



Doctoral School of International
Relations and Political Science

MONETARY POLICY SPILLOVERS

The Impact of Advanced Central Banks' Decisions on Emerging
Financial Markets

Thesis summary

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I. Introduction

Globalization has exerted a profound impact on international relations, fundamentally shaping economic and political dynamics over recent decades. Despite this global shift, the discourse around macroeconomic policies has predominantly centered on the national stage. On the other hand, several authors in the literature argued that interest rates on domestic financial markets are significantly correlated, and asset price dynamics are impossible to analyze without understanding the international environment (Rey, 2016; Takats & Vela, 2014).

Since the Global Financial Crisis, intensive international capital flows have characterized the global economy. Large amounts of portfolio investment flew from advanced to emerging countries, particularly to the government bond markets, as the largest central banks applied aggressive monetary easing to stimulate the economy, increasing hard-currency asset prices significantly (Anaya, Hachula, & Offermanns, 2017; Koepke, 2018; Ramírez & González, 2017).

Many researchers have found that the post-crisis monetary policy of the largest central banks, - especially the unconventional policy measures such as the quantitative easing programs - had a sizeable impact on the pricing of financial assets domestically and internationally. While the domestic impact is regarded as monetary transmission and the direct result of the monetary policy decisions, the cross-border impact, the so-called 'spillover effect', is less intuitive. The puzzling question for economists, investors, and policymakers is the following: to what extent do large central banks influence emerging financial markets?

The seminal contribution of Mundell and Fleming formed the foundation for policy choices and deduces the potential interconnections influencing the decisions of sovereign economic policymakers. However, the evolving international financial landscape and the frequent choice of countries not to adhere strictly to the policy trilemma call for a reconsideration of the original explanation. Aizenman argues that financial stability became an important goal for emerging countries as a result of a decade-long history of financial crises, even though the primary goal is expressed in a framework of inflation targeting or exchange rate peg. The policy tool for achieving financial stability is the hoarding of international reserves, broadly similar to the actual reserve management behavior of some emerging countries recently (Aizenman, 2019; Aizenman & Ito, 2012).

Another empirically driven theory is the Global Financial Cycle, which has become popular in the last decade. This suggests that major players, notably some of the advanced central banks, especially the Federal Reserve in the US, generate waves in external financial conditions that impact all smaller, non-core countries (Coeurdacier & Rey, 2013; Miranda-Agrippino & Rey, 2022). This theory not only elucidates the linkage between financial markets at the price level but is also in line with specific capital flows scrutinized by the authors. Both approaches assume that global financial markets are interconnected, but the nature of this relationship is debated.

Several empirical papers focused on the actual relationship between advanced monetary policy decisions and the financial conditions in emerging countries. They empirically confirmed that the impact of the Federal Reserve is undeniable, though the European Central Bank is also an important player in the global financial markets. From the perspective of smaller, emerging, open economies, the ability of shock absorption differs, and several factors may influence it. While external financial conditions can influence domestic financial markets in several ways, channels of adjustment (like flexible exchange rates) and policy choices may help mitigate these effects (Albu, Lupu, Călin, & Popovici, 2014; Bauer & Neely, 2012; Chen, Filardo, He, & Zhu, 2011; Fratzscher, Lo Duca, & Straub, 2017; Tillmann, 2016; Zorzi, Dedola, Georgiadis, & Jarociński, 2020).

Overall, the literature review motivated the following research agenda. First, the size of monetary policy spillovers and the power of each central bank will be examined in a coherent framework but carefully considering methodological issues that may arise during the estimation. Second, shock recipients emerging countries are regarded in a geographical breakdown. Thus, each central bank's power will be discussed at a regional level. After doing that, the sensitivity of recipient countries is discussed. This calls for a framework that assesses this feature of economies in a comparable and consistent way. Finally, this sensitivity is contrasted with macroeconomic factors, such as business cycle and external stability. The policy choices, including openness, monetary policy autonomy, and FX rate stability, are contrasted with the countries' sensitivity to external financial conditions.

II. Methodology

The aim of the thesis is to reveal some parts of cross-border financial linkages, particularly the impact of advanced central banks on emerging government bond markets. The main goal of the thesis is to quantify so-called 'monetary policy spillovers', examine them exhaustively with particular regard to regional differences, and provide a brief discussion on the factors that relate to the sensitivity of emerging countries to changes in the external financial environment.

