emerging & Developed Market Economies	Sovereign Default Event	1996 - 2012	Logistic Regression

CHAPTER III

LOCAL CURRENCY SOVEREIGN RISK

Local currency sovereign risk refers to the likelihood that the country default on its debt obligations denominated in its own currency. It primarily stems from the economic and financial conditions of a country, as well as the quality of its domestic institutions. In general, countries with strong economic fundamentals and stable financial systems tend to exhibit lower default risk compared to those with weaker economic structures and financial vulnerabilities.

To assess sovereign risk associated with a local currency, researchers prefer to consider the country's economic, financial and political landscape. Some of the key factors that can affect local currency sovereign risk include (i) High level of public debt; (ii) Large current account deficit; (iii) Weak economic growth; (iv) Political instability and policy uncertainty; (v) Low level of international reserve. The combination of these factors with various statistical methods and expert judgment are commonly used approach for determining a credit rating. These risk assessment frameworks allow investors and market participants to make informed decisions regarding the risks and returns of investing in emerging market (EM) local currency debt, particularly when constructing a bond portfolio.

Nonetheless, rating-based methods present certain challenges, primarily related to the potential for delayed or outdated information. Monthly or quarterly data may not capture sudden economic or political shifts that can significantly impact a country's creditworthiness between reporting periods. Low-frequency data can also make it challenging to differentiate between short-term fluctuations and long-term trends.

Also, instead of 'hard default', governments may choose 'soft default' by rolling

over debt or reducing the real value of debt by allowing inflation to rise. Assessing the impact of actions like debt restructuring on a country's overall financial health can be challenging. There is a lack of widely accepted definition of what constitutes a soft default. Different stakeholders (investors, rating agencies, and government officials) might have varying interpretations. Distinguishing between a proactive debt restructuring (as a part of sound financial management) and a restructuring due to an inability to pay can be subtle. Incorporating soft defaults into predictive financial models requires complex assumptions about future government actions and market reactions. Unique, non-recurring factors may influence past instances of soft defaults, or they may not provide clear patterns. Figure 1 presents the sovereign foreign and local currency selective defaults by year and the following is a comprehensive list of significant government bond defaults since 1990:

- 1990s
 - Russia (1998): Default on domestic debt in local currency during the financial crisis.
 - Ecuador (1999): Default on bonds, primarily in foreign currency, due to economic crisis.
- 2000s
 - Argentina (2001): Default on over \$100 billion, largely in hard currency.
 - Dominican Republic (2005): Default on government bonds in foreign currency.
 - Ecuador (2008): Second default on foreign currency bonds.
- 2010s
 - Greece (2012): Default on debt including bonds in both local (Euro) and foreign currencies.
 - Belize (2012, 2017): Defaults on bond payments in foreign currency.
 - Argentina (2014): Default on foreign currency bonds due to legal dispute.
 - Puerto Rico (2015): Default on bond payments, primarily in hard currency.
 - Venezuela and PDVSA (2017): Default on bond payments in foreign currency.

- Lebanon (2020): Default on Eurobonds in hard currency.
- 2020s
 - Zambia (2020): Default on Eurobond payments in foreign currency.
 - Suriname (2020, 2021): Multiple defaults on bond payments in hard currency.
 - Belize (2021): Default on foreign currency bonds before debt restructuring.

To address these issues, Du and Schreger (2016) [4] introduced a methodology for measuring the local currency credit spread using daily data from cross currency swaps (CCS) and government bonds. Typically, investors use cross-currency swaps for hedging, financing, or speculating to manage their currency and interest rate exposures. One party pays a fixed rate in one currency, while the other pays a reference rate, such as LIBOR or EURIBOR, plus a spread in another currency ¹. Those paying the floating rate compensate through the asset swap spread for the credit and basis risks inherent in cross currency swaps. As a result, the asset swap spread, an essential component of the LCCS formula, reflects not only expectations for future interest rates and inflation, but also the relative credit risk of bonds.

Du and Schreger (2016) [4] framework for CCS contracts involves swapping US Treasury bonds for LC bonds to evaluate the credit risk associated with LC debt. Three critical assumptions serve as the foundation for interpreting the LC credit spread in a frictionless financial market:

- No Risk-Free Arbitrage in the Market: The financial market precludes any risk-free arbitrage opportunities. This implies:
 - The bond market has a perfect liquidity condition.
 - Arbitrageurs have unrestricted access to bond market.
 - There are no constraints on short-selling.

¹The Financial Conduct Authority (FCA) announced that all LIBOR settings would cease immediately after December 31, 2021, for sterling, euro, Swiss franc, Japanese yen, and the 1-week and 2-month US dollar settings. The remaining US dollar settings ceased immediately after June 30, 2023. This marks the official end of LIBOR, as confirmed by the FCA. In order to follow the course of the LCCS calculation on the current date, it is necessary to use swap contracts negotiated at Secured Overnight Financing Rate (SOFR) instead of LIBOR (source: <https://www.fca.org.uk/news/press-releases/announcements-end-libor>).

- The bond supply is perfectly elastic, denominated both US dollars and local currencies in emerging markets.
- FX Forwards and Swaps are Free from Counterparty Risk: The transactions in the FX forwards and swaps market are assumed to be free from counterparty risk.
- Dollar-denominated US Treasury bonds are riskless: US Treasury bonds, when denominated in dollars, are considered risk-free assets.

In essence, LCCS represents the onshore-offshore interest rate spread at the same maturity. To measure LCCS, the FX forward premium must first be calculated using CCS. It is common for CCS agreements to be fixed-to-float, involving an exchange of fixed interest payments in local currencies for floating rate payments in US dollars. Typically, over-the-counter markets acknowledge the benchmark reference rates for the respective local currency to align the floating-rate payments. To compute the LCCS effectively, it's essential to convert the floating rate dollar payments into fixed payments.

The initial step for investors is to convert the fixed-rate LC cash flows into floating-rate dollar cash flows, pegged to benchmarks like LIBOR, through the CCS. Then, investors transform these dollar cash flows back into fixed payments through a float-to-fix interest rate swap. This sequence of conversions and swaps is used to determine the implied forward premium for foreign exchange. Conversely, if an investor commences with fixed-rate dollar cash flows, inverting this process can produce cash flows at the LC risk-free rate. The following equation defines the LCCS under the stated assumptions:

$$lccs_{nt} \equiv r_{nt}^{lc} - (r_{nt}^{fc} + s_{nt}) \equiv r_{nt}^{lc} - (r_{nt}^{\$} + s_{nt}) \quad (1)$$

where r_{nt}^{lc} is LC nominal yield, r_{nt}^{fc} is risk-free rate and s_{nt} is long-term forward premium. Equation 1 is equivalent to the covered interest rate parity between the bond yield of a particular emerging market country and the U.S. government bond yield. Covered interest rate parity suggests that the difference in interest rates between two countries should be equal to the variations in exchange rates between two currencies. Typically, the interest rate differential should match the cost of insuring against currency risk. An increase in the

local currency sovereign risk might disrupt this parity. When a country's local currency sovereign risk rises, investors and creditors may demand a higher risk premium on its local currency debt, leading to higher interest rates. So, covered interest rate parity might not work because the expected change in the exchange rate might not match up with the actual differences in interest rates. This could make covered interest arbitrage less appealing and increase market volatility.

The foundation of LCCS in a frictionless market is the representation of expected loss using an LC-risk-neutral measure. I regard the expected default loss as a potential financial shortfall if a bond issuer fails to meet debt obligations. The expected loss can be calculated by multiplying the default probability with the bond value. The relationship between local currency sovereign risk and expected default loss indicates that an increase in sovereign risk heightens the likelihood of government default on debt, leading to losses for local currency bond investors. This correlation also does not necessarily follow a linear path; sovereign risk might rise disproportionately compared to the expected default loss, especially if the country maintains a strong credit rating. Market or external factors could escalate sovereign risk without significantly influencing the expected default loss.

To calculate the expected default loss using dollar risk-free rates instead of LC-risk-neutral rates, the LC-FC covariance, which reflects the interaction between exchange rate and default risk, must be considered. Du and Schreger (2016) [4] introduce a quanto adjustment parameter to express the LC expected loss in dollar terms.

$$lccs_t \approx \mathbb{E}_t^{Q^{LC}} [L_{t+1}^{LC}] \text{ under } Q^{LC} \quad (2)$$

$$\approx \mathbb{E}_t^{Q^S} [L_{t+1}^{LC} - q_t] \text{ under } Q^S, \quad (3)$$

$$q_t = \frac{Cov_t^{Q^{fc}} \left(\frac{1-L_t^{LC}}{1-L_{t+1}^{LC}}, \epsilon_{t+1} \right)}{\mathbb{E}_t^{Q^{fc}} \left(\frac{1-L_t^{LC}}{1-L_{t+1}^{LC}} \right) \mathbb{E}_t^{Q^{fc}} (\epsilon_{t+1})} \quad (4)$$

Equation 2 and Equation 3 refer to the expected loss in local currency and foreign currency terms, respectively. q_t is a quanto adjustment parameter to measure the

covariance between currency and credit risk under Q^{fc} .

During times of potential market friction, there may be a deviation from the LCCS calculation. Deviations from one or more of the above-described assumptions primarily cause the presence of these market frictions. For instance, dealers manage the counterparty risk inherent in the CCS contracts used in the LCCS calculation through robust collateral procedures. Additionally, in some countries, regulatory or supervisory authorities may restrict short-selling or limit the use of LC bonds as collateral in CCS contracts. There are different levels of liquidity in the bond market and the swap market. During periods of low capital flows or capital outflows, the bond liquidity risk premium may surpass that of the swap market, leading to higher costs for hedged local currency bond investments.

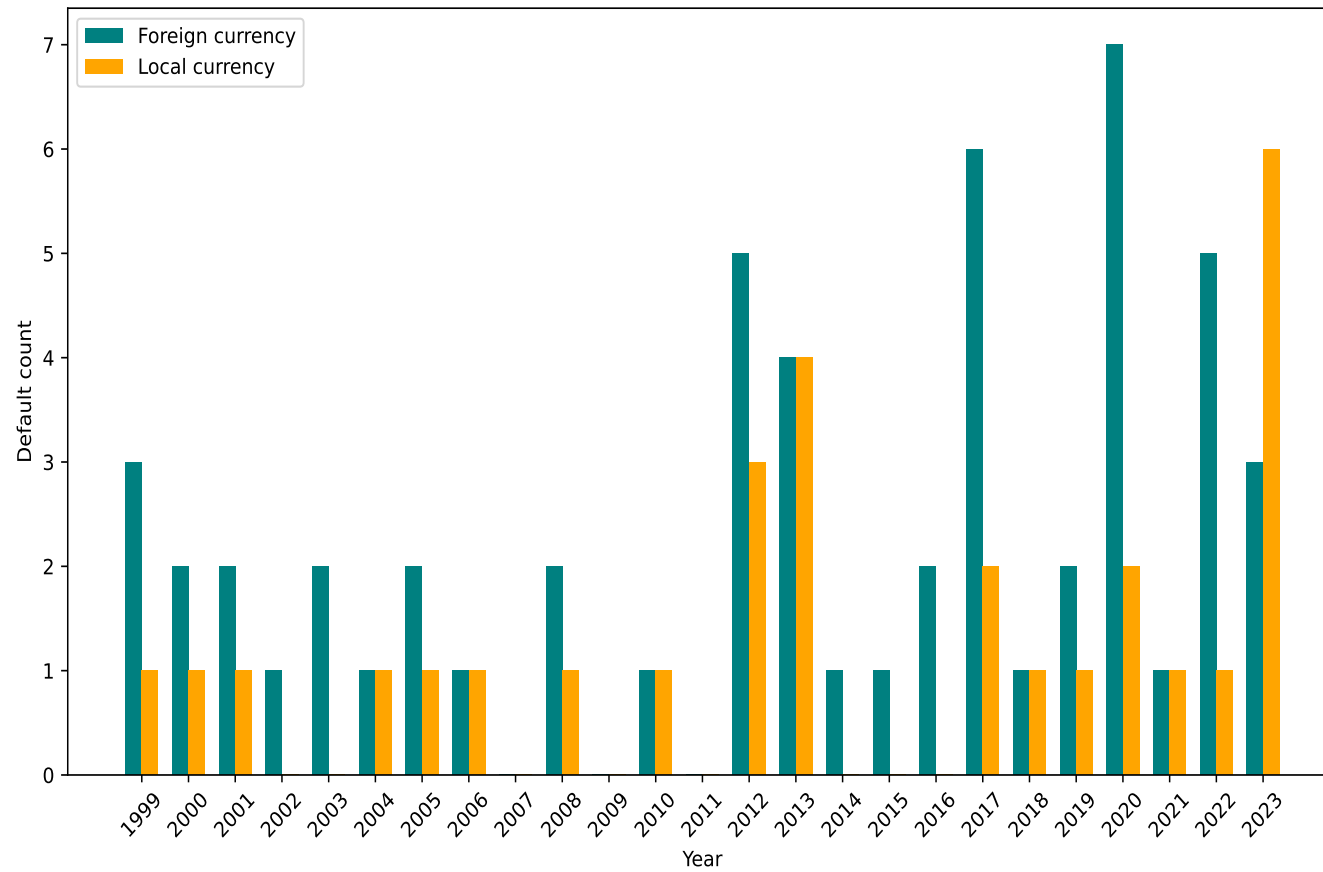
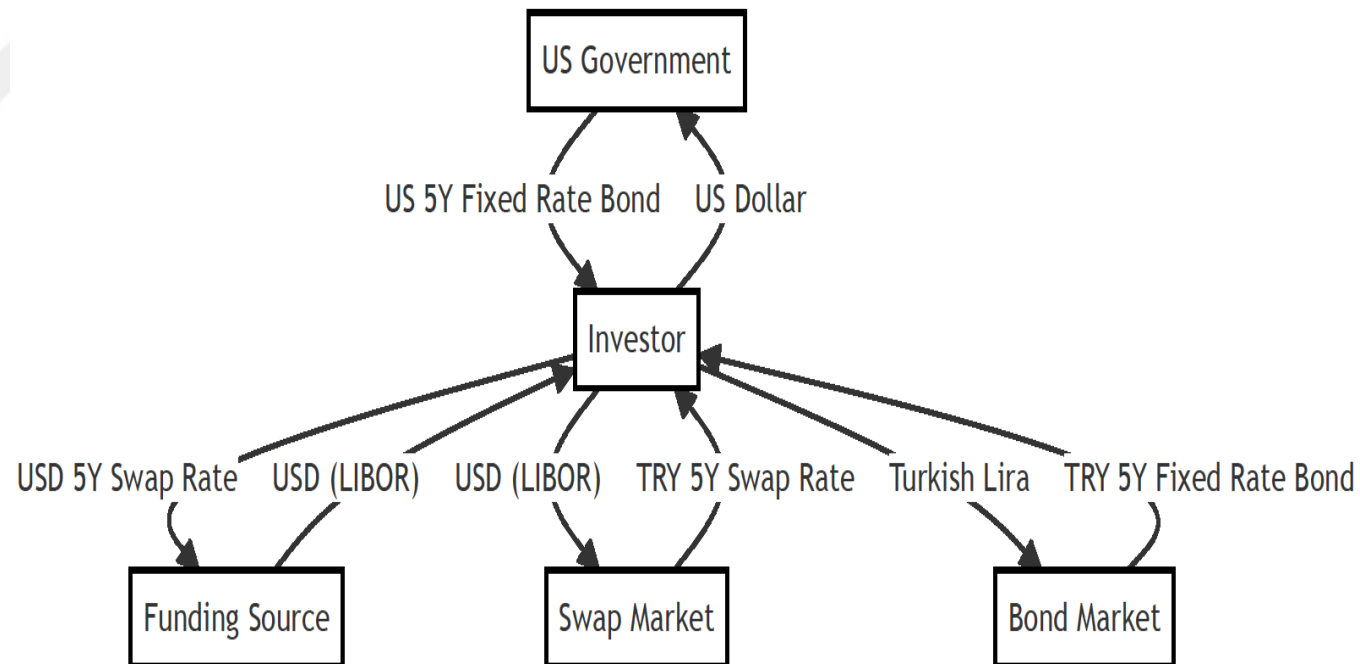


Figure 1: Sovereign Foreign and Local Currency Selective Defaults by Year



$$\text{LCCS} = (\text{TRY 5Y Fixed Rate Bond} - \text{TRY 5Y Swap Rate}) - (\text{USD 5Y Fixed Rate Bond} - \text{USD 5y Swap Rate})$$

Figure 2: Local Currency Credit Spread Calculation for Turkey

CHAPTER IV

PREDICTABILITY OF LOCAL CURRENCY CREDIT SPREAD

In this chapter, I investigate the predictability of the LCCS in selected EM countries. I compile dataset tailored to each country, consisting of local variables, and augment these with global variables, all within the structure of a dynamic factor model. The methodology for data preparation and model estimation remains consistent across each country examined.

4.1 Data

I use a 15-year span of data to cover different business cycle stages and macroeconomic conditions. They represent a variety of economic, fiscal and political indicators and include around 100 variables for each country,.

For my study, I selected 5-year fixed-rate bond yields. Emerging economies often choose 5-year maturity for bond issuance, which not only expands the size of my dataset but also aligns with common practices in these markets, making it useful for effective cross-sectional analysis. The sample period covers the years 2007 - 2021 including the COVID-19 period and major crises. I select nine countries - Brazil, Hungary, Indonesia, Mexico, the Philippines, Poland, Russia, South Africa, and Turkey - all representing different geographical and political risks, trade balances, and debt structure- offer insights into the impact of emerging market characteristics on local currency credit spreads.

I categorize a broad array of macroeconomic and financial data into two main categories for each country: local variables and global variables. In country-specific analysis, I create subgroups for local variables and incorporate global variables in observable form.

To collect the data, I first identify the key variables that are relevant to the study of local currency sovereign risk. My selection criteria focus on the relevance of these variables to the LCCS and their availability in public data sources. Key data sources include the World Bank, the International Monetary Fund, the Bank for International Settlements, various central banks, national statistical offices, government entities, and data providers such as Bloomberg and Reuters.

Following the approach used in dynamic factor model studies, which handle a large number of variables, I organize the local variables for each country into six subgroups: Real Economic Activity, Money Credit Quantity Aggregates, Labor Market, Prices, and Financial Markets.

- **Financial Variables:** This subgroup includes data related to financial market indicators such as stock market indices, bond yields, and derivative markets measures of financial market performance.
- **Housing and Orders:** This subgroup contains data related to the housing market and orders for goods and services, which can be indicators of consumer confidence and economic activity.
- **Money and Credit Quantity Aggregates:** This includes measures of money supply, credit availability, and other monetary indicators that reflect the liquidity and credit conditions in the economy.
- **Labour Market:** This subgroup focuses on employment-related data, including unemployment rates, job creation figures, and wage data, providing insights into the health and dynamics of the labor market.
- **Prices:** This category includes various measures of price levels and inflation, such as consumer price indexes and wholesale price indexes, which are critical for understanding inflationary trends and cost pressures in the economy.
- **Real Economic Activity:** This subgroup encompasses indicators that directly measure economic activity, such as GDP growth, industrial production, and retail sales, offering a comprehensive view of the overall economic performance.

I consistently use these subgroups in the analysis of each selected countries. Additionally, I use the following global variables in observed form in predictive regression analysis:

- **Libor-OIS Spread:** The Libor-OIS Spread measures the difference between Libor and the Overnight Indexed Swap (OIS) rate. It serves as a barometer for banking sector health and interbank borrowing costs. A widening spread indicates an increased perceived risk of interbank lending, often associated with financial turmoil.
- **Ludvigson Uncertainty Index:** The Ludvigson Uncertainty Index quantifies economic uncertainty using a variety of economic indicators and news-based data proposed as by Jurado et al. (2015) [46] . It captures market sentiment and forecasts the volatility of economic activities, influencing investment and policy decisions.
- **US 2-Year Rate:** It reflects investor expectations for the Federal Reserve's monetary policy over the next two years, affecting short-term interest rates and financial market conditions.
- **US 10-Year Rate:** The US 10-Year Rate is the yield on the 10-year Treasury note. It is a benchmark that guides long-term interest rates, including mortgages and loans. The 10-year rate is a crucial indicator of investor sentiment towards long-term economic prospects.
- **DXY Index:** The DXY Index, or US Dollar Index, measures the value of the United States dollar relative to a basket of foreign currencies, including the euro, Japanese yen, British pound, Canadian dollar, Swedish krona, and Swiss franc. It is a major indicator of the international value of the USD and influences international trade and investment flows.
- **US Corporate Bond Spread:** The US Corporate Bond Spread is the yield difference between US corporate bonds and US Treasury bonds. It reflects the risk premium investors demand to hold corporate debt over risk-free government debt. This spread is an important indicator of corporate borrowing costs and overall economic health.
- **Euro 5-Year Basis Spread:** The Euro 5-Year Basis Spread compares the interest

rates between euro-denominated contracts and equivalent contracts in US dollar, adjusted for the euro's five-year term. It reflects the liquidity and credit risk differences between the euro and US dollar, impacting cross-border investment and financing decisions.

These global variables are crucial in my analysis, providing insights into the complexities of the global financial markets. By examining these variables, we can better understand the factors influencing market movements and economic conditions.

4.2 Previous Studies on Dynamic Factor Models

Dynamic factor models have attracted attention in economics and econometrics for many years. Geweke and Singleton (1981) [47] introduce a method requiring estimation in the frequency domain. Watson and Engle (1983) [48] and Engle and Watson (1981) [49] expand this method to fit the time domain, making it more suitable for econometric analysis. These studies estimate parameters using maximum likelihood estimation, known for its computational intensity. The factor estimation process adheres to strict assumptions, such as a normal distribution, error term independence, and no serial autocorrelation.

Over the past two decades, factor models have grown in importance due to increased computational power and data access. Classical linear models with many observed variables face issues like parameter uncertainty, multicollinearity, instability, and inconsistency. Principal component estimation and non-parametric dimension reduction prove effective in addressing these issues, with Stock and Watson (2002) [50] leading recent research.

We can categorize studies on factor estimation into several approaches: nonparametric methods, parametric state space methods, mixed frequency models, and nowcasting techniques. Chamberlain and Rothschild (1983) [51] employ a Gaussian maximum

likelihood estimator for principal components, based on weaker assumptions about common factors. Choi and Yang (2022) [52] demonstrate that, with a growing number of factors and observations, it is feasible to derive an asymptotic form of the principal component estimator. Boivin and Ng (2006) [53] investigate the effect of variable size on factor estimation in a two-step process, focusing initially on factor loadings and subsequently on cross-correlated idiosyncratic terms. Doz et al. (2006) [54] and Breitung and Tenhofen (2011) [55] also study the impact of the restrictions on serial and cross-correlation among idiosyncratic terms on factor loadings.

The state-space estimation approach is widely used in many studies because it adds flexibility to dynamic factor models. State space models significantly contribute to the computation time of maximum likelihood estimation, account for missing data consistently. The use of Kalman filter as an estimation method in state-space models is quite common. Doz et al. (2011) [56] develop a two-step model using PCA for weighted cross-section averaging and Kalman filters for time averaging and idiosyncratic terms. Doz et al. (2012) [57] examine the impact of variables and observations on estimation in hybrid and static factor models, showing factors from large data sets maintain consistency in the asymptotic space. Moreover, Durbin and Koopman (2001) [58] describe an efficient Kalman filter computation with a large number of variables. The estimation procedures for forecasting with missing data and nowcasting with mixed frequency data are similar. Banbura et al. (2013) [59] demonstrate how policymakers use nowcasting with real-time data streaming for quick decision-making on economic trends and expectations. Likewise, Hindrayanto et al. (2016a) [60] explore nowcasting euro area GDP with missing and mixed frequency data.

While research on variable selection in dynamic factor models is limited, Bai and Ng (2002) [61] provide a method to determine the optimal number of factors based on information criteria. Also, Onatski (2010) [62] examines the effects of idiosyncratic terms in variable selection and proposes a method to analyze weak factors influencing the explained variance proportion of PCA. Table 2 summarizes key literature on dynamic factor

models, mostly focusing on empirical analysis.



Table 2: Previous Studies on Dynamic Factor Model

Authors	Country/Region	Data	Sample Period	Methodology
Favero et al. (2005) [63]	U.S. & Euro Area	Domestic Policy Rate	1959 - 1998	GMM VAR
Kryshko (2011) [64]	U.S.	Monetary Policy (Interest Rate & Inflation & Output)	1959 - 2006	Dynamic Stochastic General Equilibrium Model
Chauvet (1998) [65]	U.S.	Business Cycle	1952 - 1993	Dynamic Factor Model with Regime Switching
Forni et al. (2003) [66]	Euro Area	Inflation & Real Activity	1987 - 2001	2-Step Dynamic Factor Model
Koopman and Mesters (2014) [67]	U.S	144 Macroeconomic Data	1959 - 2008	Dynamic Factor Model with VAR
Caldeira et al. (2015) [68]	U.S	U.S. Zero-Coupon Bonds	1970 - 2009	Dynamic Factor Model with Nelson-Siegel
Dordonnat et al. (2012) [69]	France	French hourly electricity loads	1997 - 2003	Multivariate Linear Gaussian State - Space
Kagraoka (2016) [70]	Global	Commodity Prices	1995 - 2015	Generalized Dynamic Factor Model
Hindrayanto et al. (2016b) [71]	Euro Area	GDP	1980 - 2013	Collapsed Dynamic Factor Model
Berger et al. (2021) [72]	60 Emerging & Developed Market Economies	Real GDP	1961 - 2017	Dynamic Factor Model with Bayesian Stochastic Model Specification
Cepni et al. (2018) [73]	4 Emerging Market Economies (EMEs)	GDP Growth Rates	2005 - 2017	Dynamic Factor Model with Diffusion Indexes
Ludvigson and Ng (2009) [6]	U.S.	Excess Bond Returns	1964 - 2013	Factor Augmented VAR
Gilchrist et al. (2009) [74]	U.S.	Credit Market	1990 - 2008	Factor Augmented VAR
Bork and Moller (2018) [75]	U.S.	House Price Index	1975 - 2011	Dynamic Factor Model in Static Form
Giovannelli et al. (2021) [76]	U.S.	Stock Market Returns	1960 - 2014	Generalized Dynamic Factor Model
Engel et al. (2015) [77]	17 OECD Countries	Exchange Rates	1973 - 2007	Dynamic Factor Model with Country Fixed Effect
AYE (2015) [78]	Global	Gold Prices	1992 - 2013	Dynamic Model Averaging
Figa-Talamanca et al. (2021) [79]	Global	20 Cryptocurrencies with Highest Market Cap	2016 - 2019	Dynamic Factor Model with AR Process

4.3 *Methodology*

A description of my econometric framework is presented below, which includes estimating common factors from a large dataset of financial and macroeconomic variables using dynamic factor model. It is based on principal component analysis, an approach that is applied in Stock and Watson (2002) [50] for forecasting macroeconomic activity and inflation. Ludvigson and Ng (2009) [6] use a similar methodology to predict the bond risk premia of US Treasury bonds.

Dynamic factor models in statistics explain the common variations among a group of time series data. Based on the estimated factors, one can then predict the future values of a target variable.

Dynamic factor models outperform classical regression models for several reasons. One is that regression with a large number of variables has some limitations compared to factor models. Overfitting is one of the drawbacks of regression analysis with a large number of variables. When the regression model is too complex or has too many independent variables, it captures random noise or irrelevant details in the data, rather than the underlying variation. Thus, the regression model performs well on the training data, but does not generalize well to new data or test data. We can use regularization techniques like ridge regression and lasso regression to prevent the model from capturing random noise, but this may cause confusion in interpreting the coefficients.

There is also the problem of multicollinearity when performing regression analysis with a large number of variables. Multicollinearity occurs when the independent variables are highly correlated, leading to unstable, unreliable, and biased coefficient estimates. Identifying and eliminating highly correlated variables can avoid multicollinearity, but it may lead to a loss of valuable information.

Compared to other time series models, such as autoregressive models and moving average models, dynamic factor models offer a number of advantages. First, dynamic

factor models use fewer factors to explain variation in a large number of time series, making them more parsimonious. This leads to a more efficient and easy-to-interpret model because the estimated common factors are able to capture the key trends and patterns in the data.

Second, dynamic factor models provide greater flexibility, as they can deal with a wide range of time series data. For example, it is able to handle data with a monthly, quarterly, and annual frequency, as well as data with missing values or outliers. This makes the model more robust and less sensitive to specific features of the data.

As a third advantage, dynamic factor models are capable of predicting future values with greater accuracy and reliability. A useful feature of the model is that it is able to provide an estimate of the uncertainty associated with the forecasts, which is useful for assessing the risks involved in error component.

The dynamic factor model can be estimated using a variety of methods, including principal component analysis, maximum likelihood estimation, and Bayesian estimation. The estimation method chosen will depend on the specific data and research questions, as each of these methods has its own strengths and weaknesses. Among the estimation methods, principal component analysis (PCA) is the most widely used one. There are several benefits to use PCA in dynamic factor models. (i) PCA helps to avoid the problem of multicollinearity by summarizing the information in high-dimensional data over a small number of synthetic factors (ii) PCA allows to detect common trends considering co-movements in high dimensional data. (iii) By eliminating noise and irrelevant factors, PCA can improve the accuracy and interpretability of dynamic factor models, making the results more reliable.

By revealing a small number of common factors and ensuring that these factors are uncorrelated, PCA is applied for cross-sectional averaging with the aim of eliminating overfitting and multicollinearity problems. The orthogonality of the factors is a strict assumption in the estimation process, so it might be hard to combine the information

from the data set into the synthetic structure. Also, there are likely to be consistency issues in the time series component. In the time domain, Kalman filter and state space representations have widely replaced least squares estimation to address this issue.

The state space approach is used to estimate latent factors that drive the dynamics of a time series. In a state space model, there are two components: the observation equation and the state equation. The observation equation describes how the observed variables are related to the latent factors and the error term. The observed variables are typically economic or financial time series, while the latent factors represent the underlying trends and patterns. State equation describes how latent factors evolve over time. The latent factors are typically specified to follow a random walk or a stationary process, such as an autoregressive or moving average process. As part of the state space approach, it is necessary to estimate the parameters of the observation and state equations using maximum likelihood or Bayesian techniques and then go on to infer the latent factors and their evolution over time. The estimated latent factors can then be used to forecast the future values of the observed variables or to identify the sources of common patterns in the data.

The estimation process of state space models is carried out by Kalman filter and smoother. Kalman filter is a recursive estimation algorithm that can be used in dynamic factor models to estimate the common factors over time. The Kalman filter and a state-space model represent the time series as a combination of a deterministic component and a stochastic component. The deterministic component captures the common trends, while the stochastic represents captures the unpredictable or random variations in the time series. The Kalman filter updates the estimates of the common factors over time based on the new data and the previous estimates, and provides an accurate and reliable solution.

In general, dynamic factor models are structured as follows: Let y_t represent T observations on p different time series variables. Dynamic factor models can be expressed

as follows:

$$\begin{aligned} X_t &= \Lambda f_t + e_t \quad t = 1..T \\ f_t &= \Omega(L)f_{t-1} + \xi_t \quad t = 1..T \end{aligned} \tag{5}$$

where f_t is a k -dimensional vector of common factors, Λ is a $p \times k$ matrix of factor loadings, and e_t is a vector of residuals. Λ determine the relative importance of the factors for each time series, while the common factors capture the trends and variations. Residuals represent the unique variations in each time series not explained by common factors. $\Omega(L)$ is $k \times k$ matrix of lag operator ξ is $k \times 1$ vector of factor innovations, which is assumed to be serially uncorrelated.

An estimation of the dynamic factor model requires the specification of the number of common factors k and the structure of the factor loadings matrix Λ .

The basic concept is to estimate the future values of the common factors and factor loadings, followed by forecasting the future values of a specific time series.

We can use a variety of statistical criteria and model selection techniques to determine the optimal number of factors in a dynamic factor model. The most common methods for determining the optimal number of factors are: (i) Eigenvalue ratio test: The eigenvalue ratio test is a statistical criterion that compares the eigenvalues of the common factors to determine the optimal number of factors. The eigenvalues represent the amount of variation explained by each common factor, and the eigenvalue ratio test uses a threshold to determine which factors have a sufficiently large eigenvalue to be included in the model. (ii) Scree plot: A scree plot is a graphical tool that can be used to determine the optimal number of factors in a dynamic factor model. It plots the eigenvalues of the common factors on the vertical axis and the number of factors on the horizontal axis. The optimal number of factors is the point where the eigenvalues start to level off or decline, and it is often referred to as the "elbow" in the scree plot. (iii) Information criteria: Information criteria, such as the Akaike information criterion (AIC) and the Bayesian

information criterion (BIC), are statistical measures that can be used to determine the optimal number of factors in a dynamic factor model. The information criteria balance the fit of the model with the complexity of the model, and they use a penalty term to penalize models with a large number of factors

4.3.1 Estimation Procedure

I use dynamic factor model in static form which allows me to interpret the results easier. As a first step, I transformed the local variables into stationary forms for each country.

Dynamic factor models rely on stationary data as one of their key assumptions. This implies that the statistical properties of the data, such as mean and variance, remain constant over time. As a result, it becomes easier to develop accurate forecasting models. On the other hand, non-stationary time series are more challenging since their statistical properties have time dependencies.

I use differencing techniques such as first difference, log difference and second difference to transform the data into stationary form. I then normalized all variables by subtracting them from the sample means and dividing by their standard deviations. It helps me to ensure that all variables are on the same scale, which can make it easier to compare the relative importance of each variable in the model. If the variables are measured on a larger scale without normalization, they may dominate principal component analysis and mask the contributions of variables measured on a smaller scale. Moreover, normalization can help to reduce the impact of outliers on the analysis and make estimations more stable.

After applying data pre-processing steps, I construct the dynamic factor model in static form. There are major differences between static and dynamic factor models

in terms of the assumptions about the constancy of the common factors and the estimation procedure. Dynamic factor models allow the common factors to vary over time as opposed to static factor models, which assume constant common factors. One additional key difference is that in static factor models, the common factors are estimated using a single sample of data, whereas in dynamic factor models, the common factors are estimated using multiple samples of data. As the underlying time series changes and develops, the common factors are updated over time. I construct the model as

$$\begin{aligned} y_{t+1} &= a_t + \beta_t(L)F_t + \epsilon_t \quad t = 1..T \\ X_t &= \Lambda F_t + e_t \quad t = 1..T \end{aligned} \tag{6}$$

y_t is monthly change of LCCS at time t , a_t is the constant term, $\beta_t(L)$ is the slope coefficients with L th finite order lag polynomial. F_t is the set of common factors, Λ is factor loading matrix. ϵ_t and e_t are prediction error and idiosyncratic error respectively.

The equation above addresses the scenario where the dynamic factor model solely utilizes local variables. My predictive regression employed the common factors estimated from local variables together with the observable global factors to examine how their effects vary across countries. As a result, the model evolved into the following:

$$\begin{aligned} y_{t+1} &= a_t + \beta_t(L)F_t + \gamma_t(L)X_t^{Global} + \zeta_t \quad t = 1..T \\ X_t &= \Lambda F_t + e_t \quad t = 1..T \end{aligned} \tag{7}$$

Where X_t^{Global} contains additional (nonfactor) regressors and ζ_t is the residual term. Identifying the number of factors is another important step in the model construction process. Bai and Ng (2002) [61] summarize several consistent estimation methods and present the results for various dimensions of cross-section and time series. For serially correlated data sets, it proposes non-restricted models based on observed data where N and T tend to infinity.

4.4 *Summary Statistics*

Table 4 provides essential summary statistics for credit spreads across selected countries. Key measures like mean, median, standard deviation, and range for each country offer an initial quantitative overview of the credit spread landscape. The range, marked by maximum and minimum values, indicates market extremes. For instance, a broad range for Russia might suggest periods of low credit spreads, possibly influenced by global investor sentiment cycles. Conversely, a narrow range for Hungary could reflect economic stability, growth, and low inflation.

Figure 3 plots local currency credit spreads (LCCS) from 2007 to 2021, exhibiting changes in volatility and responsiveness to various events, particularly noticeable in 2008, 2011, and during the COVID-19 period.

Previous studies explore the co-movement of LCCS and FCCS in developing countries. In Figure 4, I extend the sample period and confirms the previous findings. The first bar, focusing on LCCS, reveals lower co-movement compared to FCCS, suggesting the influence of local dynamics on LCCS divergence. The second bar, centered on FCCS, demonstrates higher cumulative variance than LCCS, indicating the impact of global factors and leading to more uniform movement across countries. The first principal component accounts for 45% of LCCS variability and 70% of FCCS.

Table 3 displays the correlation between FCCS and LCCS, alongside the spread between FC and LC (FC/LC Spread) for each country. Brazil and Russia show moderate correlations between FC and LC Credit Spreads, suggesting these spreads often move in tandem. Hungary and Poland exhibit strong correlations, indicating closely linked dynamics. In contrast, Indonesia, Mexico, the Philippines, and Turkey demonstrate weak correlations, with their FC and LC Credit Spreads frequently moving in opposite directions. Furthermore, the FC/LC Spread correlations vary in magnitude and direction across these countries, ranging from negative to strongly positive, underscoring the country-specific

nature of these measures.



Table 3: Correlation matrix of Credit Spreads

	FC Credit Spread	LC Credit Spread	FC / LC Spread
Brazil			
FC Credit Spread	100%	63%	34%
LC Credit Spread	63%	100%	-52%
FC/LC Spread	34%	-52%	100%
Hungary			
FC Credit Spread	100%	95%	30%
LC Credit Spread	95%	100%	0%
FC/LC Spread	30%	0%	100%
Indonesia			
FC Credit Spread	100%	-11%	82%
LC Credit Spread	-11%	100%	-67%
FC/LC Spread	82%	-67%	100%
Mexico			
FC Credit Spread	100%	-1%	57%
LC Credit Spread	-1%	100%	-83%
FC/LC Spread	57%	-83%	100%
Philippines			
FC Credit Spread	100%	-13%	40%
LC Credit Spread	-13%	100%	-96%
FC/LC Spread	40%	-96%	100%
Poland			
FC Credit Spread	100%	89%	-15%
LC Credit Spread	89%	100%	-57%
FC/LC Spread	-15%	-57%	100%
Russia			
FC Credit Spread	100%	64%	85%
LC Credit Spread	64%	100%	15%
FC/LC Spread	85%	15%	100%
South Africa			
FC Credit Spread	100%	45%	69%
LC Credit Spread	45%	100%	-34%
FC/LC Spread	69%	-34%	100%
Turkey			
FC Credit Spread	100%	-31%	86%
LC Credit Spread	-31%	100%	-76%
FC/LC Spread	86%	-76%	100%



Table 4: Summary Statistics for Local Currency Credit Spread

Country	Mean	Standard Deviation	Minimum	Median	Maximum	Autocorrelation	N. of observation
Brazil	1.720	1.128	-0.262	1.721	5.945	0.908	177
Hungary	1.583	1.382	-0.220	1.051	5.931	0.952	181
Indonesia	0.472	0.817	-3.025	0.334	3.302	0.684	184
Mexico	2.427	1.078	0.349	2.299	5.388	0.971	182
Philippines	0.755	1.436	-3.251	0.525	7.743	0.879	184
Russia	0.315	2.018	-14.957	0.719	3.664	0.887	184
Poland	0.802	0.732	-0.471	0.706	3.654	0.939	181
South Africa	0.334	0.598	-0.877	0.211	2.527	0.921	181
Turkey	1.618	1.607	-0.970	1.113	6.069	0.956	181

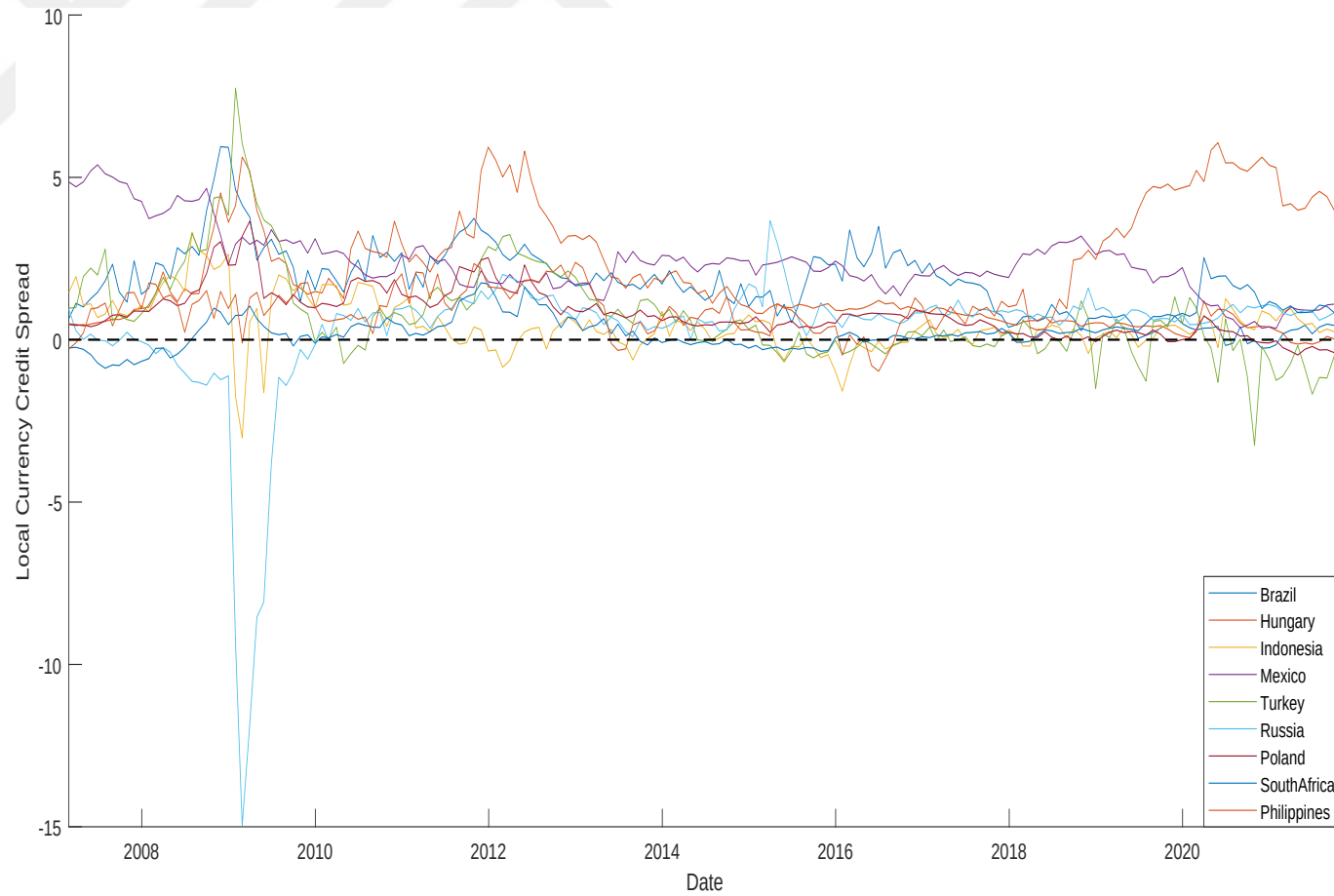


Figure 3: Historical Trends of Local Currency Credit Spread in Selected EM Countries Over Time (2007-2021)

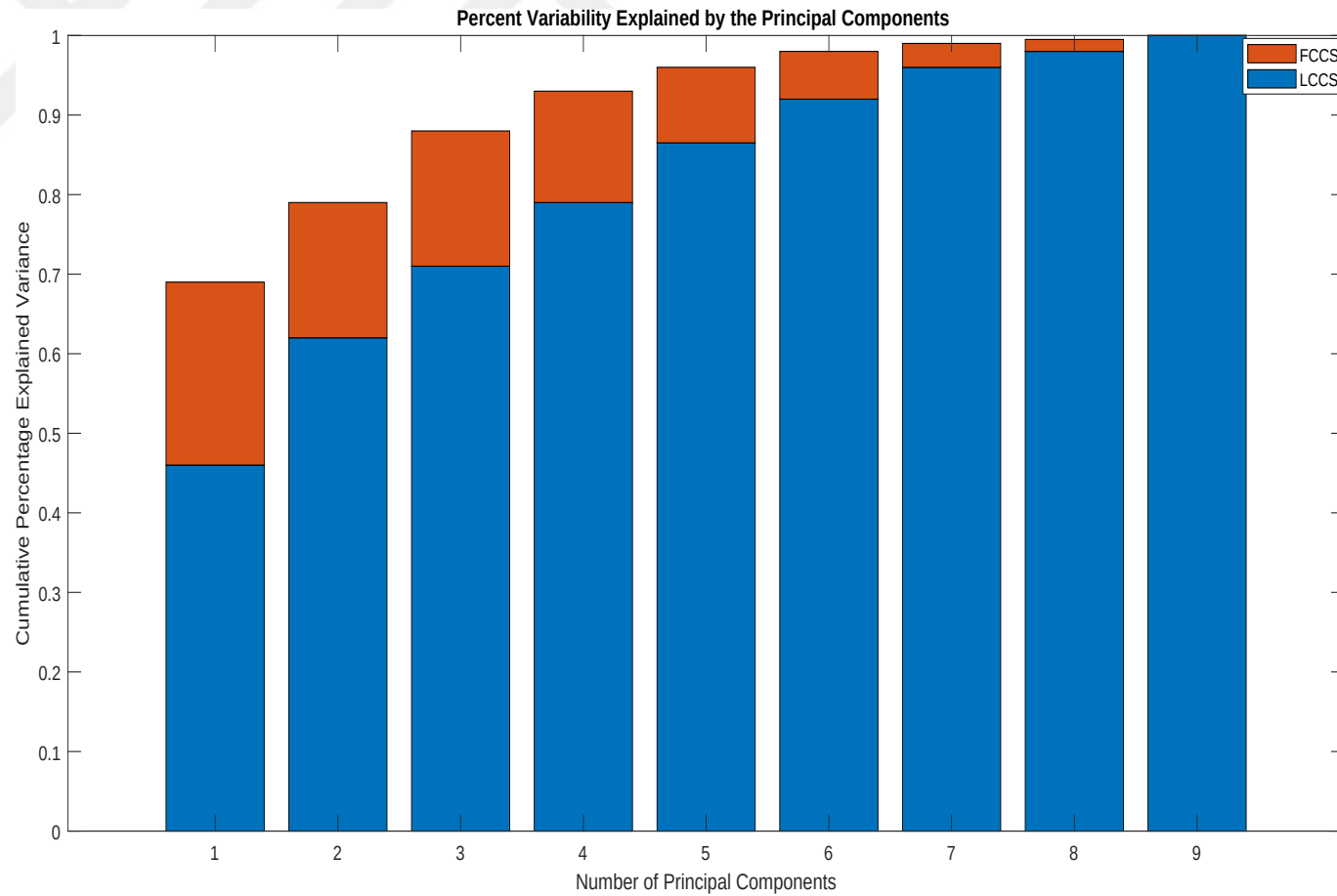


Figure 4: Variance Contributions of PCA for LC and FC Credit Spread

4.5 *Factor Extraction and Variable Selection*

The factor extraction procedure starts with data pre-processing for each country using the sets of variables listed in the Appendix. Initially, I test the stationarity of each variable using Augmented Dickey-Fuller test. I transform data that contains unit root into first difference form. In the next step, to prevent the mean and standard deviation values of the data from dominating the principal component analysis, I convert each data point into z-score form by subtracting the mean and dividing by the standard deviation.

Using Bai and Ng (2002) [61] information criterion, I determine the optimal number of synthetic factors based on their variance contribution after principal component analysis. Figures 5 to 7 show the optimal number of factors for each country and the percentage of information they represent in the data set.

For variable selection of the estimated factors, I apply the forward-backward selection procedure. I start with the factors estimated using principal component analysis and then use forward selection to test their statistical significance and R^2 contributions in a multivariate setting to see how well they can predict one month ahead changes. Since these factors are orthogonal to each other, forward selection is sufficient. Similar to Ludvigson and Ng (2009) [6], I incorporate the squared terms of the factors into the selected variables set by applying backward selection.

The motivation behind testing the predictive power of squared terms is their potential to better capture the variation in countries with high credit risk volatility. Finally, I apply the same procedure to the global variable set. Figures 8 and 9 display the R^2 contributions of selected factors in each country. For Hungary, the R^2 contribution graph is not included since the only surviving variable is the Ludvigson Uncertainty Index when the entire variable selection procedure is applied.