A technical definition of the term 'monetary policy spillovers' shall be made. Throughout the research chapters, it is used parallelly with the term 'cross-border impact of large central banks' and means a direct relationship between advanced monetary policy (and therefore the short-term interest rates in the respective countries) and the long-term government bond yields in emerging countries, therefore, a direct financial market transmission of the advanced financial conditions. Based on common definitions, the calculations attempt to offset the impact of occasional changes in investors' risk sentiment, the impact of local (emerging) central banks' simultaneous monetary policy changes, and any second-round impacts such as macroeconomic spillovers or trade linkages. However, it is not always feasible. In these cases, the arguments are either more general (in Chapter 4) or slightly different (in Chapter 7).

In general, the empirical framework is designed to find a systematical relationship between variables of interest related to shock origins (mostly to advanced markets) and shock recipient countries. The analysis initiates with a broad perspective, applying time-series methods, and subsequently transitions to a more targeted panel approach that allows for the consideration of country heterogeneity. The last chapter uses a slightly different dataset and follows the goals of the analysis to investigate some long-term features of individual countries in the sample further.

Operatively, the main goal is to adequately analyze the dataset collected during the research phase, which is not necessarily straightforward. Several additional steps were needed, such as data cleaning, verification, transformations of variables, tests, and checks. In general, we regard long-term government bond yields in emerging countries as the dependent variable and shock variables, mostly short-term rates or policy decisions of advanced markets, as a key independent variable, the variable of interest.

In the first research chapter, **time-series methods were applied to aggregate data as an introductory approach** (Chapter 4). The examined dataset consists of a set of different time series with a certain frequency, but a comparison is only made between emerging long yields and advanced short rates in line with the research plan. The first attempt is not even a time series method *per se*. A simple correlation matrix introduces the potential variables and the relationship between them. The fourth chapter represents the dilemmas that the variable choice poses for this research. Correlations alone say very little about the dynamics of the time series, but detecting the initial comovement between the target variables may be done.

After the correlations, standard time series methods were used to find a statistically significant relationship between the respective variables. The variable set is very similar to the correlations, but further aspects are also taken into account. Among others, the frequency and aggregation type differ in different time series. The strategy follows Shrestha & Bhatta (2018) and benefits from the general remarks outlined in Kiss et al. (2022). Briefly, variables were tested for stationarity, and the integration order was determined. Variable pairs were created (one advanced, one emerging time series with some considerations about comparability). These pairs were examined with the Johansen test, and if they are cointegrated, an ARDL/NARDL model is developed, if not, a VAR approach is proposed. ARDL models have gained popularity recently because of their flexibility and nicely documented application in Mészáros & Kiss (2020). For illustrative purposes, 12 variable pairs were used, and four final models were introduced in detail. In an experimental attempt, 40 models were involved (including the initial 12), and their truncated average was used for each considered frequency (Kiss, Mészáros, & Rácz, 2022; Mészáros & Kiss, 2020; Shrestha & Bhatta, 2018).

Two important caveats emerge from the time series analysis. The most significant advantage of the method is that it enables us to decide on the first hypothesis confidently. The drawback of such time series analysis is the neglect of certain heterogeneities in both sides: shock senders and shock recipient economies are vastly different, which calls for a more sophisticated analysis of the dataset, thus, a panel approach is proposed in the following two chapters.

Chapter 5 discusses a panel approach to quantify the cross-border impact of advanced central banks' monetary policy decisions. Panel dataset enables us to consider the diversity of each country, which appears to be necessary on both sides of the

equation. As it was argued, emerging countries are different in economic development, depth of financial markets, macroeconomic performance, and several other factors that may now be exploited in the regressions. On the other hand, the difference between shock sender countries is how largely they can influence the monetary conditions abroad. An important result is to prove the existence of the so-called 'monetary policy spillovers,' as the cross-border impact may be nonexistent in certain advanced countries.

As an initial step, a benchmark model was designed to quantify the impact of certain internal and external conditions on long-term government bond yields in emerging markets. This benchmark model was later expanded with several target variables. In the first step, the impact of the Federal Reserve, via the USD conditions, was tested, and several attempts were considered for the correct variable that represents the change in the USD market.