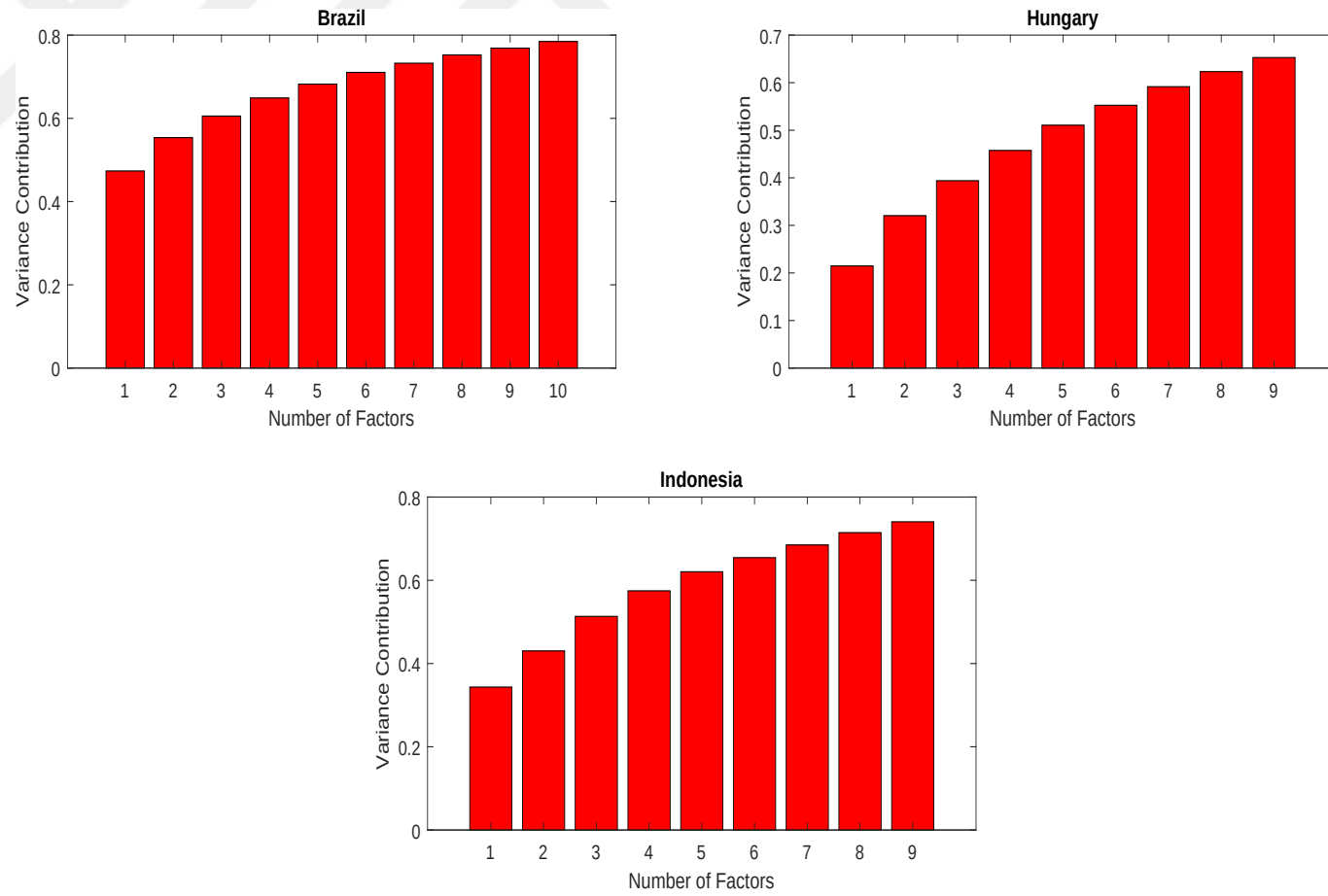


Figure 5: Variance Contributions of PCA for Brazil, Hungary and Indonesia

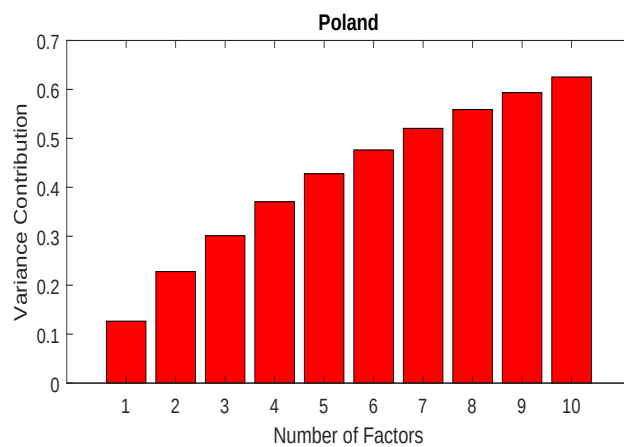
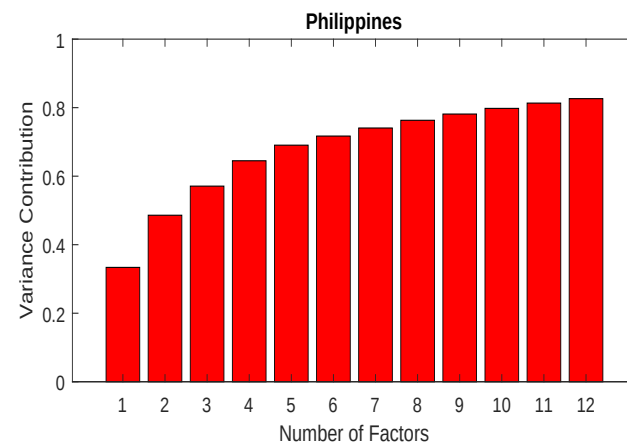
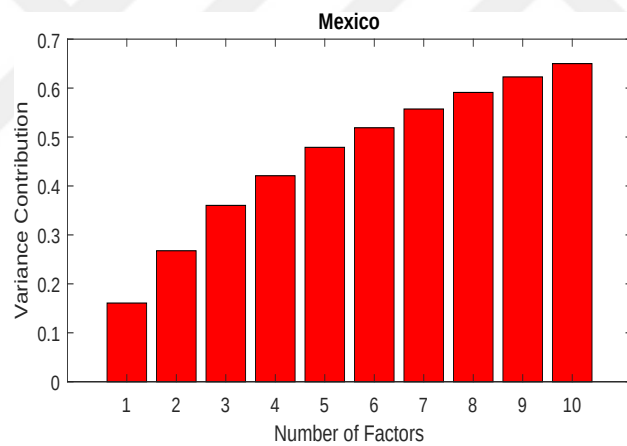
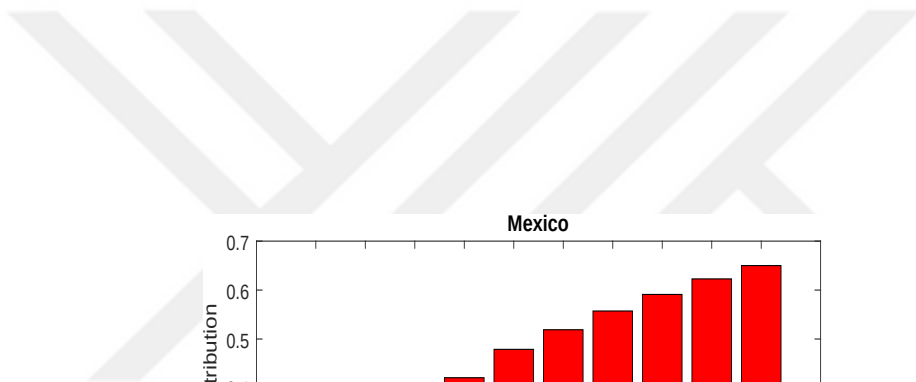


Figure 6: Variance Contributions of PCA for Mexico, Philippines and Poland

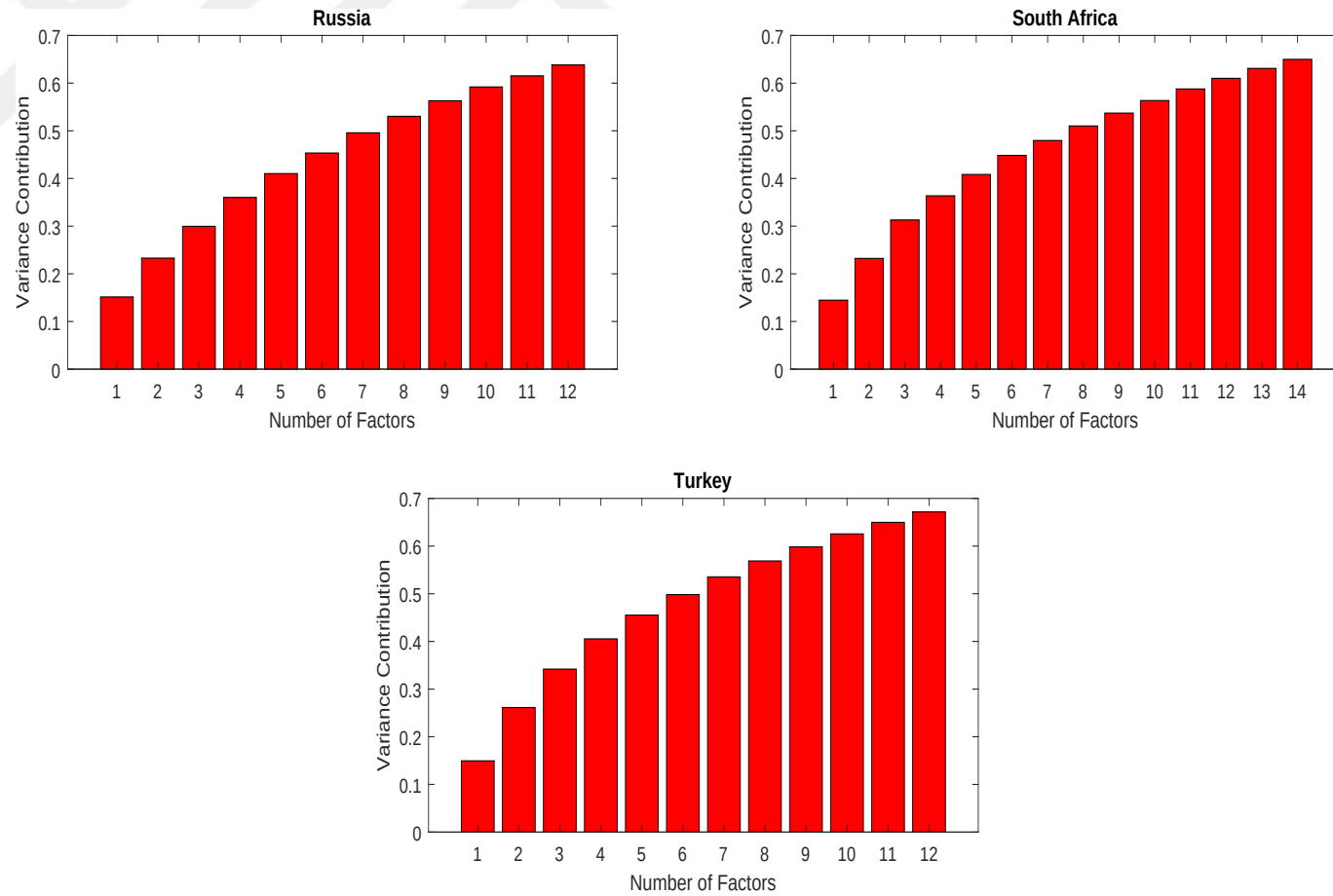


Figure 7: Variance Contributions of PCA for Russia, South Africa and Turkey

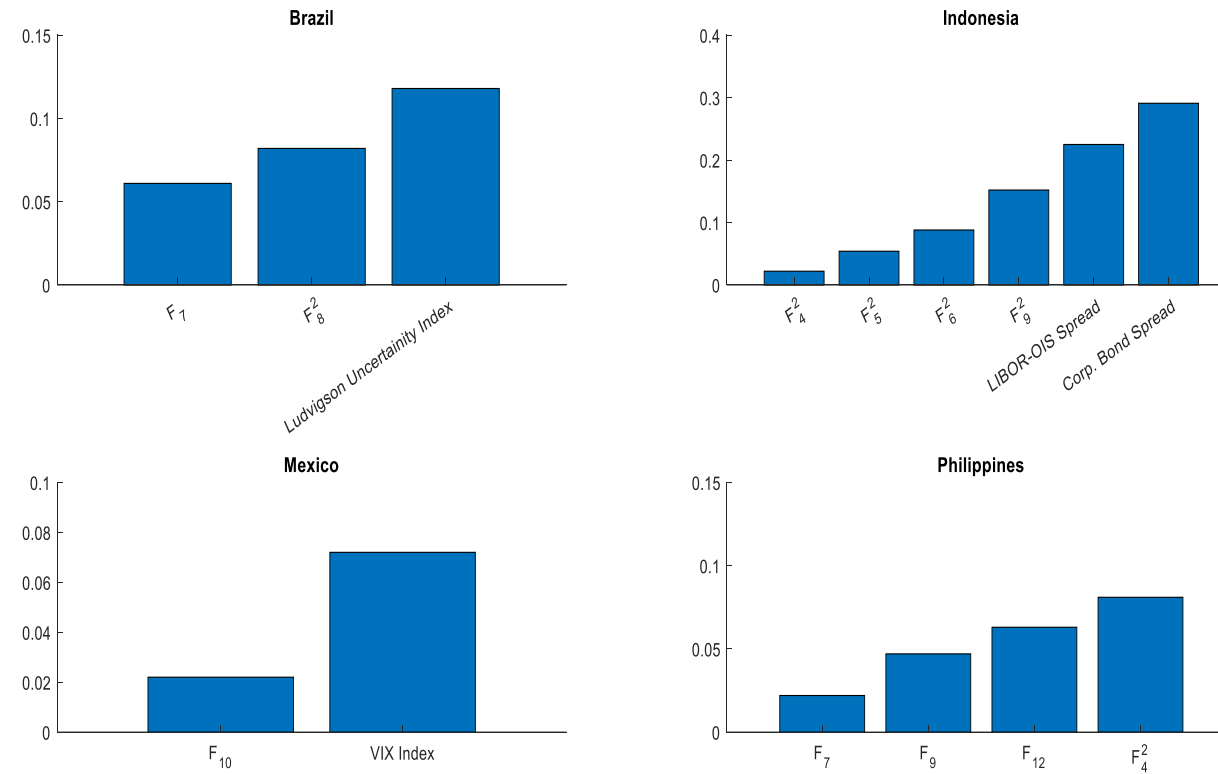


Figure 8: R^2 Contributions of Linear Factors for Brazil, Indonesia, Mexico and Philippines

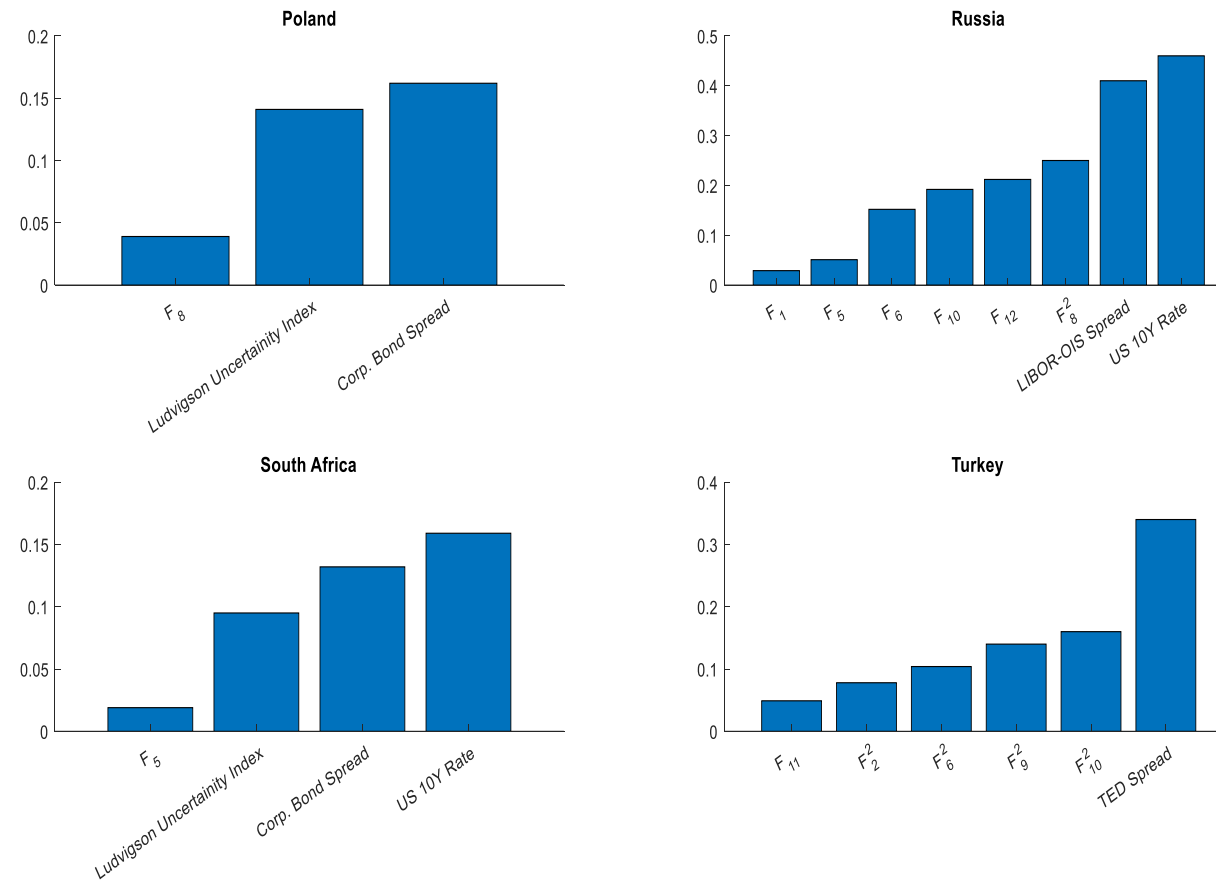


Figure 9: R^2 Contributions of Linear Factors for Poland, Russia, South Africa and Turkey

4.6 Country-Specific Regression Analysis

This section provides a detailed discussion and comparative analysis of the effect of local and global factors on local currency credit spreads in a diverse group of emerging economies: Brazil, Hungary, Indonesia, the Philippines, Mexico, Poland, Russia, South Africa, and Turkey. Tables 5 to 13 present the regression results under discussion.

4.6.1 Comparative Analysis of Local Factors

In Indonesia, Russia, and Turkey, the local variables emerge as primary determinants of credit spread fluctuations, each exhibiting unique financial characteristics.

Based on the predictive power of the models, we can categorize countries into three groups. Russia, Indonesia, and Turkey exhibit higher R^2 values, while Russia stands out in the analysis with its five components and one squared term to capture the dynamics of LCCS. The significant R^2 value of 25.10% indicates that these extracted factors, along with the squared term, explain a significant portion of LCCS. Indonesia involves three components and their corresponding squared terms, resulting in an R^2 value of 20.80%. Turkey presents an interesting case with one principal component and four squared terms, indicating possible complex nonlinear movements in LCCS, as evidenced by a 15.50% R^2 value.

In Poland, regression analysis suggests a blend of linear and nonlinear relationships, with its local variables presenting a moderate R^2 of 11%.

However, Brazil, Mexico, the Philippines, Hungary, and South Africa record lower model accuracy. This suggests a limited role of local factors in forecasting local currency credit spreads in these countries. Altering the mix of factors and terms in their regression models does not significantly enhance results, with R^2 ranging from 4.9% to 7.7%.

4.6.2 Comparative Analysis of Global Factors

To assess the influence of global financial factors on local currency credit spreads, I run regression analysis focusing exclusively on global variables. The selected global variables, representing liquidity conditions, economic uncertainty, interest rates, and credit risk, serve as indicators of broader market dynamics.

Significantly, the Ludvigson Uncertainty Index shows marked relevance for Brazil, Hungary, Poland, South Africa, and Turkey, underscoring the extensive impact of global uncertainty on country-specific risk profiles. Additionally, both long-term and short-term interest rates emerge as critical variables. The US 10-year rate, for instance, is particularly influential in Hungary, Indonesia, and Russia, which vary in terms of economic and geographical landscapes. The noteworthy response of South Africa to the Libor-OIS spread underlines the crucial importance of liquidity and credit risk factors within its banking sector.

While certain variables remain consistent across most countries, the results indicate that the LCCS of each country responds to global shocks differently. The significance of the TED Spread for Turkey highlights the country's sensitivity to global funding conditions and its strong ties to external trade. The VIX Index effectively explains the LCCS in Mexico and Poland. Economically, these countries are more vulnerable to global market volatility, likely because of their greater integration into international financial markets.

The comparison of model outputs across countries reveals that global factors influence the LCCS of each country to different magnitudes and that significant risk drivers vary across countries. Indonesia and Russia have particularly high R^2 values, likely due to their economic structures, trade dynamics, and financial market conditions. Notably, Brazil and Hungary have lower R^2 , with a weak effect of the selected variables. Although global factors alone do not fully account for the dynamics of LCCS, they serve as a complementary element when used in conjunction with local variables.

4.6.3 The Impact of Combining Local and Global Factors

Integrating both local and global variables leads to improved results in models applied across different countries. Since using global factors and all factors in one setting yields insightful regression results, models refined with selected variables emerge as the most definitive. The inclusion of global variables distinctly augments the explanatory capacity within numerous countries. For instance, the integration of the TED Spread in Turkey elevates the model's explanatory power from 15.5% to 33.2%. Similarly, in Russia, the inclusion of the Ludvigson Uncertainty Index and the US 10-year rate significantly contributes to the predictive power; the R^2 value 46% of the final model indicates a large degree of predictability. Likewise, in Indonesia, adding the Libor-OIS spread and the US Corporate Bond Spread boost the model performance from 20.8% to 30.1%.

After examining the findings for Brazil, Poland, and South Africa, it becomes evident that the model performances improve with the use of selected variables. However, what predicts outcomes varies for each country. In Brazil, the Ludvigson Uncertainty Index primarily contributes to the R^2 enhancement from 7.5% to 11.3%.. The model performance in Poland, which ascends from 11.00% to 16.20%, benefits from the dual contribution of the Ludvigson Uncertainty Index and the US Corporate Bond Spread. Meanwhile, the analysis for South Africa reveals a significant additional impact from the US 10-year rate alongside these two variables, underscoring a nuanced interplay between local and global economic elements across different geographic contexts. This shows the heterogeneity in the model performance and the source of predictability across national contexts, emphasizing the different ways local and global economic factors interact.

In the cases of Hungary, Mexico, and the Philippines, the process of selecting variables does not significantly enhance the model performance. For Hungary, the Ludvigson Uncertainty Index emerges as the sole variable, exhibiting a predictive capability for the LCCS in Hungary with R^2 value of 5%. In the Philippines, while local factors maintain

an R^2 of 7.7%, no global variable demonstrated a significant complementary effect. Conversely, in Mexico, a combination of a local factor with the VIX Index yields the best result, achieving an R^2 value of 7.2%.

The Ludvigson Uncertainty Index makes models more accurate for 5 out of 9 countries. This means that global uncertainty, along with local factors, affect the credit risk of local currency debt instruments in many emerging economies significantly. Figures 8 and 9 are informative in understanding how variable selection affects the accuracy of regression models.

The results show that LC credit spread variation in developing countries is not homogeneous. Another interesting result is that, as shown in Figure 10, there is a strong positive relationship between the increase in the FC/LC spread and the predictive performance of local and global variables. This highlights the importance of focusing on the FC/LC spread as much as the LCCS in analyzing the factors underlying the heterogeneity of countries.

4.6.4 Factor Contributions by Categories

Labeling predictor factors with a single variable is inappropriate due to the dimension reduction process and orthogonality. Since these factors are influenced to some degree by many variables, it is more useful to determine their relevance to macroeconomic information in each category rather than to specific variables in a large dataset.

To achieve this, I connect the factor components to categories by regressing on each variable. Figures 30 to 59 consist of a series of R^2 bar charts that highlight how sub-categories affect predictor factors (F).

The examination of Brazil through Figures 30 to 31 reveals notable patterns. 'Real Economic Activity', which encompasses indicators like GDP growth rates and industrial

production, significantly influences the factors F7 and F8. Figures 32 to 33 provide insight into the economic drivers of the factors in Hungary. The "Prices" category, which includes sub-components of inflation and external trade prices, influences F1, as Figure 32 demonstrates.

In Indonesia, Russia, and Turkey, the regression model contains a higher number of predictor factors compared to other countries. All aspects of the economy in these countries affect LCCS, as they relate to all categories. The primary drivers of F2, F5, and F10 in Mexico are 'Housing and Orders', 'Financial Variables', and 'Money and Credit Quantity Aggregates', which encompass aspects such as money supply and credit conditions.

This analysis highlights the multidimensional nature of the factors determining LCCS, which is crucial for policy formulation. Factors in each country primarily stem from similar sub-categories. It reveals the complex relationships between economic indicators and LCCS, emphasizing the necessity for customized policy measures to effectively address the unique factors influencing LCCS across countries.

Table 5: Predictive Regression Results of Brazil

	F7	F8²	VIX	Libor- OIS Spread	Ludvigson Uncer- tainty Index	US 2 Year Rate	US 10 Year Rate	DXY	TED	US Cor- porate Bond Spread	Euro Basis Spread	R²
Local factors	-0.078 -3.74	0.014 1.69										7.50%
Global Factors			0.014 1.65	-0.008 -0.02	2.577 2.36	0.002 0.01	0.217 0.99	0.009 0.39	-0.002 -0.72	-0.207 -0.88	-0.001 -0.1	4.80%
All Factors	-0.0671 -3.07	0.0226 2.08	0.0122 1.48	0.1304 0.39	2.1528 2.03	0.0833 0.3	0.1304 0.6	0.0104 0.47	-0.0027 -1.04	-0.2626 -1.15	0.002 0.28	11.00%
Selected Factors	-0.069 -3.25	0.025 2.11			2.093 2.51							11.30%

Notes: Table reports regression results of Brazil local currency credit spread on global variables and estimated local factors named in each row. The first row shows regression results for local factors selected based on forward selection procedure. The second row focuses on the impact of global factors exclusively. The third row combines both sets, showing outcomes for all global variables and selected local factors. The fourth row presents results from using backward selection for variable choice. Results derived from various factor combinations, as set out in the table's first row, are detailed column by column. Coefficients that are statistically significant at a 5% confidence level are in bold. Although a constant term is included in each regression model, its estimated value is not included in the table. T-statistics, corrected as per Newey and West (1987) [80], are noted in brackets.

Table 6: Predictive Regression Results of Hungary

	F1	F7 ²	VIX	Libor-OIS Spread	Ludvigson Uncertainty Index	US 2 Year Rate	US 10 Year Rate	DXY	In-dex	TED	US Corporate Bond Spread	Euro Basis Spread	R ²
Local factors	0.019 2.83	-0.009 -2.45											5.30%
Global Factors			0.001 0.03	0.015 0.05	2.543 2.66	-0.69 -2.71	0.372 1.94	0.027 1.34	-0.002 -0.71	-0.31 -1.51	-0.003 -0.46		5.90%
All Factors	0.015 1.77	-0.008 -1.95	-0.001 -0.07	0.13 0.43	2.144 2.23	-0.634 -2.49	0.293 1.52	0.019 0.96	-0.003 -1.11	-0.449 -2.06	-0.002 -0.31		7.90%
Selected Factors					2.394 3.2								5%

Notes: Table reports regression results of Hungary local currency credit spread on global variables and estimated local factors named in each row. The first row shows regression results for local factors selected based on forward selection procedure. The second row focuses on the impact of global factors exclusively. The third row combines both sets, showing outcomes for all global variables and selected local factors. The fourth row presents results from using backward selection for variable choice. Results derived from various factor combinations, as set out in the table's first row, are detailed column by column. Coefficients that are statistically significant at a 5% confidence level are in bold. Although a constant term is included in each regression model, its estimated value is not included in the table. T-statistics, corrected as per Newey and West (1987) [80], are noted in brackets.

Table 7: Predictive Regression Results of Indonesia

	F2	F9	F4 ²	F5 ²	F6 ²	F9 ²	VIX	Libor-OIS Spread	Ludvigson Uncertainty Index	US 2 Year Rate	US 10 Year Rate	DXY	In-dex	TED Spread	US Corporate Bond Spread	Euro Basis Spread	R ²
Local factors	-0.033 -3.23	0.044 2.02	-0.012 -5.12	0.007 4.16	0.011 2.58	-0.027 -3.98											20.80%
Global Factors							-0.01 -0.98	-0.708 -1.66	-1.21 -0.89	0.277 0.77	-0.749 -2.75	-0.036 -1.24	-0.003 -0.93	0.354 1.22	-0.005 -0.59		17.30%
All Factors	0.002 0.13	0.034 -1.54	-0.012 -4.55	0.007 3.69	0.009 1.94	-0.022 -3.34	-0.007 -0.70	-0.738 -1.70	-0.524 -0.40	0.06 0.17	-0.458 -2.04	-0.025 -0.9	-0.003 -0.82	0.724 2.43	0.001 0.11		29.10%
Selected Factors			-0.013 -4.85	0.007 3.84	0.009 2.01	-0.026 -3.94		-1.172 -5.10							0.67 2.83		30.10%

Notes: Table reports regression results of Indonesia local currency credit spread on global variables and estimated local factors named in each row. The first row shows regression results for local factors selected based on forward selection procedure. The second row focuses on the impact of global factors exclusively. The third row combines both sets, showing outcomes for all global variables and selected local factors. The fourth row presents results from using backward selection for variable choice. Results derived from various factor combinations, as set out in the table's first row, are detailed column by column. Coefficients that are statistically significant at a 5% confidence level are in bold. Although a constant term is included in each regression model, its estimated value is not included in the table. T-statistics, corrected as per Newey and West (1987) [80], are noted in brackets.

Table 8: Predictive Regression Results of Mexico

	F2	F5	F10	VIX	Libor-OIS Spread	Ludvigson Uncertainty Index	US 2 Year Rate	US 10 Year Rate	DXY Index	In-TED Spread	US Corporate Bond Spread	Euro Basis Spread	R²
Local factors	-0.012 -2.18	-0.018 -2.38	0.024 2.15										6.30%
Global Factors				-0.01 -2.13	0.168 0.91	0.207 0.35	0.029 0.18	-0.006 -0.05	-0.004 -0.31	-0.002 -1.06	-0.153 -1.21	0.002 0.48	3.40%
All Factors	-0.008 -1.15	-0.013 -1.35	0.022 1.77	-0.006 -1.20	0.166 0.85	0.106 0.18	0.026 0.17	0.039 0.33	-0.001 -0.09	-0.002 -1.03	-0.095 -0.71	0.002 0.42	5.20%
Selected Factors			0.021 1.97	-0.011 -3.26									7.20%

Notes: Table reports regression results of Mexico local currency credit spread on global variables and estimated local factors named in each row. The first row shows regression results for local factors selected based on forward selection procedure. The second row focuses on the impact of global factors exclusively. The third row combines both sets, showing outcomes for all global variables and selected local factors. The fourth row presents results from using backward selection for variable choice. Results derived from various factor combinations, as set out in the table's first row, are detailed column by column. Coefficients that are statistically significant at a 5% confidence level are in bold. Although a constant term is included in each regression model, its estimated value is not included in the table. T-statistics, corrected as per Newey and West (1987) [80], are noted in brackets.

Table 9: Predictive Regression of Philippines

	F7	F9	F12	F4²	VIX	Libor-OIS Spread	Ludvigson Uncertainty Index	US 2 Year Rate	US 10 Year Rate	DXY Index	In-Spread	TED Spread	US Corporate Bond Spread	Euro Basis Spread	R²
Local factors	0.046 2.15	0.062 2.51	-0.061 -2.11	-0.004 -2.96											7.70%
Global Factors					-0.004 -0.42	-0.029 -0.09	1.428 1.31	0.027 0.09	-0.328 -1.50	0.01 0.43		-0.002 -0.70	0.045 0.19	0.002 0.3	0.10%
All Factors	0.051 2.08	0.066 2.42	-0.055 -1.99	-0.004 -1.97	-0.008 -0.92	0.073 0.22	1.442 1.36	0.094 0.33	-0.265 -1.2	-0.001 -0.02		-0.003 -1.02	-0.165 -0.7	-0.001 -0.09	6.30%
Selected Factors	0.046 2.15	0.062 2.51	-0.061 -2.11	-0.004 -1.96											7.70%

Notes: Table reports regression results of Philippines local currency credit spread on global variables and estimated local factors named in each row. The first row shows regression results for local factors selected based on forward selection procedure. The second row focuses on the impact of global factors exclusively. The third row combines both sets, showing outcomes for all global variables and selected local factors. The fourth row presents results from using backward selection for variable choice. Results derived from various factor combinations, as set out in the table's first row, are detailed column by column. Coefficients that are statistically significant at a 5% confidence level are in bold. Although a constant term is included in each regression model, its estimated value is not included in the table. T-statistics, corrected as per Newey and West (1987) [80], are noted in brackets.

Table 10: Predictive Regression Results of Poland

	F1	F4	F8	F2 ²	VIX	Libor-OIS Spread	Ludvigson Uncertainty Index	US 2 Year Rate	US 10 Year Rate	DXY Index	In-TED Spread	US Corporate Bond Spread	Euro Basis Spread	R ²
Local factors	-0.015 -3.17	0.018 2.77	-0.03 -3.33	0.002 2.31										11.00%
Global Factors					0.008 1.98	0.098 0.58	1.954 3.62	-0.233 -1.63	0.16 1.48	-0.002 -0.20	-0.001 -0.68	-0.37 -3.21	-0.008 -2.16	16.00%
All Factors	0.051 2.08	0.066 2.42	-0.055 -1.69	-0.004 -1.97	0.002 0.56	0.128 0.76	1.699 3.14	-0.134 -0.92	0.131 1.23	-0.012 -1.07	-0.001 -0.22	-0.402 -3.29	-0.005 -1.46	21.10%
Selected Factors			-0.026 -2.94				2.571 5.34					-0.21 -2.31		16.20%

Notes: Table reports regression results of Poland local currency credit spread on global variables and estimated local factors named in each row. The first row shows regression results for local factors selected based on forward selection procedure. The second row focuses on the impact of global factors exclusively. The third row combines both sets, showing outcomes for all global variables and selected local factors. The fourth row presents results from using backward selection for variable choice. Results derived from various factor combinations, as set out in the table's first row, are detailed column by column. Coefficients that are statistically significant at a 5% confidence level are in bold. Although a constant term is included in each regression model, its estimated value is not included in the table. T-statistics, corrected as per Newey and West (1987) [80], are noted in brackets.

Table 11: Predictive Regression Results of Russia

	F1	F5	F6	F10	F12	F7 ²	VIX	Libor-OIS Spread	Ludvigson Uncertainty Index	US 2 Year Rate	US 10 Year Rate	10 DXY Index	In-Spread	TED Spread	US Corporate Bond Spread	Euro Basis Spread	R ²
Local factors	-0.043 -2.92	0.064 2.51	0.18 6.06	-0.107 -3.16	0.09 2.39	-0.012 -3.41											25.10%
Global Factors							-0.024 -1.67	-0.294 -0.52	-2.724 -1.50	0.913 1.9	-1.563 -4.31	-0.045 -1.17	-0.013 -2.96	-0.335 -0.86	0.001 0.05		33.50%
All Factors	-0.03 -1.9	0.068 2.93	0.139 4.86	-0.084 -2.67	0.069 2	-0.013 -3.87	-0.002 -0.19	-0.907 -1.72	-2.457 -1.45	0.45 1.01	-1.302 -3.84	0.003 0.08	-0.008 -2.03	-0.193 -0.52	0.002 0.16		46.50%
Selected Factors	-0.034 -2.52	0.078 3.44	0.165 6.35	-0.073 -2.34	0.077 2.28	-0.014 -4.46			-2.021 -7.19		-0.987 -3.95						46%

Notes: Table reports regression results of Russia local currency credit spread on global variables and estimated local factors named in each row. The first row shows regression results for local factors selected based on forward selection procedure. The second row focuses on the impact of global factors exclusively. The third row combines both sets, showing outcomes for all global variables and selected local factors. The fourth row presents results from using backward selection for variable choice. Results derived from various factor combinations, as set out in the table's first row, are detailed column by column. Coefficients that are statistically significant at a 5% confidence level are in bold. Although a constant term is included in each regression model, its estimated value is not included in the table. T-statistics, corrected as per Newey and West (1987) [80], are noted in brackets.

Table 12: Predictive Regression Results of South Africa

	F5	F10 ²	VIX	Libor-OIS Spread	Ludvigson Uncertainty Index	US 2 Year Rate	US Year Rate	10 DXY In-dex	TED	US Corporate Bond Spread	Euro Basis Spread	R ²
Local factors	0.019 2.35	0.01 2.67										4.90%
Global Factors			0.003 0.83	-0.27 -1.70	2.43 4.78	-0.05 -0.37	-0.094 -0.93	0.001 0.11	0.001 0.93	-0.339 -3.12	-0.005 -1.38	14.10%
All Factors	0.014 1.62	0.005 1.34	0.004 1.09	-0.168 -0.99	2.116 3.94	-0.025 -0.18	-0.113 -1.1	0.003 0.32	0.001 0.46	-0.332 -3.01	-0.004 -1.06	15%
Selected Factors	0.016 2.07				2.382 5.28		-0.163 -2.16			-0.338 -3.72		15.50%

Notes: Table reports regression results of South Africa local currency credit spread on global variables and estimated local factors named in each row. The first row shows regression results for local factors selected based on forward selection procedure. The second row focuses on the impact of global factors exclusively. The third row combines both sets, showing outcomes for all global variables and selected local factors. The fourth row presents results from using backward selection for variable choice. Results derived from various factor combinations, as set out in the table's first row, are detailed column by column. Coefficients that are statistically significant at a 5% confidence level are in bold. Although a constant term is included in each regression model, its estimated value is not included in the table. T-statistics, corrected as per Newey and West (1987) [80], are noted in brackets.

Table 13: Predictive Regression Results of Turkey

	F11	F2 ²	F6 ²	F9 ²	F10 ²	VIX	Libor-OIS Spread	Ludvigson Uncertainty Index	US 2 Year Rate	US Year Rate	10	DXY Index	In-	TED Spread	US Corporate Bond Spread	Euro Basis Spread	R ²
Local factors	0.119 (3.62)	-0.004 (-3.33)	-0.011 (-2.79)	0.024 (2.70)	0.017 (2.21)												15.5%
Global Factors						0.004 (.36)	-0.173 (-.37)	3.716 (2.49)	-0.017 (-.04)	0.043 (.15)		-0.041 (-1.31)		0.011 (3.14)	-0.507 (-1.59)	-0.011 (-1.11)	16.6%
All Factors	0.091 (2.86)	-0.003 (-3.23)	-0.012 (-2.89)	0.026 (3.06)	0.027 (3.30)	0.002 (.18)	-0.110 (-.24)	3.260 (2.36)	-0.151 (-.42)	0.148 (.55)		-0.022 (-.78)		0.012 (3.35)	-0.414 (-1.43)	-0.006 (-.64)	33.0%
Selected Factors	0.105 3.43	-0.004 -3.7	-0.012 -3.23	0.029 3.54	0.024 2.99									0.013 6.68			33.2%

Notes: Table reports regression results of Turkey local currency credit spread on global variables and estimated local factors named in each row. The first row shows regression results for local factors selected based on forward selection procedure. The second row focuses on the impact of global factors exclusively. The third row combines both sets, showing outcomes for all global variables and selected local factors. The fourth row presents results from using backward selection for variable choice. Results derived from various factor combinations, as set out in the table's first row, are detailed column by column. Coefficients that are statistically significant at a 5% confidence level are in bold. Although a constant term is included in each regression model, its estimated value is not included in the table. T-statistics, corrected as per Newey and West (1987) [80], are noted in brackets.

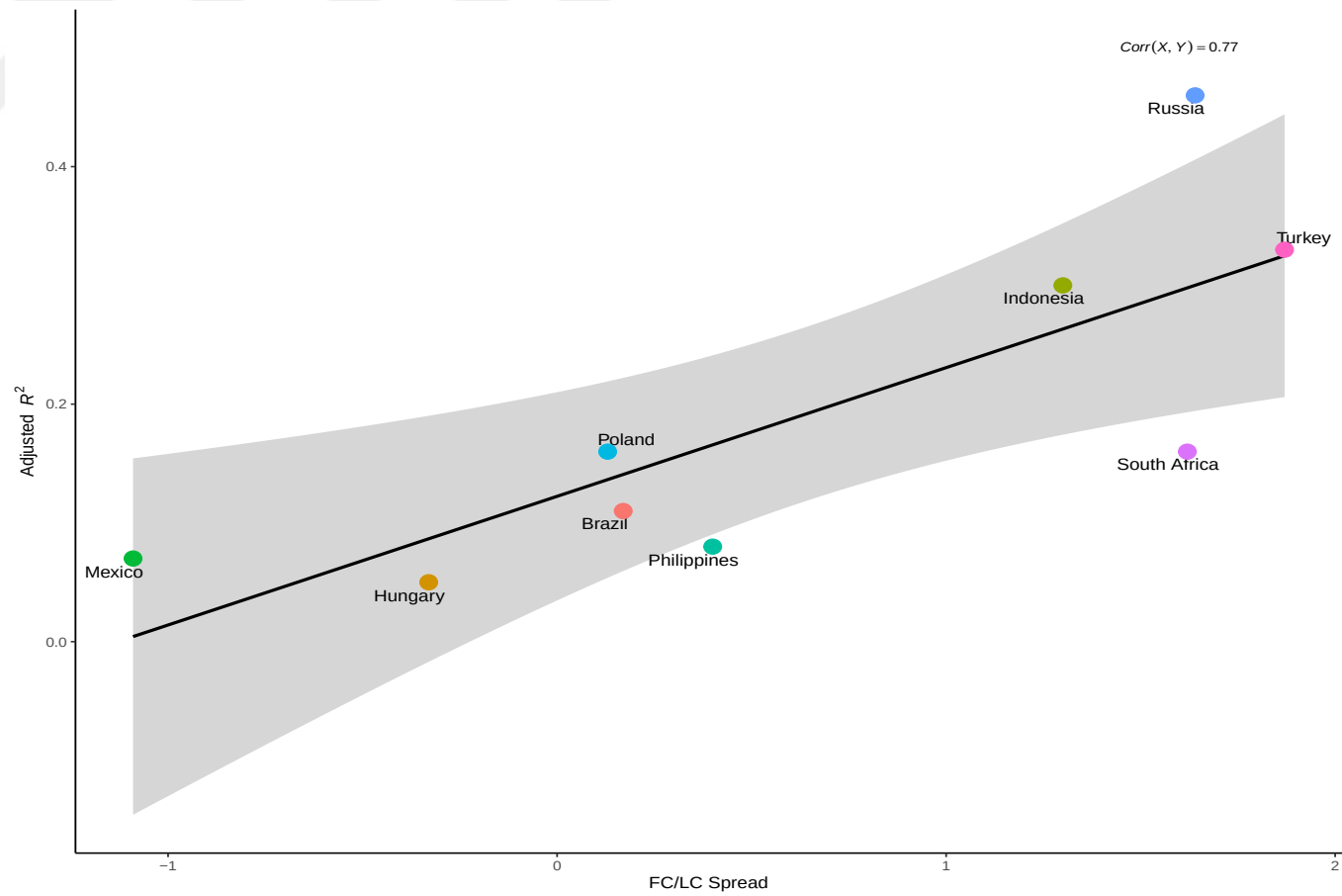


Figure 10: Comparison of Model Accuracy and LC/FC Spread

CHAPTER V

HETEROGENEOUS EFFECT OF ECONOMIC DRIVERS ON LOCAL CURRENCY CREDIT SPREAD

In this chapter, I first examine the impact of macroeconomic fundamentals, financial markets, and the governance framework on credit spreads. Following this, I analyze how credit spreads vary across different countries based on the identified characteristics.

5.1 Data Description

I collect the data spanning from 2007, the earliest date for calculating local currency credit spreads, until 2021. I select variables that could influence credit risk across nine countries, reflecting their financial and economic conditions. The variables are detailed below:

- **Financial Development Index:** It reflects the condition and efficiency of a country's financial sector and environment for economic growth.
- **Financial Institutions Index:** It measures the performance and stability of financial institutions like banks and insurance companies. It's essential to include this variable as it provides insights into the robustness of the banking sector, which is a key driver of economic activity through credit provision and risk management.
- **Financial Markets Index:** This index gauges the development and efficiency of financial markets, including stock and bond markets. It helps assess the level of market development and its role in resource allocation and risk diversification, which are vital for economic stability and growth.
- **Inflation (Year Over Year):** Inflation rates are indicative of price stability in the

economy and influence consumer purchasing power, investment decisions, and monetary policy. They are essential for understanding economic conditions.

- **Current Account Deficit / GDP:** It shows trade and financial flows relative to economic size. A high deficit may indicate reliance on foreign capital and potential vulnerabilities to external shocks.
- **Short Term Debt / GDP:** It indicates the immediate debt obligations relative to the size of the economy. It is a critical measure of liquidity risk and debt sustainability.
- **Total Debt / GDP:** This ratio measures the total debt burden of a country in relation to its GDP. It's a key indicator of long-term fiscal sustainability and creditworthiness. In economic models, it helps evaluate the risks of debt distress and its implications for economic stability.
- **Real GDP:** Real GDP is a fundamental indicator of a country's economic performance, representing the total value of goods and services produced, adjusted for inflation.

5.2 Methodology

To measure heterogeneity between countries, I run a fixed effect panel regression with a dataset created from local variables. In this chapter, I present the results of testing not only the LCCS but also the FCCS and the FC/LC spread as dependent variables.

Fixed effect panel regression is a popular econometric technique used to analyze panel data, which consists of multiple observations over time for the same cross-sectional units (e.g., individuals, firms, countries). This method is particularly useful for controlling for unobserved heterogeneity when it is constant over time but varies across countries. The fixed effect model essentially eliminates the effects of time-invariant characteristics, allowing for measurement of the predictors' net effect on the model outcome. The key assumptions of fixed effect panel regression include:

- No Perfect Multicollinearity: Similar to other regression models, the fixed effects model assumes no perfect collinearity among independent variables. In other words, independent variables are not linear functions of other explanatory variables.
- Exogeneity of Independent Variables: There are no biases due to omitted variables correlated with the dependent variable and one or more of the independent variables within the model.
- No Serial Correlation: Errors do not exhibit serial correlation within a single cross-sectional unit over time. For the standard errors of the estimates to be valid, this is the assumption must hold.
- Homoskedasticity: The variance of the error term is assumed to be constant across time for each cross-sectional unit. If the error variance is heteroskedastic, it could lead to inefficient estimates and incorrect standard errors.
- Balanced vs. Unbalanced Panel: Fixed effects models are applicable to both balanced and unbalanced panels. However, the handling of unbalanced panels requires careful attention to ensure that the missing data does not introduce bias.
- Large N, Small T: The fixed effects model in particular handles panels in which the number of cross-sectional units N is large, and the number of time periods T is quite small. In this setting, the model will estimate a separate intercept for each cross-sectional unit, potentially overfitting the data if T is also large.
- Time-Invariant Characteristics Are Differenced Out: A crucial feature (and assumption) of the fixed effects model is that it controls for all time-invariant characteristics of the individual cross-sectional units. Demeaning the variables by subtracting their means over time effectively removes any influence of these time-variant factors from the regression. As a result, fixed effects models cannot estimate the effects of time-variant variables.

I construct the model using the following Prais-Winsten panel regression model as follows:

$$y_{it} = \alpha_i + \beta' X_{it} + \epsilon_{it} \quad (8)$$

$$\epsilon_{it} = \rho\epsilon_{it-1} + u_{it}, \quad u_{it} \sim IID(0, \sigma_u^2) \quad (9)$$

where y_{it} is yearly changes of the dependent variable, X_{it} is a vector of yearly changes of independent variables, α_i represents country-specific fixed effects, and β is a vector of coefficients. The error term ϵ_{it} follows an AR(1) process. I include country-fixed effects to account for unobserved heterogeneity across countries that could potentially impact the dependent variable by introducing a dummy variable for each country, allowing the intercept to vary across countries but remain constant over time within each country.

The purpose of Prais-Winsten regression is to tackle the problem of autocorrelation, specifically first-order autocorrelation, in the residuals of linear regression models. Autocorrelation exists when the residuals (errors) of a regression model are not independent of each other, but, in fact, are systematically patterned over time. Time series data and panel data analysis often face this issue, as the observations are collected over time and are likely to be influenced by their past values.

Autocorrelation results in inefficient estimates of the regression coefficients, which bias the standard errors and lead to incorrect inferences. For example, positive autocorrelation normally causes the underestimation of standard errors, which causes the coefficients to appear more significant than they are in reality. This misleads the interpretation of the model, affects policy decisions, forecasting, and scientific conclusions drawn from the analysis. The Prais-Winsten procedure transforms both dependent and independent variables by removing autocorrelation from the error term. Unlike the Cochrane-Orcutt method, which discards the first observation to achieve transformation, the Prais-Winsten method retains all observations, so it uses the full data set and provides more efficient estimates.

Testing the assumptions of the model allows a researcher to identify violations. This ensures that estimates from the model are not only valid but also reliable. I report hypothesis tests for the critical assumptions in the Results section, such as Hausman test for exogeneity, Wooldridge test for serial correlation, Wald test for homoscedasticity, and

Dickey-Fuller test for stationarity.

5.3 *Results*

To investigate the influence of local variables on the variations of local currency credit spreads (LCCS) across emerging markets, the initial step entails a visualization of country-level heterogeneity. Figure 11 illustrates that the LCCS values of countries are distributed into distinct clusters on a monthly frequency basis. Notably, Brazil, Hungary, Mexico, and the Philippines all have high LCCS values, whereas Poland and Russia have intermediate levels. Conversely, Indonesia, South Africa, and Turkey present lower LCCS values in comparison to their counterparts. This graphical representation serves as a preliminary indication of the necessity for employing fixed effect regression analysis. Table 3 also shows that the correlations between each country's dependent variables vary from each one, which is more proof that a fixed-effect regression approach is the right choice.

Prior to conducting the Prais-Winsten fixed effect regression analysis for the dependent variables LCCS, FCCS, and the FC/LC spread, I test the assumptions of the model through various hypothesis tests. As reported in Table 15 and Table 16, the Hausman test outcome supports the application of fixed effect regression to achieve more consistent results. The Im-Pesaran-Shin Unit-Root Test confirms the stationarity of each variable in the dataset. Furthermore, the Wooldridge test identifies the presence of serial correlation, and the Breusch-Pagan Test confirms the existence of heteroscedasticity within standard panel regression.

Due to the presence of autocorrelation, I used the Prais-Winsten method, a modified version of panel regression, to correct autocorrelation. I use independent variables detailed in the Data Description section to measure the net effect of local variables. The results show that several macroeconomic variables and financial markets index have an

impact on LC and FC credit spreads and the FC/LC spread, which represents the difference between these two spreads. Additionally, the FC Debt / GDP ratio, previously identified as influential in prior studies, continues to affect credit spreads. The R^2 value of 21% is deemed reasonable given the contemporaneous nature of the regression analysis and its annual frequency. The regression results for the FC/LC Spread reveal R^2 value of 19%, with Year-over-Year Inflation, Short Term Debt / GDP as the most important explanatory variables of annual variations in the FC/LC Spread within a multivariate context.



Table 14: Prais-Winsten Regression Result

Variables	(a) Δ LCCS	(b) Δ FCCS	(c) Δ FC/LC Spread
Δ Financial Development Index	-0.158 [0.694]	-0.560 [0.119]	-0.328 [0.430]
Δ Financial Institutions Index	-0.113 [0.563]	0.211 [0.219]	0.281 [0.177]
Δ Financial Markets Index	0.149 [0.681]	0.620* [0.055]	0.458 [0.225]
Δ Inflation	-0.007 [0.935]	0.388*** [< 0.001]	0.292*** [< 0.01]
Δ Current Account Deficit / GDP	-0.303*** [< 0.01]	-0.148 [0.092]	0.096 [0.347]
Δ Short Term Debt / GDP	0.083 [0.349]	-0.145* [0.064]	-0.158* [0.075]
Δ Total Debt / GDP	0.081 [0.417]	0.143 [0.107]	0.126 [0.234]
Δ Real GDP	-0.227** [0.044]	-0.133 [0.193]	0.124 [0.291]
<i>Other Controls</i>			
Δ Inflation ²	0.068 [0.437]	-0.076 [0.334]	-0.039 [0.677]
Δ FC Debt / GDP	-0.271** [0.039]	-0.294** [0.013]	-0.026 [0.843]
Δ LC Debt / GDP	0.199 [0.333]	0.053 [0.774]	-0.094 [0.657]
Δ FC Debt / Total Debt	0.08 [0.112]	-0.450 [0.381]	-0.105 [0.046]
R^2	0.21	0.34	0.19

Notes: The dependent variables are yearly changes of local currency credit spread (LCCS), foreign currency credit spread (FCCS), and the spread between foreign currency and local currency credit spreads (FC / LC Spread) in columns 1, 2, and 3 respectively. Coefficients are presented with their p-values in brackets. * denote the level of statistical significance: $p^* < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$. The R^2 values at the bottom of each column indicate the proportion of variance explained by the model.

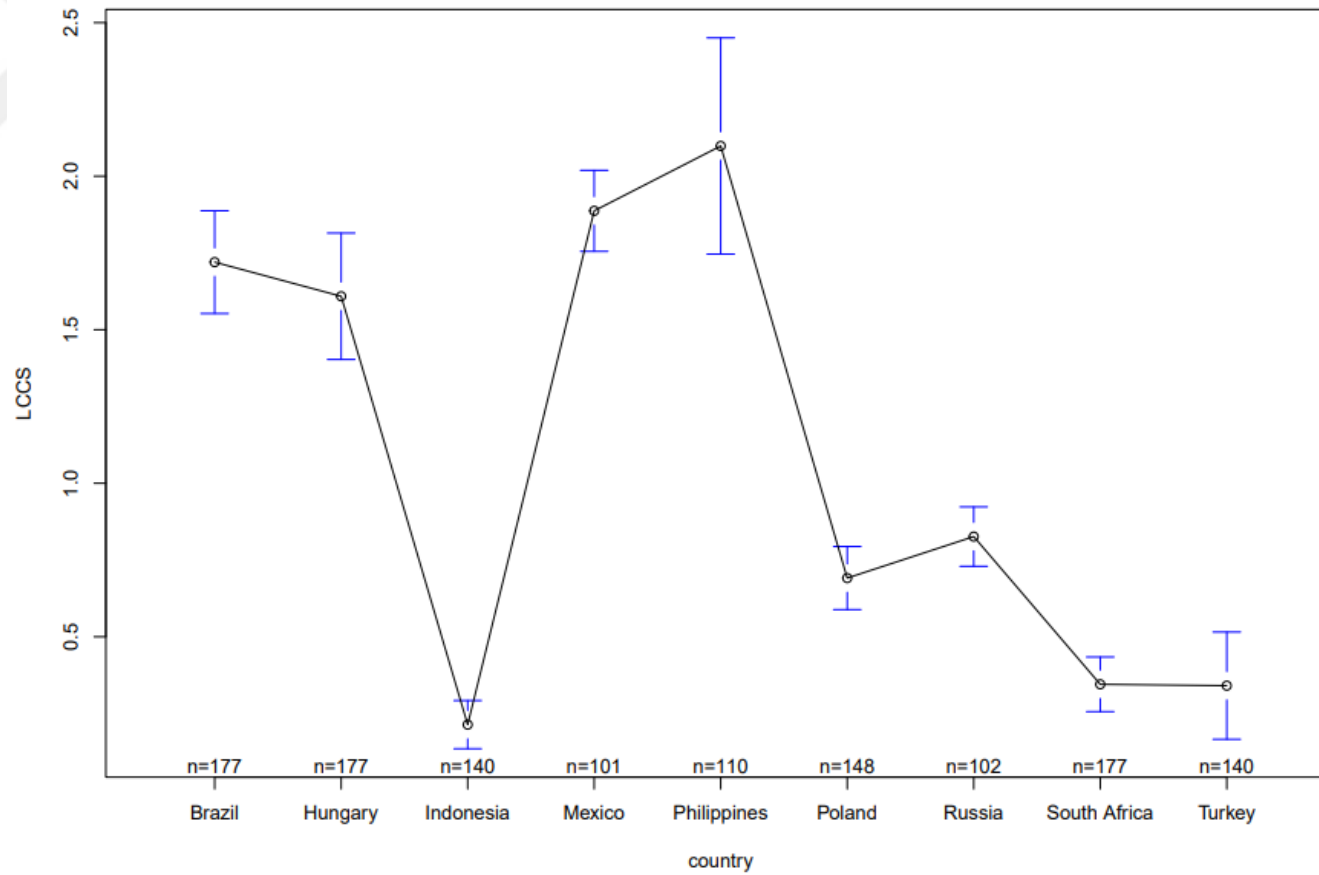


Figure 11: Heterogeneity of LC Credit Spread Across Countries

Notes: This figure shows heterogeneity across countries in panel data. Interquartile range, mean and median are visualized and the number of observations for each country is indicated on the x-axis

Table 15: Pre-Regression Hypothesis Tests

Pre-Regression Tests Hypothesis Test	Dependent Variable			Results
	LCCS	FCCS	FC/LC Spread	
Wooldridge test for serial correlation	p<0.05	p<0.05	p<0.05	The presence of serial correlation in the panel data set at a 95% confidence level.
Breusch-Pagan Test for homoskedasticity	p<0.05	p<0.05	p<0.05	The presence of heteroskedasticity in the regression model 95% confidence level.
Im-Pesaran-Shin Unit-Root Test	p<0.05	p<0.05	p<0.05	The panel is stationary at a 95% confidence level
Hausmann test for fixed effect	p<0.05	p<0.05	p<0.05	The fixed effects model is the appropriate choice at a 95% confidence level

Table 16: Post-Regression Hypothesis Tests

Post-Regression Tests Hypothesis Test	Dependent Variable			Results
	LCCS	FCCS	FC/LC Spread	
Ramsey RESET test	p>0.05	p>0.05	p>0.05	The model does not suffer from omitted variable bias
Durbin-Watson test for autocorrelation	p>0.05	p>0.05	p>0.05	No first-order autocorrelation in the residuals of the regression model
Kolmogorov-Smirnov test for normality	p>0.05	p>0.05	p>0.05	Residuals are normally distributed

5.3.1 Robustness

To check the robustness of the results, I performed hypothesis tests after regressions to identify potential issues, and I ran two additional regressions to assess the stability and structural breaks in crisis and non-crisis periods.

I aim to ensure that all relevant variables are included in my model. The Ramsey RESET test confirms the adequacy of the functional form, the absence of omitted variables, and the inclusion of all important variables. Afterwards, I utilized the Durbin Watson test to check for error term independence, which indicated that errors are random and independent of each other. However, the Breusch Pagan test highlights heteroskedasticity in error terms, suggesting error variability among observations. Therefore, I report the results in table 2 using the Heteroskedasticity - Adjusted Covariance (HAC) estimator to ensure the reliability of my findings. I also use the Kolmogorov - Smirnov test, which suggests that errors are normally distributed.

For a more detailed analysis, I run two more regressions. In the first one, I add an interaction term to test whether inflation has a significant effect on LCCS during crisis periods in 2008, and 2020. Table 17 shows that Inflation alone may not be perceived as a substantial risk factor by market participants under normal economic conditions; yet, during crises, it is significantly heightened within the context of economic or financial instability, where market sensitivity to inflation as a risk factor intensifies on LCCS.

In the second regression, I remove the crisis periods from the set of observations. The results in Table 18 show that the effect of inflation on LCCS disappears and the R^2 value remains 24%. Hence, inflation becomes the primary factor during high volatile periods, while Current Account Deficit / GDP remains important during stable times. On the other hand, the effect of inflation on the FC/LC spread persists for all periods. The results for the FCCS during non-crisis periods reveal an increase in the R^2 value from 34% to 37%, indicating that country-specific characteristics gain significance in stable periods.

Nonetheless, when a global shock occurs, the relevance of these variables diminishes.

By examining and analyzing these aspects, I enhance the reliability and strength of the regression findings providing insights across different scenarios.



Table 17: Prais-Winsten Regression Results with Crisis Dummy

Variables	(a) Δ LCCS	(b) Δ FCCS	(c) Δ FC/LC Spread
Δ Financial Development Index	-0.154 [0.708]	-0.391 [0.248]	-0.328 [0.430]
Δ Financial Institutions Index	-0.106 [0.592]	0.168 [0.296]	0.281 [0.177]
Δ Financial Markets Index	0.162 [0.655]	0.457 [0.124]	0.458 [0.225]
Δ Inflation	-0.007 [0.939]	0.286*** [< 0.01]	0.166* [0.082]
Δ Inflation*Crisis	-0.571* [0.058]	0.055 [0.825]	0.184 [0.531]
Δ Current Account Deficit / GDP	-0.333*** [< 0.01]	-0.153* [0.054]	0.141 [0.140]
Δ Short Term Debt / GDP	0.439 [0.069]	-0.150** [0.047]	-0.149* [0.085]
Δ Total Debt / GDP	0.033 [0.774]	0.004 [0.963]	-0.019 [0.868]
Δ Real GDP	-0.243** [0.048]	0.082 [0.425]	0.274** [0.026]
<i>Other Controls</i>			
Δ Inflation ²	0.140 [0.120]	-0.070 [0.349]	-0.061 [0.498]
Δ FC Debt / GDP	-0.259* [0.053]	-0.233** [0.039]	0.142 [0.279]
Δ LC Debt / GDP	0.176 [0.386]	0.039 [0.815]	-0.216 [0.283]
Δ FC Debt / Total Debt	0.683 [0.189]	-0.151 [0.735]	0.907* [0.081]
R^2	0.24	0.48	0.24

Notes: The dependent variables are yearly changes of local currency credit spread (LCCS), foreign currency credit spread (FCCS), and the spread between foreign currency and local currency credit spreads (FC / LC Spread) in columns 1, 2, and 3 respectively. Coefficients are presented with their p-values in brackets. * denote the level of statistical significance: $p^* < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$. The R^2 values at the bottom of each column indicate the proportion of variance explained by the model.

Table 18: Prais-Winsten Regression Results Excluding Crisis Period

Variables	(a) Δ LCCS	(b) Δ FCCS	(c) Δ FC/LC Spread
Δ Financial Development Index	0.286 [0.478]	-0.439 [0.178]	-0.840** [0.044]
Δ Financial Institutions Index	-0.387* [0.057]	0.132 [0.406]	0.500** [0.018]
Δ Financial Markets Index	-0.077 [0.830]	0.478 [0.102]	0.821** [0.024]
Δ Inflation	0.021 [0.817]	0.318*** [< 0.01]	0.198** [0.029]
Δ Current Account Deficit / GDP	-0.278*** [< 0.01]	-0.112 [0.178]	0.103 [0.330]
Δ Short Term Debt / GDP	0.005 [0.959]	-0.099 [0.216]	-0.092 [0.352]
Δ Total Debt / GDP	0.059 [0.682]	0.156 [0.159]	0.156 [0.236]
Δ Real GDP	-0.116 [0.335]	0.067 [0.509]	0.151 [0.220]
<i>Other Controls</i>			
Δ Inflation ²	0.125 [0.185]	-0.141* [0.057]	-0.092 [0.300]
Δ FC Debt / GDP	-0.190 [0.191]	-0.121 [0.280]	0.141 [0.314]
Δ LC Debt / GDP	0.112 [0.611]	-0.023 [0.894]	-0.201 [0.347]
Δ FC Debt / Total Debt	0.910 [0.102]	-0.316 [0.458]	0.141 [0.314]
R^2	0.24	0.37	0.18

Notes: Table presents the results of a Prais-Winsten regression analysis excluding crisis periods. The dependent variables are yearly changes of local currency credit spread (LCCS), foreign currency credit spread (FCCS), and the spread between foreign currency and local currency credit spreads (FC / LC Spread) in columns 1, 2, and 3 respectively. Coefficients are presented with their p-values in brackets. * denote the level of statistical significance: $p^* < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$. The R^2 values at the bottom of each column indicate the proportion of variance explained by the model.

5.3.2 Endogeneity

I employ the Multi-level Generalized Method of Moments (GMM) approach, which Kim and Frees (2007) [81] suggest, to address the potential endogeneity of independent variables. Endogeneity arises when predictors are correlated with the error term, potentially due to omitted variables, measurement error, simultaneity, or reverse causality. Such correlations bias the estimates of regression coefficients, leading to spurious or misleading conclusions.

Traditional methods, including ordinary least squares and fixed/random effects models, may not provide consistent parameter estimates in the presence of endogeneity, especially within multilevel data structures. The Multilevel GMM method extends conventional instrumental variable techniques to complex hierarchical data settings, enabling consistent estimation under correlated effects. One of the most significant benefits of the Multilevel GMM approach is its use of internal instruments derived from the data itself. This eliminates the need for external instrumental variables, which may not always be available or may introduce their own biases.

Figure 12 displays the pooled correlation results between dependent and independent variables, excluding within and between country interactions. It suggests there might be a bias in the standard estimation procedure. We can expect the reduced statistical significance due to existing correlations and mutual causality with some variables, as the Ramsey RESET test rejects the presence of omitted variables. Assuming that all variables are endogenous, Table 19 confirms the statistical influence of Current Account Deficit / GDP on LCCS. When examining FCCS, Inflation, Financial Markets Index and Current Account Deficit / GDP consistently exert a significant exogenous impact. Additionally, the exogenous variables that contribute FC / LC Spread are identified as Inflation and Short Term Debt / GDP.

The hierarchical structure of GMM approach emphasizes the pivotal role of Inflation on FC / LC Spread divergence and the impact of Current Account Deficit / GDP on both credit risk metrics, distinguishing it from other variables where Financial Markets Index and Short Term Debt / GDP have significant minor effects.

Table 19: Multilevel GMM Results

Variables	(a) Δ LCCS	(b) Δ FCCS	(c) Δ FC/LC Spread
Δ Financial Development Index	-0.343 [0.441]	-0.488 [0.179]	-0.204 [0.614]
Δ Financial Institutions Index	-0.078 [0.708]	0.150 [0.391]	0.251 [0.195]
Δ Financial Markets Index	0.239 [0.542]	0.573* [0.078]	0.349 [0.320]
Δ Inflation	-0.051 [0.523]	0.380*** [< 0.01]	0.258*** [< 0.01]
Δ Current Account Deficit / GDP	-0.268*** [< 0.01]	0.201*** [< 0.01]	0.093 [0.310]
Δ Short Term Debt / GDP	0.045 [0.668]	-0.207 [< 0.01]	-0.168* [0.082]
Δ Total Debt / GDP	0.053 [0.631]	0.097 [0.317]	0.095 [0.388]
Δ Real GDP	-0.111 [0.368]	-0.013 [0.892]	0.083 [0.462]
R^2	0.12	0.27	0.14

Notes: Table reports the results of Multilevel GMM estimation presented by Kim and Frees (2007) [81]. * denote the level of statistical significance: $p^* < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$.

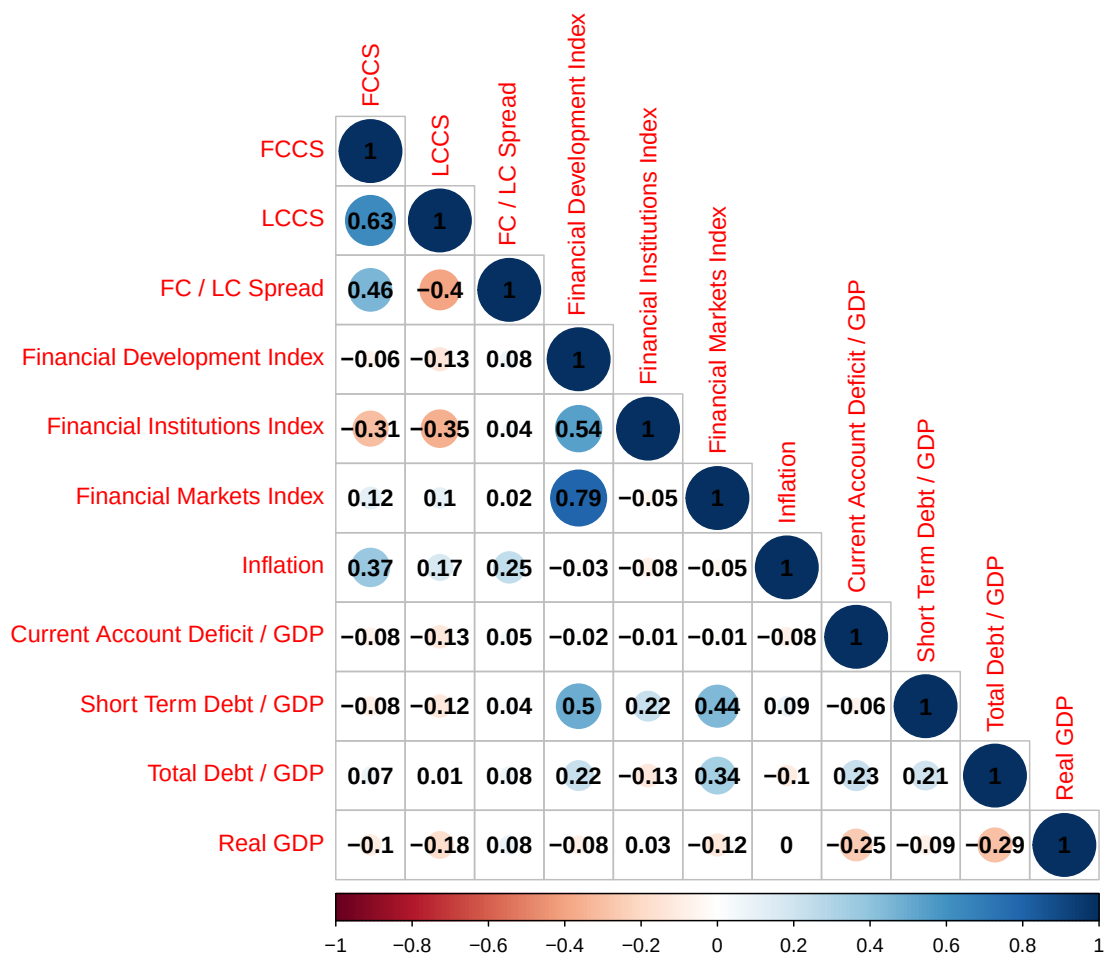


Figure 12: Pairwise Correlation of Regression Variables

Notes: This figure shows pairwise correlation of FC, LC and FC /LC spread and regression variables. All pairwise correlations are computed as pooled data assuming no fixed effect in the panel.

5.3.3 Economic Interpretation of Exogenous Variables

Considering both cross-country and time dimensions, I analyze the impact of the average changes in four characteristics derived from the endogeneity test on LCCS, FCCS, and FC/LC spread. As illustrated in Figures 25 to 28, the influence of these average changes on LCCS remains consistent over time, with the notable exception of a moderate correlation with inflation at 45%. Furthermore, when aggregating data across time periods to assess variations among countries, the results become significantly more pronounced. Considering the directional impact of the variables in my study, the findings align well with existing literature.

Cross-country analysis indicates that inflation significantly drives the spread between foreign currency (FC) and local currency (LC) credit spreads across countries. Figures 13 to 15 reveal a strong correlation, showing that an increase in inflation leads to a widening gap between FC and LC credit spreads. This trend suggests that with rising inflation, FC debt is perceived as riskier, leading investors to demand higher yields to compensate for the increased risk, thereby broadening the FC credit spread. In contrast, LC credit spreads benefit from inflationary pressures. This observation aligns with prior research; for instance, Aguiar et al. (2013) [27] and Ottonello and Perez (2019) [28] demonstrate that governments, when challenged by the need to issue additional debt for refinancing, often permit inflation to rise. This strategy effectively serves as a protective measure for LC debt, reducing the default risk on LC bonds since the sovereign has greater control over monetary policy and, consequently, inflation outcomes. Similarly, Aizenman et al. (2021) [82] examine bond issuance in emerging markets, highlighting a strategic pivot from a heavy reliance on foreign currency-denominated debt towards increased issuance of local currency bonds. This shift aims to mitigate the risks linked to currency mismatches and external financial shocks. Such a transition can be supported by a suite of policy measures, including managed exchange rate flexibility and inflation targeting, which collectively enhance the appeal of local currency bonds to both issuers

and investors.

As illustrated in Figures 16 to 18, there is a noticeable increase in the the FC / LC spread as the magnitude of the current account deficit deepens. In response to exchange rate fluctuations and the escalating credit risk associated with current account deficit, policymakers may consider raising interest rates. Such a move can enhance the attractiveness of investments within the country, potentially leading to currency appreciation due to increased foreign capital inflow or, conversely, by elevating the cost of borrowing, which could have adverse effects. In the context of substantial current account deficits and heightened external debt, it is imperative for policymakers to devise innovative strategies to stabilize the exchange rate and maintain balance of payments equilibrium, as suggested by Bouraoui (2019) [83].

Figures 19 to 21 show that Short Term Debt / GDP has an upward impact on the FC credit spread but not on the LC credit spread. This suggests that higher short-term debt increases the perceived risk for investors in FC-denominated assets, potentially due to concerns over liquidity and roll-over risks in the short term, which do not similarly affect LC-denominated assets. The reliance on short-term FC debt may exacerbate vulnerability to sudden shifts in exchange rates or global interest rates, thereby increasing FC credit spreads. However, the sovereign's ability to exercise more control over local currency conditions, including through monetary policy tools that can mitigate short-term liquidity risks, can explain the lack of a similar impact on LC credit spreads. The distinction between the impact of short-term debt on FC and LC credit spreads can also reflect differing perceptions of risk between sovereign and corporate borrowers. While sovereigns may shift towards LC borrowing to reduce currency mismatch risks, as detailed in Du et al. (2020) [8], given the upward impact of short-term debt on FC credit spreads, policymakers in emerging markets might consider strategies to lengthen the maturity profile of external debt and encourage more LC borrowing.

Figures 22 to 24 indicate that an improvement in the Financial Markets Index,

which signifies better financial market health and efficiency in emerging markets, is associated with a narrowing FC/LC spread. This suggests that as financial markets become more resilient, they better manage and mitigate the risks associated with local currency borrowing. Consequently, investors demand a lower risk premium over FC debt, leading to a convergence of credit spreads. Bertaut et al. (2023) [84] show that while improved financial market conditions contribute to the narrowing of credit spreads, external financial conditions and investor behavior remain influential factors. A more developed financial market provides mechanisms and instruments for hedging against currency and liquidity risks, thereby enhancing the appeal of local currency instruments to foreign investors and diminishing the disparity in spreads. This relationship emphasizes the critical role of both internal market enhancements and external risk management strategies. These are critical for reducing the inherent risk premium associated with local currency debts and addressing external vulnerabilities, especially during periods of global financial uncertainty.

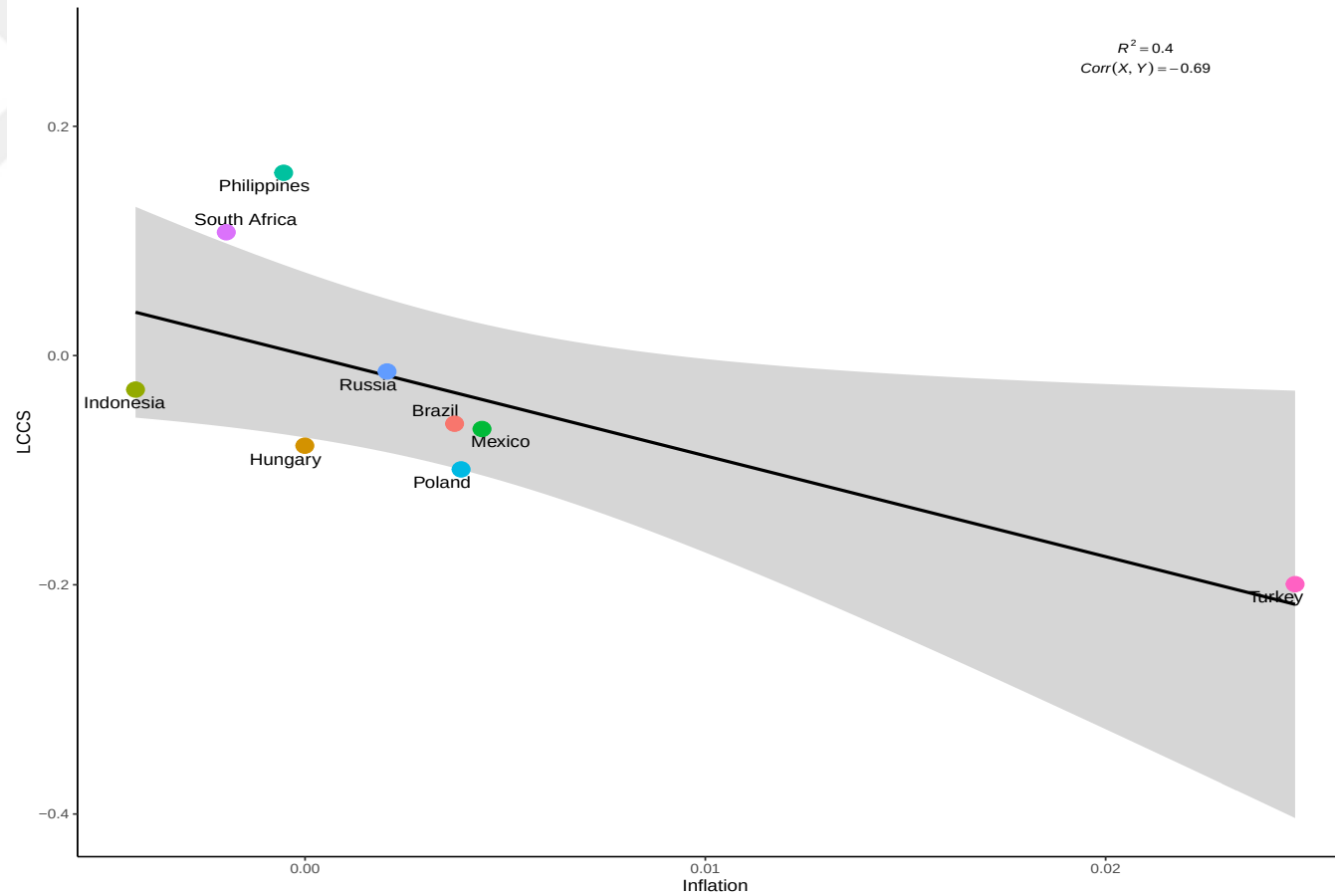


Figure 13: Between-Country Correlations of LCCS and Inflation

Notes: This figure shows average changes of local currency credit spread against average changes of Inflation between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

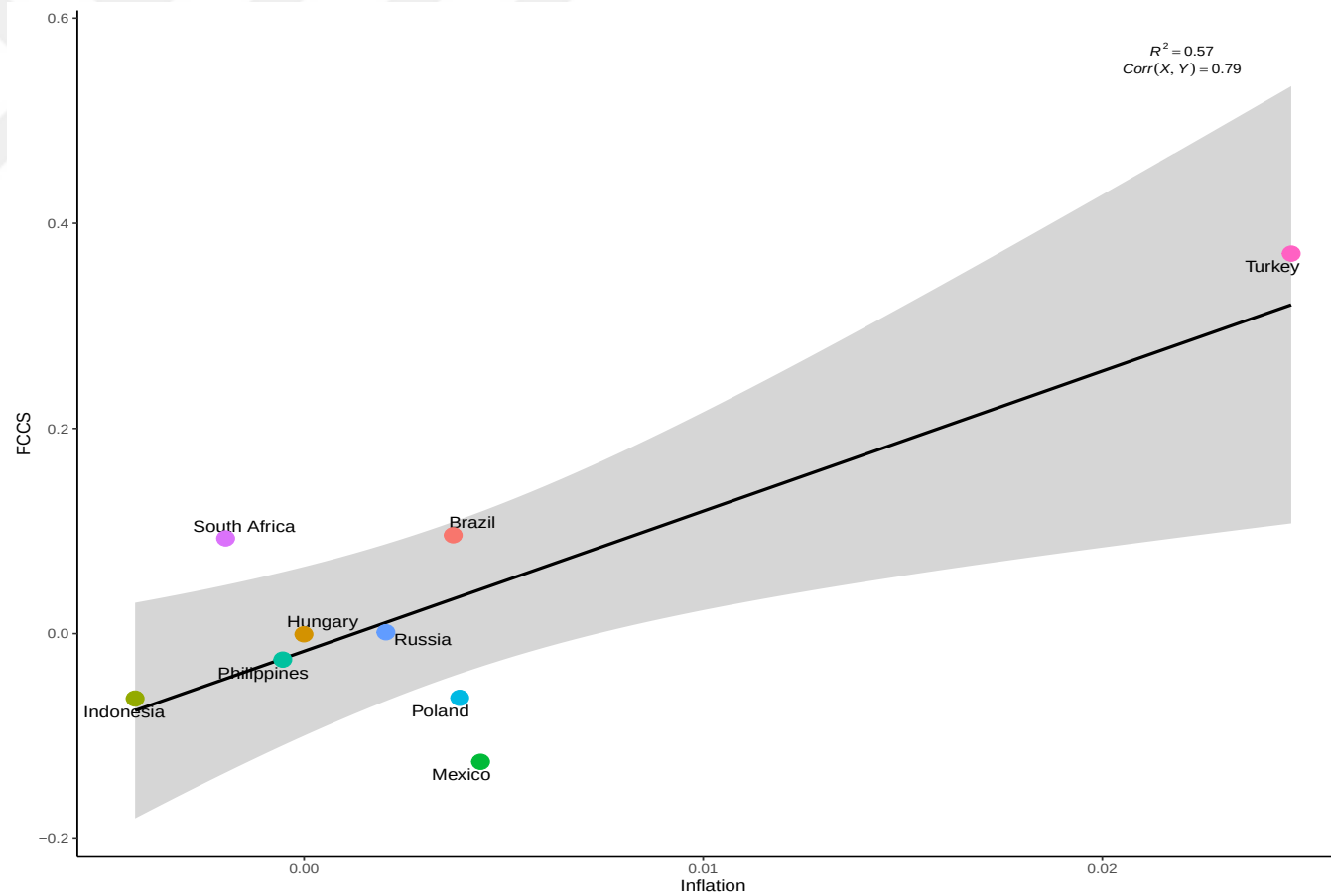


Figure 14: Between-Country Correlations of FCCS and Inflation

Notes: This figure shows average changes of foreign currency credit spread against average changes of Inflation between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

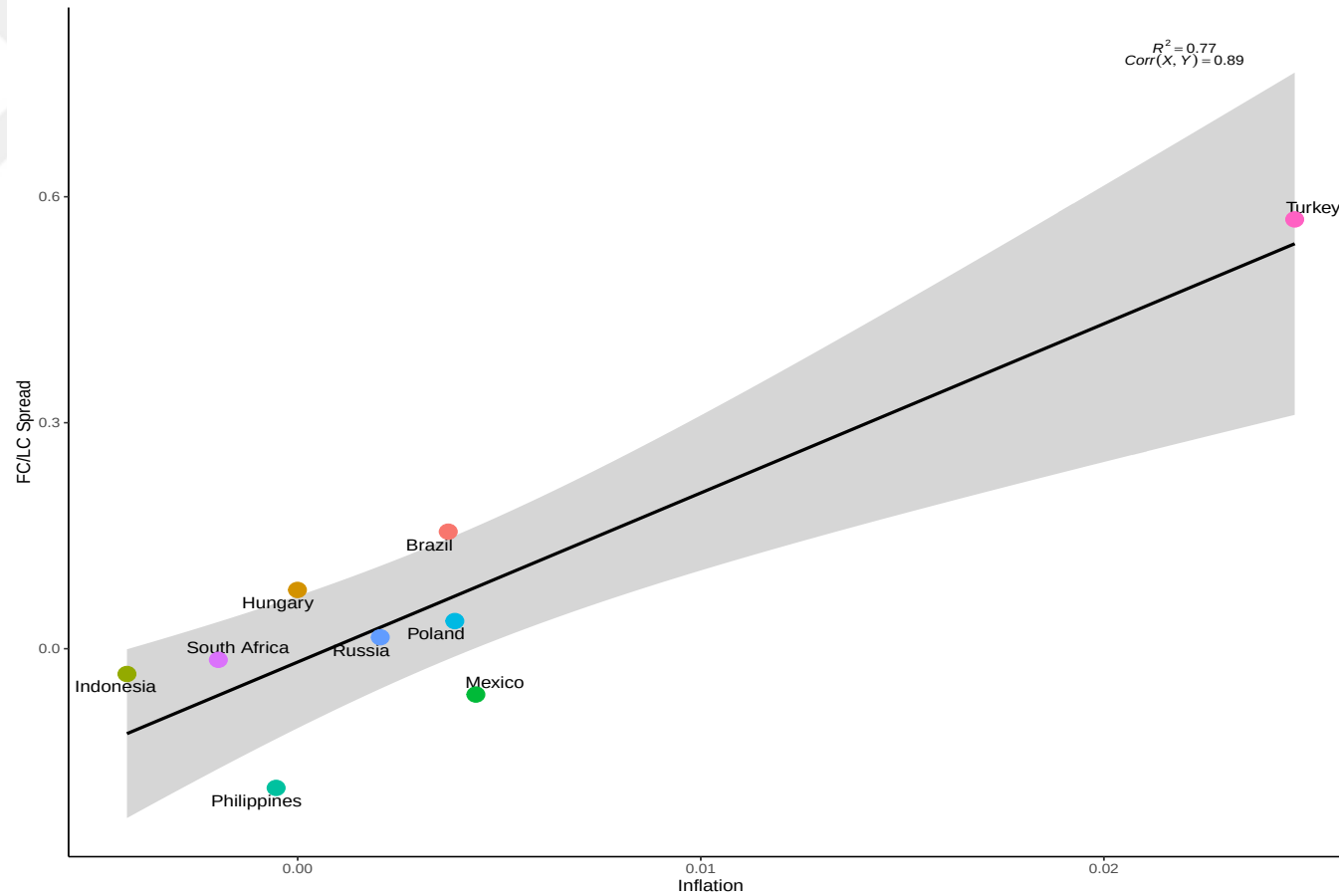


Figure 15: Between-Country Correlations of FC/LC Spread and Inflation

Notes: This figure shows average changes of the FC/LC spread against average changes of Inflation between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

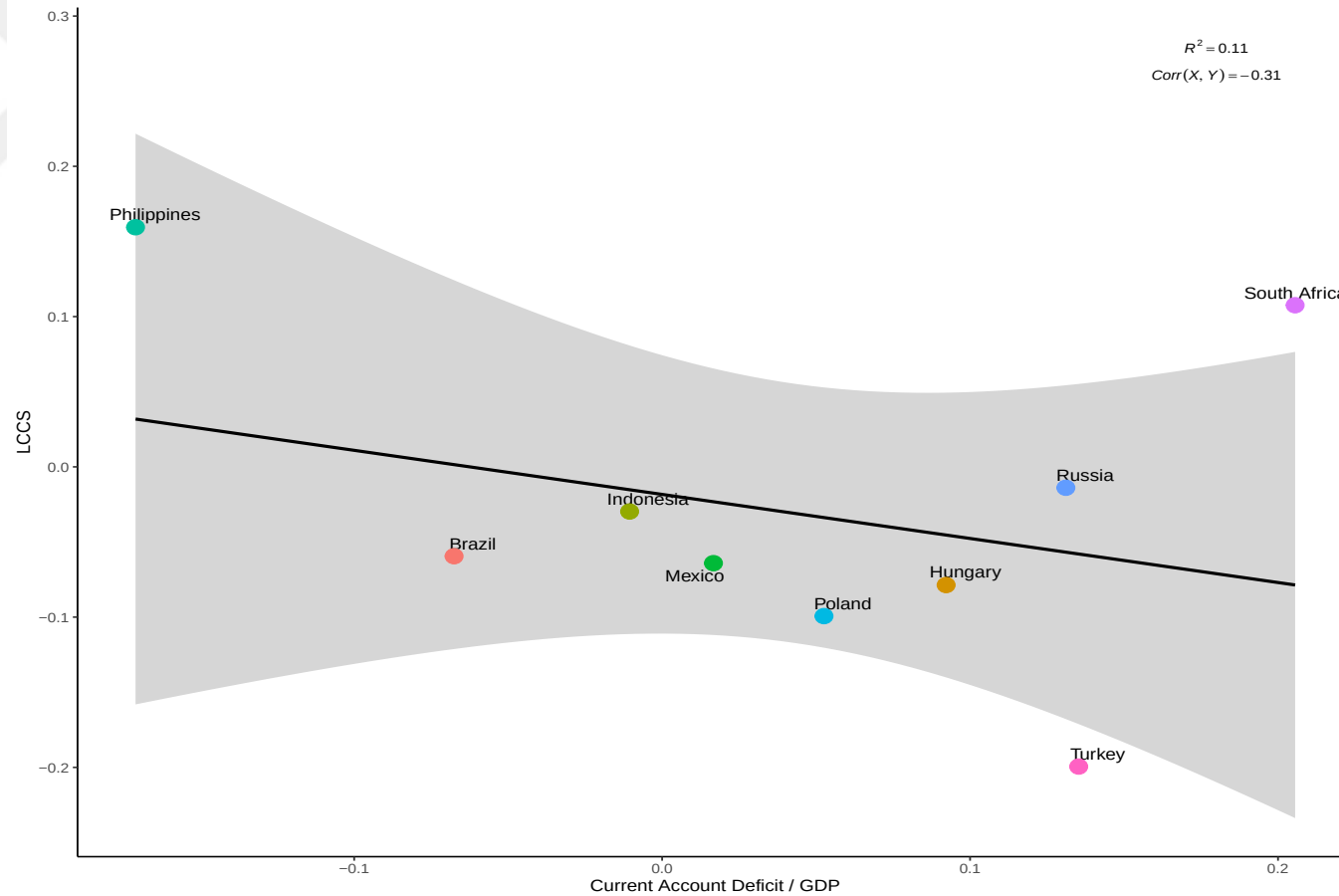


Figure 16: Between-Country Correlations of LCCS and Current Account Deficit / GDP

Notes: This figure shows average changes of local currency credit spread against average changes of Current Account Deficit / GDP between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

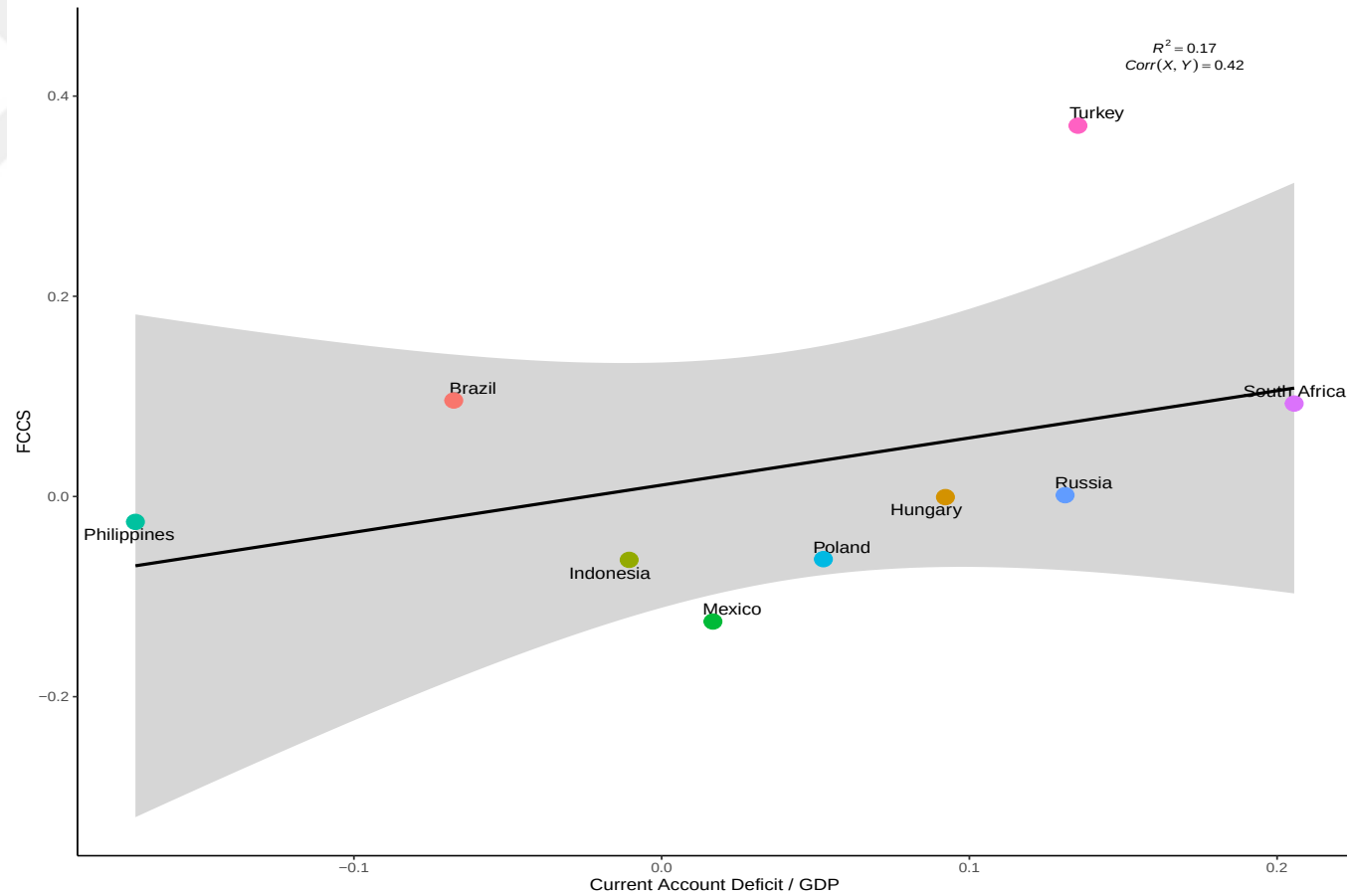


Figure 17: Between-Country Correlations of FCCS and Current Account Deficit / GDP

Notes: This figure shows average changes of foreign currency credit spread against average changes of Current Account Deficit / GDP between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

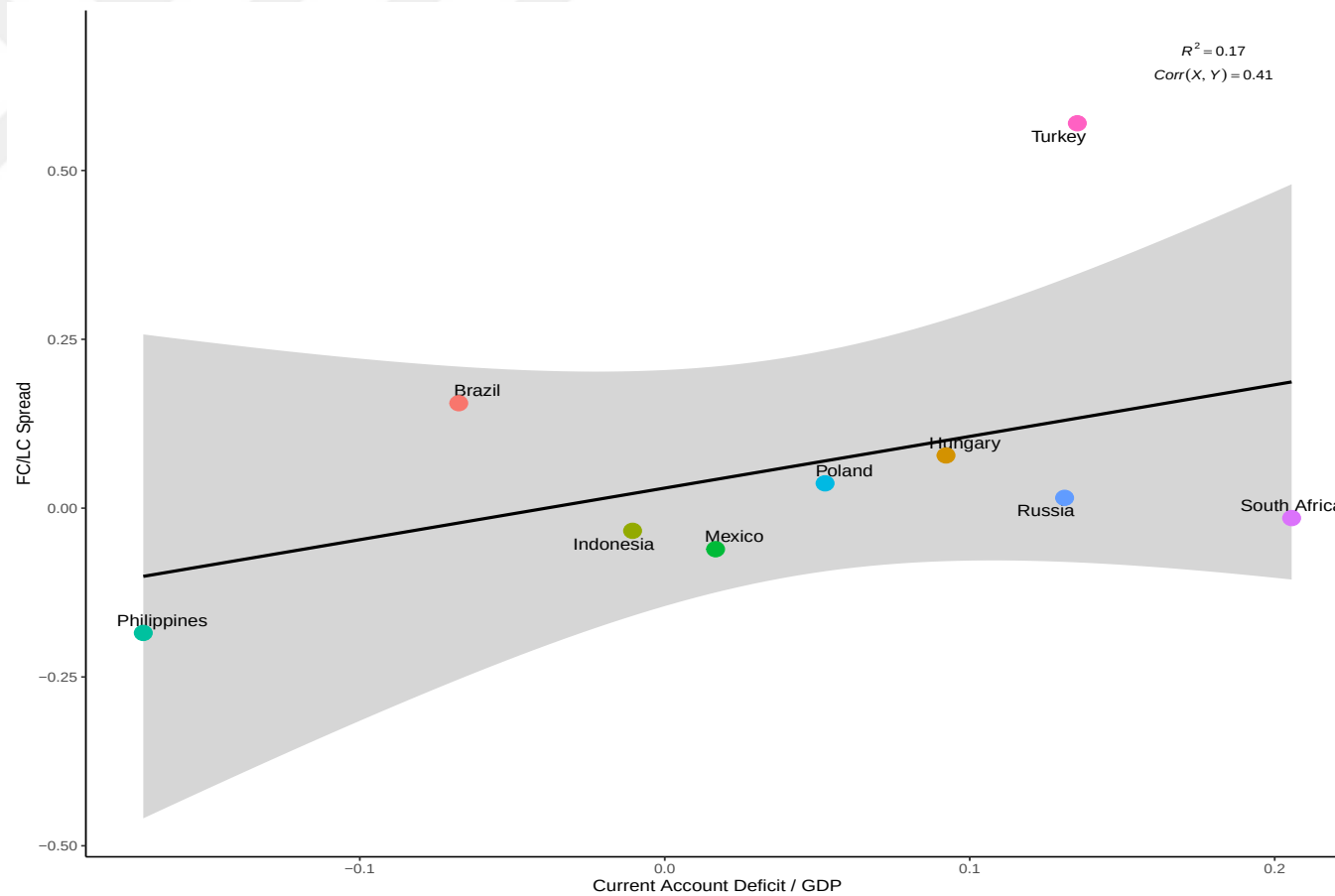


Figure 18: Between-Country Correlations of FC/LC Spread and Current Account Deficit / GDP