The benchmark model was further modified in several ways. An important extension of the model is incorporating variables reflecting the monetary policy of the European Central Bank and the Bank of Japan. Keeping an eye on comparability, virtually the same regressions were run in these two additional cases. Optimally, these three robust and accepted models show an average impact of certain central banks' monetary policy on emerging countries. However, a brief discussion is needed before comparing them. The comparison of the three advanced central banks in terms of impact on emerging countries is an essential part of the thesis work.

The baseline regressions were supported by additional attempts to provide a more nuanced picture with the use of available data. Beyond the baseline models, two alternative approaches were proposed and introduced. In both cases, the shock variable was changed into a binary (dummy) variable, which portrays a significant impulse from the respective central banks. This is a slightly different approach from the baseline model: instead of taking the quantity of certain and permanent impulses from the advanced economies, certain days, when a sizable monetary policy spillover is supposed, are flagged and evaluated distinctly. One of these dummy approaches used the relative changes of the respective shock variables and flagged those days when an extreme negative (decrease in rates) or positive (increase in rates) change occurred. A similar idea was to use announcements of monetary policy decisions as a base. Following Falagiarda & Reitz (2015), an event set was selected, and a dummy variable represented those days when a significant monetary policy event occurred (Falagiarda & Reitz, 2015).

A special type of panel data model is the dynamical panel model, and one of the most popular approaches is to use the generalized method of moments (GMM). In an alternative attempt, several GMM models were developed and tested to highlight the relationship between emerging and advanced market variables. However, GMM models are unsuitable for panels with many times and few identities, thus, a decrease in frequency was needed to run the models. One good recent example is the work of Czezeli (2021): she applied this method to a slightly different research question but emphasized the advantages of the estimation (Czezeli, 2021).

Chapter 6 is an extension of the previous chapter that seeks to answer the question of how different the monetary policy spillovers in certain regions are, with particular regard to the sensitivity to that large central bank (out of the Fed, ECB, and BOJ) which belongs to the same region as the respective emerging countries. Two different methods were used to find out the regional impact of certain central banks. One natural idea is to add a region-specific dummy interaction to the target variable (which is an advanced market rate), bearing in mind that only two of three regions may be flagged with a dummy variable. Another similarly correct idea is that subsamples were created based on the geographic location of each observation, and the original regression was redone.

A discussion concludes the chapter regarding the question of whether geographical region is, in fact, the best and most important differentiating factor among emerging countries. Nonetheless, the research question about the regional extent of monetary policy spillover remains valid many additional questions are aimed to be answered by investigating certain groups of countries in terms of the different perceptions of monetary policy spillovers. Chapter 6 concludes with the decision on the set of theses regarding the regional importance of certain advanced central banks, and the latter discussion on the differentiating factors motivates the following chapter. An important research step is to move from a generalized impact of a certain group of countries to individual countries and their unique responsiveness to external shocks.

Chapter 7 seeks to identify the country-specific determinants of emerging market responsiveness to external shocks. In this chapter, the dependent variable shifted from observed government bond yields of emerging countries to a custom variable that depicts the responsiveness of certain countries' long-term government bond yields with the composite advanced market short-term rate changes. On the right side of the equation, the independent variables corresponded to specific conditions of the emerging countries

as per the tested sub-hypothesis. As the sensitivity score is a yearly observation, a smaller panel-structured dataset was applied, but the regressions did not use panel features at this time. Beyond basic macroeconomic and institutional conditions, discussing the monetary policy mix is an important finding of the paper. The analysis and the decisions on sub-hypotheses are centered around the significance and sign of the respective independent variables.

The thesis uses one large database in the majority of the cases, but this database is sliced into appropriate subsets as the research tasks require. This database is a compilation of several data sources in a relatively strict structure. Hence, most empirical modeling relies on secondary data, meaning that market-observed or statistical data are used for analysis. The large panel is structured in the following way: daily observations of the chosen emerging countries are compiled into a panel structure; therefore, one observation (row) means one emerging country's data on a given workday. For technical reasons, the variables unrelated to emerging countries or country-independent are also merged into this data structure via the date of observations.

The final datasets are designed with the attention of two particular features: level of aggregation, therefore, aggregate values or panel structure is needed, and frequency of data. Therefore, aggregated analysis was conducted on a dataset where only one country's country-independent columns were set up as a criterion for subsampling. Similarly, the daily frequency was simply downgraded to lower when needed with a subsampling procedure.