Notes: This figure shows average changes of the FC/LC spread against average changes of Current Account Deficit / GDP between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

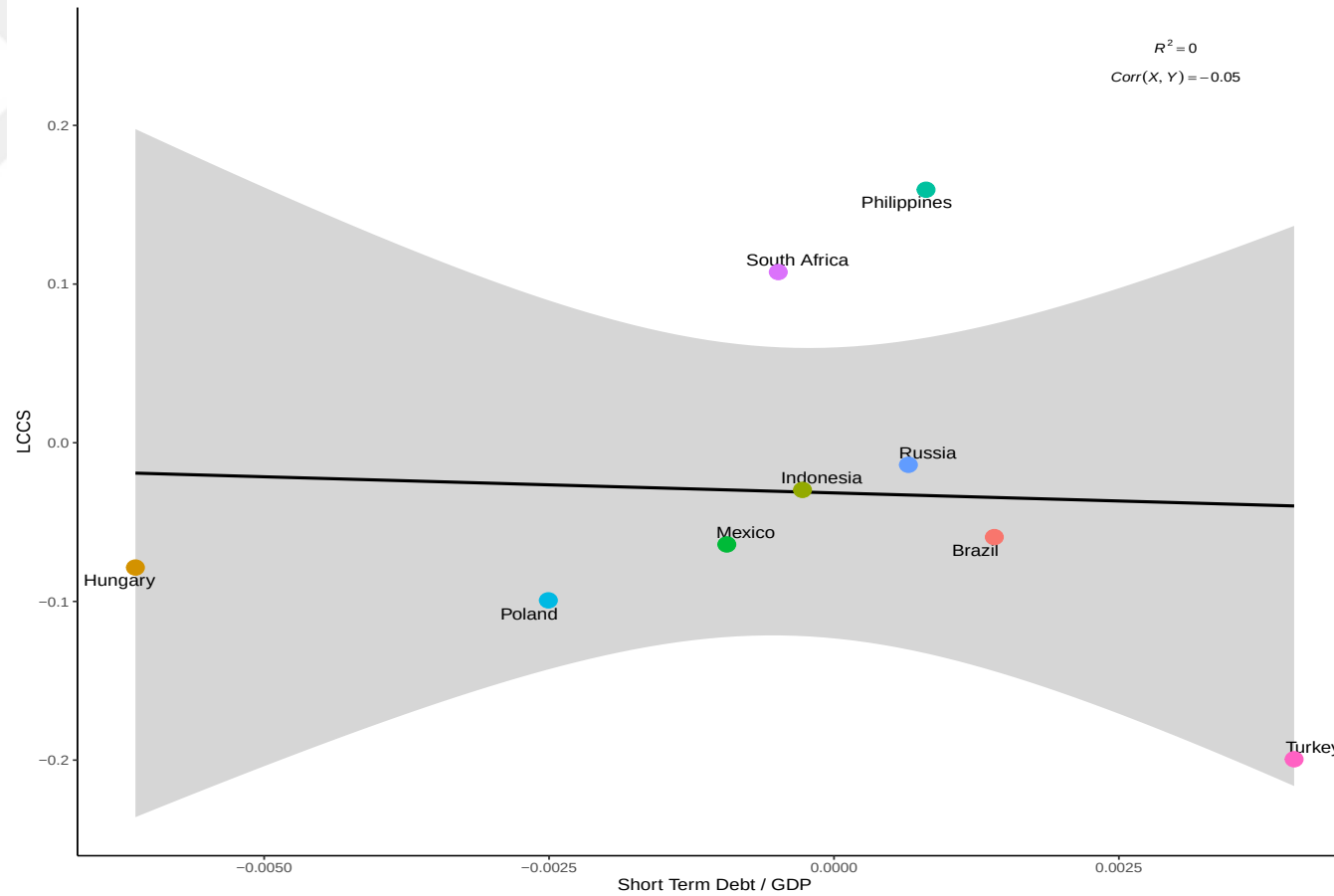


Figure 19: Between-Country Correlations of LCCS and Short-Term Debt / GDP

Notes: This figure shows average changes of the LCCS against average changes of Short-Term Debt / GDP between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

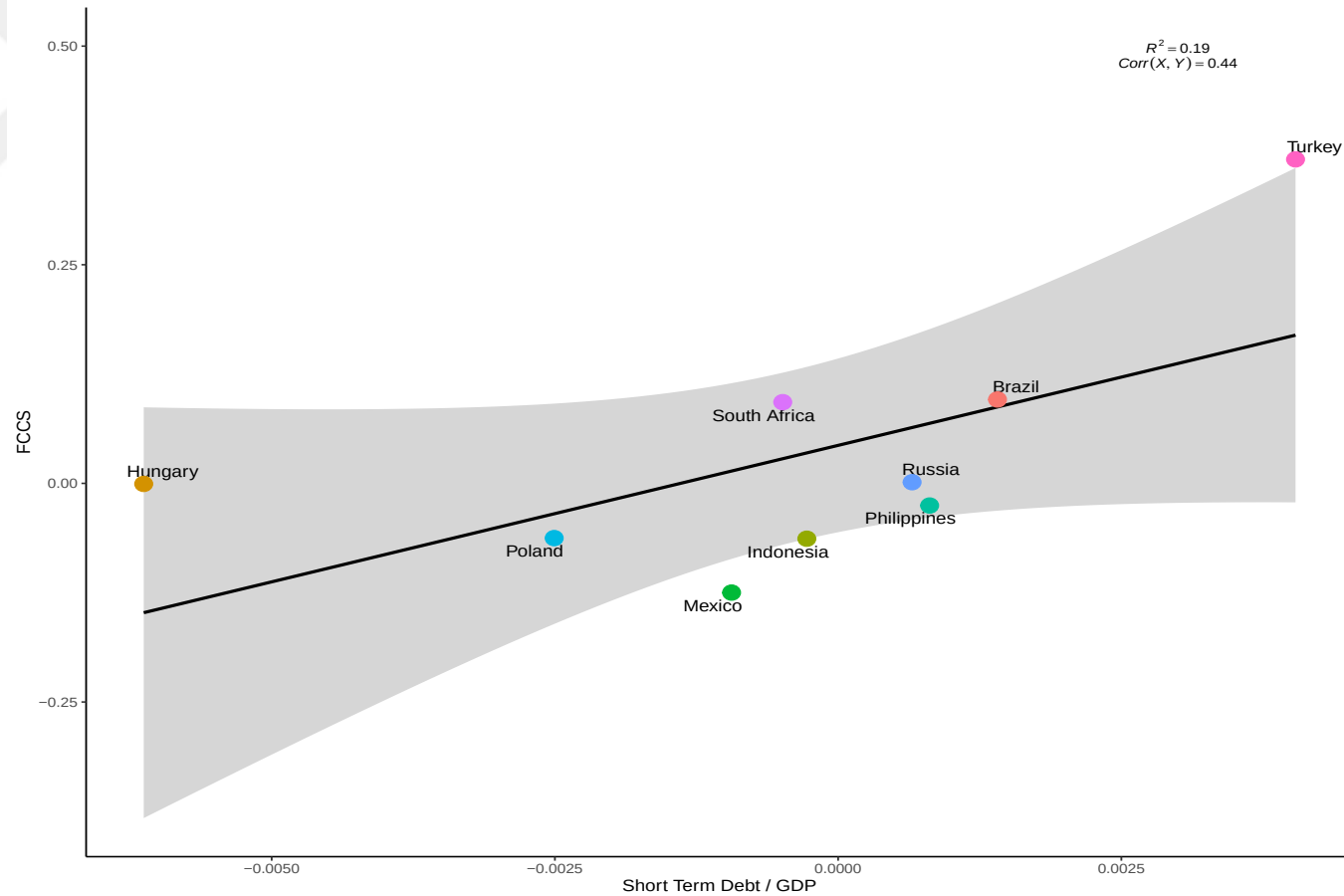


Figure 20: Between-Country Correlations of FCCS and Short-Term Debt / GDP

Notes: This figure shows average changes of foreign currency credit spread against average changes of Short-Term Debt / GDP between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

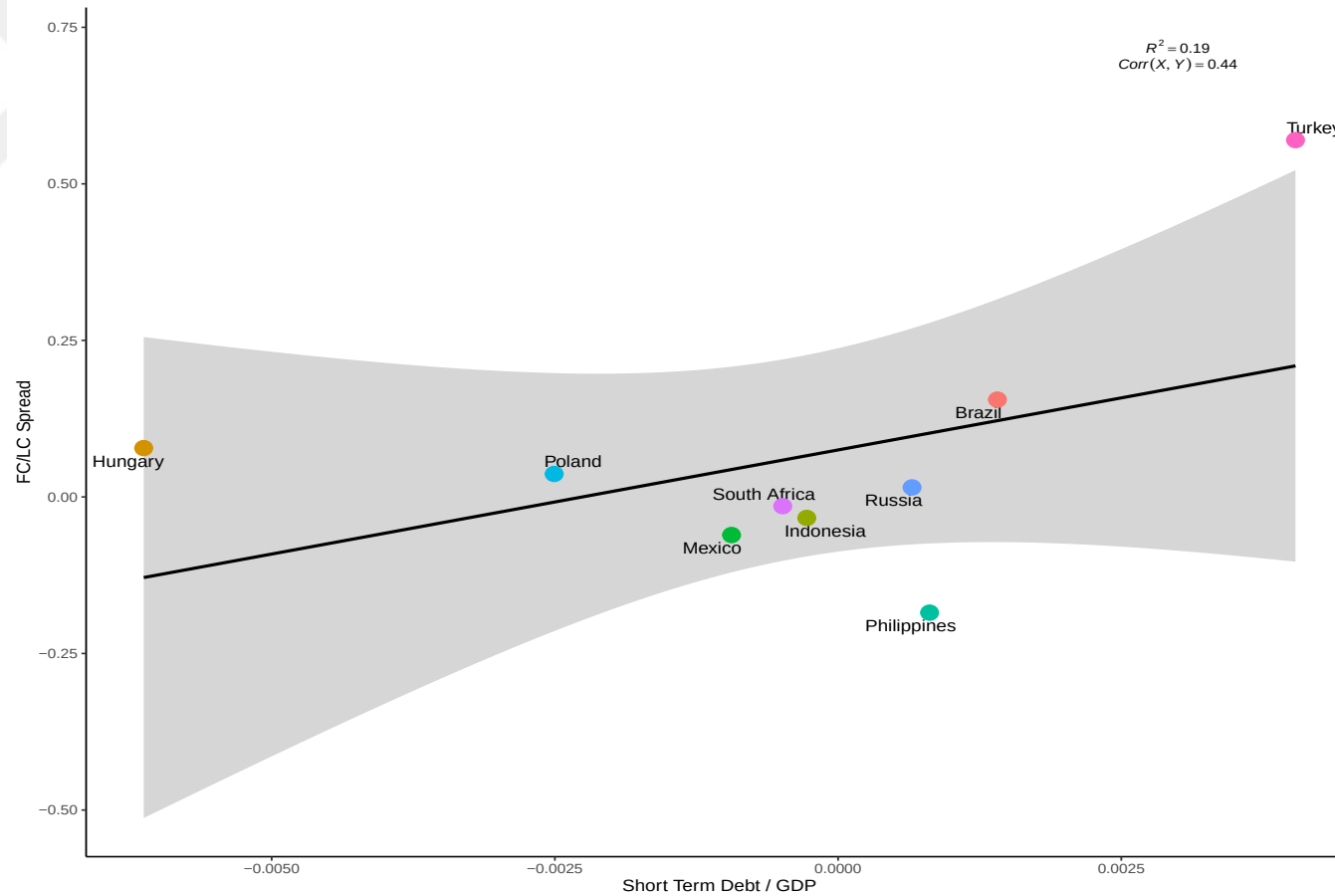


Figure 21: Between-Country Correlations of FC/LC Spread and Short-Term Debt / GDP

Notes: This figure shows average changes of FC/LC spread against average changes of Short-Term Debt / GDP between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

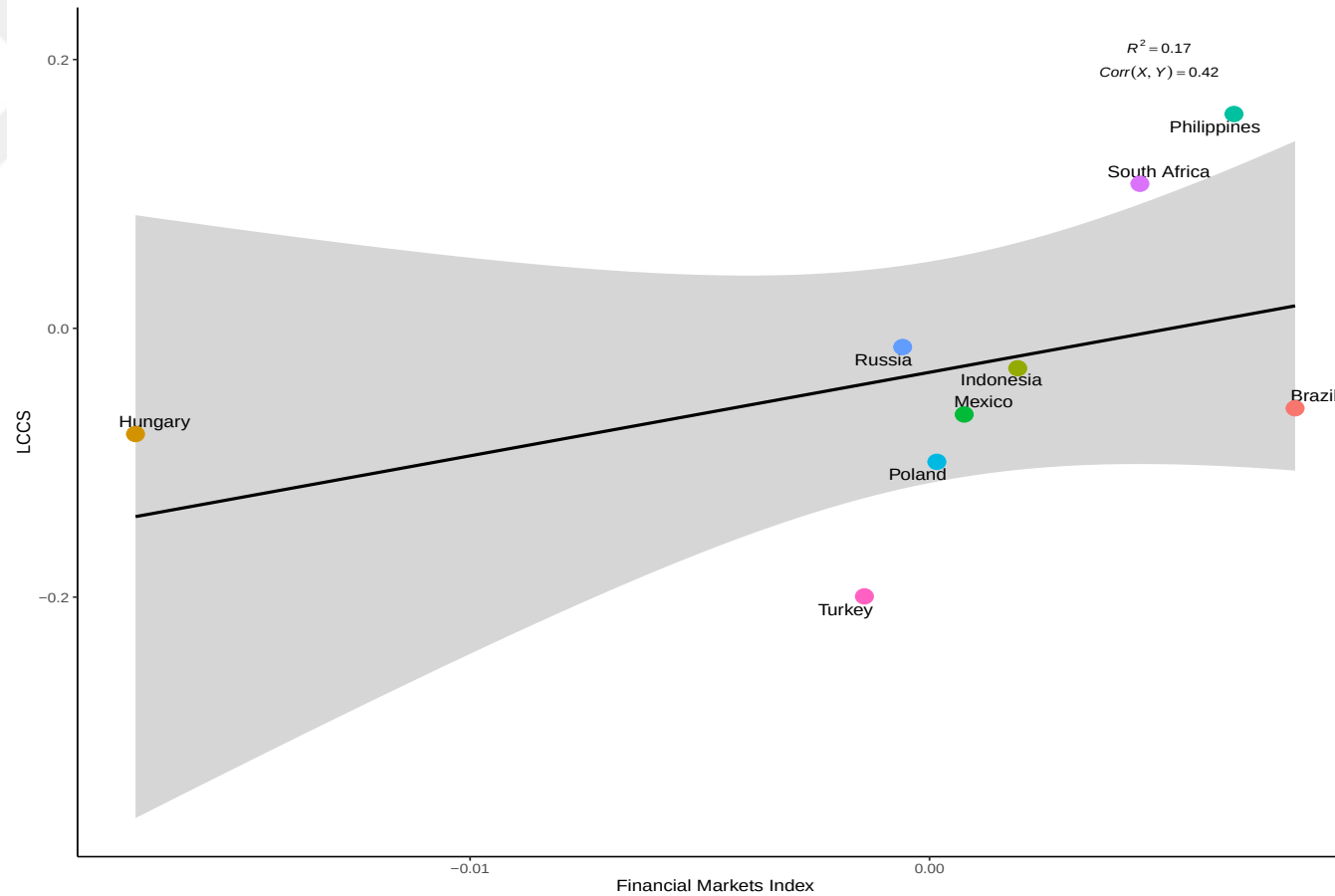


Figure 22: Between-Country Correlations of LCCS and Financial Markets Index

Notes: This figure shows average changes of local currency credit spread against average changes of Financial Markets Index between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

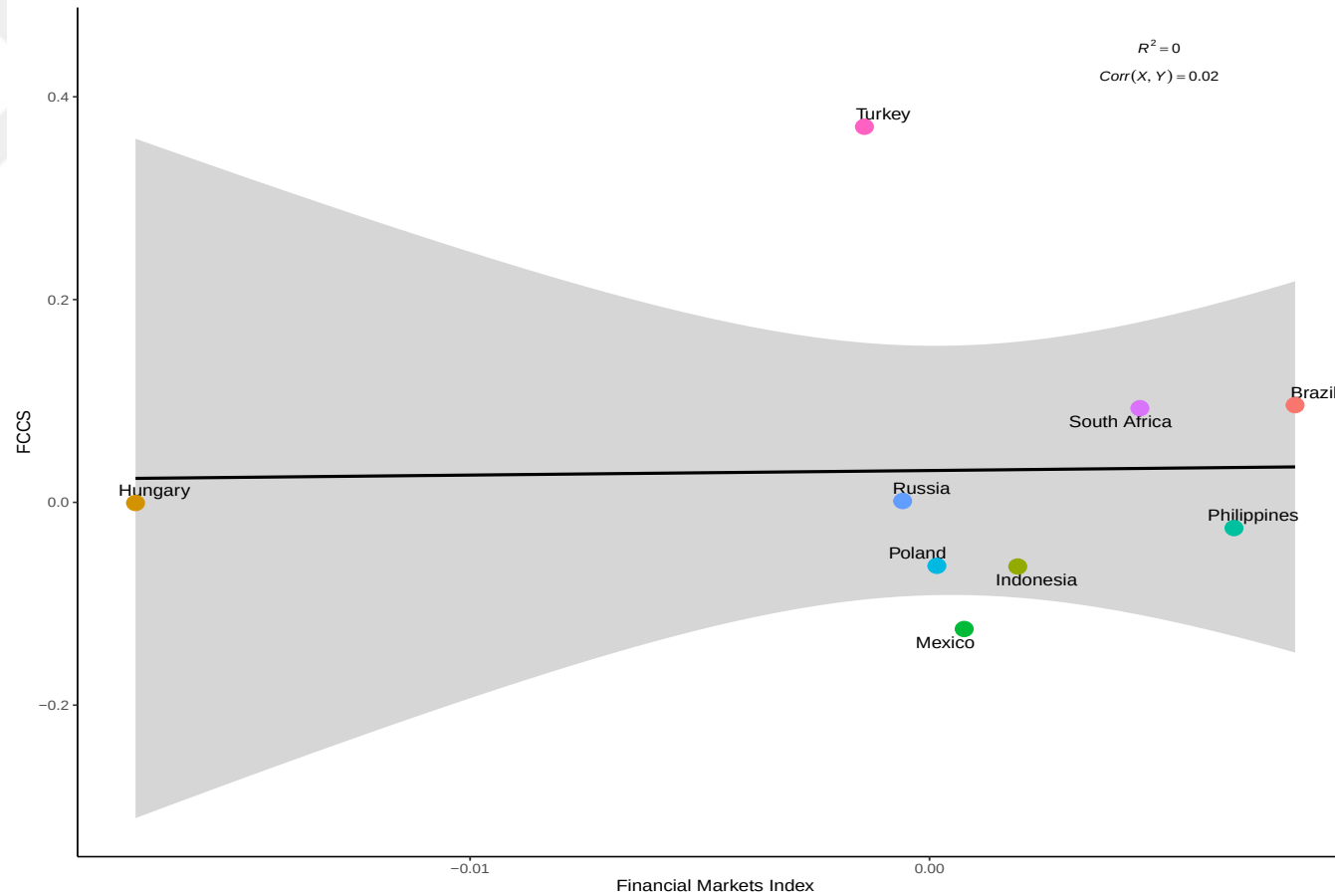


Figure 23: Between-Country Correlations of FCCS and Financial Markets Index

Notes: This figure shows average changes of foreign currency credit spread against average changes of Financial Markets Index between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

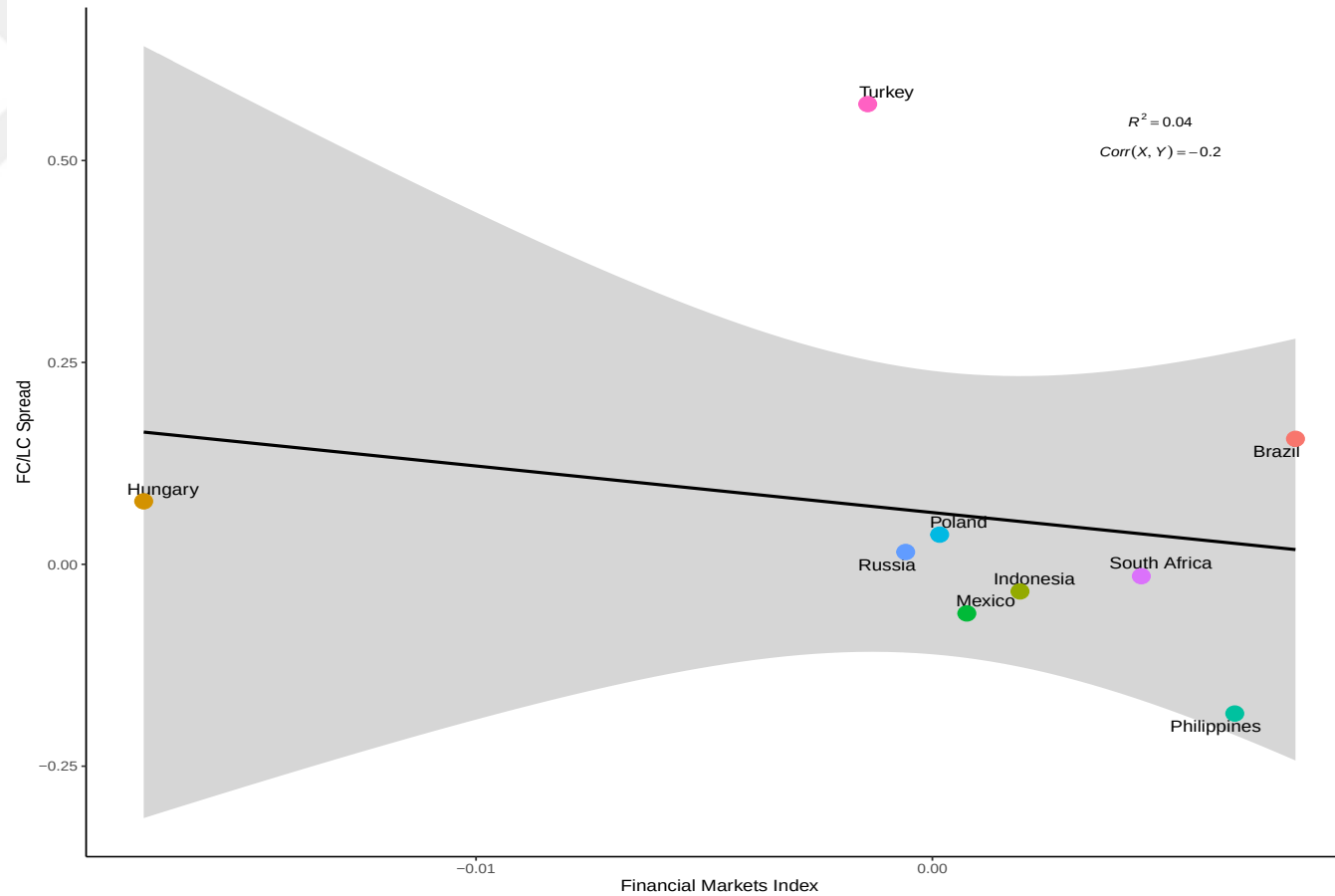


Figure 24: Between-Country Correlations of FC/LC Spread and Financial Markets Index

Notes: This figure shows average changes of FC/LC spread against average changes of Financial Markets Index between 2007 and 2021 for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

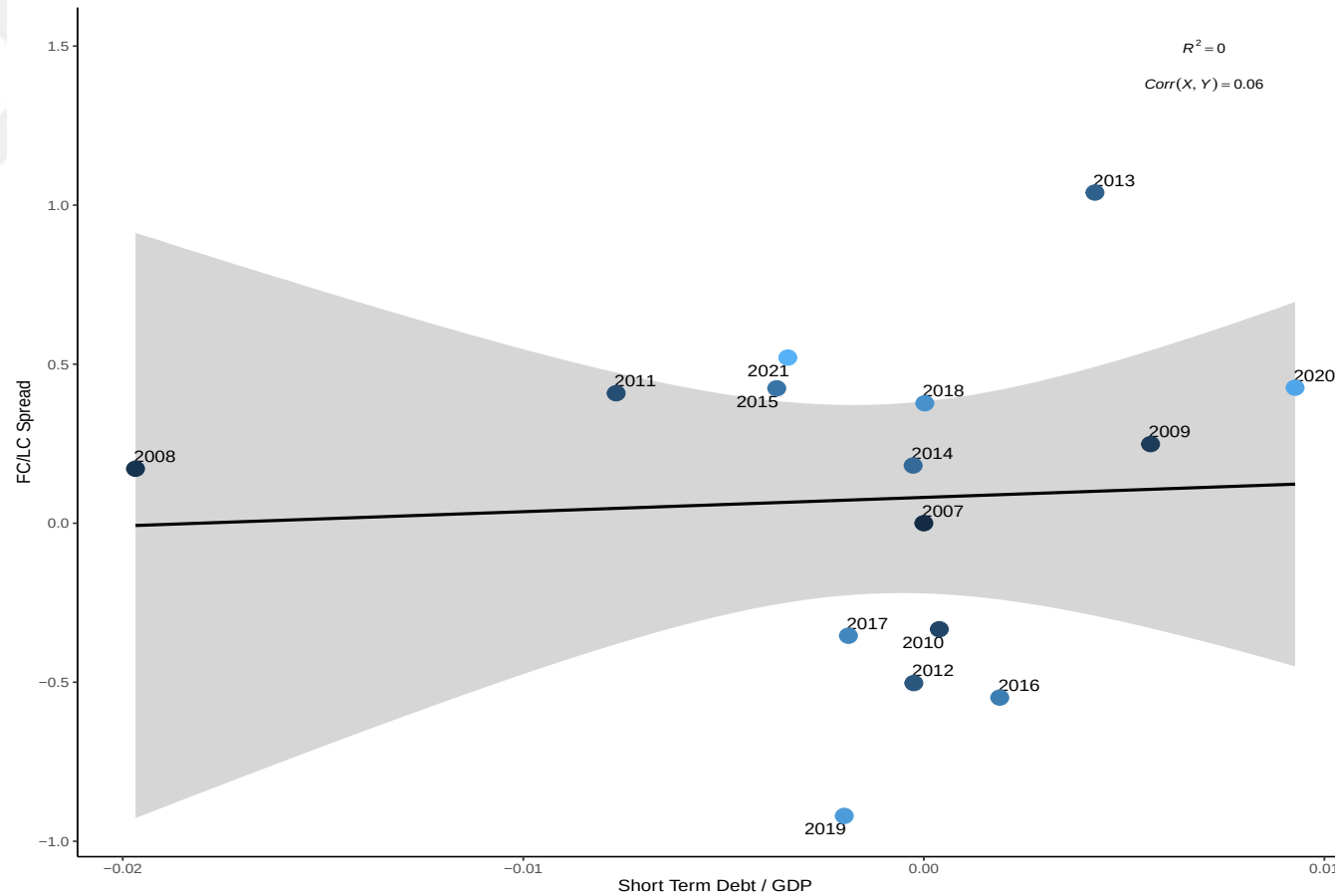


Figure 25: Time Variation of FC/LC Spread and Short-Term Debt / GDP

Notes: This figure shows average changes of the FC/LC spread against average changes of Short-Term Debt / GDP over time for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

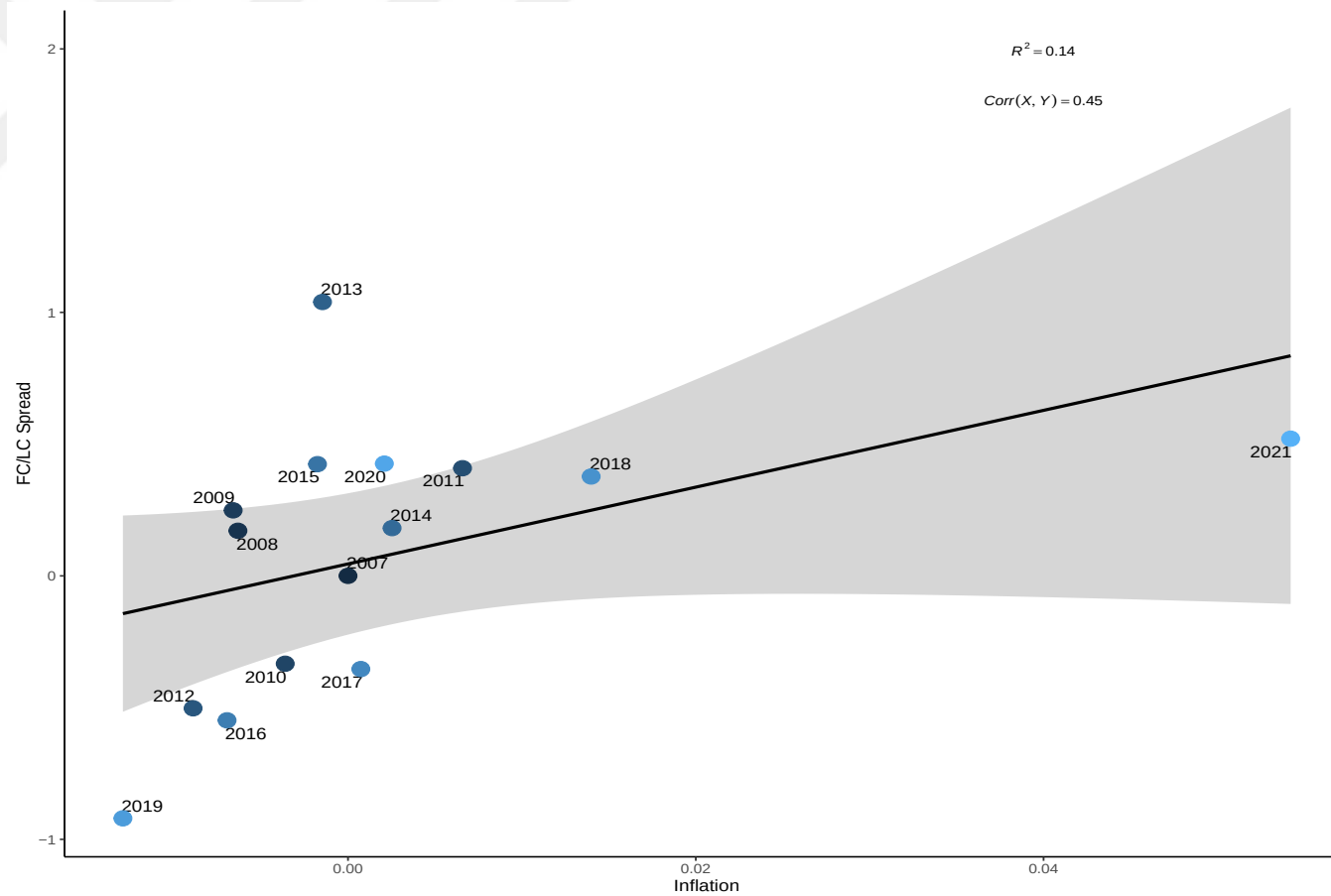


Figure 26: Time Variation of FC/LC Spread and Inflation

Notes: This figure shows average changes of the FC/LC spread against average changes of Inflation over time for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

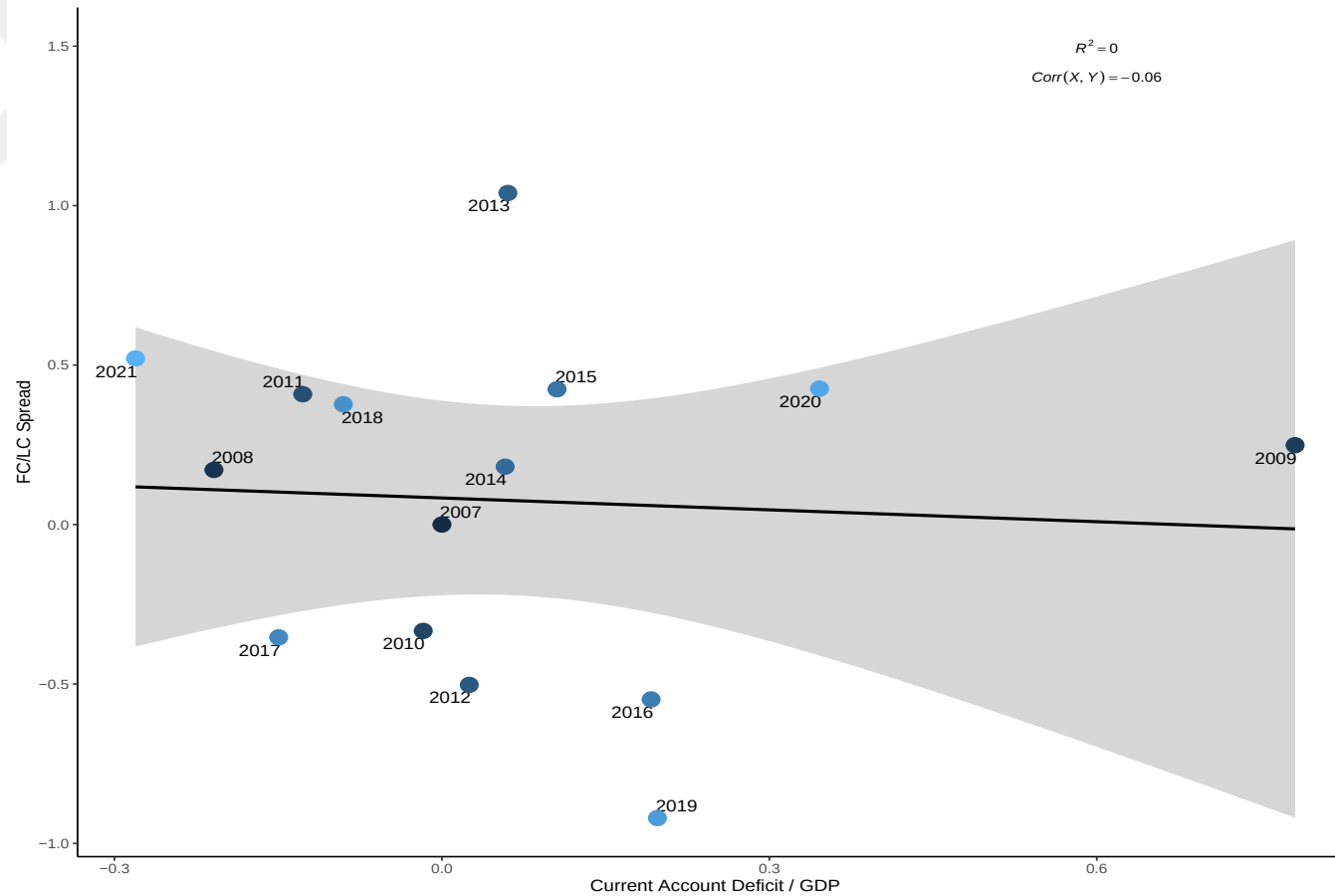


Figure 27: Time Variation of FC/LC Spread and Current Account Deficit / GDP

Notes: This figure shows average changes of the fc/lc spread against average changes of Current Account Deficit / GDP over time for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

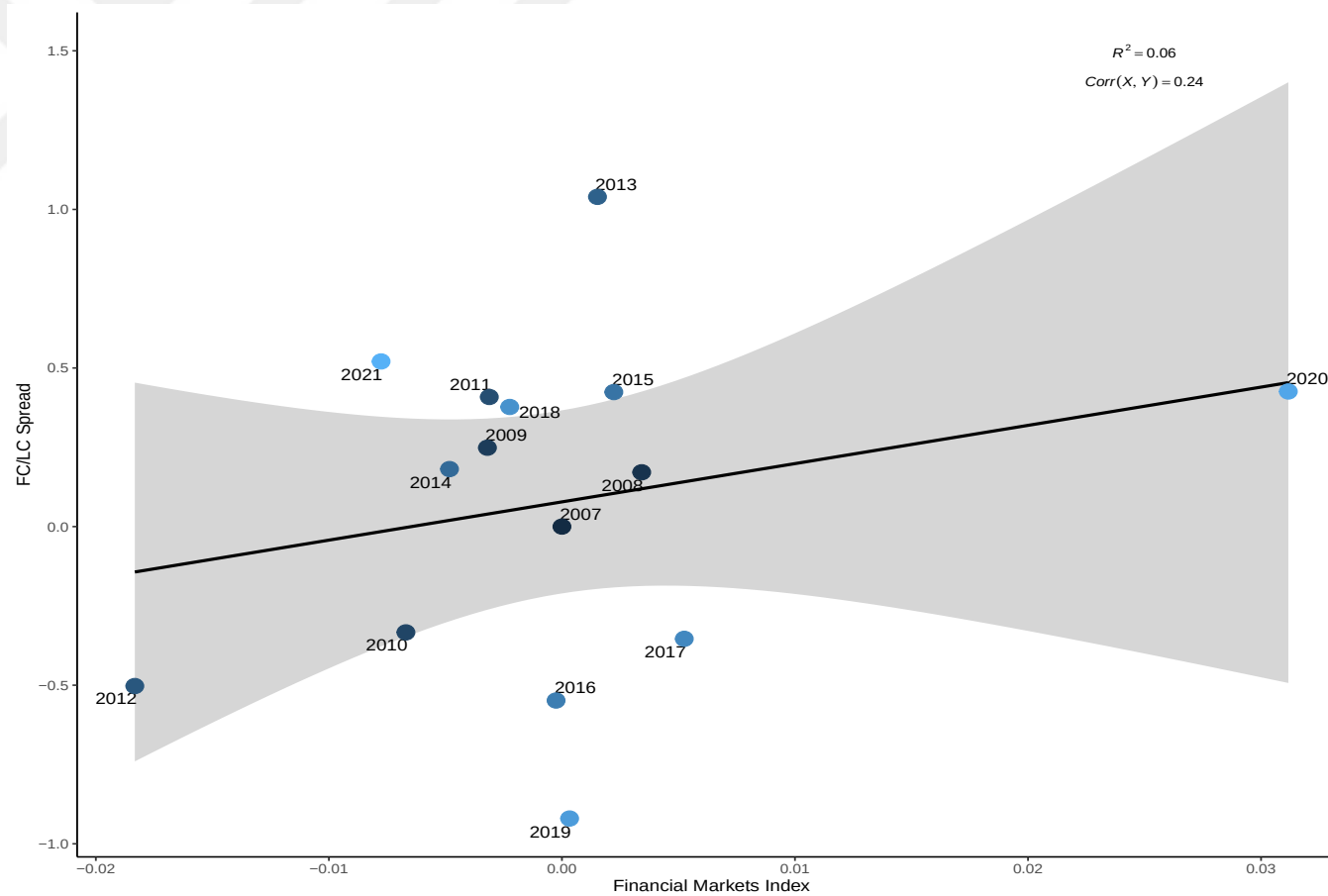


Figure 28: Time Variation of FC/LC Spread and Financial Markets Index

Notes: This figure shows average changes of the fc/lc spread against average changes of Financial Markets Index over time for 9 countries: Brazil, Hungary, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Turkey.

CHAPTER VI

CONCLUSION

This thesis explores the factors that impact local currency credit spreads in emerging markets. Through an analysis using dynamic factor models and data spanning from 2007 to 2021, I identify key predictors of local currency credit spreads, enhancing our understanding of sovereign risk in emerging markets. The main findings underscore the influence of both local and global factors on local currency credit spreads across emerging markets. Specifically, local economic factors estimated from large number of variables play a role in shaping these spreads. Similarly, global economic indicators like US interest rates, market volatility, international trade dynamics, and global uncertainty are also contributors. This highlights how global economic conditions influence investor confidence and risk perception, thereby affecting credit spreads. Moreover, a separate analysis of each country reveals a dramatic increase in LCCS predictability as the FC/LC spread widens. The presented analysis not only contributes to discussions on risk and credit spreads, but also emphasizes the interconnectedness between local economic performance and global financial conditions. Furthermore, I test the macroeconomic fundamentals behind the weak co-movement in the LCCS compared to the FCCS. While inflation emerged as the main source of this dispersion, I show that short-term debt, current account deficit, and financial markets index, a measure of how developed financial markets are in terms of their depth, access, and efficiency, are also important characteristics for the deterioration of local currency credit spread dynamics. My evidence for the strong relationship between macroeconomic fundamentals and credit spread dispersion provides a guide for policymakers in emerging markets to mitigate risk and enhance market attractiveness. Furthermore, it offers international investors an understanding of risk - return dynamics in EM bond investments, supported by an analysis of credit spread determinants with the

economic idiosyncrasies and risks inherent to developing economies.



APPENDIX A

TRANSITION FROM LIBOR TO SOFR

The financial markets have undergone a significant transition in benchmark rates, with the replacement of the London Interbank Offered Rate (LIBOR) by the Secured Overnight Financing Rate (SOFR). LIBOR, which included a credit risk premium, was calculated based on estimates from participating banks. In contrast, SOFR is a secured overnight rate based on actual transactions in the U.S. Treasury repurchase (repo) market, which averages over \$1 trillion in daily trading volume. SOFR is a risk-free rate, reflecting the cost of borrowing U.S. dollars backed by U.S. Treasury securities. This change from an unsecured to a secured rate, and from a term-based to an overnight rate, has implications for financial contracts, including the calculation of LCCS.

LCCS measures the spread between a sovereign's local currency bond yields and U.S. dollar borrowing costs, adjusted for currency hedging. With the transition from LIBOR to SOFR, the components of the LCCS formula involving U.S. dollar interest rates must now reference SOFR, which impacts the market-implied forward premium and overall spread calculations. The general formula for LCCS is given by:

$$\text{LCCS} = \text{LC Bond Yield} - \text{Market-Implied Forward Premium} - \text{U.S. Treasury Yield} \quad (10)$$

With the transition from LIBOR to SOFR, the *Market-Implied Forward Premium* is now derived using SOFR-based instruments instead of LIBOR-based ones. The forward premium for converting local currency into U.S. dollars is typically calculated using cross-currency basis swaps and interest rate swaps (IRS). The formula for the market-implied

forward premium (for 5-year maturity) using SOFR is:

$$\rho_{\text{local},5y,t} = \text{Cross-Currency Basis Swap (5y)} - \text{USD SOFR Interest Rate Swap (5y)}$$

where $\rho_{\text{local},5y,t}$ represents the *Market-Implied Forward Premium* for the currency of the respective country with a maturity of 5 years at time t . To calculate the values of LCCS for 2022 and beyond, it is essential to determine the values of SOFR-indexed Cross-Currency Basis Swaps issued for the relevant country's currency.

The data appendix of Du and Schreger (2016) [4] contains the Bloomberg data tickers used for the LCCS formulation. For Turkey, for example, if the Libor-indexed CCS product used in the LCCS calculation is replaced by the SOFR-indexed CCS product, the formula becomes as follows:

$$\text{LCCS Turkey} = (\text{C9655Y Index} - \text{TRYSAQ5}) - (\text{USSFCT05}/100)$$

- C9655Y Index: 5-year Turkish government bond yield (in TRY).
- USSFCT05: 5-year USD SOFR swap spread.
- TRYSAQ5: TRY 5-year cross-currency swap (against SOFR).

Calculation of LCCS in Euro area countries has an additional step due to the Euro intermediary in the currency conversion process. For Hungary, Hungarian Forint (HUF) bond yields must first be converted into EUR and then into USD, introducing additional cross-currency basis swaps. LCCS for Hungary, accounting for the USD-EUR-HUF conversion, can be given by:

$$\begin{aligned} \text{LCCS Hungary} = & \text{C1145Y Index} - (\text{USSFCT05}/100 - \text{EEOBVC1}/100 - \text{HFEB5}/100 \\ & - \text{HFBSV5}/100 - \text{EUXOQQ5}/100) - \text{HFSW5} \end{aligned}$$

- C1145Y Index: 5-year: Hungarian Sovereign Bond Yield in HUF.
- HFSW5 Curncy: 5-year: HUF interest rate swap (against 6-month BUBOR).
- USSFCT05 BGN Curncy: 5-year USD SOFR swap spread.

- EUXOQQ5 BGN: Curncy: 5-year cross-currency basis swap between USD and EUR (SOFR/ESTRON).
- HFBSV5 CMPN: Curncy: 5-year HUF basis swap (6M vs 3M).
- HFEBS5 BGN Curncy: 5-year HUF-EUR basis swap (3M vs 3M EUR).
- EEOBVC1 BGN Curncy: 5-year EUR basis swap (ESTR vs 3M EUR).

This formula reflects the multi-currency hedging process required for Hungary, where Hungarian sovereign bonds are first converted into EUR before being hedged into USD using SOFR-based instruments. The extra step introduces additional basis swaps, accounting for the currency risk between HUF-EUR, and EUR-USD.

Following the same approach, Figure 29 presents the LCCS values before and after 2022 for the countries in my study. The effects of the Russia-Ukraine war, after the transition to SOFR-indexed calculations, are evident in the Russian LCCS values, which display extreme negative figures. Similarly, the period of high inflation in Turkey during this time significantly impacted the Turkish LCCS.

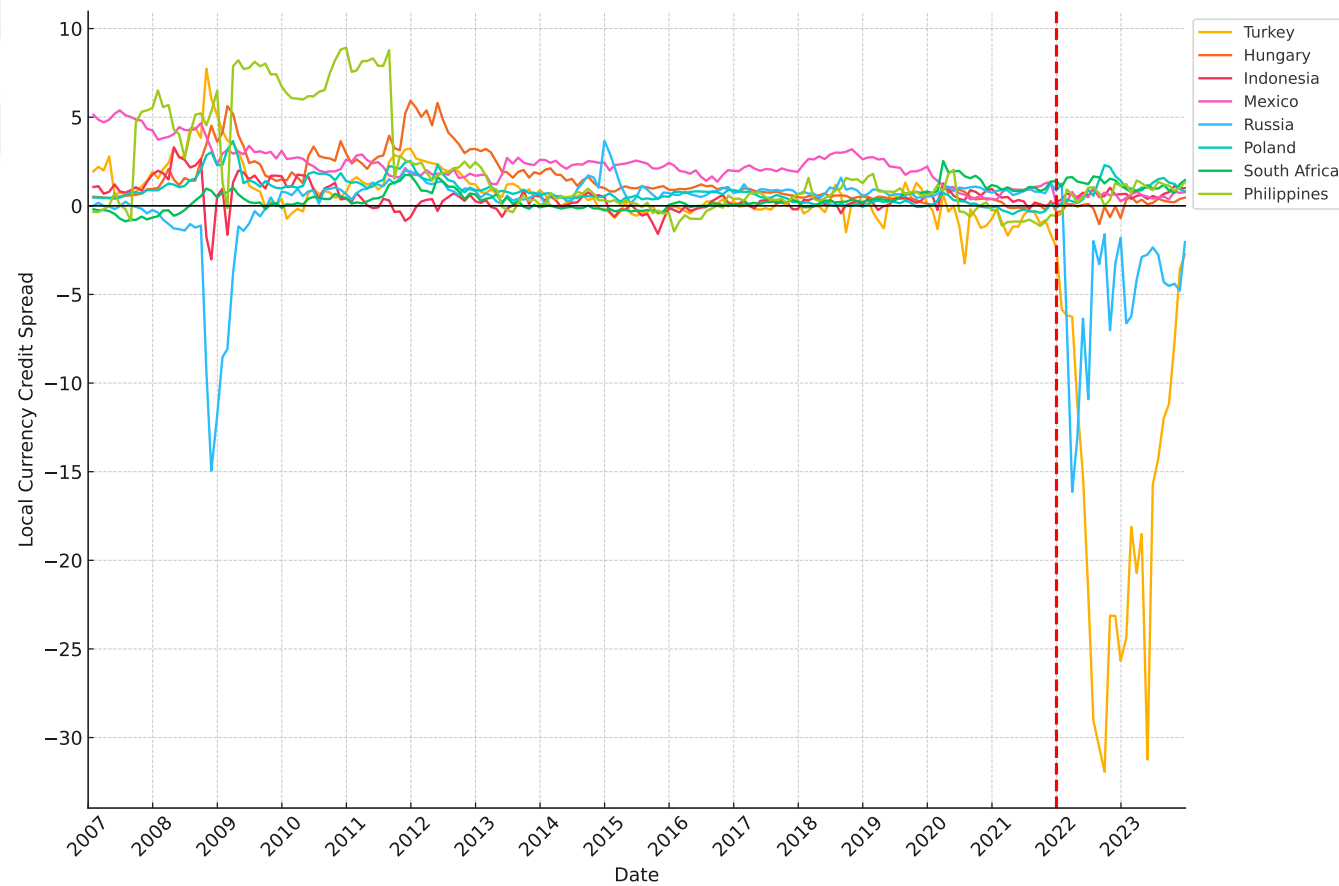


Figure 29: Time Series of LCCS After the Transition From LIBOR to SOFR

Notes: This graph shows the LCCS values for various countries over the observed period. The red dashed vertical line marks the point in 2022, after which LIBOR-based products are replaced with SOFR-indexed calculations.

APPENDIX B

FACTOR LOADINGS

Figures 30 to 59 display the marginal R^2 statistics resulting from the regression of factors identified to have predictive power for each country's LC credit spread on individual series within the panel data.



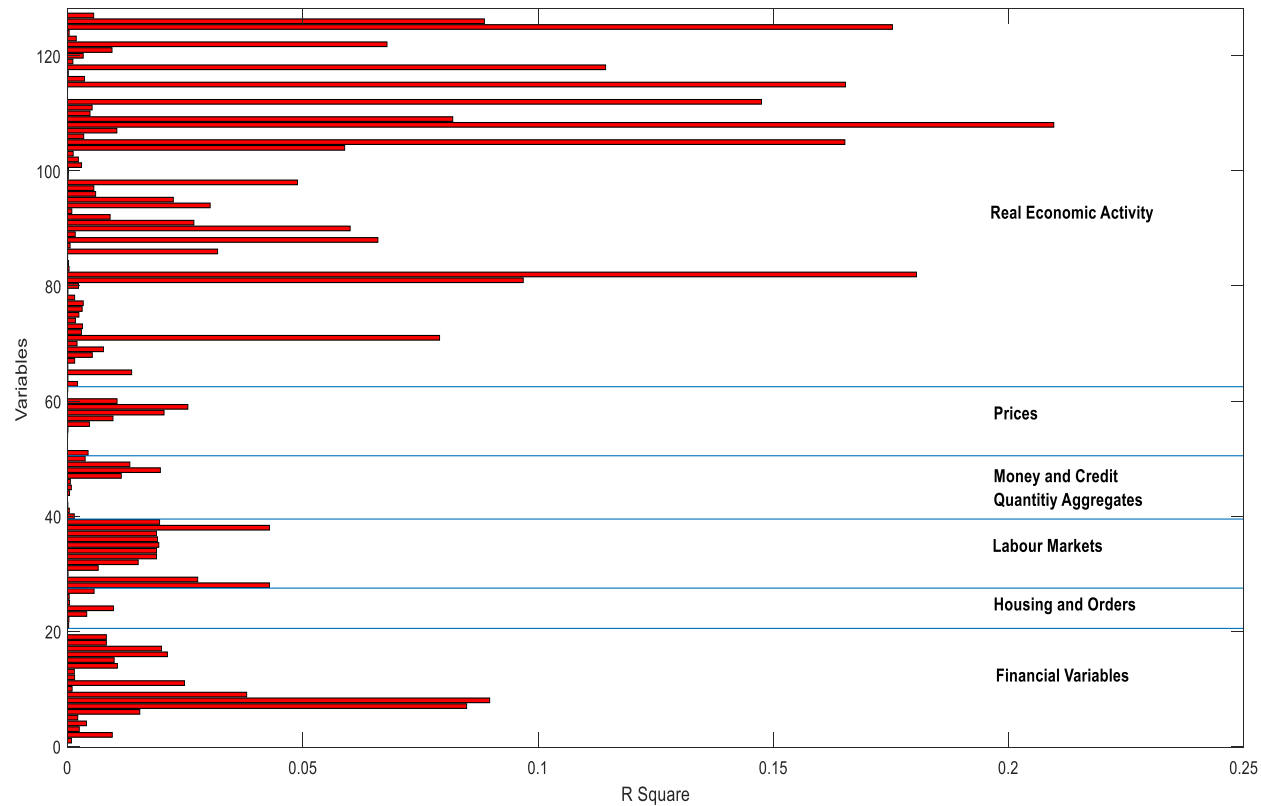


Figure 30: Factor Loadings of Brazil F_7

Notes: The bar chart shows the R_2 statistics for Brazil by regressing each time series variable on F_7 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

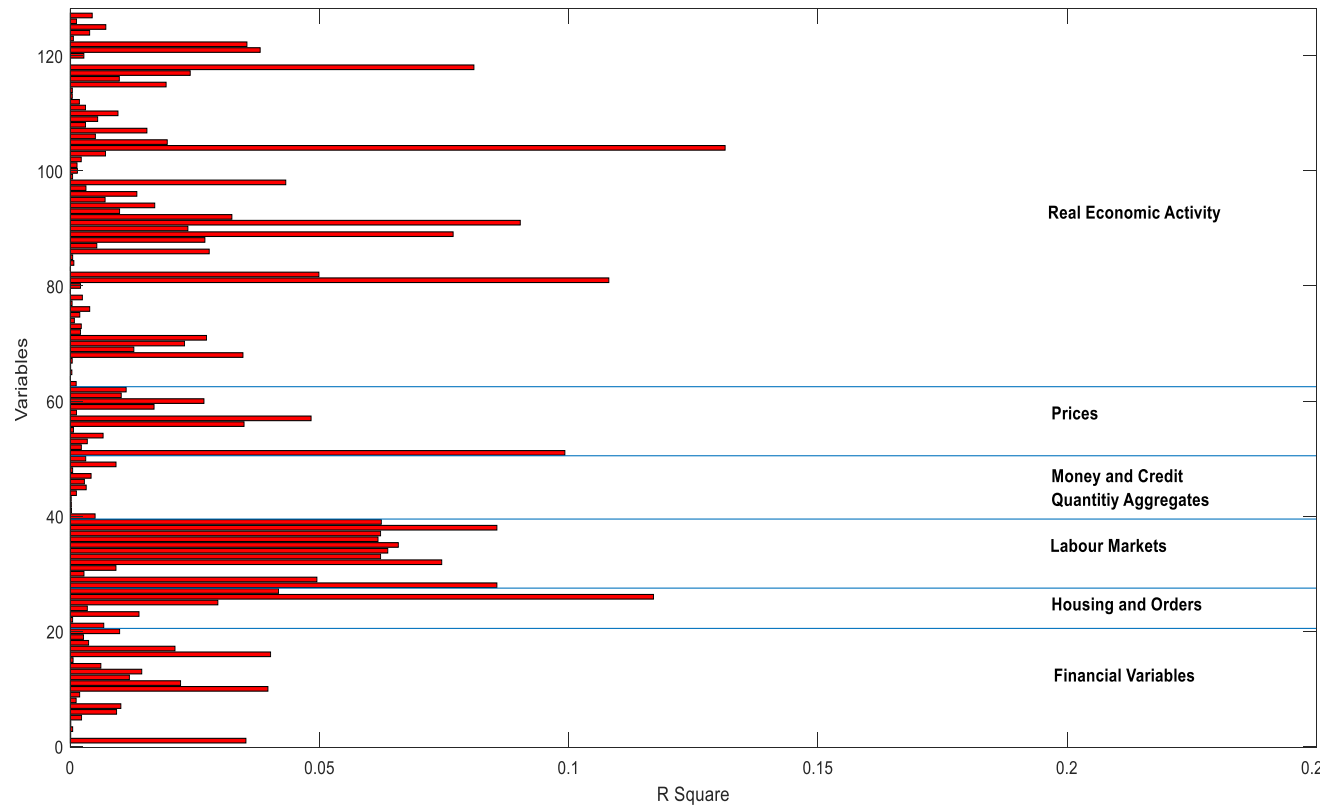


Figure 31: Factor Loadings of Brazil F_8

Notes: The bar chart shows the R^2 statistics for Brazil by regressing each time series variable on F_8 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity . Lines are used to separate the subgroups.

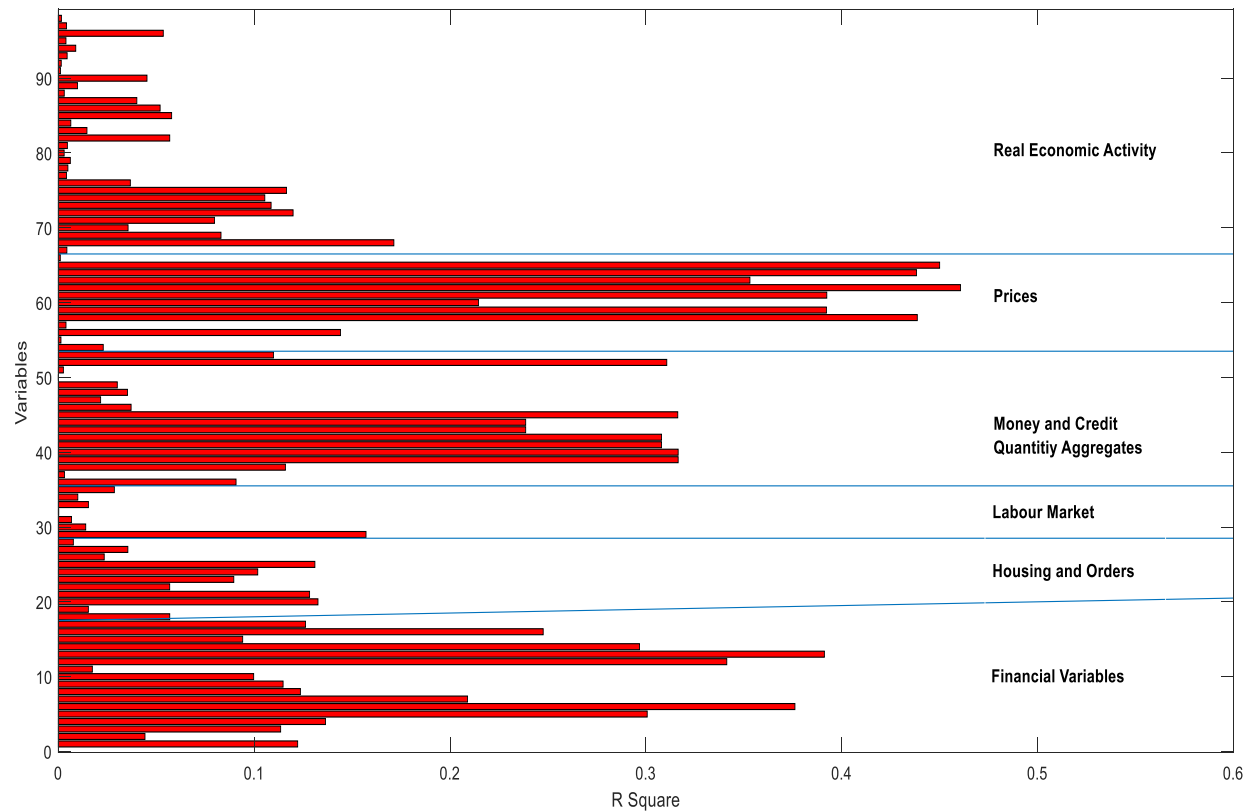


Figure 32: Factor Loadings of Hungary F_1

Notes: The bar chart shows the R^2 statistics for Hungary by regressing each time series variable on F_1 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

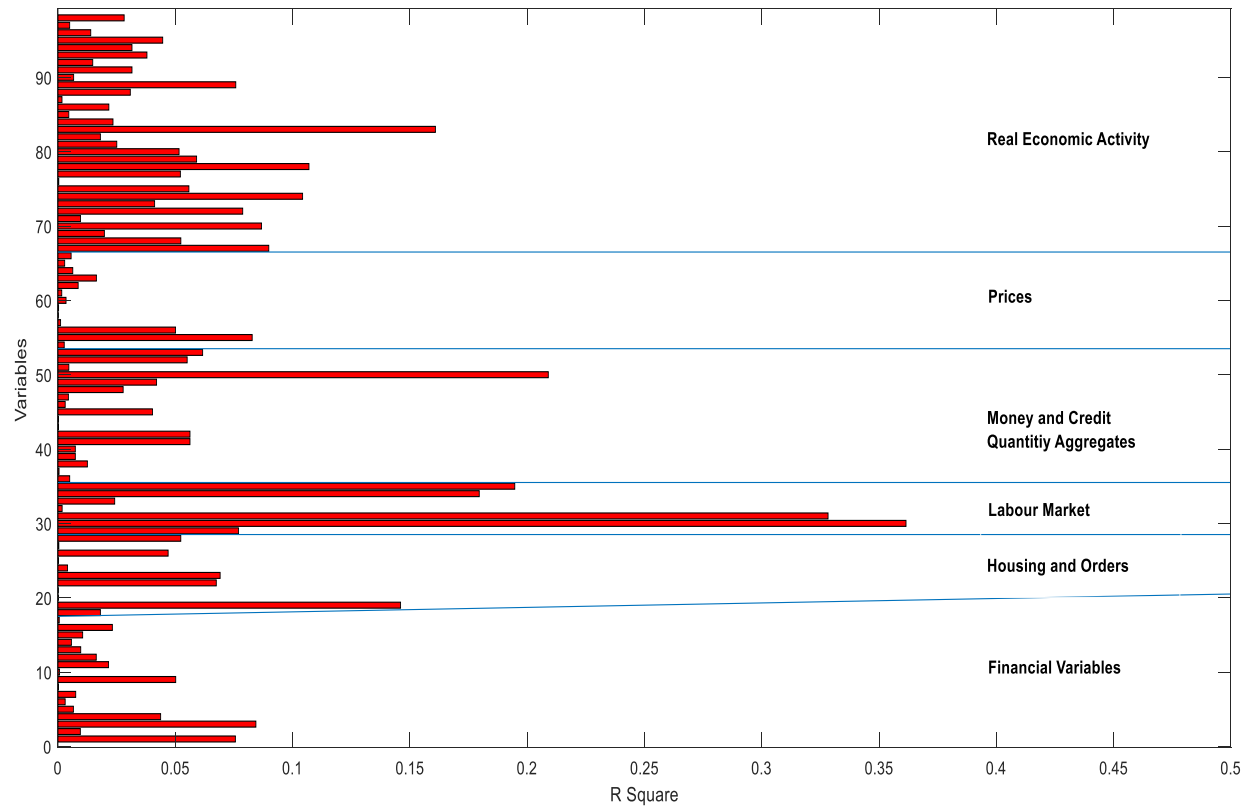


Figure 33: Factor Loadings of Hungary F_8

Notes: The bar chart shows the R^2 statistics for Hungary by regressing each time series variable on F_8 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity . Lines are used to separate the subgroups.

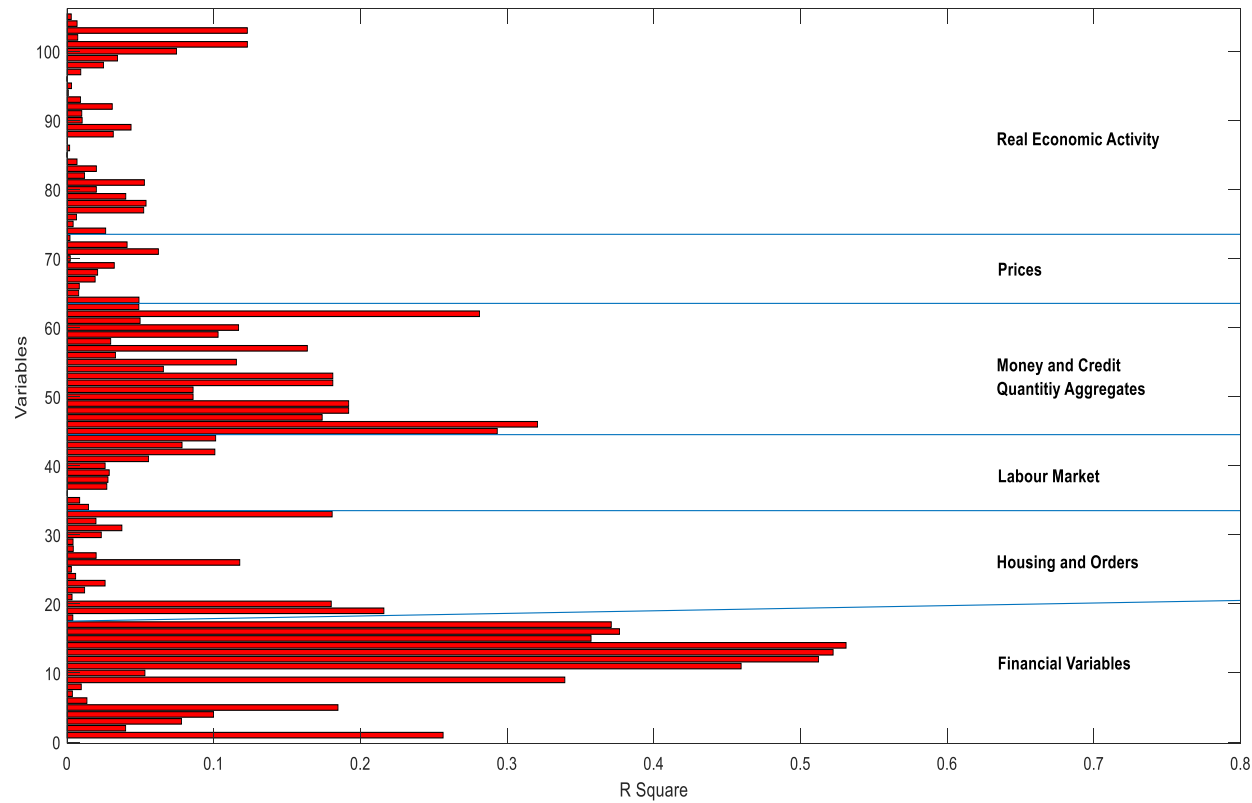


Figure 34: Factor Loadings of Indonesia F_2

Notes: The bar chart shows the R^2 statistics for Indonesia by regressing each time series variable on F_2 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity . Lines are used to separate the subgroups.

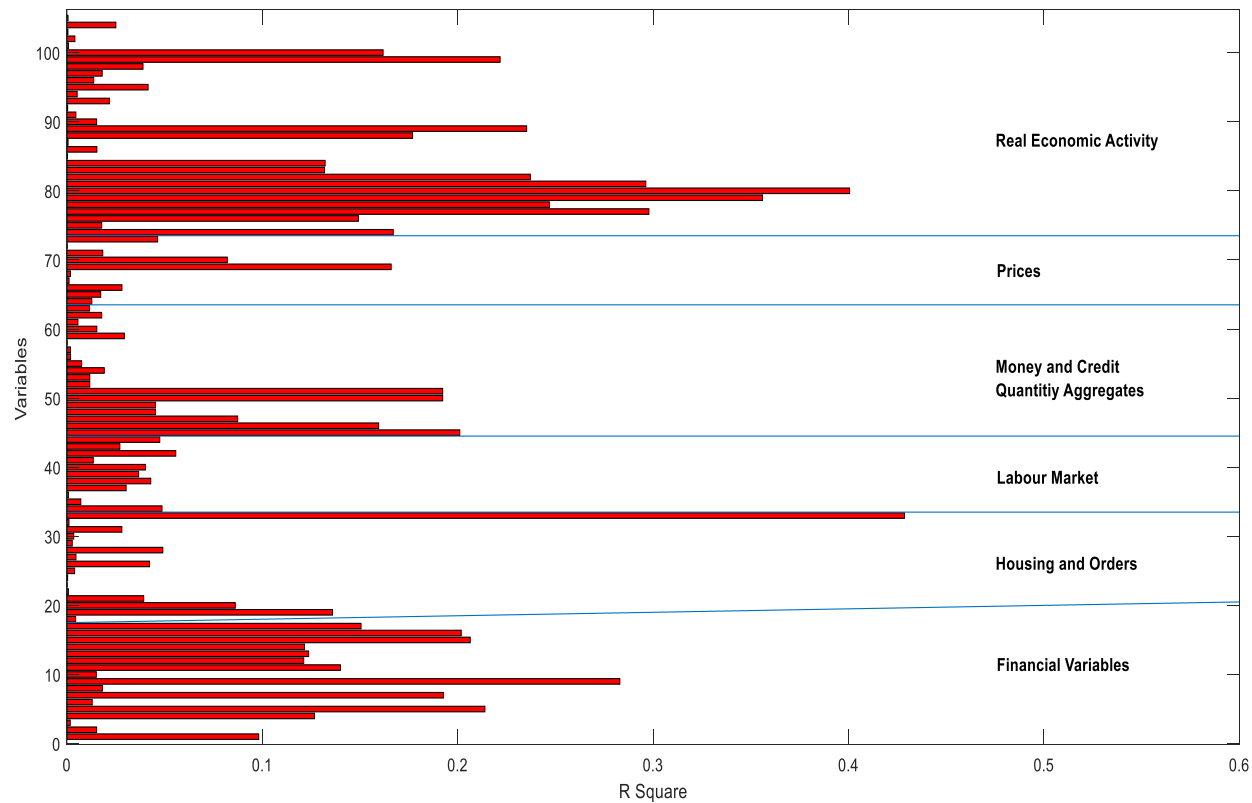


Figure 35: Factor Loadings of Indonesia F_4

Notes: The bar chart shows the R^2 statistics for Indonesia by regressing each time series variable on F_4 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity . Lines are used to separate the subgroups.

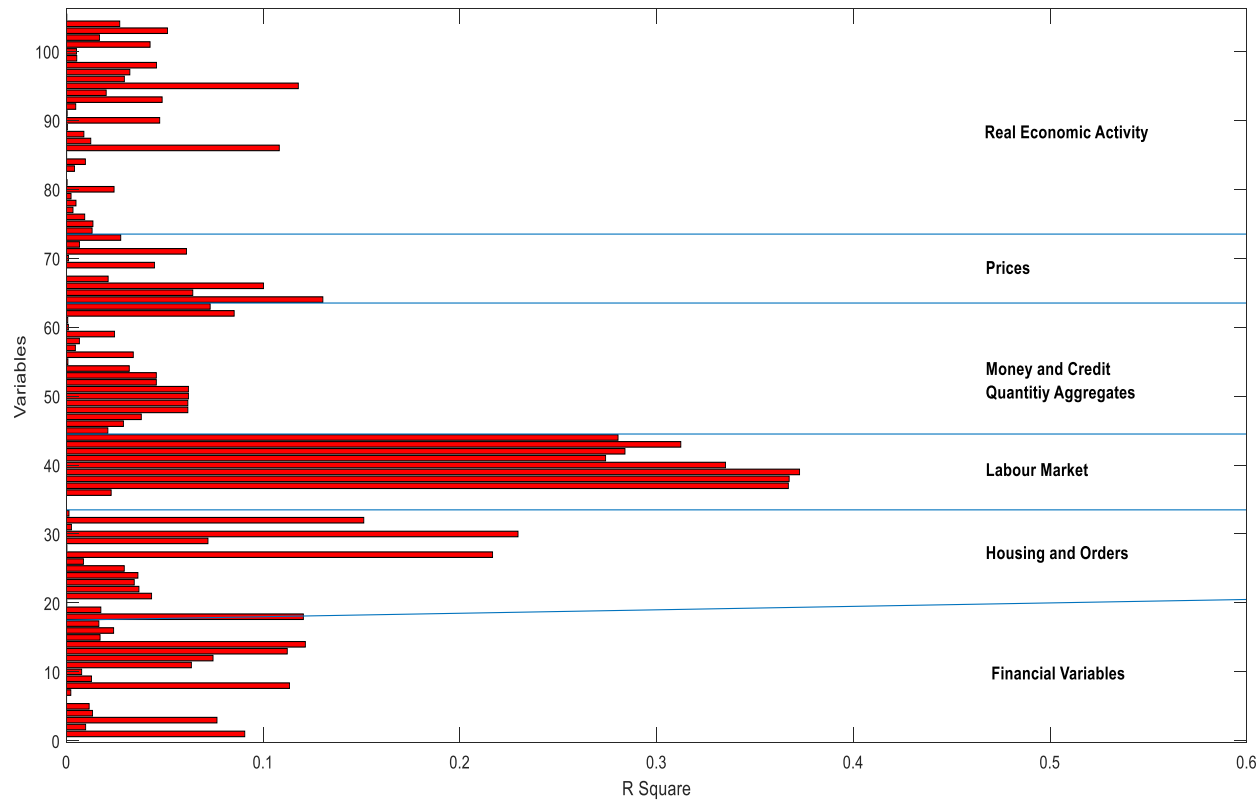


Figure 36: Factor Loadings of Indonesia F_5

Notes: The bar chart shows the R^2 statistics for Indonesia by regressing each time series variable on F_5 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity . Lines are used to separate the subgroups.

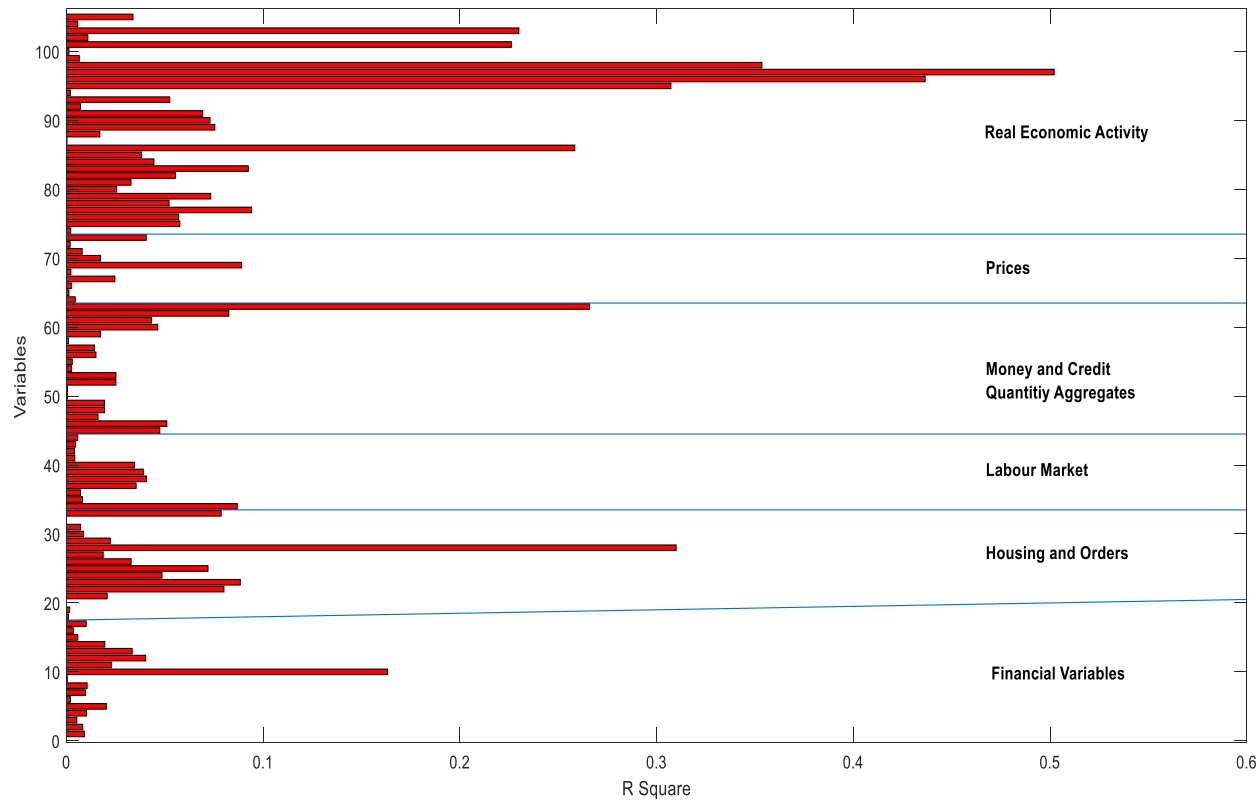


Figure 37: Factor Loadings of Indonesia F_6

Notes: The bar chart shows the R^2 statistics for Indonesia by regressing each time series variable on F_6 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity . Lines are used to separate the subgroups.

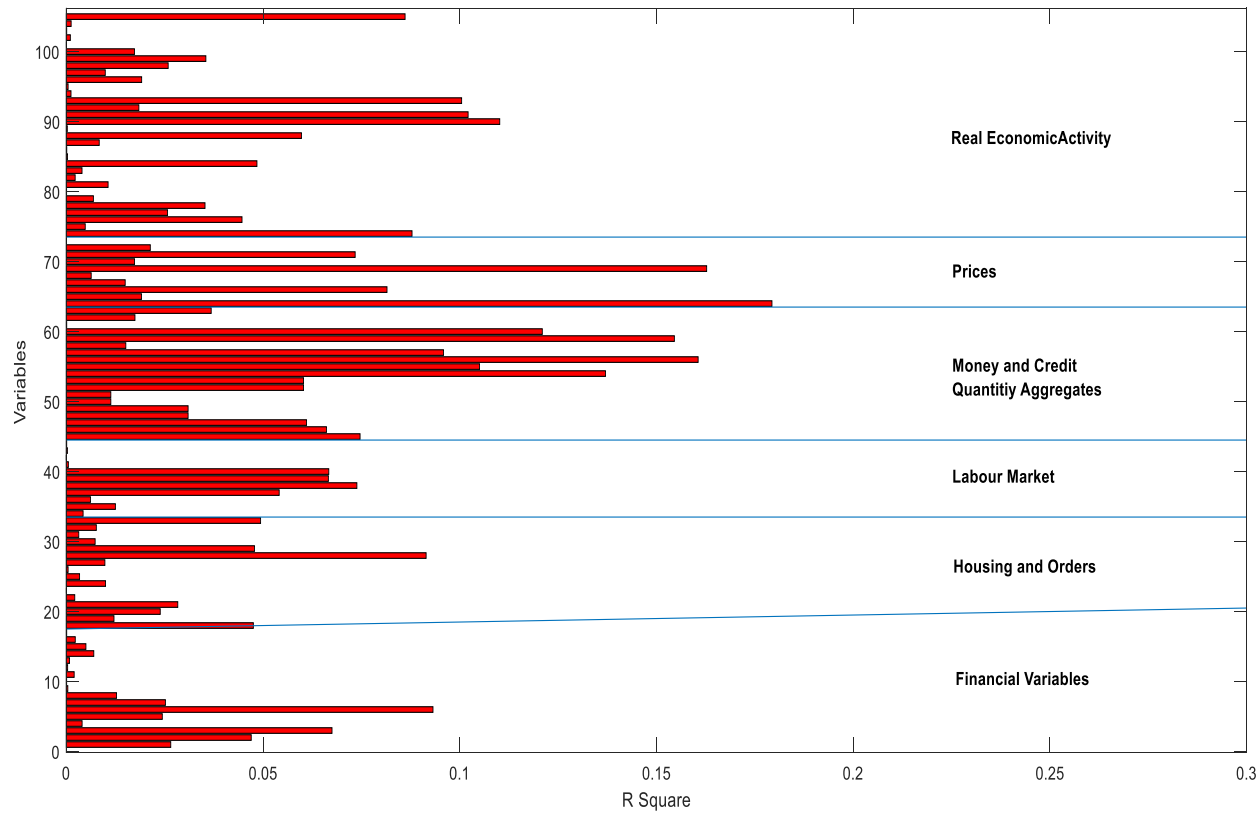


Figure 38: Factor Loadings of Indonesia F_9

Notes: The bar chart shows the R^2 statistics for Indonesia by regressing each time series variable on F_9 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity . Lines are used to separate the subgroups.

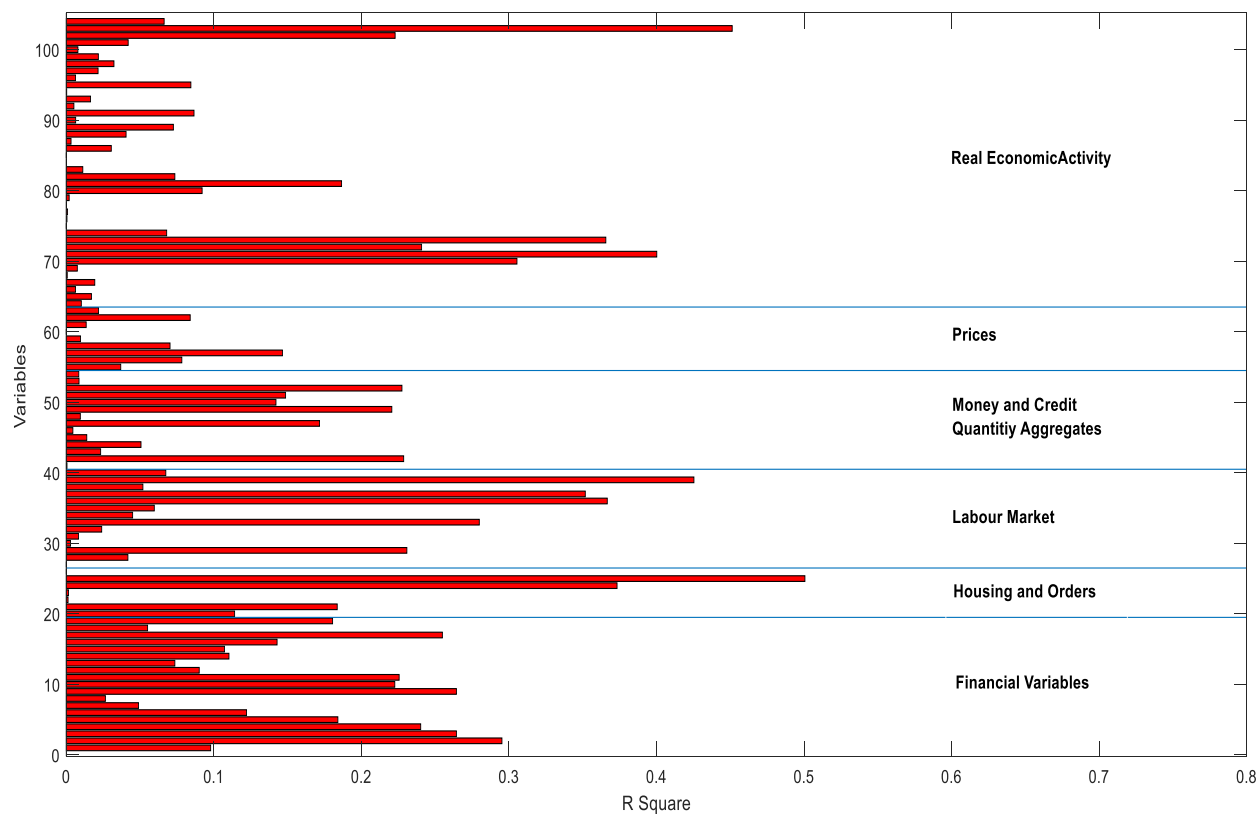


Figure 39: Factor Loadings of Mexico F_2

Notes: The bar chart shows the R^2 statistics for Mexico by regressing each time series variable on F_2 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

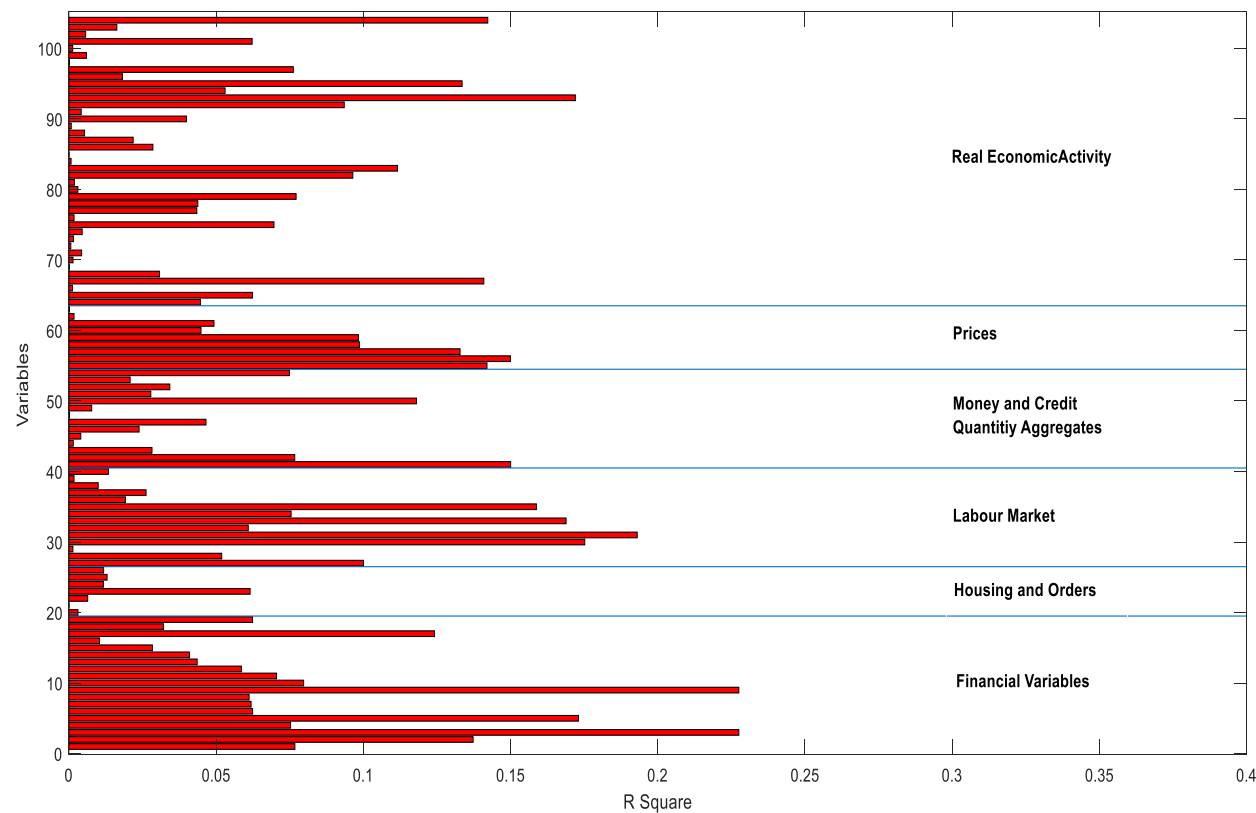


Figure 40: Factor Loadings of Mexico F_5

Notes: The bar chart shows the R^2 statistics for Mexico by regressing each time series variable on F_5 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

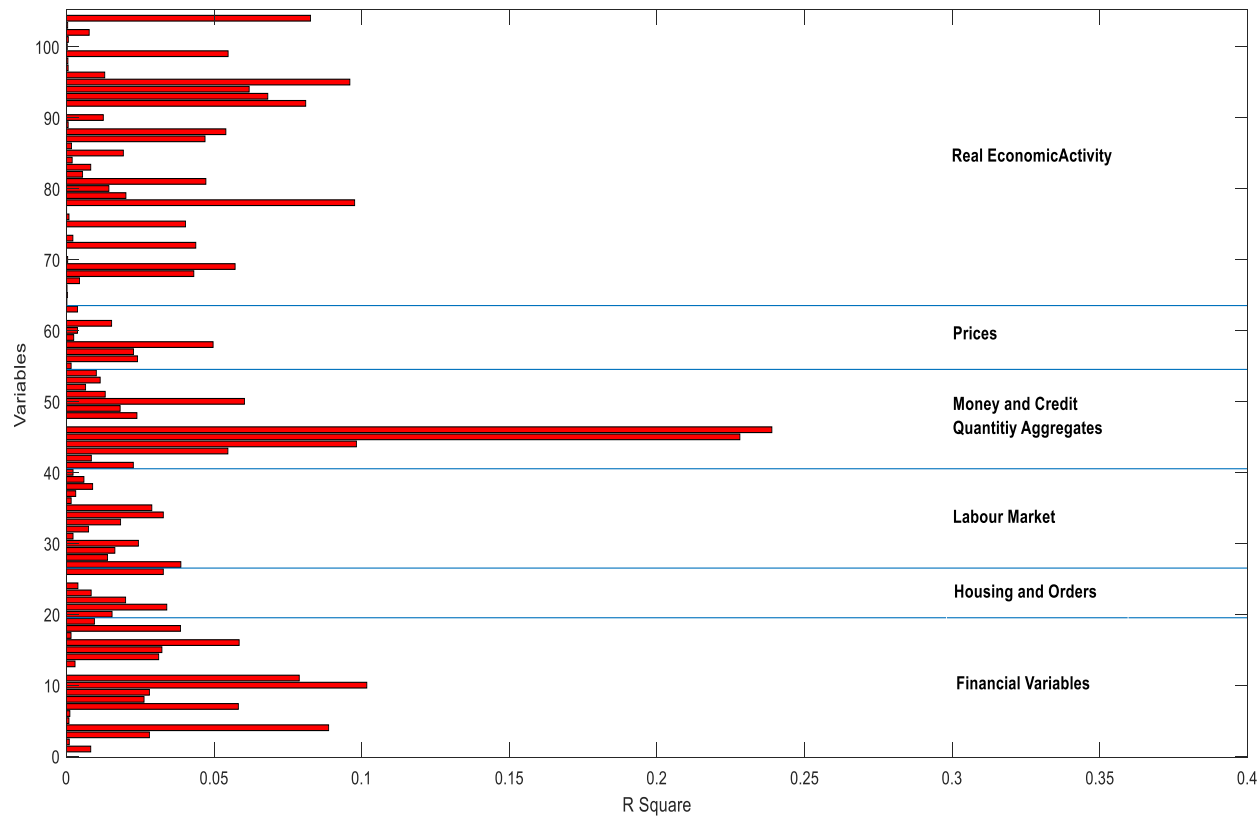


Figure 41: Factor Loadings of Mexico F_{10}

Notes: The bar chart shows the R^2 statistics for Mexico by regressing each time series variable on F_{10} . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity . Lines are used to separate the subgroups.

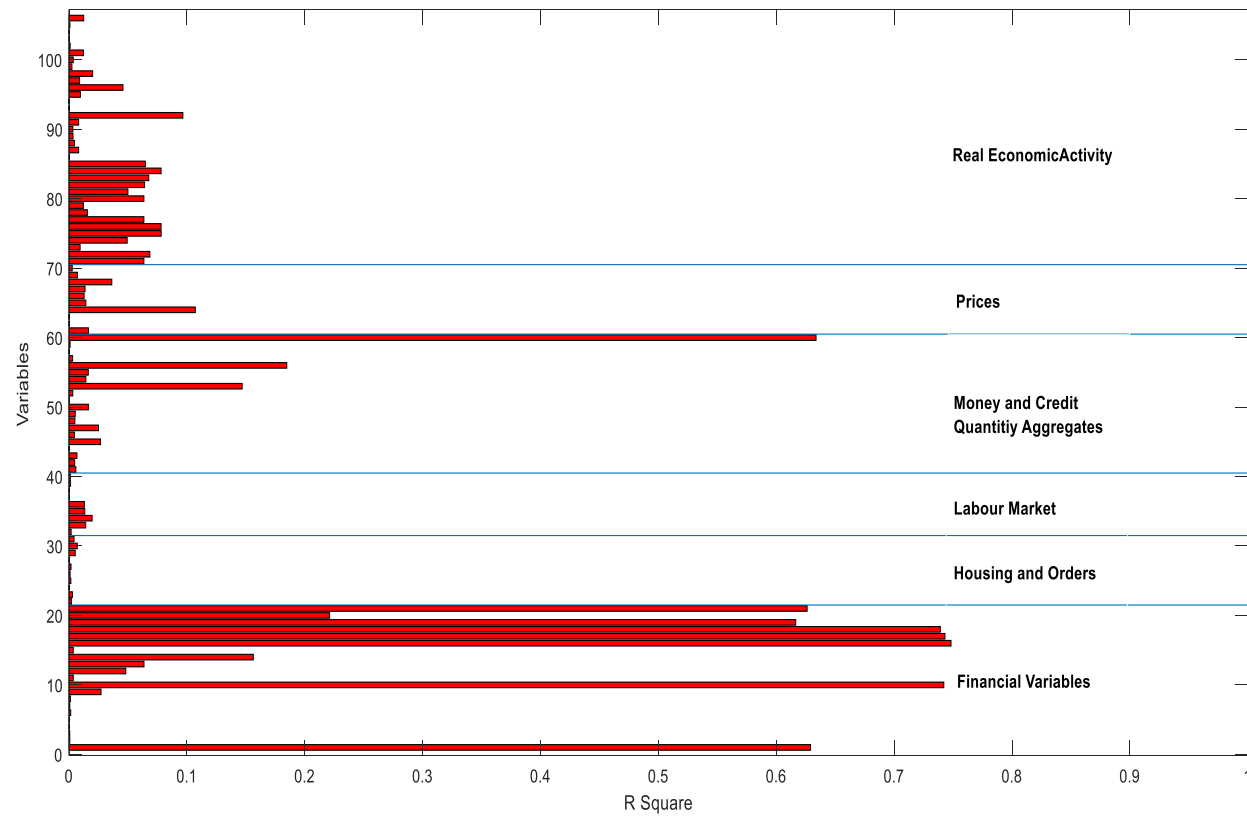


Figure 42: Factor Loadings of Philippines F_4

Notes: The bar chart shows the R^2 statistics for Philippines by regressing each time series variable on F_4 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

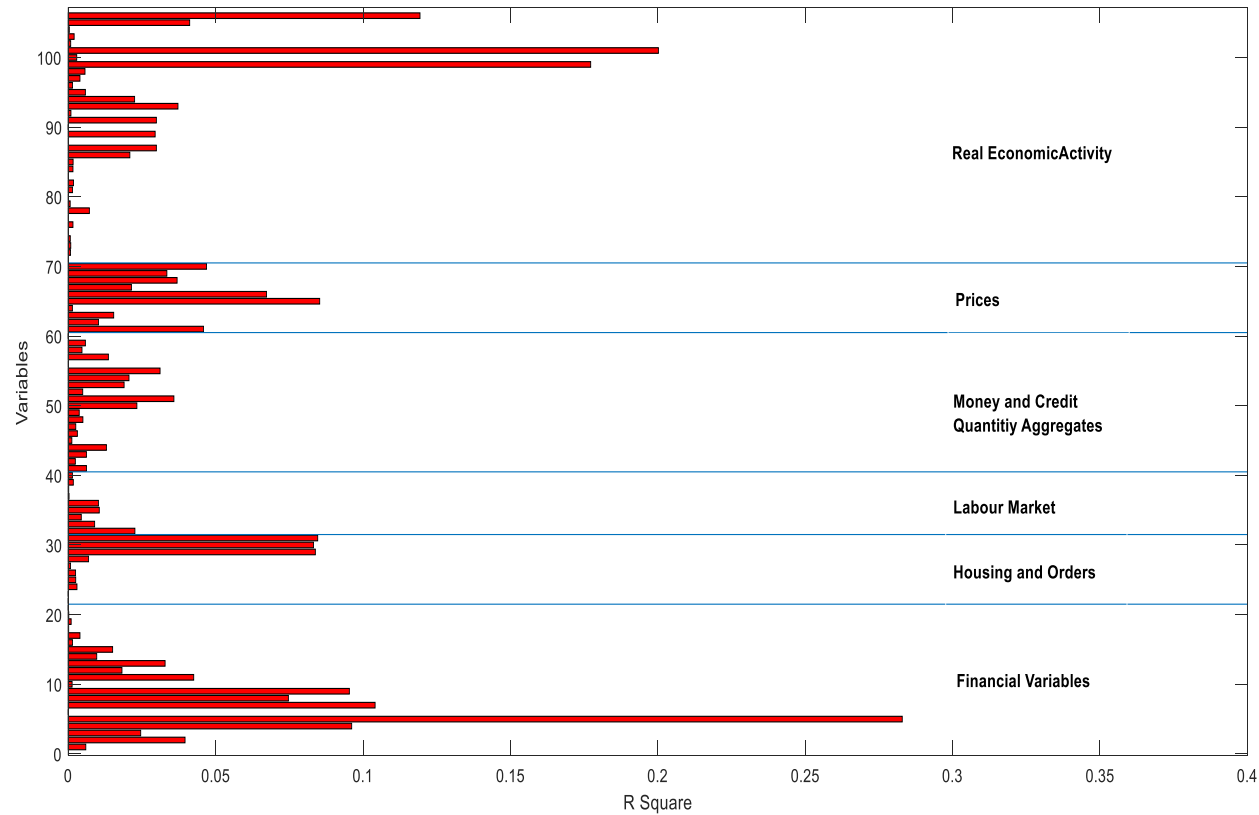


Figure 43: Factor Loadings of Philippines F_7

Notes: The bar chart shows the R^2 statistics for Philippines by regressing each time series variable on F_7 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity . Lines are used to separate the subgroups.

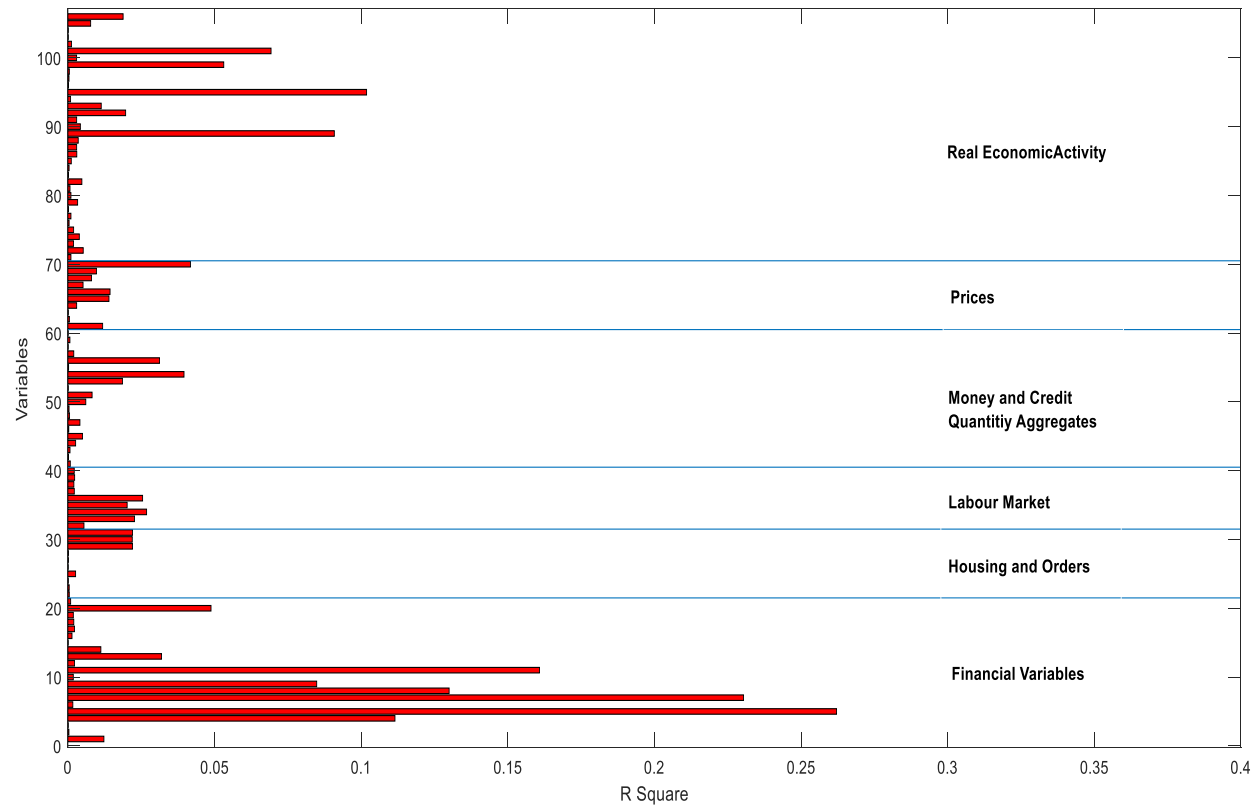


Figure 44: Factor Loadings of Philippines F_9

Notes: The bar chart shows the R^2 statistics for Philippines by regressing each time series variable on F_9 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity . Lines are used to separate the subgroups.

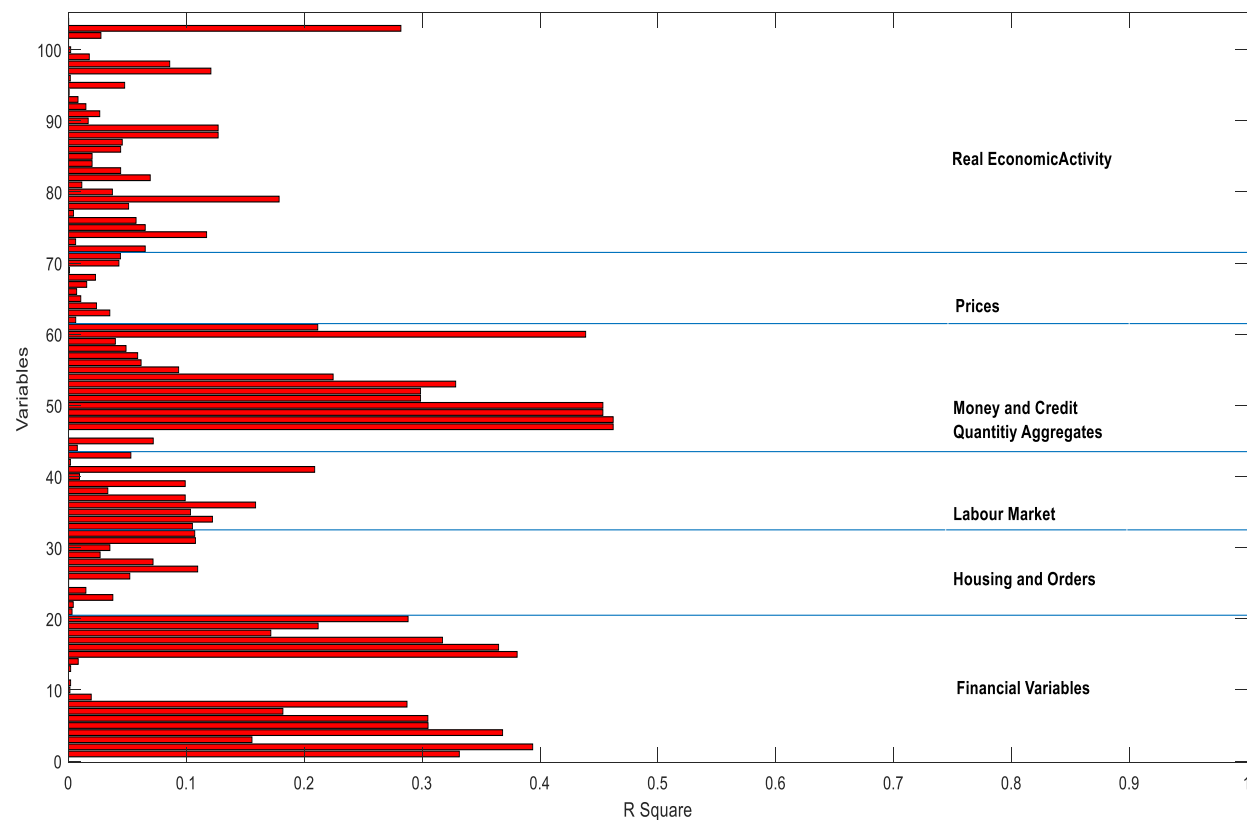


Figure 45: Factor Loadings of Poland F_1

Notes: The bar chart shows the R^2 statistics for Poland by regressing each time series variable on F_1 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

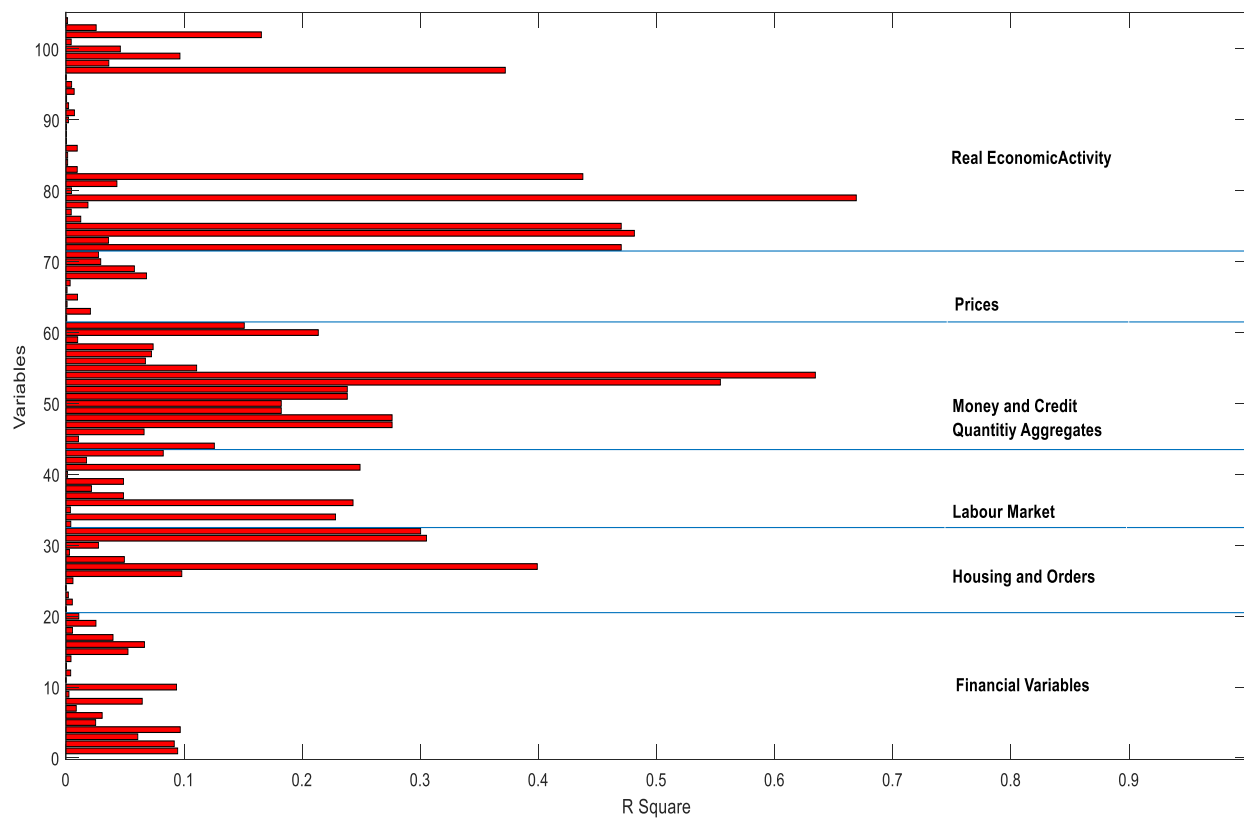


Figure 46: Factor Loadings of Poland F_2

Notes: The bar chart shows the R^2 statistics for Poland by regressing each time series variable on F_2 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

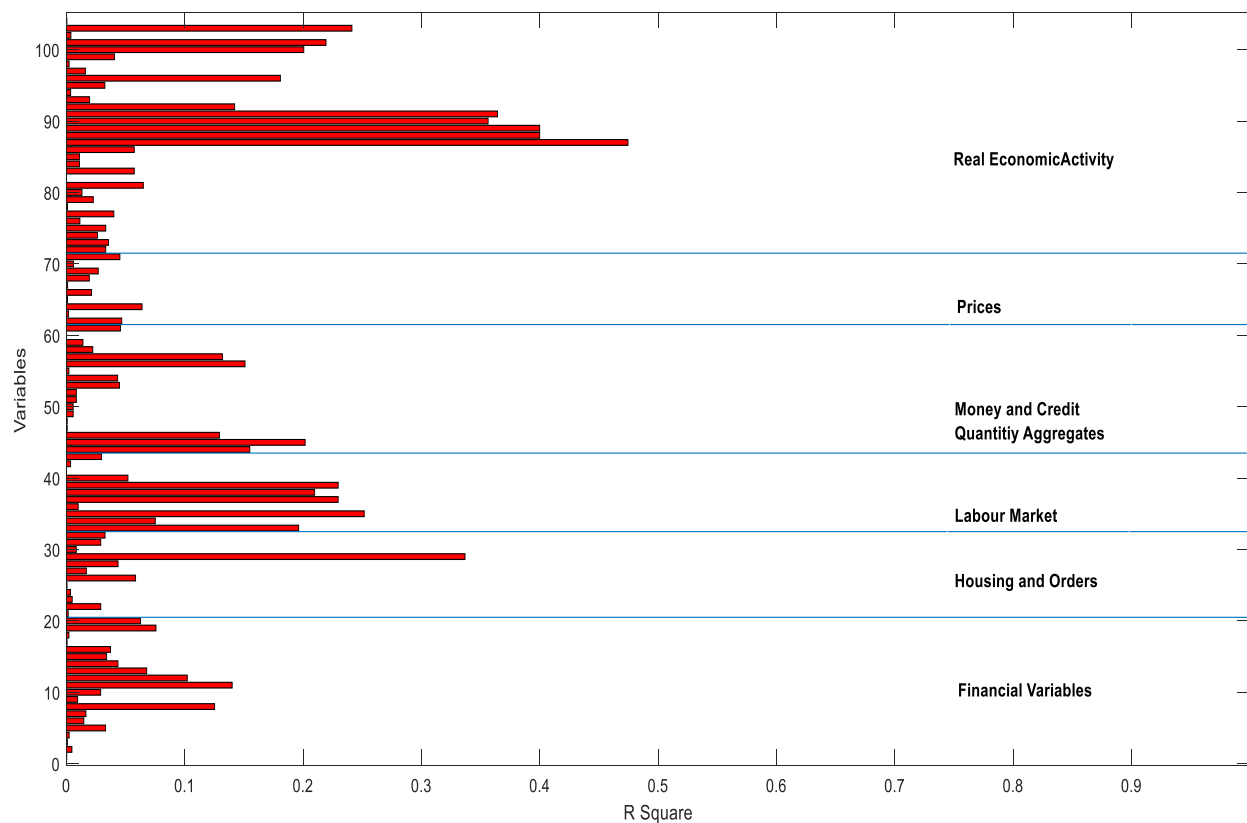


Figure 47: Factor Loadings of Poland F_4

Notes: The bar chart shows the R^2 statistics for Poland by regressing each time series variable on F_4 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

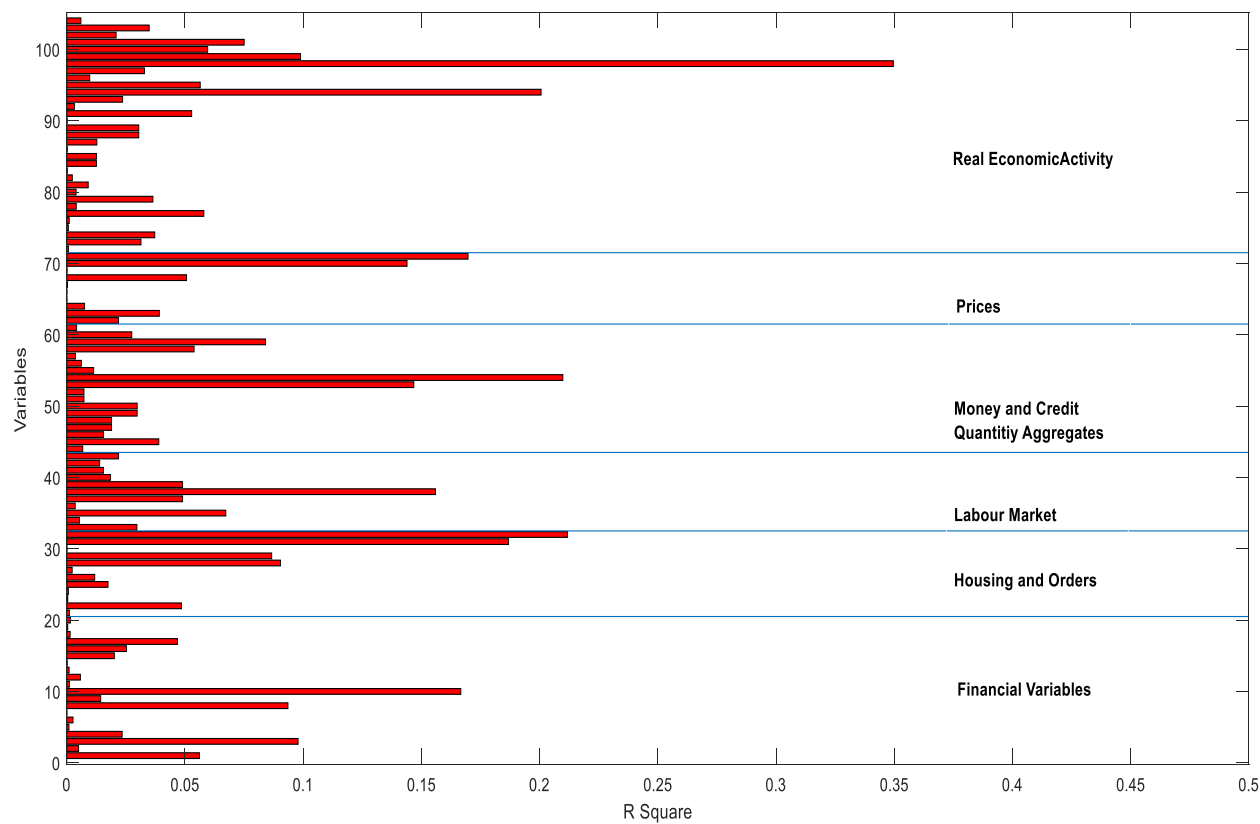


Figure 48: Factor Loadings of Poland F_8

Notes: The bar chart shows the R^2 statistics for Poland by regressing each time series variable on F_8 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

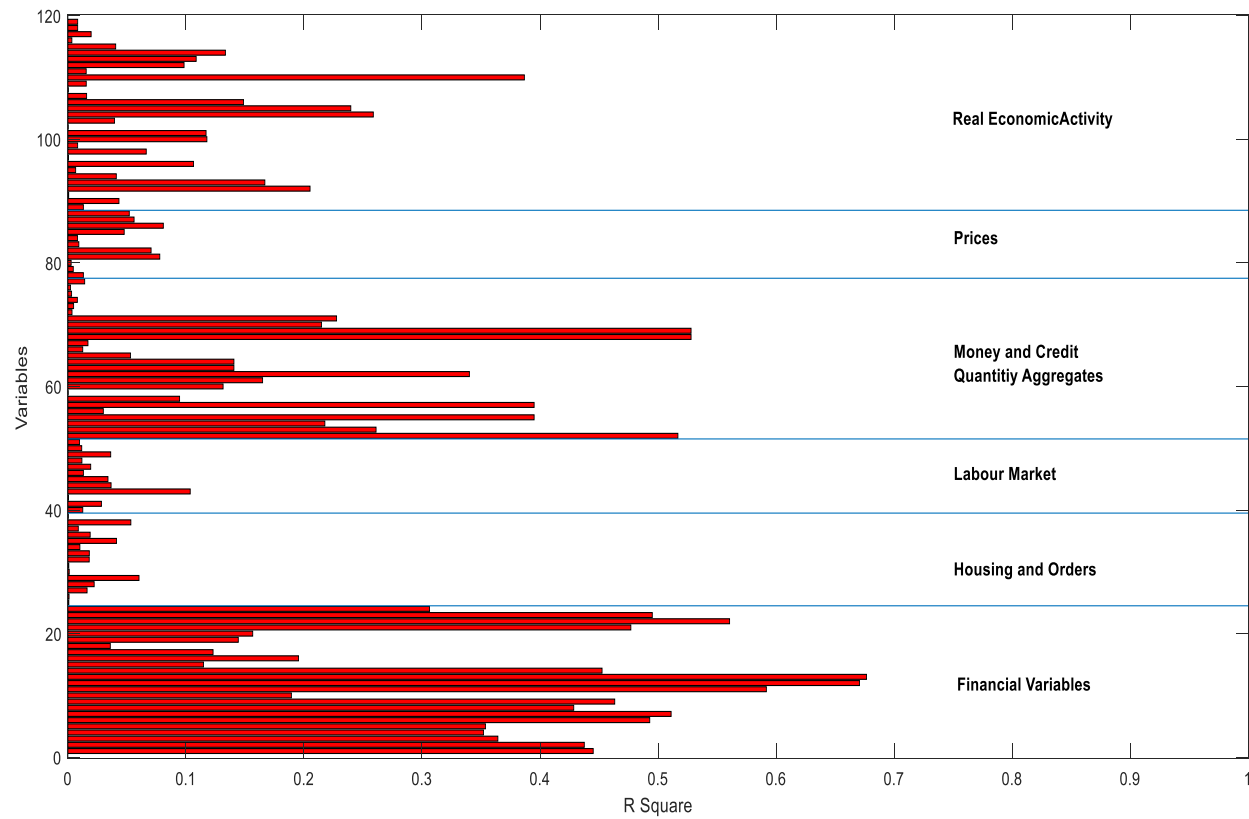


Figure 49: Factor Loadings of Russia F_1

Notes: The bar chart shows the R^2 statistics for Russia by regressing each time series variable on F_1 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

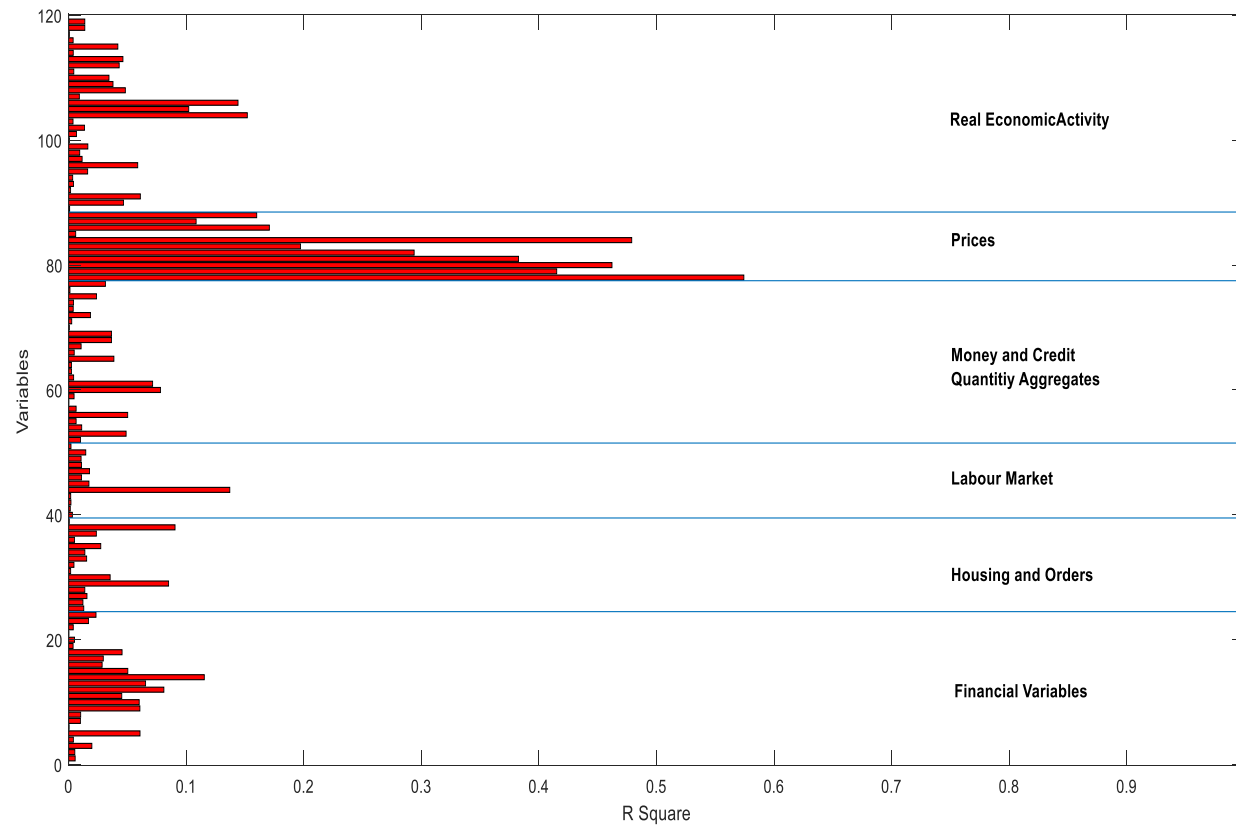


Figure 50: Factor Loadings of Russia F_5

Notes: The bar chart shows the R^2 statistics for Russia by regressing each time series variable on F_5 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

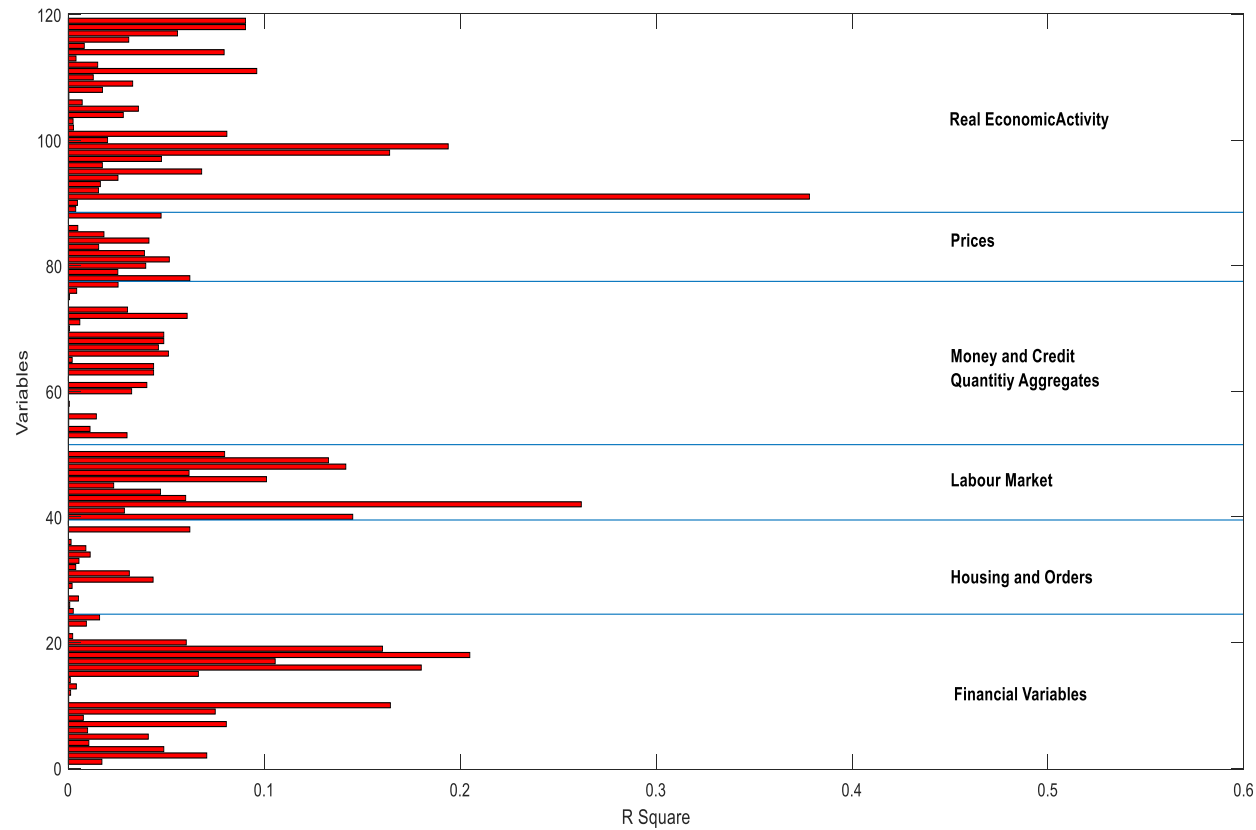


Figure 51: Factor Loadings of Russia F_6

Notes: The bar chart shows the R^2 statistics for Russia by regressing each time series variable on F_6 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

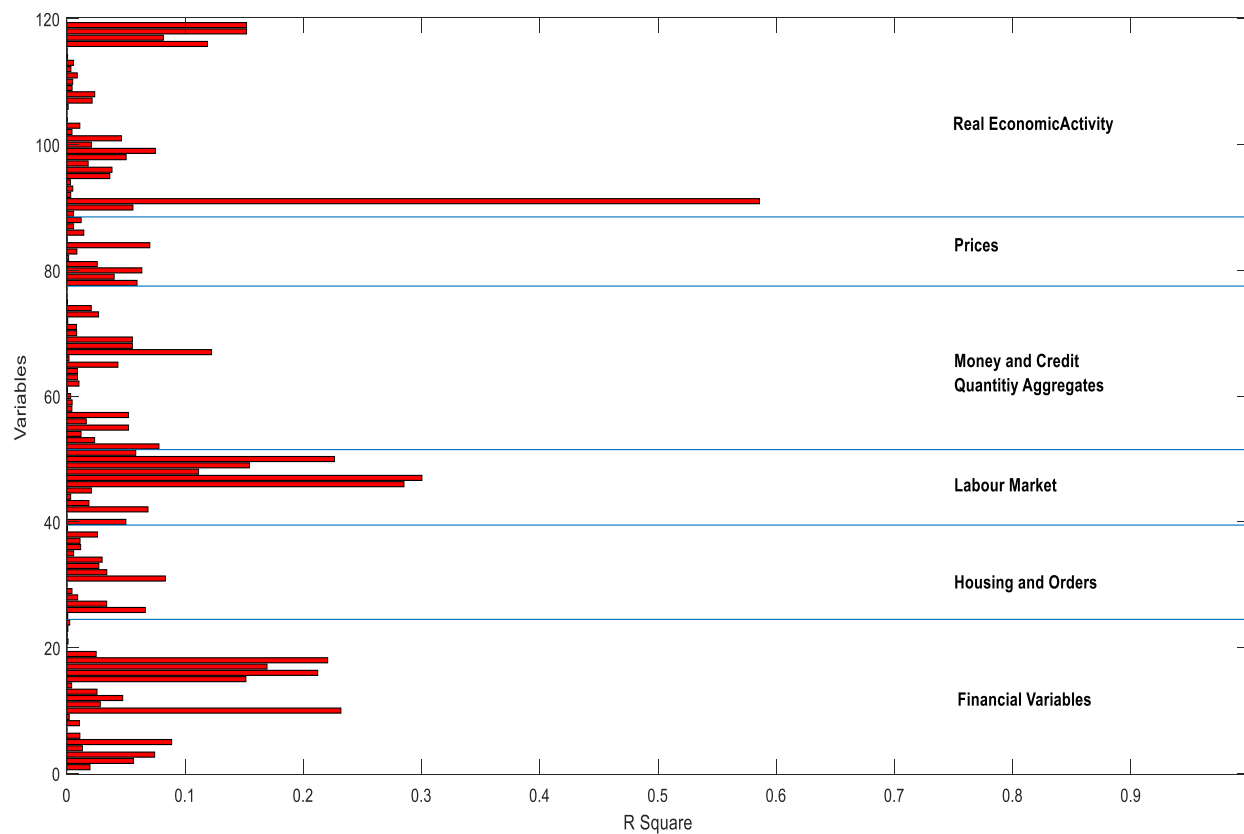


Figure 52: Factor Loadings of Russia F_7

Notes: The bar chart shows the R^2 statistics for Russia by regressing each time series variable on F_7 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

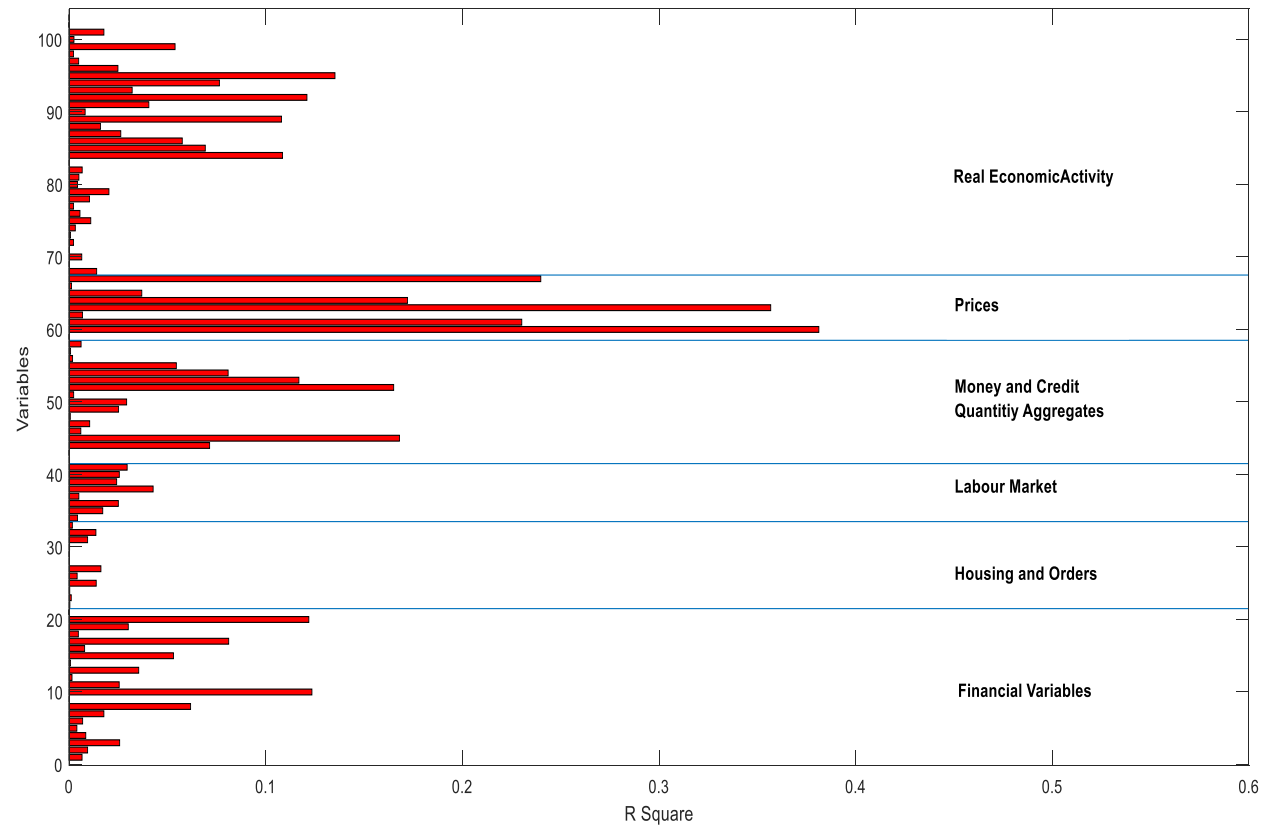


Figure 53: Factor Loadings of South Africa F_5

Notes: The bar chart shows the R^2 statistics for South Africa by regressing each time series variable on F_5 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

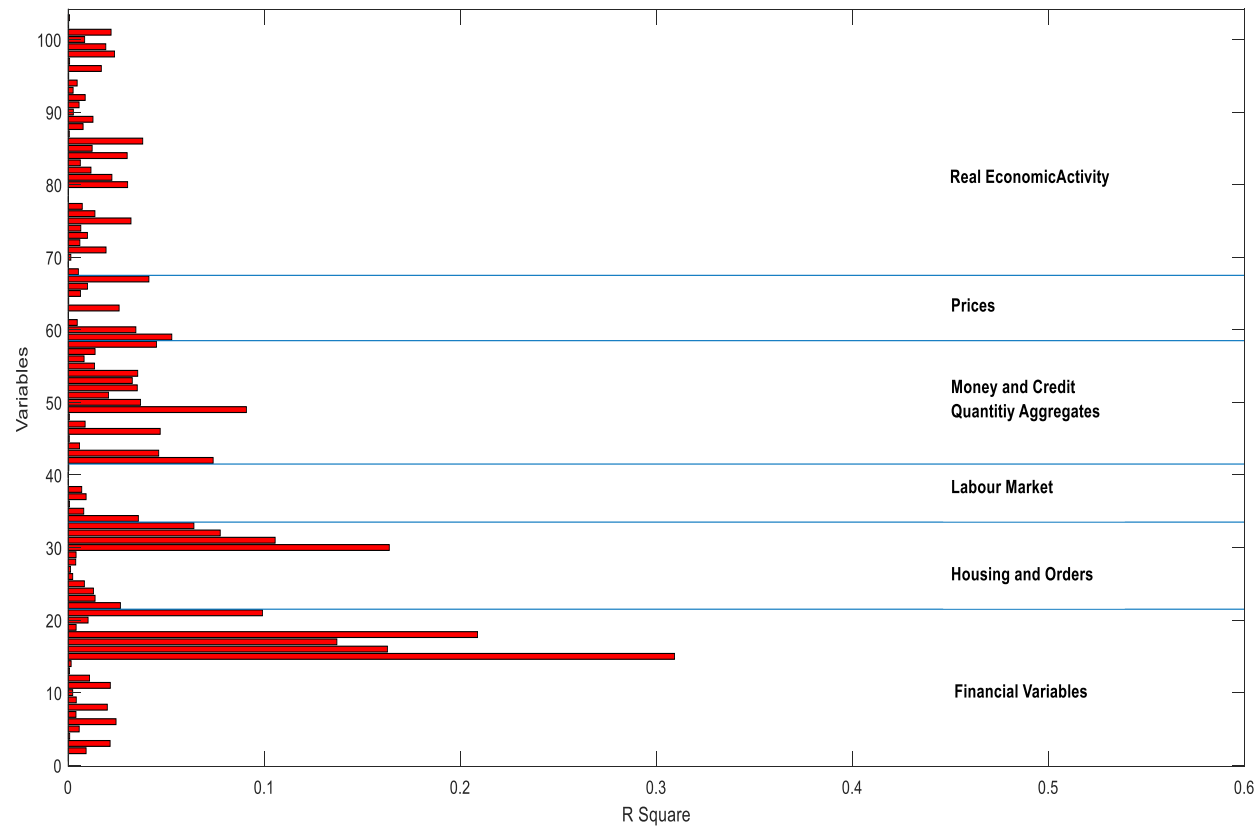


Figure 54: Factor Loadings of South Africa F_{10}

Notes: The bar chart shows the R^2 statistics for South Africa by regressing each time series variable on F_{10} . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

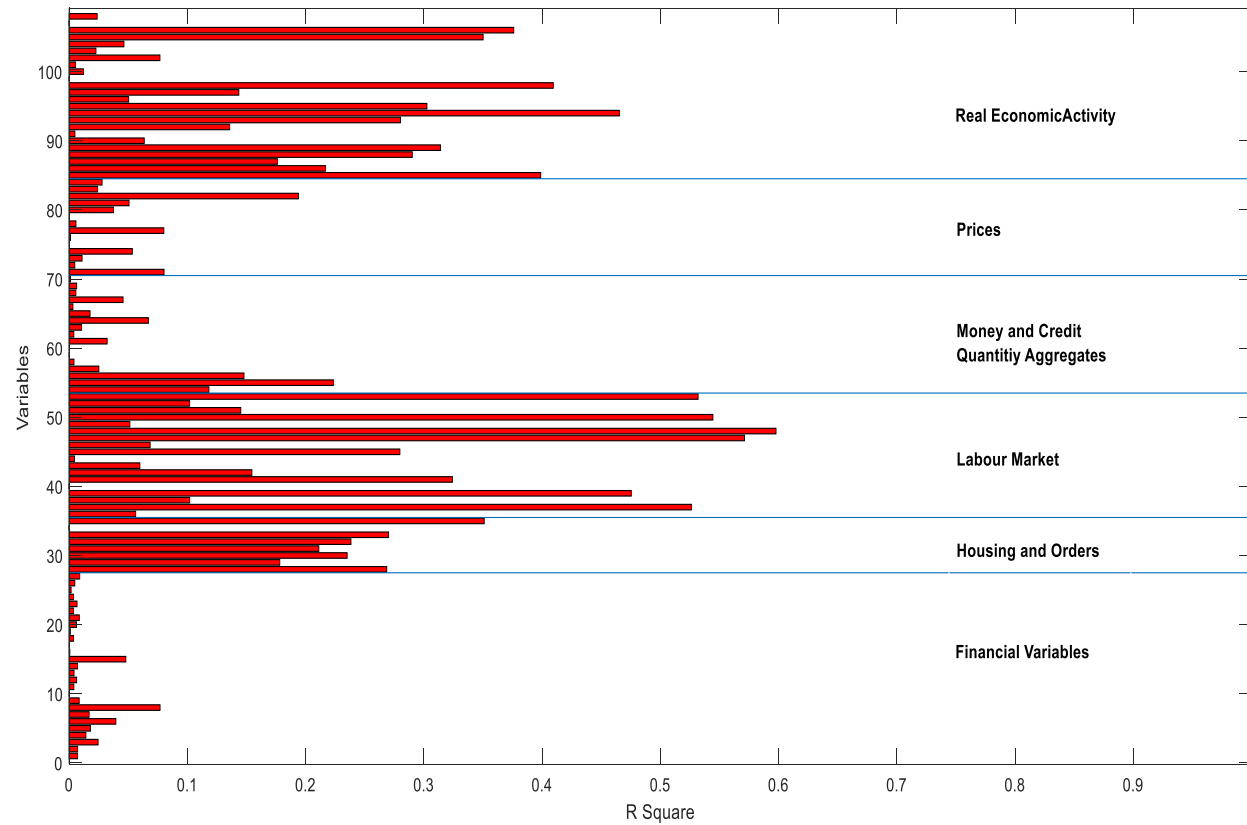


Figure 55: Factor Loadings of Turkey F_2

Notes: The bar chart shows the R^2 statistics for Turkey by regressing each time series variable on F_2 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

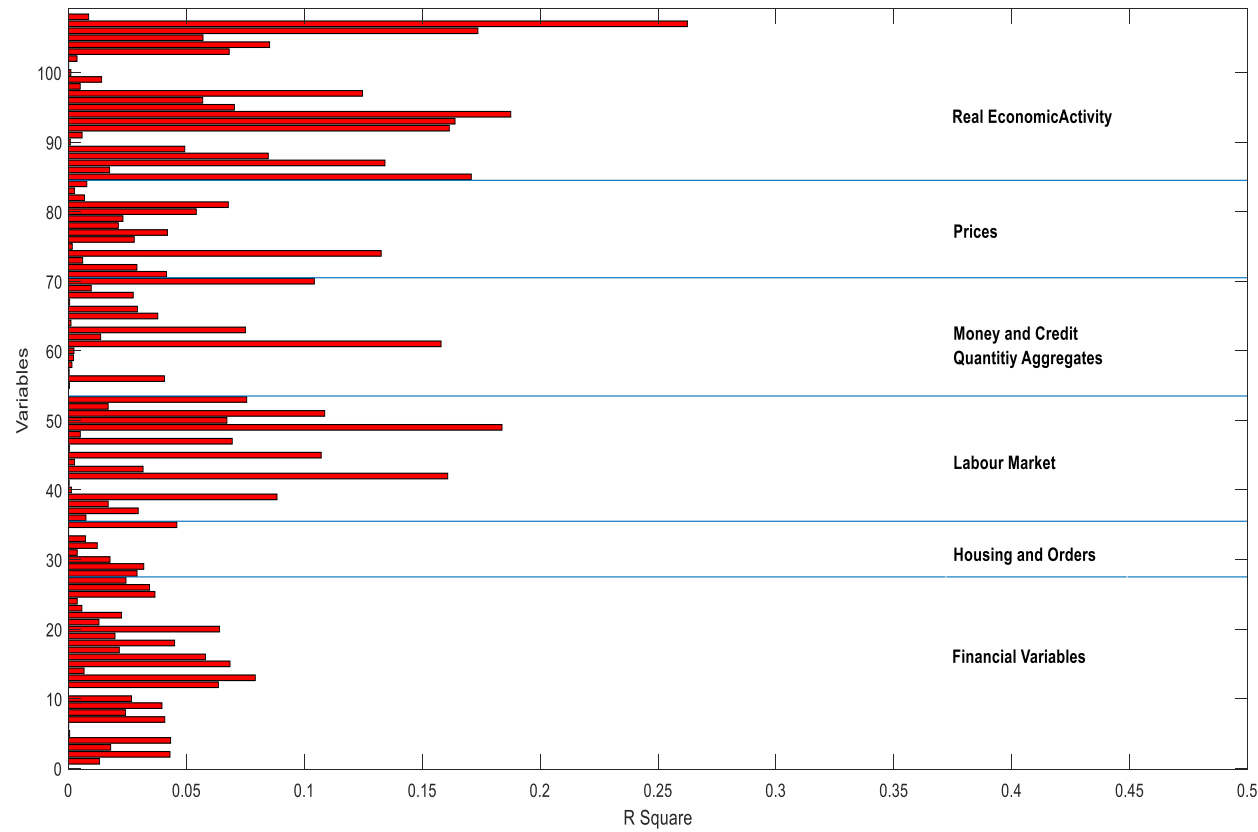


Figure 56: Factor Loadings of Turkey F_6

Notes: The bar chart shows the R^2 statistics for Turkey by regressing each time series variable on F_6 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

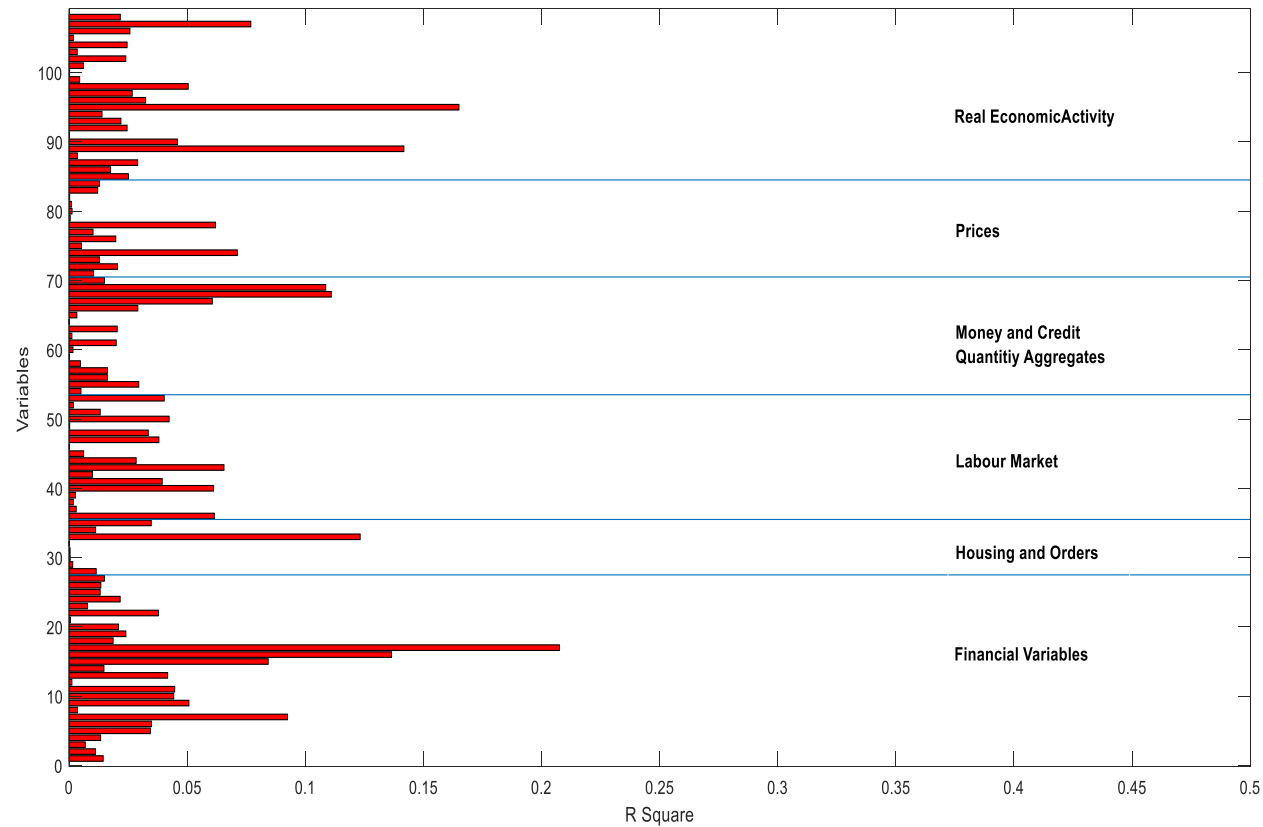


Figure 57: Factor Loadings of Turkey F_9

Notes: The bar chart shows the R^2 statistics for Turkey by regressing each time series variable on F_9 . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

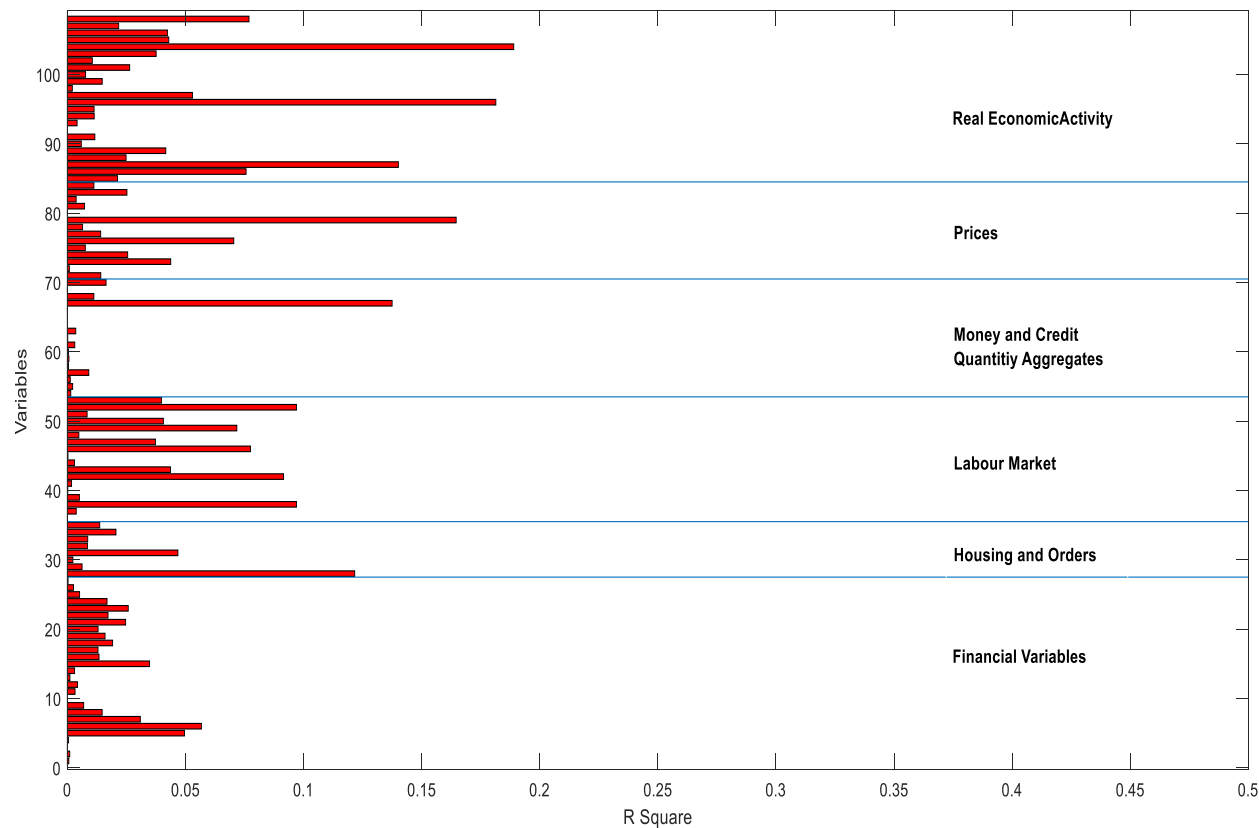


Figure 58: Factor Loadings of Turkey F_{10}

Notes: The bar chart shows the R^2 statistics for Turkey by regressing each time series variable on F_{10} . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

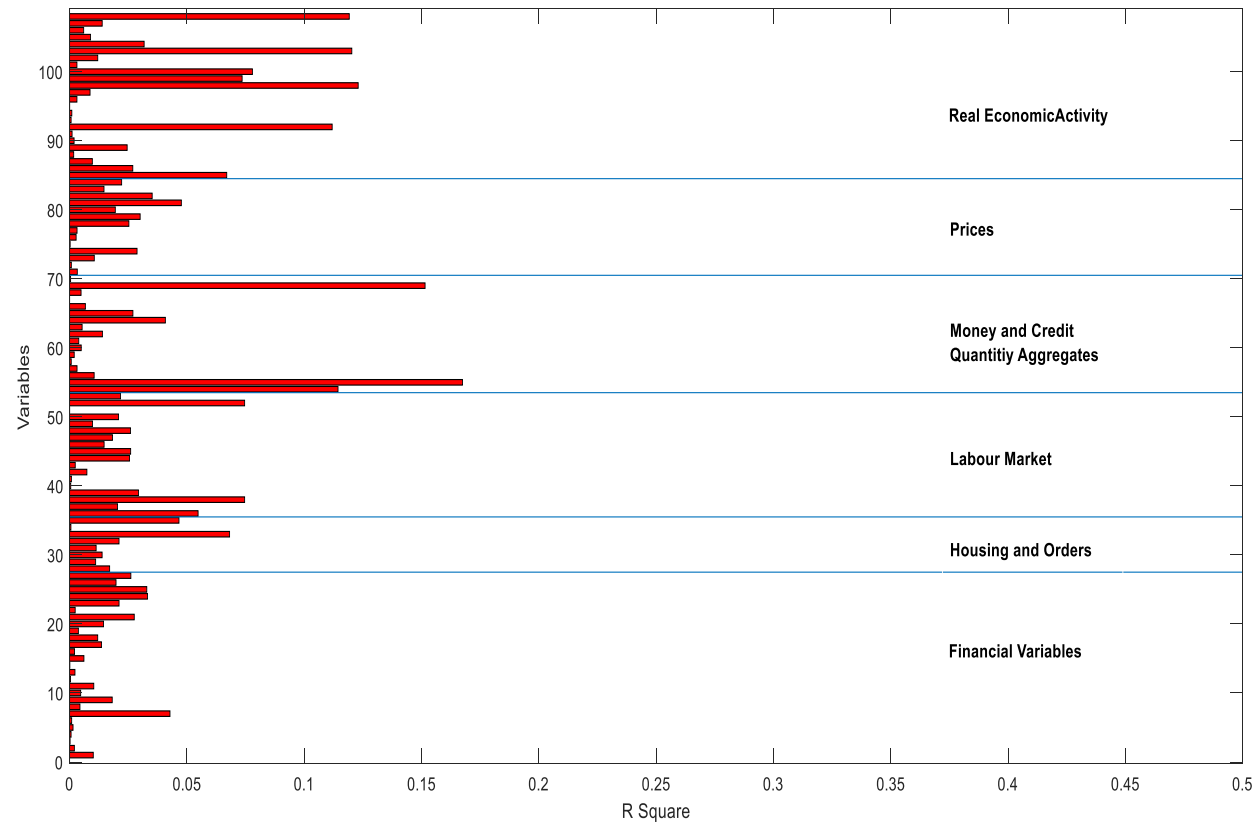


Figure 59: Factor Loadings of Turkey F_{11}

Notes: The bar chart shows the R^2 statistics for Turkey by regressing each time series variable on F_{11} . The time series are categorized into six subgroups: Financial Variables, Housing and Orders, Money and Credit Quantity Aggregates, Labour Market, Prices, Real Economic Activity. Lines are used to separate the subgroups.

APPENDIX C

DATA SOURCES

Tables 20 to 28 provide details on the data used in analysis. The tables are created separately for each country and include data description, data source and transformation method used under category headings



Table 20: Descriptions of Variables Related to Brazil

Brazil			
#	Name	Data Source	Data Transformation
Financial Variables			
1	USDBRL Spot Exchange Rate - Price of 1 USD in BRL	Bloomberg	first difference
2	JPYBRL Spot Exchange Rate - Price of 1 JPY in BRL	Bloomberg	first difference
3	EURBRL Spot Exchange Rate - Price of 1 EUR in BRL	Bloomberg	first difference
4	GBPBRL Spot Exchange Rate - Price of 1 GBP in BRL	Bloomberg	first difference
5	Brazil Real Effective Exchange Rate Broad	Bank for International Settlement	first difference
6	USDBRL 1 Month ATM Implied Volatility	Bloomberg	first difference
7	USDBRL 1 Month 25 Delta Risk Reversal	Bloomberg	first difference
8	USDBRL 1 Month 25 Delta Butterfly	Bloomberg	first difference
9	Federative Republic of Brazil 5Y CDS	Bloomberg	first difference
10	Brazil Selic Target Rate	Banco Central do Brasil	first difference
11	Brazil BNDES Long Term Interest Rate TJLP	Banco Nacional Desenvolvimento	first difference
12	Anbima Brazil Govt Bond Fixed Rate 1 Year	Anbima	first difference
13	Anbima Brazil Govt Bond Fixed Rate 2 Years	Anbima	first difference
14	Brazil Government Generic Bond 5 Year	Bloomberg	first difference
15	Brazil Government Generic Bond 10 Year	Bloomberg	first difference
16	Brazil Government Generic Bond 10 Year USD	Bloomberg	first difference
17	Bloomberg Brazil Exchange Market Capitalization USD	Bloomberg	first difference
18	Ibovespa Brasil Sao Paulo Stock Exchange Index	BOVESPA	first difference
19	Brazil Financial Index	BOVESPA	first difference
20	Bovespa Volume Brazil Settlement	Sao Paulo Stock Exchange - SAO	first difference
Housing and Orders			
21	Brazil Sao Paulo Secovi Real Estate Units Sale Value	Secovi	level
22	Brazil Sao Paulo Secovi Real Estate Units Offered	Secovi	first difference
23	Brazil Sao Paulo Secovi Real Estate Units Started	Secovi	level
24	Secovi Brazil Real Estate Units Average Sale Time Period	Secovi	first difference
25	Brazil Sao Paulo Secovi Real Estate Units Sold	Secovi	first difference
26	FGV Brazil IGP-M Construction Prices INCC-M MoM	Fundacao Getulio Vargas	level
27	FGV Brazil IGP-M Construction Prices INCC-M YoY	Fundacao Getulio Vargas	first difference
Labour Market			
32	Brazil PNAD Average Nominal Income Employed Persons	IBGE	first difference
33	Brazil PNAD Total Personal Real Income Usually Paid for Main Job	IBGE	first difference

34	Brazil PNAD Dmst Wrker Sgn Wrk Pmt Prsnl Real Income Usually Paid for Main Job	IBGE	first difference
35	Brazil PNAD Dmst Wrker no Sgn Wrk Pmt Prsnl Rel Income Usually Paid for Main Job	IBGE	first difference
36	Brazil PNAD Total Personal Real Income Pvt Sector Excl Domestic Worker	IBGE	first difference
37	Brazil PNAD Total Personal Real Income Usually Paid for Main Job Classified	IBGE	first difference
38	Brazil CAGED Government Registered Job Creation Total NAdj	Brazil Labor Ministry	level
39	Brazil PNAD Total Personal Real Inc PvtSec Excl Dom Worker Formal Work Contract	IBGE	first difference
Money and Credit Quantity Aggregates			
40	Brazil Financial System Loans	Banco Central do Brasil	first difference
41	Brazil Financial Private System Loans	Banco Central do Brasil	first difference
42	Brazil Monetary Base	Banco Central do Brasil	first difference
43	Brazil Money Supply M1 Brazil M1	Banco Central do Brasil	first difference
44	Brazil Money Supply M2 Brazil M2	Banco Central do Brasil	first difference
45	Brazil Money Supply M3 Brazil M3	Banco Central do Brasil	first difference
46	Brazil Money Supply M4 Brazil M4	Banco Central do Brasil	first difference
47	Brazil Personal Loans More Than 90 Days Late	Banco Central do Brasil	first difference
48	Brazil Currency Trade and Investment Flows Balance	Banco Central do Brasil	level
49	Brazil Foreign Exchange Operations - Commercial Sector - Balance	Banco Central do Brasil	level
50	Brazil International Daily Reserves	Banco Central do Brasil	first difference
Prices			
51	FGV Brazil IGP-M Wholesale Prices IPA-M YoY	Fundacao Getulio Vargas	first difference
52	Brazil CPI IPCA MoM	IBGE	first difference
53	Brazil IPCA-15 CPI Extended National MoM	IBGE	first difference
54	Brazil CPI INPC MoM	IBGE	level
55	Brazil CPI IPCA Dec 1993=100	IBGE	first difference
56	Brazil Producer Price Index Industry Total YoY % Change	IBGE	first difference
57	Brazil Producer Price Index Mining and Quarrying YoY % Change	IBGE	first difference
58	FGV Brazil IGP-M Wholesale Prices IPA-M MoM	Fundacao Getulio Vargas	level
59	FGV Brazil Wholesale Prices IPA-DI MoM	Fundacao Getulio Vargas	level
60	Brazil Producer Price Index Manufacturing Industry YoY % Change	IBGE	first difference
61	Brazil Basic Food Basket Sao Paulo	DIEESE	first difference
62	Brazil Basic Food Basket Rio De Janeiro	DIEESE	first difference
Real Economic Activity			
63	Anfavea Brazil Vehicle Production	Anfavea	first difference
64	Anfavea Brazil Vehicle Sales Licensed	Anfavea	first difference
65	Anfavea Brazil Vehicle Exports	Anfavea	first difference
66	Anfavea Brazil Vehicle Sales Licensed Cars	Anfavea	first difference

67	Anfavea Brazil Vehicle Production Passenger	Anfavea	first difference
68	Anfavea Brazil Vehicle Production Trucks	Anfavea	first difference
69	Anfavea Brazil Vehicle Production Buses	Anfavea	first difference
70	Brazil GDP Median Market Current Quarter Expectation YoY	Banco Central do Brasil	first difference
71	Brazil Economic Activity GDP MOM% IBC-BR	Banco Central do Brasil	level
72	CNI Brazil Manufacture Industry Capacity Utilization SA	CNI - Confederacao Nacional da	first difference
73	CNI Brazil Manufacture Industry Capacity Utilization NSA	CNI - Confederacao Nacional da	first difference
74	CNI Brazil Manufacture Industry Real Sales SA 2006=100	CNI - Confederacao Nacional da	first difference
75	CNI Brazil Manufacture Industry Employment SA 2006=100	CNI - Confederacao Nacional da	first difference
76	CNI Brazil Manufacture Industry Working Hours SA 2006=100	CNI - Confederacao Nacional da	first difference
77	Brazil CNI Industrial Confidence General	CNI - Confederacao Nacional da	first difference
78	Brazil Industrial Production NSA YoY 2012	IBGE	level
79	Brazil Auto Sales Subtotal	Fenabrave	first difference
80	Brazil Real Industrial Production SA 2012=100	IBGE	first difference
81	Brazil Retail Sales Volume MoM% Change SA	IBGE	level
82	Brazil Amplified Retail Sales Volume MoM SA	IBGE	level
83	Anfavea Brazil Vehicle Sales Licensed Domestic Cars	Anfavea	first difference
84	Anfavea Brazil Vehicle Sales Licensed Imported Cars	Anfavea	first difference
85	ANFAVEA Brazil Domestic Sales of Flex - Fueled Light Vehicle	Anfavea	first difference
86	Brazil Industrial Production Activity Extractive Industry YoY2012	IBGE	level
87	Brazil Industrial Production Activity Manufacturing Industry YoY2012	IBGE	level
88	Brazil Industrial Production Activity Food YoY2012	IBGE	level
89	Brazil Manufacture of Vegetable and Animal Oils and Fats YoY	IBGE	level
90	Brazil Manufacture of Grain Mill Products Starches and Animal Feeds YoY	IBGE	level
91	Brazil Industrial Production Activity Beverage YoY2012	IBGE	level
92	Brazil Industrial Production Activity Textile YoY2012	IBGE	level
93	Brazil Ind Prod Other Textile Articles 2012 YoY	IBGE	level
94	Brazil Industrial Production Activity Footwear & Leather YoY2012	IBGE	level
95	Brazil Industrial Production Activity Wood YoY2012	IBGE	level
96	Brazil Ind Prod Petroleum Refining NSA YoY2012	IBGE	level
97	Brazil Industrial Production Activity Other Chemicals YoY2012	IBGE	level
98	Brazil Industrial Production Activity Basic Metallurgy YoY2012	IBGE	level
99	Brazil Retail Sales Volume SA	IBGE	first difference
100	Brazil Retail Sales Volume Furniture and Domestic Appliance SA	IBGE	first difference
101	Brazil Consumer Opinion Confidence Composite OECD Normalised SA	Organisation for Economic Co-o	first difference
102	OECD Brazil Production in Total Manufacturing Index SA	Organisation for Economic Co-o	first difference

103	Brazil OECD Leading Indicators CLI Trend Restored SA	Organisation for Economic Co-o	first difference
104	Brazil GDP YoY 1995=100	IBGE	first difference
105	Brazil Current Account Monthly	Banco Central do Brasil	level
106	Brazil FGV Consumer Confidence Index SA	Fundacao Getulio Vargas	first difference
107	Brazil Current Account % of GDP Last 12 Months Accumulated	Banco Central do Brasil	first difference
108	Brazil BOP Financial Account Net	Banco Central do Brasil	level
109	Brazil BOP Capital Account Net	Banco Central do Brasil	level
110	Brazil Foreign Direct Investment Net	Banco Central do Brasil	first difference
111	Brazil Public Net Debt % of GDP	Banco Central do Brasil	first difference
112	Brazil Public Primary Budget Result	Banco Central do Brasil	level
113	Brazil Public Net Debt	Banco Central do Brasil	first difference
114	Brazil General Government Net Debt	Banco Central do Brasil	first difference
115	Brazil BOP Current Account Net	Banco Central do Brasil	level
116	Brazil FGV Consumer Confidence Current Situation Index SA	Fundacao Getulio Vargas	first difference
117	Brazil BOP Portfolio Investment Net	Banco Central do Brasil	level
118	Brazil BOP Errors and Omissions	Banco Central do Brasil	level
119	Brazil Total Imports USD	Ministerio da Industria e do C	first difference
120	Brazil FGV Consumer Confidence Expectations Index SA	Fundacao Getulio Vargas	first difference
121	Brazil Trade Balance Weekly Balance	Ministerio da Industria e do C	level
122	Brazil Trade Balance FOB Balance NSA	Ministerio da Industria e do C	level
123	Brazil Trade Balance FOB Imports NSA	Ministerio da Industria e do C	first difference
124	Brazil Trade Balance FOB Exports	Ministerio da Industria e do C	first difference
125	Brazil Central Government Primary Budget Surplus/Deficit	Secretaria do Tesouro Nacional	level
126	Brazil Central Government Nominal Budget Surplus/Deficit	Secretaria do Tesouro Nacional	level
127	Brazil Central Government Total Expenditures	Secretaria do Tesouro Nacional	first difference

Table 21: Descriptions of Variables Related to Hungary

Hungary			
#	Name	Data Source	Data Transformation
Financial Variables			
1	USDHUF Spot Exchange Rate - Price of 1 USD in HUF	Bloomberg	first difference
2	EURHUF Spot Exchange Rate - Price of 1 EUR in HUF	Bloomberg	first difference
3	GBPHUF Spot Exchange Rate - Price of 1 GBP in HUF	Bloomberg	first difference
4	JPYHUF Spot Exchange Rate - Price of 100 JPY in HUF	Bloomberg	first difference
5	USDHUF 1 Month ATM Implied Volatility	Bloomberg	first difference
6	Hungary Real Effective Exchange Rate Broad	Bank for International Settlements	first difference
7	USDHUF 1 Month 25 Delta Risk Reversal	Bloomberg	level
8	USDHUF 1 Month 25 Delta Butterfly	Bloomberg	first difference
9	Hungary 5Y CDS	Bloomberg	level
10	National Bank of Hungary O/N collateralized loan	National Bank of Hungary	level
11	Hungary Treasury Bills	Bloomberg	level
12	Hungary Government Bond	Bloomberg	first difference
13	Hungary Government Bond	Bloomberg	first difference
14	Hungary Government Bond	Bloomberg	first difference
15	Budapest Stock Exchange Budapest Stock Index	Budapest Stock Exchange	first difference
16	Budapest Stock Exchange Central European Blue Chip Index	Budapest Stock Exchange	first difference
17	Budapest Stock Exchange Mid & Smallcap Index	Budapest Stock Exchange	first difference
Housing and Orders			
18	GKI Hungary Business Confidence Index	GKI Economic Research Co.	first difference
19	Hungary Retail Trade Non Food Products Monthly	Hungarian Statistical Office	level
20	Hungary New Construction Permits Residential Buildings	Hungarian Statistical Office	first difference
21	Hungary New Construction Permits Residential Buildings with One Dwelling	Hungarian Statistical Office	first difference
22	Hungary New Construction Permits Holiday Houses	Hungarian Statistical Office	first difference
23	Hungary New Construction Permits Nonresidential Buildings	Hungarian Statistical Office	first difference
24	Hungary New Construction Permits Residential Buildings Floor Space m2	Hungarian Statistical Office	first difference
25	Hungary New Construction Permits Residential Buildings One Dwelling Floor Space m2	Hungarian Statistical Office	first difference
26	Hungary New Construction Permits Holiday Houses Floor Space m2	Hungarian Statistical Office	level
27	Hungary New Construction Permits Nonresidential Buildings Floor Space m2	Hungarian Statistical Office	first difference
28	Eurostat House Price Index Hungary YoY	Eurostat	first difference
Labour Market			
29	OECD Eco Outlook Hungary Competitiveness Indic Rel Consumer Pxs Overall Weights	Organisation for Economic Co-operation and Development	first difference
30	OECD Hungary Labour Force Survey Employment Activity Manufacturing	Organisation for Economic Co-operation and Development	first difference

31	OECD Hungary Labour Force Survey Employment Activity Industry Ex Construction	Organisation for Economic Co-operation and Development	first difference
32	Hungary Unemployment Rate	Hungarian Statistical Office	first difference
33	Eurostat Vacancy Rate Hungary	Eurostat	first difference
34	Hungary Avg Net Wages YoY	Hungarian Statistical Office	first difference
35	Hungary Avg Net Wages Private YoY	Hungarian Statistical Office	first difference
Money and Credit Quantity Aggregates			
36	Hungary Liquidity Total Assets Nat Curr	International Monetary Fund	first difference
37	Hungary Liquidity Liquid Assets Nat Curr	International Monetary Fund	first difference
38	Hungary Liquidity Short Term Liabilities Nat Curr	International Monetary Fund	level
39	Hungary Total Credit to Private Non Financial Sector Adjusted for Breaks	Bank for International Settlements	first difference
40	Hungary Total Credit to Private Non Financial Sector Unadjusted	Bank for International Settlements	first difference
41	Hungary Total Credit to Households & NPISHs Adjusted for Breaks	Bank for International Settlements	first difference
42	Hungary Total Credit to Households & NPISHs Unadjusted	Bank for International Settlements	first difference
43	Hungary Total Credit to Non Financial Corporations Adjusted for Breaks	Bank for International Settlements	first difference
44	Hungary Total Credit to Non Financial Corporations Unadjusted	Bank for International Settlements	first difference
45	Hungary Loans to Households Consumer Credit Total	National Bank of Hungary	first difference
46	Hungary Money Supply M0	National Bank of Hungary	first difference
47	Hungary Money Supply M1	National Bank of Hungary	first difference
48	Hungary Money Supply M2	National Bank of Hungary	first difference
49	Hungary Money Supply M3 HUF	National Bank of Hungary	first difference
50	IMF Hungary IIP Net Reserve Assets	International Monetary Fund	first difference
51	Hungary Reserve Assets Monetary Gold	National Bank of Hungary	first difference
52	BIS Hungary Banks Credit to Private Non Financial Sector Adjust for Breaks % GDP	Bank for International Settlements	first difference
53	BIS Hungary Banks Credit to Private Non Financial Sect Adjust for Breaks in USD	Bank for International Settlements	first difference
Prices			
54	Hungary Harmonized CPI Food Yearly	Hungarian Statistical Office	level
55	Hungary Harmonized CPI Housing Yearly	Hungarian Statistical Office	first difference
56	Hungary Harmonized CPI Health Yearly	Hungarian Statistical Office	first difference
57	Hungary Harmonized CPI Transportation Yearly	Hungarian Statistical Office	level
58	Hungary PPI Manufacturing YoY	Hungarian Statistical Office	level
59	Hungary External Trade Prices Import YoY	Hungarian Statistical Office	first difference
60	Hungary External Trade Prices Import from non European Union YoY	Hungarian Statistical Office	first difference
61	Hungary External Trade Prices Import from European Union YoY	Hungarian Statistical Office	first difference
62	Hungary External Trade Prices Export YoY	Hungarian Statistical Office	first difference
63	Hungary External Trade Prices Export to non European Union YoY	Hungarian Statistical Office	first difference
64	Hungary External Trade Prices Export to European Union YoY	Hungarian Statistical Office	first difference

65	Hungary PPI YoY	Hungarian Statistical Office	first difference
66	Hungary CPI Monthly	Hungarian Statistical Office	level
Real Economic Activity			
67	Hungary Retail Trade Yearly	Hungarian Statistical Office	level
68	Hungary Retail Sales Non Specialised Stores	Hungarian Statistical Office	first difference
69	Hungary Retail Sales Food Beverages and Tobacco in Specialised Stores	Hungarian Statistical Office	first difference
70	Hungary Retail Sales Sale of Automotive Fuel	Hungarian Statistical Office	first difference
71	Hungary Retail Sales Food Beverages and Tobacco	Hungarian Statistical Office	first difference
72	Hungary Retail Sales Non Food Products including Fuel	Hungarian Statistical Office	first difference
73	Hungary Retail Sales Total Sale except Automotive Fuel	Hungarian Statistical Office	first difference
74	Hungary Retail Sales of Motor Vehicles and Vehicle Parts and Accessories	Hungarian Statistical Office	first difference
75	Hungary Retail Sales Total	Hungarian Statistical Office	first difference
76	OECD Hungary Sales Retail Trade Volume Index	Organisation for Economic Co-operation and Development	first difference
77	OECD Hungary Sales Retail Trade Volume Index SA	Organisation for Economic Co-operation and Development	first difference
78	OECD Hungary Sales Retail Trade Volume Growth SA	Organisation for Economic Co-operation and Development	level
79	OECD Hungary Sales Retail Trade Volume YoY SA	Organisation for Economic Co-operation and Development	level
80	OECD Hungary Sales Retail Trade Value Index SA	Organisation for Economic Co-operation and Development	first difference
81	OECD Hungary Sales Retail Trade Passenger Car Registrations Monthly SA	Organisation for Economic Co-operation and Development	first difference
82	GKI Hungary Business Confidence Index	GKI Economic Research Co.	first difference
83	OECD Hungary Business Tendency Survey Retail Trade Situation Tendency Natnl SA	Organisation for Economic Co-operation and Development	level
84	Hungary Business Support Activities Index (2010=100)	Eurostat	first difference
85	GKI Hungary Consumer Confidence	GKI Economic Research Co.	first difference
86	European Commission Consumer Confidence Indicator Hungary	European Commission	first difference
87	EC Consumer Confidence Hungary Price Trends Over the Next 12 Month	European Commission	first difference
88	EC Consumer Confidence Hungary Price Trends Over the Last 12 Month	European Commission	first difference
89	IMF Hungary Household Consumption Expenditure Including NPISHs	International Monetary Fund	first difference
90	Hungary Trade Balance (Billion USD) NSA	Bloomberg	first difference
91	Hungary Foreign Trade Balance EUR	Hungarian Statistical Office	level
92	Hungary Exports (Billion USD) NSA	Bloomberg	first difference
93	Hungary Budget Balance (% GDP)	Bloomberg	first difference
94	Hungary Consolidated Govt Budget Balance	Hungarian Finance Ministry	level
95	Eurostat Non Finl Accounts for General Govt Net Lending Net Borrowing Hungary	Eurostat	first difference
96	Hungary Current Account Balance (% GDP)	Bloomberg	level
97	Hungary Current Account Balance Qtrly	National Bank of Hungary	level
98	Hungary Current Account Non Debt Creating Financing Net Qtrly	National Bank of Hungary	level

Table 22: Descriptions of Variables Related to Indonesia

Indonesia			
#	Name	Data Source	Data Transformation
Financial Variables			
1	USDIDR Spot Exchange Rate - Price of 1 USD in IDR	Bloomberg	first difference
2	EURIDR Spot Exchange Rate - Price of 1 EUR in IDR	Bloomberg	first difference
3	GBPIDR Spot Exchange Rate - Price of 1 GBP in IDR	Bloomberg	first difference
4	JPYIDR Spot Exchange Rate - Price of 1 JPY in IDR	Bloomberg	first difference
5	USDIDR 1 Month ATM Implied Volatility	Bloomberg	first difference
6	Indonesia Real Effective Exchange Rate Broad	Bank for International Settlements	first difference
7	USDIDR 1 Month 25 Delta Risk Reversal	Bloomberg	level
8	USDIDR 1 Month 25 Delta Butterfly	Bloomberg	first difference
9	Republic of Indonesia 5Y CDS	Bloomberg	first difference
10	Bank Indonesia JIBOR 1 Week	Bloomberg	first difference
11	Indonesia Treasury Bond	Bloomberg	first difference
12	Indonesia Treasury Bond	Bloomberg	first difference
13	Indonesia Treasury Bond	Bloomberg	first difference
14	Indonesia Treasury Bond	Bloomberg	first difference
15	Jakarta Stock Exchange Composite Index	Indonesia Stock Exchange	first difference
16	Jakarta Stock Exchange LQ45 Index	Indonesia Stock Exchange	first difference
17	Jakarta Stock Exchange Jakarta Islamic Index	Indonesia Stock Exchange	first difference
18	Indonesia Jakarta Stock Exchange Net Foreign Stocks Investment (USD)	Indonesia Stock Exchange	level
19	Jakarta Stock Exchange Finance Index	Indonesia Stock Exchange	first difference
20	Jakarta Stock Exchange Agricultural Index	Indonesia Stock Exchange	first difference
Housing and Orders			
21	Indonesia Residential Property Price Index 17-City Composite	Bank Indonesia	level
22	Indonesia Residential Property Price Index 18-City Composite	Bank Indonesia	first difference
23	Indonesia Residential Property Price Index 18-City Small	Bank Indonesia	first difference
24	Indonesia Residential Property Price Index 18-City Medium	Bank Indonesia	first difference
25	Indonesia Residential Property Price Index 18-City Large	Bank Indonesia	first difference
26	Indonesia Real Estate Markets Commercial Real Estate Prices Percent	International Monetary Fund	first difference
27	Indonesia Commercial Property Price Index - Retails	Bank Indonesia	level
28	Indonesia Commercial Property Price Index - Industrial Estates	Bank Indonesia	first difference
29	Indonesia Commercial Property Supply Index - Retails	Bank Indonesia	first difference
30	Indonesia Commercial Property Supply Index - Industrial Estates	Bank Indonesia	level
31	Indonesia Commercial Property Demand Index - Retails	Bank Indonesia	first difference

32	Indonesia Commercial Property Demand Index - Industrial Estates	Bank Indonesia	level
33	Indonesia Prompt Manufacturing Index New Orders from Customers	Bank Indonesia	first difference
Labour Market			
34	Indonesia Unemployment Rate	Badan Pusat Statistik Indonesia	first difference
35	Indonesia Number of People Employed	Badan Pusat Statistik Indonesia	first difference
36	Indonesia Labor Force Participation Rate	Badan Pusat Statistik Indonesia	first difference
37	Indonesia Wage for Farm Worker per Day Real	Badan Pusat Statistik Indonesia	first difference
38	Indonesia Wage for Construction Worker per Day Real	Badan Pusat Statistik Indonesia	first difference
39	Indonesia Wage for Women's Haircut per Head Real	Badan Pusat Statistik Indonesia	first difference
40	Indonesia Wage for Household Servant per Month Real	Badan Pusat Statistik Indonesia	first difference
41	Indonesia Wage for Farm Worker per Day Nominal	Badan Pusat Statistik Indonesia	first difference
42	Indonesia Wage for Construction Worker per Day Nominal	Badan Pusat Statistik Indonesia	first difference
43	Indonesia Wage for Women's Haircut per Head Nominal	Badan Pusat Statistik Indonesia	first difference
44	Indonesia Wage for Household Servant per Month Nominal	Badan Pusat Statistik Indonesia	first difference
Money and Credit Quantity Aggregates			
45	Indonesia Liquidity Total Assets Nat Curr	International Monetary Fund	first difference
46	Indonesia Liquidity Liquid Assets Nat Curr	International Monetary Fund	first difference
47	Indonesia Liquidity Short Term Liabilities Nat Curr	International Monetary Fund	first difference
48	Indonesia Total Credit to Private Non Financial Sector Adjusted for Breaks	Bank for International Settlements	first difference
49	Indonesia Total Credit to Private Non Financial Sector Unadjusted	Bank for International Settlements	first difference
50	Indonesia Total Credit to Households & NPISHs Adjusted for Breaks	Bank for International Settlements	first difference
51	Indonesia Total Credit to Households & NPISHs Unadjusted	Bank for International Settlements	first difference
52	Indonesia Total Credit to Non Financial Corporations Adjusted for Breaks	Bank for International Settlements	first difference
53	Indonesia Total Credit to Non Financial Corporations Unadjusted	Bank for International Settlements	first difference
54	Indonesia Outstanding Loans by Economic Sector Housing	Bank Indonesia	first difference
55	Indonesia Outstanding Loans by Economic Sector Agriculture	Bank Indonesia	first difference
56	Indonesia Outstanding Loans by Economic Sector Construction	Bank Indonesia	first difference
57	Indonesia Outstanding Loans by Economic Sector Manufacturing	Bank Indonesia	first difference
58	Indonesia Outstanding Loans by Economic Sector Mining	Bank Indonesia	first difference
59	Indonesia Money Supply M1	Bank Indonesia	first difference
60	Indonesia Money Supply M2	Bank Indonesia	first difference
61	Indonesia Money Supply Foreign Currency Demand Deposits	Bank Indonesia	first difference
62	IMF Indonesia IIP Net Reserve Assets	International Monetary Fund	first difference
63	OECD Indonesia Financial Account Reserve Assets Total USD	Organisation for Economic Co-operation and Development	first difference
Prices			
64	Indonesia Consumer Price Index 2010=100 NSA	Bloomberg	first difference

65	Indonesia Wholesale Prices YoY	Badan Pusat Statistik Indonesia	first difference
66	Indonesia Wholesale Prices Agriculture YoY	Badan Pusat Statistik Indonesia	first difference
67	Indonesia Wholesale Prices Mining & Quarrying YoY	Badan Pusat Statistik Indonesia	first difference
68	Indonesia Wholesale Prices Manufacturing YoY	Badan Pusat Statistik Indonesia	first difference
69	Indonesia Wholesale Prices Import YoY	Badan Pusat Statistik Indonesia	first difference
70	Indonesia Wholesale Prices Export YoY	Badan Pusat Statistik Indonesia	first difference
71	Indonesia CPI MoM	Badan Pusat Statistik Indonesia	level
72	IMF Indonesia GDP Deflator	International Monetary Fund	first difference
73	Indonesia Exports Total USD	Badan Pusat Statistik Indonesia	first difference
Real Economic Activity			
74	Indonesia Retail Sales Survey - Total YoY (2010=100)	Bank Indonesia	first difference
75	Astra Indonesia Motor Vehicle Local Car Sales	PT Astra	first difference
76	Bank Indonesia Consumer Confidence Index	Badan Pusat Statistik Indonesia	first difference
77	Indonesia Consumer Appraisal of Present Situation Employment Conditions	Badan Pusat Statistik Indonesia	first difference
78	Indonesia Consumer Appraisal of Present Situation Buying Durable Goods Condition	Badan Pusat Statistik Indonesia	first difference
79	OECD Indonesia Business Tendency Survey Construction Confidence Composite SA	Organisation for Economic Co-operation and Development	first difference
80	OECD Indonesia Business Tendency Manufacturing Confidence Composite Natnl SA	Organisation for Economic Co-operation and Development	first difference
81	OECD Indonesia Business Tendency Survey Retail Trade Confidence Composite SA	Organisation for Economic Co-operation and Development	first difference
82	OECD Indonesia Business Tendency Survey Services Confidence Composite Natnl SA	Organisation for Economic Co-operation and Development	first difference
83	Indonesia OECD Component Series Confidence Indicator Normalised SA	Organisation for Economic Co-operation and Development	first difference
84	Indonesia OECD Component Series Confidence Indicator Monthly Level SA	Organisation for Economic Co-operation and Development	first difference
85	Indonesia Trade Balance	Badan Pusat Statistik Indonesia	level
86	Indonesia Trade Balance (Billion USD) NSA	Bloomberg	first difference
87	IMF DOT Indonesia Imports from India CIF	International Monetary Fund	first difference
88	Indonesia BOP Current Account Goods General Merchandise Gas Balance of Trade	Bank Indonesia	first difference
89	Indonesia BOP Current Account Goods General Merchandise Oil Balance of Trade	Bank Indonesia	first difference
90	Eurozone Trade Balance with Indonesia	Eurostat	first difference
91	Indonesia BOP Financial Account Other Investment Assets Priv Trade credit	Bank Indonesia	first difference
92	Indonesia Jakarta Market Capitalization Trade	Indonesia Stock Exchange	first difference
93	EA Balance with Indonesia Manufactured Goods NSA	Eurostat	level
94	IMF DOT Indonesia Imports from European Union Aggregate CIF	International Monetary Fund	first difference
95	Indonesia Current Account Balance (% GDP)	Bloomberg	first difference
96	Indonesia Balance of Payments Current Account Balance	Bank Indonesia	first difference
97	Indonesia BOP Current Account Goods Balance	Bank Indonesia	first difference
98	Indonesia BOP Capital & Financial Account Balance	Bank Indonesia	first difference
99	OECD Indonesia Capital Account Credits USD	Organisation for Economic Co-operation and Development	level

100	IMF Indonesia Real GDP	International Monetary Fund	first difference
101	Indonesia BoP Financial Account Portfolio Investment Liabilities	Bank Indonesia	first difference
102	IMF Indonesia Reserve Position in IMF Fund Account	International Monetary Fund	first difference
103	Indonesia Financial Account Portfolio Investment USD	International Monetary Fund	first difference
104	Indonesia BOP Current Account Manufacturing services	Bank Indonesia	first difference
105	Indonesia BOP Financial Account Direct investment	Bank Indonesia	first difference

Table 23: Descriptions of Variables Related to Mexico

Mexico			
#	Name	Data Source	Data Transformation
Financial Variables			
1	Mexico Real Effective Exchange Rate Broad	Bank for International Settlements	first difference
2	USDMXN Spot Exchange Rate - Price of 1 USD in MXN	Bloomberg	first difference
3	USDMXN 1 Month ATM Implied Volatility	Bloomberg	first difference
4	USDMXN 3 Month 25 Delta Risk Reversal	Bloomberg	level
5	MXNJPY Spot Exchange Rate - Price of 1 MXN in JPY	Bloomberg	first difference
6	MXNCAD Spot Exchange Rate - Price of 1 MXN in CAD	Bloomberg	first difference
7	Bank of Mexico Official Overnight Rate	Banco de Mexico	first difference
8	BOM Government Funding Rate Closing Interest Rate	Banco de Mexico	first difference
9	USDMXN 1 Month ATM Implied Volatility	Bloomberg	first difference
10	USDMXN 1 Month 25 Delta Risk Reversal	Bloomberg	level
11	USDMXN 1 Month 25 Delta Butterfly	Bloomberg	level
12	MXN T-BILL 6 MO	Bloomberg	first difference
13	MXN T-BILL 1 YR	Bloomberg	first difference
14	Mexico Generic 2 Year	Bloomberg	first difference
15	Mexico Generic 3 Year	Bloomberg	first difference
16	Mexico Generic 5 Year	Bloomberg	first difference
17	Bloomberg Mexico Exchange Market Capitalization USD	Bloomberg	first difference
18	OECD Mexico Share Prices All Shares Broad Total 2010=100	Organisation for Economic Co-operation and Development	first difference
19	S&P/BMV IPC	Mexico Stock Exchange	first difference
Housing and Orders			
20	Mexico Manufacturing Index New Orders SA	IMEF (Instituto Mexicano de Ejecutivos en Finanzas)	first difference
21	Mexico Non Manufacturing Index New Orders SA	IMEF (Instituto Mexicano de Ejecutivos en Finanzas)	first difference
22	Mexico House Price Index YoY	Sociedad Hipotecaria Federal	first difference
23	Mexico Bank Lending Mortgages	Banco de Mexico	first difference
24	Mexico Construction Spending Buildings	INEGI	first difference
25	Mexico Construction Spending Total	INEGI	first difference
26	Mexico House Price Index	Sociedad Hipotecaria Federal	first difference
Labour Market			
27	Mexico Participation Rate SA	INEGI	first difference
28	Mexico Population 15 Years and Over Economically Active Population	INEGI	first difference
29	Mexico Employment Rate	INEGI	first difference
30	Mexico Formal Job Temporary & Permanent Workers Total	Secretaria del Trabajo y Previsi3) 13/16n Social	first difference

31	Mexico Formal Job Temporary & Permanent Workers Manufacturing	Secretaria del Trabajo y Previsi3) 13/16n Social	first difference
32	Mexico Formal Job Temporary & Permanent Workers Construction	Secretaria del Trabajo y Previsi3) 13/16n Social	first difference
33	Mexico Formal Job Temporary & Permanent Workers Retail	Secretaria del Trabajo y Previsi3) 13/16n Social	first difference
34	Mexico Formal Job Temporary & Permanent Workers Transportation & Communication	Secretaria del Trabajo y Previsi3) 13/16n Social	first difference
35	Mexico Formal Job Temporary & Permanent Workers Commercial Services	Secretaria del Trabajo y Previsi3) 13/16n Social	first difference
36	Mexico Average Nominal Wages per Person Employed Manufacturing Industry	Banco de Mexico	first difference
37	Mexico Average Nominal Wages per Person Employed Commerce	Banco de Mexico	first difference
38	Mexico Labor Productivity per Person Employed Manufacturing Industry	Banco de Mexico	first difference
39	Mexico Labor Productivity per Person Employed Commerce	Banco de Mexico	first difference
40	Mexico Unit Cost of Labor per Person Employed Commerce	Banco de Mexico	first difference
Money and Credit Quantity Aggregates			
41	Mexico Federal Government Net Domestic Debt in Millions of Mexican Pesos	Secretaria de Hacienda y Credito Publico	first difference
42	Mexico Public Sector Net External Debt in Millions of U.S. Dollars	Secretaria de Hacienda y Credito Publico	first difference
43	Mexico Money Supply M1-M4 M1 YOY %	Banco de Mexico	first difference
44	Mexico Money Supply M1-M4 M2 YOY %	Banco de Mexico	first difference
45	Mexico Money Supply M1-M4 M3 YOY %	Banco de Mexico	first difference
46	Mexico Money Supply M1-M4 M4 YOY %	Banco de Mexico	first difference
47	Mexico Monetary Base Money Base	Banco de Mexico	first difference
48	Mexico International Reserves in USD	Banco de Mexico	first difference
49	Mexico Bank Lending Performing Loans	Banco de Mexico	first difference
50	Mexico Bank Lending Performing Consumer Loans	Banco de Mexico	first difference
51	Mexico Bank Lending Performing Comp	Banco de Mexico	first difference
52	Mexico Bank Lending Performing Loans for Non Bank Financial	Banco de Mexico	first difference
53	Mexico Development Banks Total Public Demand Deposits Volume	Banco de Mexico	first difference
54	Mexico Development Banks Total Public Time Deposits Volume	Banco de Mexico	first difference
Prices			
55	Mexico CPI	INEGI	first difference
56	Mexico Core CPI	INEGI	first difference
57	Mexico CPI Monthly Food Drinks and Tobacco	INEGI	first difference
58	Mexico CPI Monthly Non Food Goods	INEGI	first difference
59	Mexico CPI Monthly Services	INEGI	first difference
60	Mexico CPI Monthly Agriculture	INEGI	first difference
61	Mexico CPI Monthly Energy Rates Auth by Govt	INEGI	first difference
62	Mexico Producer Price Index Total %YoY	INEGI	first difference
63	Mexico Producer Price Index Total Ex Oil %YoY	INEGI	first difference
Real Economic Activity			

64	Mexico GDP Total YoY NSA	INEGI	level
65	Mexico Supply & Demand Private Consumption YoY	INEGI	first difference
66	Mexico Supply & Demand Public Consumption YoY	INEGI	first difference
67	Mexico Economic Indicator Monthly Change	INEGI	level
68	Mexico Indicator of Economic Activity Index SA	INEGI	first difference
69	Mexico Economic Activity Primary Activities Series Index SA	INEGI	first difference
70	Mexico Unit Cost of Labor per Person Employed Manufacturing Industry	Banco de Mexico	first difference
71	Mexico Wholesale/Retail Sale Totl Retl	INEGI	first difference
72	Mexico Wholesale/Retail Sale Totl Whole	INEGI	first difference
73	Mexican Vehicle Sales Auto+truck NSA	INEGI	first difference
74	Mexico Vehicle Production Total Production	INEGI	first difference
75	Mexico Industrial Production Total Seasonally Adjusted	INEGI	first difference
76	Mexico Industrial Production Mining Seasonally Adjusted	INEGI	first difference
77	Mexico Industrial Production Utilities Seasonally Adjusted	INEGI	first difference
78	Mexico Industrial Production Construction Seasonally Adjusted	INEGI	first difference
79	Mexico Industrial Production Manufacturing Seasonally Adjusted	INEGI	first difference
80	Mexico Manufacturing Index SA	IMEF (Instituto Mexicano de Ejecutivos en Finanzas)	first difference
81	Mexico Non Manufacturing Index SA	IMEF (Instituto Mexicano de Ejecutivos en Finanzas)	first difference
82	Mexico Manufacturing Aggregate Trend Indicator	INEGI	first difference
83	Mexico Capacity Utilization Total	INEGI	first difference
84	Mexico Capacity Utilization Food Industry	INEGI	first difference
85	Mexico Capacity Utilization Manufacture of Petroleum Products and Coal	INEGI	first difference
86	Mexico Seasonally Adjusted Leading Indicator	INEGI	first difference
87	Mexico Seasonally Adjusted Coincident Indicator	INEGI	first difference
88	Mexico Capital Investment Construction	INEGI	first difference
89	Mexico Trade Balance Exports Monthly Total USD Million	INEGI	first difference
90	Mexico Exports by Sector Petroleum Monthly Total USD Million	INEGI	first difference
91	Mexico Exports by Sector Non Petroleum Mexico Exports Monthly Total USD Million	INEGI	first difference
92	Mexico Trade Balance Imports Monthly Total USD Million	INEGI	first difference
93	Mexico Imports by Sector Consumer Goods Monthly Total USD Million	INEGI	first difference
94	Mexico Imports by Sector Intermediate Goods Monthly Total USD Million	INEGI	first difference
95	Mexico Imports by Sector Capital Goods Monthly Total USD Million	INEGI	first difference
96	Mexico Nominal Current Account Balance	Banco de Mexico	first difference
97	Mexico OECD Leading Indicators CLI Trend Restored SA	Organisation for Economic Co-operation and Development	first difference
98	Mexico Balance of Payments Financial Account	Banco de Mexico	first difference
99	Mexico Balance of Payments Financial Account Foreign Direct Investment	Banco de Mexico	first difference

100	Mexico Balance of Payments Financial Account Portfolio Investment	Banco de Mexico	level
101	Mexico OECD Leading Indicators CLI Trend Restored YoY SA	Organisation for Economic Co-operation and Development	level
102	Mexico Public Rev & Expend Budgetary Deficit YTD	Banco de Mexico	level
103	Mexico Pub Sec Expend Budgetary Expenditures YTD	Banco de Mexico	level
104	Mexico Trade Balance Monthly Total USD Million	INEGI	level

Table 24: Descriptions of Variables Related to Philippines

Philippines			
#	Name	Data Source	Data Transformation
Financial Variables			
1	USDPHP Spot Exchange Rate - Price of 1 USD in PHP	Bloomberg	first difference
2	EURPHP Spot Exchange Rate - Price of 1 EUR in PHP	Bloomberg	first difference
3	GBPPHP Spot Exchange Rate - Price of 1 GBP in PHP	Bloomberg	first difference
4	JPYPHP Spot Exchange Rate - Price of 1 JPY in PHP	Bloomberg	first difference
5	USDPHP 1 Month ATM Implied Volatility	Bloomberg	first difference
6	Philippines Real Effective Exchange Rate Broad	Bank for International Settlements	first difference
7	USDPHP 1 Month 25 Delta Risk Reversal	Bloomberg	level
8	USDPHP 1 Month 25 Delta Butterfly	Bloomberg	first difference
9	Republic of the Philippines 5Y CDS	Bloomberg	first difference
10	Philippines Stock Exchange PSEi Index	Philippine Stock Exchange	first difference
11	Philippine Treasury Bill	Bloomberg	first difference
12	Philippine Government Bond	Bloomberg	first difference
13	Philippine Government Bond	Bloomberg	first difference
14	Philippine Government Bond	Bloomberg	first difference
15	Philippine Stock Exchange Net Foreign Stocks Investment (USD)	The Philippine Stock Exchange Inc	level
16	Philippines Stock Exchange Financials Sector Index	Philippine Stock Exchange	first difference
17	Philippines Stock Exchange Property Sector Index	Philippine Stock Exchange	first difference
18	Philippines Stock Exchange Industrial Sector Index	Philippine Stock Exchange	first difference
19	Philippines Stock Exchange Mining & Oil Sector Index	Philippine Stock Exchange	first difference
20	Philippines O/N Interbank Reference Rate PHIREF at 4pm	Bloomberg	level
21	Philippine Stock Exchange Services Sector Index	Philippine Stock Exchange	first difference
Housing and Orders			
22	Philippines Volume Permitted Constructions Total	Philippine Statistics Authority	first difference
23	Philippines Volume Permitted Constructions-Residential	Philippine Statistics Authority	first difference
24	Philippines Volume Permitted Constructions - Non Residential	Philippine Statistics Authority	first difference
25	Philippines Volume Permitted Constructions-Others	Philippine Statistics Authority	first difference
26	Philippines Permitted Building Total (Area)	Philippine Statistics Authority	first difference
27	Philippines Permitted Residential Building (Area)	Philippine Statistics Authority	first difference
28	Philippines Permitted Non-Residential Building (Area)	Philippine Statistics Authority	first difference
29	Philippine Residential Real Estate Price Index All Types	Bangko Sentral ng Pilipinas	first difference
30	Philippine Residential Real Estate Price Index NCR All Types	Bangko Sentral ng Pilipinas	first difference
31	Philippine Residential Real Estate Price Index Outside NCR All Types	Bangko Sentral ng Pilipinas	first difference

Labour Market

32	Philippines Unemployment Rate (%)	Bloomberg	first difference
33	Philippines Labor Force Survey Employment Rate	Philippine Statistics Authority	first difference
34	Philippines Labor Force Survey Population 15 Years Old & Over	Philippine Statistics Authority	first difference
35	Philippines Labor Force Survey Labor Force Participation Rate	Philippine Statistics Authority	first difference
36	Philippines Labor Force Survey Unemployed	Philippine Statistics Authority	first difference
37	Philippines Real Daily Wage Rate Non Agricultural NCR	Bangko Sentral ng Pilipinas	first difference
38	Philippines Real Daily Wage Rate Agricultural NCR Plantation	Bangko Sentral ng Pilipinas	first difference
39	Philippines Nominal Daily Wage Rate Non Agricultural NCR	Bangko Sentral ng Pilipinas	first difference
40	Philippines Nominal Daily Wage Rate Agricultural NCR Plantation	Bangko Sentral ng Pilipinas	first difference

Money and Credit Quantity Aggregates

41	Philippines Liquidity Total Assets Nat Curr	International Monetary Fund	first difference
42	Philippines Liquidity Liquid Assets Nat Curr	International Monetary Fund	first difference
43	Philippines Liquidity Short Term Liabilities Nat Curr	International Monetary Fund	first difference
44	IMF Philippines IMF Fund Account Total Credit & Loans Outstanding	International Monetary Fund	first difference
45	Philippines Commercial Banks Loan Outstanding Total Net YoY	Bangko Sentral ng Pilipinas	first difference
46	Philippines Loan Portfolio	Bangko Sentral ng Pilipinas	first difference
47	Philippines Commercial Banks Loans Outstanding Total Gross YoY	Bangko Sentral ng Pilipinas	first difference
48	Philippines Commercial Bank Loans Outstanding For Production	Bangko Sentral ng Pilipinas	first difference
49	Philippines Commercial Banks Loans Outstanding Total Net	Bangko Sentral ng Pilipinas	first difference
50	Philippines Loans To Other Emerging Market And Developing Countries Nat Curr	International Monetary Fund	first difference
51	Bank Nonperforming Loans Total Loans - Philippines	International Monetary Fund	first difference
52	Philippines Money Supply M2 (Billion USD) NSA	Bloomberg	first difference
53	Philippines Reserves	Bangko Sentral ng Pilipinas	first difference
54	Philippines Reserve Money Peso Rediscounting	Bangko Sentral ng Pilipinas	level
55	Philippines Reserve Money Special Deposit Account	Bangko Sentral ng Pilipinas	first difference
56	Philippines Reserve Money Reverse Repurchase Facility	Bangko Sentral ng Pilipinas	first difference
57	IMF Philippines IIP Net Reserve Assets	International Monetary Fund	first difference
58	Philippines Gross Intl Reserves	Bangko Sentral ng Pilipinas	first difference
59	Philippines Gross Intl Reserve Position in the Fund	Bangko Sentral ng Pilipinas	first difference
60	Philippines Effective Reserve Requirement Ratio	Bangko Sentral ng Pilipinas	first difference

Prices

63	Philippines General Retail Price Index National Capital Region 2012=100 YoY	Philippine Statistics Authority	first difference
64	Philippines PPI Manufacturing YoY 2018=100	Philippine Statistics Authority	first difference
65	Philippines General Wholesale Price Index All Items YoY 1998=100	Philippine Statistics Authority	level
66	Philippines Consumer Price Index Food and Non-Alcoholic Beverages YOY	Philippine Statistics Authority	first difference

67	Philippines Consumer Price Index Clothing and Footwear YOY	Philippine Statistics Authority	first difference
68	Philippines Consumer Price Index Housing Water Electricity Gas & Other Fuels YOY	Philippine Statistics Authority	first difference
69	Philippines Consumer Price Index Health YOY	Philippine Statistics Authority	first difference
70	Philippines Consumer Price Index Transport YOY	Philippine Statistics Authority	level
Real Economic Activity			
71	Philippines GDP Constant Prices YoY	Philippine Statistics Authority	level
72	Philippines GDP Personal Consumption Expenditure Constant YoY	Philippine Statistics Authority	first difference
73	Philippines GDP Govt Consumption Expenditure Shares Constant 2000 Price YoY	Philippine Statistics Authority	level
74	Philippines GDP Exports Expenditure Constant YoY	Philippine Statistics Authority	level
75	Philippines GDP Imports Constant YoY	Philippine Statistics Authority	level
76	Philippines GNP Constant YoY	Philippine Statistics Authority	level
77	Philippines GDP Constant Prices YoY	Philippine Statistics Authority	level
78	Philippines GDP Implicit Price 2000=100 YoY	Philippine Statistics Authority	first difference
79	Philippines GDP by Industry Implicit Price Industrial 2000=100 YoY	Philippine Statistics Authority	level
80	Philippines GDP Constant Prices YoY	Philippine Statistics Authority	level
81	Philippines GDP Industrial Industry Constant YoY	Philippine Statistics Authority	level
82	Philippines GDP Services Industry Constant YoY	Philippine Statistics Authority	first difference
83	Philippines Per Capita GDP Constant YoY	Philippine Statistics Authority	level
84	Philippines GNP Constant YoY	Philippine Statistics Authority	level
85	Philippines Per Capita Personal Consumption Expenditure Current Prices YoY	Philippine Statistics Authority	first difference
86	Automotive Sales for Philippines	GAIKINDO	first difference
87	Automotive Production by Philippines	GAIKINDO	first difference
88	Philippines Capacity Utilization Manufacturing 2000=100	Philippine Statistics Authority	first difference
89	Philippines Manufacturing Value of Production MoM 2000=100	Bloomberg	level
90	Philippines Manufacturing Value of Production 2000=100	Bloomberg	first difference
91	Automotive Production by Philippines	GAIKINDO	first difference
92	Philippines Manufacturing PMI SA	S&P Global	first difference
93	Philippines Overall Consumer Outlook Composite Index Current	Bangko Sentral ng Pilipinas	first difference
94	Philippines Overall Consumer Outlook Composite Index Next 3 Months	Bangko Sentral ng Pilipinas	level
95	Citi Philippines Financial Conditions Index	Citigroup Global Markets Asia Limited	level
96	Philippines Budget Balance Monthly	Bureau of the Treasury Philippines	level
97	Philippines Budget Balance (% GDP)	Bloomberg	first difference
98	Philippines Budget Balance (Billion USD) NSA	Bloomberg	first difference
99	Philippines Current Account Balance (% GDP)	Bloomberg	first difference
100	Philippines Current Account Balance (Billion USD) NSA	Bloomberg	first difference
101	IMF Philippines BOP Net Current Account	International Monetary Fund	level

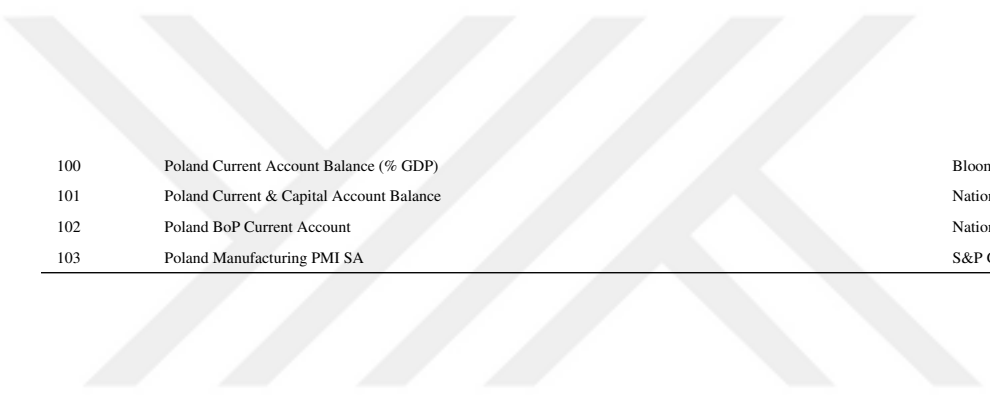
102	IMF Philippines BOP Current Account Exports Goods	International Monetary Fund	first difference
103	IMF Philippines BOP Current Account Imports Goods	International Monetary Fund	first difference
104	IMF Philippines BOP Current Account Primary Income Credit	International Monetary Fund	first difference
105	IMF Philippines BOP Current Account Net Goods & Services	International Monetary Fund	first difference
106	IMF Philippines BOP Current & Capital & Financial Account	International Monetary Fund	level

Table 25: Descriptions of Variables Related to Poland

Poland			
#	Name	Data Source	Data Transformation
Financial Variables			
1	USDPLN Spot Exchange Rate - Price of 1 USD in PLN	Bloomberg	first difference
2	EURPLN Spot Exchange Rate - Price of 1 EUR in PLN	Bloomberg	first difference
3	GBPPLN Spot Exchange Rate - Price of 1 GBP in PLN	Bloomberg	first difference
4	JPYPLN Spot Exchange Rate - Price of 100 JPY in PLN	Bloomberg	first difference
5	USDPLN 1 Month ATM Implied Volatility	Bloomberg	first difference
6	USDPLN 1 Month 25 Delta Risk Reversal	Bloomberg	first difference
7	USDPLN 1 Month 25 Delta Butterfly	Bloomberg	first difference
8	Poland Real Effective Exchange Rate Broad	Bank for International Settlements	first difference
9	Republic of Poland 5Y CDS	Bloomberg	first difference
10	GPW Benchmark WIBID/WIBOR PLN ON	Bloomberg	first difference
11	Republic of Poland Government Bond	Bloomberg	first difference
12	Republic of Poland Government Bond	Bloomberg	first difference
13	Republic of Poland Government Bond	Bloomberg	first difference
14	Republic of Poland Government Bond	Bloomberg	first difference
15	Warsaw Stock Exchange WIG Total Return Index	Warsaw Stock Exchange	first difference
16	WIG20	Warsaw Stock Exchange	first difference
17	Warsaw Stock Exchange WIG Banking Index	Warsaw Stock Exchange	first difference
18	Warsaw Stock Exchange WIG Energy Index	Warsaw Stock Exchange	first difference
19	Warsaw Stock Exchange WIG IT Index	Warsaw Stock Exchange	first difference
20	Warsaw Stock Exchange WIG Construction Index	Warsaw Stock Exchange	first difference
Housing and Orders			
22	Poland Primary Market - House Transaction Prices in 10 Cities	National Bank of Poland	first difference
23	Poland Secondary Market - House Offer Prices in 10 Cities	National Bank of Poland	first difference
24	Poland Secondary Market - House Transaction Prices in 10 Cities	National Bank of Poland	first difference
25	Poland - Sales of Construction and Assembly Production YoY	Polish Statistics Office	level
26	Poland Construction Index (2010=100)	Eurostat	first difference
27	Poland - Sales of Construction and Assembly Production MoM	Polish Statistics Office	level
28	Poland Industrial New Orders YoY	Polish Statistics Office	level
29	EC Building Activity Past 3 months Poland	European Commission	level
30	OECD Poland Work Started Construction Dwellings Residential Building Monthly	Organisation for Economic Co-operation and Development	first difference
31	Poland Non Domestic New Orders	Polish Statistics Office	first difference

32	Poland Industrial New Orders	Polish Statistics Office	first difference
Labour Market			
33	Poland Employed Persons Aged Over 15 Years	Eurostat	first difference
34	Poland Average Paid Employment Monthly	Polish Statistics Office	level
35	Poland Labour Force - Employment Rate	Polish Statistics Office	first difference
36	Poland Unemployment Job Offers End of Month	Polish Statistics Office	first difference
37	Poland Unemployment Rate	Polish Statistics Office	first difference
38	Poland Labour Force - Activity Rate	Polish Statistics Office	first difference
39	Poland Unemployment Rate	Polish Statistics Office	first difference
40	Eurostat Labor Costs Nominal Values Poland YoY WDA	Eurostat	first difference
41	Poland Unemployment Job Offers During Month	Polish Statistics Office	first difference
42	Poland Unemployment MoM	Polish Statistics Office	level
43	Poland Average Monthly Gross Wage YoY%	Polish Statistics Office	first difference
Money and Credit Quantity Aggregates			
44	Poland Liquidity Total Assets Nat Curr	International Monetary Fund	first difference
45	Poland Liquidity Liquid Assets Nat Curr	International Monetary Fund	first difference
46	Poland Liquidity Short Term Liabilities Nat Curr	International Monetary Fund	first difference
47	Poland Total Credit to Private Non Financial Sector Adjusted for Breaks	Bank for International Settlements	first difference
48	Poland Total Credit to Private Non Financial Sector Unadjusted	Bank for International Settlements	first difference
49	Poland Total Credit to Households & NPISHs Adjusted for Breaks	Bank for International Settlements	first difference
50	Poland Total Credit to Households & NPISHs Unadjusted	Bank for International Settlements	first difference
51	Poland Total Credit to Non Financial Corporations Adjusted for Breaks	Bank for International Settlements	first difference
52	Poland Total Credit to Non Financial Corporations Unadjusted	Bank for International Settlements	first difference
53	Poland Banking Sector Loans to Households Amortised in PLN	National Bank of Poland	first difference
54	Poland Banking Sector Loans to Households Real Estate Loans in PLN	National Bank of Poland	first difference
55	Poland Money Supply M0	National Bank of Poland	first difference
56	Poland Money Supply M2 ECB Standardized	National Bank of Poland	first difference
57	Poland Money Supply M3	National Bank of Poland	first difference
58	IMF Poland IIP Net Reserve Assets	International Monetary Fund	first difference
59	Poland Financial Account Reserve Assets Monetary Gold	National Bank of Poland	level
60	BIS Poland Banks Credit to Private Non Financial Sector Adjust for Breaks % GDP	Bank for International Settlements	first difference
61	BIS Poland Banks Credit to Private Non Financial Sector Adjust for Breaks in USD	Bank for International Settlements	first difference
Prices			
62	Poland Consumer Price Index (YoY %)	Bloomberg	first difference
63	Poland PPI Manufacturing YoY	Polish Statistics Office	first difference
64	Poland CPI All Items YoY	Polish Statistics Office	first difference

65	Poland PPI MoM	Polish Statistics Office	level
66	Poland PPI Mining & Quarrying MoM	Polish Statistics Office	level
67	Poland PPI Manufacturing MoM	Polish Statistics Office	level
68	Poland PPI Electricity & Gas MoM	Polish Statistics Office	level
69	Poland PPI Water Supply MoM	Polish Statistics Office	level
70	Poland Import Prices YoY	Polish Statistics Office	level
71	Poland Export Price YoY	Polish Statistics Office	level
Real Economic Activity			
72	Poland Retail Sales MoM	Polish Statistics Office	level
73	Poland Retail Sales Food Beverages & Tobacco YoY	Polish Statistics Office	level
74	Poland Retail Sales Constant Prices MoM	Polish Statistics Office	level
75	Poland Retail Sales MoM	Polish Statistics Office	level
76	Poland Retail Sales Clothing & Footwear YoY	Polish Statistics Office	level
77	Poland Retail Sales Constant Prices Other Retail Sales in Non Spec Stores YoY	Polish Statistics Office	first difference
78	Poland Retail Sales Constant Prices Furniture Radio TV & Hhold Appliances YoY	Polish Statistics Office	level
79	Poland Retail Sales Constant Prices Newsprs Books Other Sales in Spec Stores MoM	Polish Statistics Office	level
80	Poland Retail Sales Fuels MoM	Polish Statistics Office	level
81	European Commission Retail Trade Confidence Poland Volume of Stocks	European Commission	first difference
82	OECD Poland Sales Retail Trade Volume Index	Organisation for Economic Co-operation and Development	first difference
83	OECD Poland Sales Retail Trade Volume Index SA	Organisation for Economic Co-operation and Development	first difference
84	OECD Poland Sales Retail Trade Volume Growth SA	Organisation for Economic Co-operation and Development	level
85	OECD Poland Sales Retail Trade Volume Growth SA	Organisation for Economic Co-operation and Development	level
86	Eurostat Retail Sales Poland Volume SA	Eurostat	first difference
87	OECD Poland Business Tendency Survey Retail Trade Confidence Composite Natnl SA	Organisation for Economic Co-operation and Development	first difference
88	OECD Poland Business Tendency Manufacturing Confidence Composite Natnl SA	Organisation for Economic Co-operation and Development	first difference
89	OECD Poland Business Tendency Manufacturing Confidence Composite Natnl SA	Organisation for Economic Co-operation and Development	first difference
90	European Commission Retail Confidence Poland Present Business Situation	European Commission	first difference
91	European Commission Consumer Confidence Indicator Poland	European Commission	first difference
92	EC Consumer Confidence Poland Price Trends Over the Next 12 Month	European Commission	first difference
93	EC Consumer Confidence Poland Price Trends Over the Last 12 Month	European Commission	first difference
94	IMF Poland Household Consumption Expenditure Including NPISHs	International Monetary Fund	first difference
95	Poland Trade Balance (Billion USD) NSA	Bloomberg	first difference
96	Poland Exports (Billion USD) NSA	Bloomberg	first difference
97	Poland - Central Govt Budget Cumulative Balance	Ministry of Finance, Poland	level
98	OECD Poland Non-Consolidated Financial B/S - Household & NPISH Liabilities	Organisation for Economic Co-operation and Development	first difference
99	Eurostat Non Finl Accounts for General Govt Net Lending Net Borrowing Poland	Eurostat	first difference



100	Poland Current Account Balance (% GDP)	Bloomberg	first difference
101	Poland Current & Capital Account Balance	National Bank of Poland	first difference
102	Poland BoP Current Account	National Bank of Poland	level
103	Poland Manufacturing PMI SA	S&P Global	first difference

Table 26: Descriptions of Variables Related to Russia

Russia			
#	Name	Data Source	Data Transformation
Financial Variables			
1	USDRUB Spot T+1 (TOM) Exchange Rate - Price of 1 USD in RUB	Bloomberg	first difference
2	EURRUB Spot Exchange Rate - Price of 1 EUR in RUB	Bloomberg	first difference
3	GBPRUB Spot Exchange Rate - Price of 1 GBP in RUB	Bloomberg	first difference
4	JPYRUB Spot Exchange Rate - Price of 100 JPY in RUB	Bloomberg	first difference
5	Russia Real Effective Exchange Rate Broad	Bank for International Settlements	first difference
6	USDRUB 1 Month ATM Implied Volatility	Bloomberg	first difference
7	USDRUB 1 Month 25 Delta Risk Reversal	Bloomberg	level
8	USDRUB 1 Month 25 Delta Butterfly	Bloomberg	first difference
9	Russian Federation 5Y CDS	Bloomberg	first difference
10	MOEX Russia Index	MICEX	first difference
11	Russian Federal Bond - OFZ	Bloomberg	first difference
12	Russian Federal Bond - OFZ	Bloomberg	first difference
13	Russian Federal Bond - OFZ	Bloomberg	first difference
14	Russian Federal Bond - OFZ	Bloomberg	first difference
15	MOEX Oil and Gas Index	MICEX	first difference
16	MOEX 10 Index	Moscow Stock Exchange	first difference
17	MOEX Financials Index	MICEX	first difference
18	MOEX Metals and Mining Index	MICEX	first difference
19	MOEX Consumer Index	Moscow Stock Exchange	first difference
20	RUB 1 Week Deposit	Bloomberg	first difference
21	RUB Russia Sovereign 1 Year	Bloomberg	first difference
22	RUB Russia Sovereign 2 Year	Bloomberg	first difference
23	RUB Russia Sovereign 5 Year	Bloomberg	first difference
24	RUB Russia Sovereign 10 Year	Bloomberg	first difference
Housing and Orders			
25	Russia Construction Contracts Real YoY	Federal Service of State Statistics	level
26	Russia Residential Construction YoY	Federal Service of State Statistics	level
27	Russia Housing Prices Existing Apartments	Federal Service of State Statistics	first difference
28	Russia Housing Prices New Apartments	Federal Service of State Statistics	first difference
29	Office Price per Square Foot in USD Moscow	RCA	first difference
30	Industrial Price per Square Foot in USD Moscow	RCA	first difference
31	Retail Price per Square Foot in USD Moscow	RCA	first difference

32	Russia Housing Prices Existing Apartments of Low Quality	Federal Service of State Statistics	first difference
33	Russia Housing Prices Existing Apartments of Improved Quality	Federal Service of State Statistics	first difference
34	Russia Housing Prices Existing Apartments of Average Quality	Federal Service of State Statistics	first difference
35	Russia Housing Prices Existing Luxury Apartments	Federal Service of State Statistics	first difference
36	Russia Housing Prices New Apartments of Improved Quality	Federal Service of State Statistics	first difference
37	Russia Housing Prices New Apartments of Average Quality	Federal Service of State Statistics	first difference
38	Russia Moscow Property Prices	Analytical Centre IRN Russia	first difference
39	Russia Housing Prices New Luxury Apartments	Federal Service of State Statistics	first difference
Labour Market			
40	Russia Unemployment Rate (%)	Bloomberg	first difference
41	Russia Labor Force Participation Rate	Federal Service of State Statistics	first difference
42	Registered Unemployed in Russia in mln.	Federal Service of State Statistics	first difference
43	Russia Demand for Workforce as Registered by Firms with Employment Service	Federal Service of State Statistics	first difference
44	Russia Real Monthly Wages YoY	Federal Service of State Statistics	first difference
45	Russia Nominal Monthly Wages YoY	Federal Service of State Statistics	first difference
46	Russia Average Weekly Hours Worked	Federal Service of State Statistics	first difference
47	Russia Total Weekly Hours Worked	Federal Service of State Statistics	first difference
48	Russia Employees Worked Less than 9 Hours per Week	Federal Service of State Statistics	first difference
49	Russia Employees Worked from 16 to 20 Hours per Week	Federal Service of State Statistics	first difference
50	Russia Employees Worked from 31 to 40 Hours per Week	Federal Service of State Statistics	first difference
51	Russia Employees Worked from 41 to 50 Hours per Week	Federal Service of State Statistics	first difference
Money and Credit Quantity Aggregates			
52	Russia Liquidity Total Assets Nat Curr	International Monetary Fund	first difference
53	Russia Liquidity Liquid Assets Nat Curr	International Monetary Fund	first difference
54	Russia Liquidity Short Term Liabilities Nat Curr	International Monetary Fund	first difference
55	Russia Total Loans used in Commercial Real Estate Loans to Total Loans	International Monetary Fund	first difference
56	Russia Total Debt on Mortgage Loans	The Central Bank of the Russian Federation	first difference
57	Russia Total Loans used in Residential Real Estate Loans to Total Loans	International Monetary Fund	first difference
58	Debt on Extended Loans Overdue in For Currency	The Central Bank of the Russian Federation	first difference
59	Debt on Extended Loans Overdue in Rubles	The Central Bank of the Russian Federation	first difference
60	Russia Loans to Corps and Individual Entrepreneurs RUB	The Central Bank of the Russian Federation	first difference
61	Russia Loans to Corps & Enterp Manufacturing of Food Beverages & Tobacco FC	The Central Bank of the Russian Federation	first difference
62	Russia Money Supply M2 (Billion USD) NSA	Bloomberg	first difference
63	Russia Monetary Base Currency Issued	The Central Bank of the Russian Federation	first difference
64	Russia Monetary Base Currency Issued	The Central Bank of the Russian Federation	first difference
65	Russia Monetary Base Required Reserves	The Central Bank of the Russian Federation	first difference

66	Russia Monetary Base Deposit Accounts Balances with Central Bank	The Central Bank of the Russian Federation	first difference
67	Russia Monetary Base Central Bank Bonds Held by Banks	The Central Bank of the Russian Federation	first difference
68	Credit Institutions Assets - Banking Sector Assets	The Central Bank of the Russian Federation	first difference
69	Credit Institutions - Banking Sector Liabilities	The Central Bank of the Russian Federation	first difference
70	Russia International Reserves monthly value	The Central Bank of the Russian Federation	first difference
71	Russia International Reserves Excluding Gold	The Central Bank of the Russian Federation	first difference
72	Russia International Reserves Gold	The Central Bank of the Russian Federation	first difference
73	Russia Banking Liquidity Change in Cash in Circulation (outside of CBR)	The Central Bank of the Russian Federation	first difference
74	Russia Banking Liquidity Change in Gov Accounts with CBR	The Central Bank of the Russian Federation	first difference
75	Russia Banking Liquidity Change in Required Reserves Accounts with CBR	The Central Bank of the Russian Federation	first difference
76	Russia Banking Liquidity CBR Interventions on the Domestic FX Market	The Central Bank of the Russian Federation	first difference
77	Russia Banking Liquidity CBR Net Operations to Provide and Absorb Liquidity	The Central Bank of the Russian Federation	first difference
Prices			
78	Russia CPI YoY	Federal Service of State Statistics	first difference
79	Russia CPI Foodstuffs YoY	Federal Service of State Statistics	first difference
80	Russia CPI Non Food YoY	Federal Service of State Statistics	first difference
81	Russia CPI Services YoY	Federal Service of State Statistics	first difference
82	Russia COU Housing Services YoY	Federal Service of State Statistics	first difference
83	Russia CPI Utility Services YoY	Federal Service of State Statistics	first difference
84	Russia Core Inflation YoY	Federal Service of State Statistics	first difference
85	Russia CPI Gasoline Prices WoW	Federal Service of State Statistics	level
86	Russia PPI 2000=100 YoY	Federal Service of State Statistics	first difference
87	Russia PPI Mining and Quarrying YoY	Federal Service of State Statistics	level
88	Russia PPI Manufacturing YoY	Federal Service of State Statistics	first difference
Real Economic Activity			
89	Russia Industrial Production YoY	Federal Service of State Statistics	level
90	Russian Industrial Production SWDA MoM	Federal Service of State Statistics	level
91	Russia Composite PMI SA	S&P Global	first difference
92	Russia Business Confidence Manufacturing	Federal Service of State Statistics	first difference
93	Russia Business Confidence Mining Industry	Federal Service of State Statistics	first difference
94	Russia Business Confidence Distribution of Electricity Gas and Water Supply	Federal Service of State Statistics	first difference
95	Russia Retail Sales Real YoY	Federal Service of State Statistics	level
96	Russia Retail Sales Real MoM	Federal Service of State Statistics	level
97	Russia Car Sales YoY	AEB	level
98	Russia Consumer Confidence Overall	Federal Service of State Statistics	first difference
99	Russia Consumer Confidence Conditions for Major Purchases	Federal Service of State Statistics	first difference

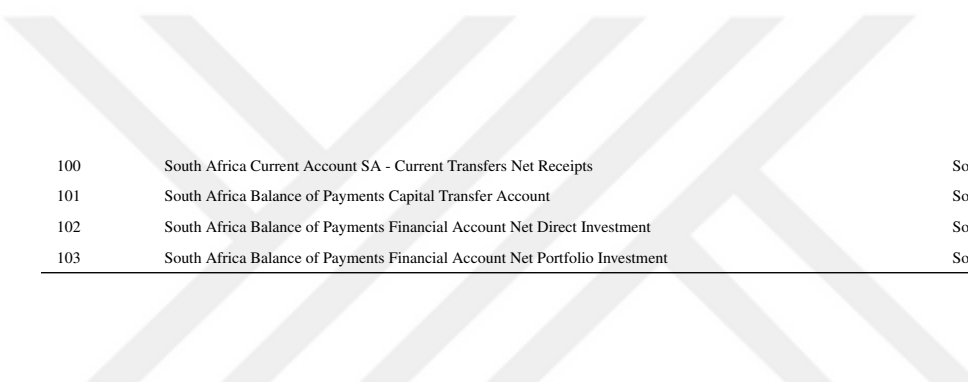
100	Russia Consumer Sentiment Index March 2008=100%	Bloomberg	first difference
101	Russia Social Sentiment Index March 2008=100%	Bloomberg	first difference
102	Russia Current Account	The Central Bank of the Russian Federation	first difference
103	Russia Current Account Balance (% GDP)	Bloomberg	level
104	Russia Net Private Sector Capital Flow	The Central Bank of the Russian Federation	first difference
105	Russia Net Private Sector Capital Flow Banks	The Central Bank of the Russian Federation	first difference
106	Russia Net Private Sector Capital Flow Non Financial Entprses Households	The Central Bank of the Russian Federation	first difference
107	Russia Merchandise Trade Balance	The Central Bank of the Russian Federation	first difference
108	Russia Merchandise Trade Exports	The Central Bank of the Russian Federation	first difference
109	Russia Merchandise Trade Imports	The Central Bank of the Russian Federation	first difference
110	Citi Commodities Terms of Trade Index - Russia	Citi - Cross Asset	first difference
111	Russia Federal Budget Cumulative Balance	Russian Ministry Of Finance	level
112	Russia Federal Budget Cumulative Revenues	Russian Ministry Of Finance	first difference
113	Russia Federal Budget Cumulative Expenditures	Russian Ministry Of Finance	level
114	Russia Federal Budget Monthly Balance	Russian Ministry Of Finance	level
115	Russia Wellbeing Fund USD	Russian Ministry Of Finance	first difference
116	Russia GDP Gross Capital Formation Const Prices NSA YoY	Federal Service of State Statistics	first difference
117	Russia GDP Const Prices YOY	Federal Service of State Statistics	level
118	Bloomberg Economics Russia Output Gap Estimate	Bloomberg	first difference

Table 27: Descriptions of Variables Related to South Africa

South Africa			
#	Name	Data Source	Data Transformation
Financial Variables			
1	USDZAR Spot Exchange Rate - Price of 1 USD in ZAR	Bloomberg	first difference
2	EURZAR Spot Exchange Rate - Price of 1 EUR in ZAR	Bloomberg	first difference
3	GBPZAR Spot Exchange Rate - Price of 1 GBP in ZAR	Bloomberg	first difference
4	JPYZAR Spot Exchange Rate - Price of 1 JPY in ZAR	Bloomberg	first difference
5	USDZAR 1 Month ATM Implied Volatility	Bloomberg	first difference
6	USDZAR 1 Year 25 Delta Risk Reversal	Bloomberg	first difference
7	USDZAR 1 Month 25 Delta Butterfly	Bloomberg	first difference
8	South Africa Real Effective Exchange Rate Broad	Bank for International Settlements	first difference
9	Republic of South Africa 5Y CDS	Bloomberg	first difference
10	South Africa Repo Avg Rate	South African Reserve Bank	first difference
11	South Africa Govt Bonds 2 Year Note Generic Bid Yield	Bloomberg	first difference
12	South Africa Govt Bonds 3 Year Note Generic Bid Yield	Bloomberg	first difference
13	South Africa Govt Bonds 5 Year Note Generic Bid Yield	Bloomberg	first difference
14	South Africa Govt Bonds 10 Year Note Generic Bid Yield	Bloomberg	first difference
15	FTSE/JSE Africa Top40 Tradeable Index	FTSE	first difference
16	FTSE/JSE Financials Index ZAR	FTSE	first difference
17	FTSE/JSE Basic Materials Index ZAR	FTSE	first difference
18	FTSE/JSE Industrials Index ZAR	FTSE	first difference
19	FTSE/JSE Africa Gold Mining Index	FTSE	first difference
20	IIF Emerging Markets Portfolio Flows Tracker Equity South Africa	Institute of International Finance - IIF	level
21	Japan Portfolio Investment to South Africa Long-term Debt Securities (net)	Ministry of Finance Japan	level
Housing and Orders			
22	Trade Activity Index Backlog on Orders	South African Chamber of Commerce and Industry	first difference
23	Trade Expectations Index Backlog on Orders	South African Chamber of Commerce and Industry	first difference
24	Trade Activity Index New Orders	South African Chamber of Commerce and Industry	first difference
25	Trade Expectations Index New Orders	South African Chamber of Commerce and Industry	first difference
26	SA Recorded Building Plans Total SA	Statistics South Africa	first difference
27	SA Recorded Building Plans Residential Buildings SA	Statistics South Africa	first difference
28	SA Recorded Building Plans Non-Residential Buildings SA	Statistics South Africa	level
29	SA Recorded Building Plans Additions and Alterations SA	Statistics South Africa	first difference
30	SA Completed Buildings Recorded Total SA	Statistics South Africa	first difference
31	SA Completed Buildings Recorded Residential Buildings SA	Statistics South Africa	first difference

32	SA Completed Buildings Recorded Non-Residential Buildings SA	Statistics South Africa	level
33	SA Completed Buildings Recorded Additions and Alterations SA	Statistics South Africa	first difference
Labour Market			
34	Trade Activity Index Employment	South African Chamber of Commerce and Industry	first difference
35	South Africa ABSA PMI Employment SA	Bureau For Economic Research	first difference
36	South Africa Labour - Not in the Labor Force	Statistics South Africa	first difference
37	OECD South Africa Unit Labour Cost Manufacturing Index SA	Organisation for Economic Co-operation and Development	first difference
38	South Africa Number of Employees Nonagricultural Industries	Statistics South Africa	first difference
39	South Africa Unemployment Rate (%)	Bloomberg	first difference
40	South Africa Labour - Discouraged Workseekers	Statistics South Africa	first difference
41	South Africa Labour - Unemployed	Statistics South Africa	first difference
Money and Credit Quantity Aggregates			
42	South Africa Total Liquidations	Statistics South Africa	first difference
43	South Africa Liquidations Cos	Statistics South Africa	first difference
44	South Africa Private Credit Extension	South African Reserve Bank	first difference
45	South Africa Private Credit Extension Investments	South African Reserve Bank	first difference
46	South Africa Private Credit Extension Bills Discounted	South African Reserve Bank	first difference
47	South Africa Private Credit Extension Total Loans and Advances	South African Reserve Bank	first difference
48	South Africa Private Credit Extension Installment Sales Credit	South African Reserve Bank	first difference
49	South Africa Private Credit Extension Leasing Finance	South African Reserve Bank	level
50	South Africa Private Credit Extension Mortgage Advances	South African Reserve Bank	first difference
51	South Africa Private Credit Extension Of Which To Households	South African Reserve Bank	first difference
52	South Africa Money Supply M0	South African Reserve Bank	first difference
53	South Africa Money Supply M1	South African Reserve Bank	first difference
54	South Africa Money Supply M2	South African Reserve Bank	first difference
55	South Africa Money Supply M3	South African Reserve Bank	first difference
56	South Africa Net Open Foreign Currency Position	South African Reserve Bank	first difference
57	South Africa Gold Reserves	South African Reserve Bank	first difference
58	South Africa Private Credit Extension YoY	South African Reserve Bank	level
Prices			
59	South Africa CPI	Statistics South Africa	first difference
60	South Africa CPI YoY	Statistics South Africa	first difference
61	South Africa ABSA PMI Prices NSA	Bureau For Economic Research	first difference
62	South Africa CPI Alcohol Tobacco YoY	Statistics South Africa	first difference
63	South Africa PPI Final Manufactured Goods YoY	Statistics South Africa	first difference
64	South Africa CPI Food and Non Alcohol YoY	Statistics South Africa	level

65	South Africa CPI House Contents and Equipment YoY	Statistics South Africa	level
66	South Africa CPI Health With Insurance YoY	Statistics South Africa	level
67	South Africa CPI Transport YoY	Statistics South Africa	first difference
Real Economic Activity			
68	South Africa Retail Sales Total Real SA	Statistics South Africa	first difference
69	South Africa Wholesale Trade Constant 2015 Prices SA	Statistics South Africa	first difference
70	NAAMSA South Africa Total Vehicle Sales Level	NAAMSA	first difference
71	South Africa Manufacturing Production SA 2019=100	Statistics South Africa	first difference
72	South Africa Manufacturing Production Food & Beverages SA	Statistics South Africa	first difference
73	South Africa Manufacturing Production Textile Leather Footwear SA	Statistics South Africa	first difference
74	South Africa Manufacturing Production Wood Paper Publish Print SA	Statistics South Africa	first difference
75	South Africa Manufacturing Production Petroleum Chemical Prod SA	Statistics South Africa	first difference
76	South Africa Manufacturing Production Petroleum & Nuclear Fuel SA	Statistics South Africa	first difference
77	South Africa Manufacturing Production Iron Steel Nonferrous Metal SA	Statistics South Africa	first difference
78	South Africa Mining Sales Total Including Gold SA	Statistics South Africa	first difference
79	South Africa Mining Sales Total Excluding Gold SA	Statistics South Africa	first difference
80	SACCI South Africa Business Confidence	South African Chamber of Commerce and Industry	first difference
81	Composite Business Cycle Indicator - Leading Indicator	South African Reserve Bank	first difference
82	Composite Business Cycle Indicator - Coincident Indicator	South African Reserve Bank	first difference
83	South Africa Electricity Production Index Year on Year %	Statistics South Africa	level
84	South Africa Consumer Confidence	Bureau For Economic Research	level
85	South Africa Consumer Confidence Economic Position in Next 12m	Bureau For Economic Research	first difference
86	South Africa Consumer Confidence Rating of Present Time To Buy Durables	Bureau For Economic Research	first difference
87	South Africa Household Debt to Disposable Income of Households	South African Reserve Bank	first difference
88	South Africa Utilization of Production Capacity	Statistics South Africa	first difference
89	South Africa Trade Balance Incl Oil Arms & Bullion	South African Revenue Service	level
90	South Africa Trade Balance Exports Incl Oil Arms & Bullion	South African Revenue Service	first difference
91	South Africa Trade Export Other Gd	South African Revenue Service	first difference
92	South Africa Trade Balance Imports Incl Oil Arms & Bullion	South African Revenue Service	first difference
93	South Africa Budget Summary National Budget Balance	South Africa National Treasury	level
94	South Africa Budget Summary National Expenditures	South Africa National Treasury	first difference
95	South Africa Budget Summary National Revenue	South Africa National Treasury	level
96	South Africa Current Account SA	South African Reserve Bank	first difference
97	South Africa Current Account SA - Merchandise Exports Free on Board	South African Reserve Bank	first difference
98	South Africa Current Account SA - Net Gold Exports	South African Reserve Bank	first difference
99	South Africa Current Account SA - Less Merchandise Imports	South African Reserve Bank	first difference



100	South Africa Current Account SA - Current Transfers Net Receipts	South African Reserve Bank	first difference
101	South Africa Balance of Payments Capital Transfer Account	South African Reserve Bank	first difference
102	South Africa Balance of Payments Financial Account Net Direct Investment	South African Reserve Bank	level
103	South Africa Balance of Payments Financial Account Net Portfolio Investment	South African Reserve Bank	level

Table 28: Descriptions of Variables Related to Turkey

Turkey			
#	Name	Data Source	Data Transformation
Financial Variables			
1	USDTRY Spot Exchange Rate - Price of 1 USD in TRY	Bloomberg	first difference
2	EURTRY Spot Exchange Rate - Price of 1 EUR in TRY	Bloomberg	first difference
3	JPYTRY Spot Exchange Rate - Price of 100 JPY in TRY	Bloomberg	first difference
4	CHFTRY Spot Exchange Rate - Price of 1 CHF in TRY	Bloomberg	first difference
5	USDTRY 1 Month ATM Implied Volatility	Bloomberg	level
6	USDTRY 1 Month 25 Delta Risk Reversal	Bloomberg	level
7	Turkey Real Effective Exchange Rate Broad	Bank for International Settlements	first difference
8	Republic of Turkiye 5Y CDS /The	Bloomberg	first difference
9	TEB O/N Repo Average Index	Bloomberg	first difference
10	Turkish Government Bond 3M Compound Yield	Bloomberg	first difference
11	Turkish Government Bond 6M Compound Yield	Bloomberg	first difference
12	Turkish Government Bond 1Y Compound Yield	Bloomberg	first difference
13	Turkish Government Bond 3Y Compound Yield	Bloomberg	first difference
14	Turkish Government Bond 5Y Compound Yield	Bloomberg	first difference
15	Weighted Average Interest Rates for Turkish Banks Loans - Cash	Central Bank of Turkey	first difference
16	Weighted Average Interest Rates for Banks Loans - Vehicles	Central Bank of Turkey	first difference
17	Weighted Average Interest Rates for Banks Loans - Housing	Central Bank of Turkey	first difference
18	Borsa Istanbul 100 Index	Istanbul Stock Exchange	first difference
19	Borsa Istanbul Banks Sector Index	Istanbul Stock Exchange	first difference
20	Borsa Istanbul Industrials Sector Index	Istanbul Stock Exchange	first difference
21	Borsa Istanbul Services Sector Index	Istanbul Stock Exchange	first difference
22	Turkey Non-Residents Holdings of Equity Stock	Central Bank of Turkey	first difference
23	Turkey Non-Residents Holdings Government Domestic Debt Securities (GDSS) Stock	Central Bank of Turkey	first difference
24	USD Turkey Govt Bond Generic Bid Yield 2 Year	Bloomberg	first difference
25	USD Turkey Govt Bond Generic Bid Yield 5 Year	Bloomberg	first difference
26	USD Turkey Govt Bond Generic Bid Yield 10 Year	Bloomberg	first difference
27	USD Turkey Govt Bond Generic Bid Yield 20 Year	Bloomberg	first difference
Housing and Orders			
28	Turkey Home Sales YoY	Turkish Statistical Institute	level
29	Turkey New Housing Price Index - Ankara	Central Bank of Turkey	first difference
30	Turkey New Housing Price Index - Istanbul	Central Bank of Turkey	first difference
31	Turkey New Housing Price Index - Izmir	Central Bank of Turkey	first difference

32	Turkey New Housing Price Index	Central Bank of Turkey	first difference
33	Turkey Real Sector Confidence Index Volume of Orders (Current Situation)	Central Bank of Turkey	first difference
34	Turkey Real Sector Confidence Stocks of Finished Goods (Current Situation) SA	Central Bank of Turkey	first difference
35	Turkey Real Sector Confidence Index Export Orders (Next 3 Months) SA	Central Bank of Turkey	first difference
Labour Market			
36	Turkey Labor Statistics Unemployment Rate SA	Turkish Statistical Institute	first difference
37	Turkey Labor Statistics Employment Rate SA	Turkish Statistical Institute	first difference
38	Turkey Unemployment Youth Unemployment Rate	Turkish Statistical Institute	first difference
39	Turkey Labor Statistics Labor Participation Rate SA	Turkish Statistical Institute	first difference
40	Electricity Gas & Water	Turkish Statistical Institute	first difference
41	Turkey Construction in Thousands	Turkish Statistical Institute	first difference
42	Wholesale & Retail Trade	Turkish Statistical Institute	first difference
43	Transportation & Communication	Turkish Statistical Institute	first difference
44	Finance & Insurance	Turkish Statistical Institute	first difference
45	Community Social & Personal Services	Turkish Statistical Institute	first difference
46	Turkey Unemployment Rate (%)	Bloomberg	first difference
47	Turkey Labor Force	Turkish Statistical Institute	first difference
48	Turkey Employed	Turkish Statistical Institute	first difference
49	Turkey Unemployment Monthly	Turkish Statistical Institute	first difference
50	Turkey Unemployment Labor Force Participation Rate	Turkish Statistical Institute	first difference
51	Turkey Unemployment Non-agricultural Unemployment Rate	Turkish Statistical Institute	first difference
52	Turkey Unemployment Youth Unemployment Rate	Turkish Statistical Institute	first difference
53	Turkey Unemployment Not in The Labor Force	Turkish Statistical Institute	first difference
Money and Credit Quantity Aggregates			
54	Turkey Consumer Loans Total	Central Bank of Turkey	first difference
55	Deposit Money Banks Loans Private Sector - Housing	Central Bank of Turkey	first difference
56	Deposit Money Banks Loans Private Sector - Consumer & Other	Central Bank of Turkey	first difference
57	Deposit Money Banks Loans Private Sector	Central Bank of Turkey	first difference
58	Turkey Money Supply M1	Central Bank of Turkey	first difference
59	Turkey New Money Supply M2	Central Bank of Turkey	first difference
60	Turkey New Money Supply M3	Central Bank of Turkey	first difference
61	Turkey Money Supply Time Deposits TRY	Central Bank of Turkey	first difference
62	Turkey Money Supply Sight Deposits FX	Central Bank of Turkey	first difference
63	Turkey Money Supply Sight Deposits TRY CBRT	Central Bank of Turkey	level
64	Turkey Money Supply Bank Vaults	Central Bank of Turkey	first difference
65	Turkey Money Supply Sight Deposits TRY	Central Bank of Turkey	first difference

66	Turkish Money Supply Time Deposits FX	Central Bank of Turkey	first difference
67	Turkey Gross Foreign Exchange Reserves (Weekly)	Central Bank of Turkey	first difference
68	Turkey Money Supply Repos	Central Bank of Turkey	first difference
69	Turkey Money Supply Money Market Funds	Central Bank of Turkey	first difference
70	Weighted Average Interest Rates for Banks Loans - Commercial	Central Bank of Turkey	first difference
Prices			
71	Turkey Consumer Price Index 2010=100 NSA	Bloomberg	first difference
72	Turkey Domestic PPI Mining & Quarrying YoY	Turkish Statistical Institute	first difference
73	Turkey Domestic PPI Food Products YoY	Turkish Statistical Institute	first difference
74	Turkey Domestic PPI Coke & Refined Petroleum Products YoY	Turkish Statistical Institute	level
75	Turkey Domestic PPI Motor Vehicles Trailers & Semi-Trailers YoY	Turkish Statistical Institute	first difference
76	Turkey Domestic PPI Electricity Gas Steam & Air Conditioning YoY	Turkish Statistical Institute	level
77	Turkey CPI	Turkish Statistical Institute	first difference
78	Turkey CPI Food & Non Alcoholic Beverages	Turkish Statistical Institute	first difference
79	Turkey CPI Alcoholic Beverages & Tobacco	Turkish Statistical Institute	first difference
80	Turkey CPI Housing Water Electricity Gas & Other Fuels	Turkish Statistical Institute	first difference
81	Turkey CPI Furnishings Household Equipment & Routine House Maintenance	Turkish Statistical Institute	first difference
82	Turkey CPI Transport	Turkish Statistical Institute	first difference
83	Turkey Domestic PPI YoY	Turkish Statistical Institute	first difference
84	Turkey Domestic PPI Manufacturing YoY	Turkish Statistical Institute	first difference
Real Economic Activity			
85	Turkey Manufacturing PMI SA	S&P Global	first difference
86	Turkey Industrial Production NSA YoY	Turkish Statistical Institute	level
87	Turkey Industrial Production WDA YoY	Turkish Statistical Institute	level
88	Turkey Industrial Production SWDA MoM	Turkish Statistical Institute	level
89	Turkey Confidence Index Real Sector	Central Bank of Turkey	first difference
90	Turkey Consumer Confidence	Turkish Statistical Institute	first difference
91	Turkey Trade Balance (Billion USD) NSA	Bloomberg	first difference
92	Turkey Industry Turnover 2010=100	Turkish Statistical Institute	first difference
93	Turkey Industrial Production	Turkish Statistical Institute	first difference
94	Turkey Industrial Production Manufacturing	Turkish Statistical Institute	first difference
95	Turkey Industrial Production Mining and Quarrying	Turkish Statistical Institute	first difference
96	Turkey Industrial Production Electricity Gas Steam and Air Conditioning Supply	Turkish Statistical Institute	first difference
97	Turkey Motor Vehicle Industry Production Total	OSD	first difference
98	Turkey Capacity Utilization NSA	Central Bank of Turkey	first difference
99	Turkey Balance of Payments Portfolio Investment Liabilities	Central Bank of Turkey	level

100	Turkey Balance of Payments Net Errors & Omissions	Central Bank of Turkey	level
101	Turkey Balance of Payments Direct Investment in Turkey	Central Bank of Turkey	level
102	Turkey Domestic Debt Position Total	Central Bank of Turkey	first difference
103	Turkey Budget Deficit Primary Balance Before Interest	Republic of Turkey Ministry of Treasury and Finance	level
104	Turkey Trade Balance	Turkish Statistical Institute	first difference
105	Turkey Total Exports	Turkish Statistical Institute	first difference
106	Turkey Total Imports	Turkish Statistical Institute	first difference
107	Turkey Balance of Payments Current Account	Central Bank of Turkey	level
108	Turkey GDP Constant Prices	Turkish Statistical Institute	first difference

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VITA

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