For the last research question, a new dataset is compiled. Several new variables were developed that represent a country's responsiveness to international financial shock and resulted in obtaining one data point for one emerging country yearly. Therefore, the new yearly dataset is also panel-structured, uses the constructed variables, and other relevant variables are merged into the dataset from the large database explained earlier.

The selection of countries was motivated by three factors. First, some papers introduced in the literature review gave hints on suitable emerging countries. Second, only those countries remained in the sample where the government debt in local currency is sizable, and the data for long-term government bond yield (at least five years, but preferably ten years) was available for the vast majority of the observations. Third, countries in the emerging panel are roughly considered to be a part of the emerging market asset class based on the portfolio allocation of large investment firms. The chosen

countries are independent economies with sovereign monetary policies. However, many of them use fixed or quasi-fixed exchange rate policies, but all of them provide more or less capital account openness for international investors.

The collected, transformed, and generated data from the two manually compiled databases is used in the following way throughout the thesis. Chapter 4 uses several aggregated datasets, focusing on the stylized relationship between emerging and advanced markets. The initial steps are done on daily datasets, but weekly, monthly, and quarterly aggregated datasets are also used in the chapter. Chapters 5 and 6 use panel structured data, but the daily frequency is altered with weekly observations, and instead of levels, differences are used. Chapter 7 uses the smaller database with the created sensitivity scores: though it is a panel structure, the regressions do not use panel features.

III. Findings and hypotheses of the dissertation

- Through the application of multiple time-series methods, the analysis revealed that advanced short-term interest rates do influence emerging long-term government bond yields. Several specifications were tested, and based on the aggregate results, it turned out that the transmission of advanced market shocks is the strongest between 1 and 4 months after the initial shock.
- **Hypothesis 1** was formulated as follows. **Short-term rates in advanced markets influence long-term government bond yields in emerging markets.** Based on empirical evidence, the hypothesis was **accepted**. Several time series models confirmed that there is a relationship between short-term rate changes and long-term government bond yields in the sample. Multiple alternative specifications and robustness tests have been conducted to validate this finding, which has demonstrated robustness.
- The narrow understanding of monetary policy spillover has been tested on a long panel dataset. A main model, a static panel model with fixed effects, was designed to highlight several different angles of monetary policy spillovers by employing different shock variables that reflect the monetary conditions in advanced countries. Several alternative specifications were explored, and robustness tests were conducted, including an alternative modeling approach with the use of dynamic panel models. As several panel regressions have shown, the monetary policy of certain advanced central banks directly affects emerging markets through money and capital markets. Based on the regressions, 100 basis point changes in the USD and EUR interest rates are translated to 22.8 and 23.1 basis point changes, respectively, in long-term government bond yields of emerging countries. These coefficients are statistically significant, even after using Driscoll-Kraay robust standard errors, and they are robust in many alternative specifications.
- The baseline model suggests that the monetary policy of the Fed and the ECB have similar transmission rates to emerging markets, but additional calculations revealed that the market impact of the Federal Reserve may be larger, particularly when the impact of larger changes and new policy announcements were measured, thus it appears to be confirmed that the 'Fed creates the waves' on the financial markets.
- Alternative versions of the baseline model revealed that surprisingly, both increase and decrease in USD rates are associated with a temporary increase in emerging bond yields. Interestingly, EUR rate drops and increases are insignificant in these specifications.

- After examining policy events and announcements in case of the large central banks, it was found that easing announcements of the Federal Reserve contributed to a decrease in emerging long yields by nine basis points each time, and interestingly, the non-QE announcements appeared to be stronger. The opposite could be observed regarding the tightening news: announcements about quantitative tightening increase long-term government bond yields in emerging countries by 7 basis points each time, while other tightening announcements are not significant. Announcements about the ECB's monetary easing have a much smaller to statistically insignificant and short-living effect on emerging long yields. In the case of BoJ, only ASP announcements have a similar short impact.
- The Bank of Japan exhibits no sign of systematic monetary policy spillovers, thus, the cross-border impact of Japanese monetary policy was rejected.
- **Hypothesis 2** was formulated as follows. **Changes in advanced markets' short-term rates have a direct financial market impact on long-term government bond yields in emerging countries, thus, the so-called 'monetary policy spillover' exists in the case of certain central banks and emerging markets.** Based on several panel regressions, **the hypothesis was accepted.** Empirical findings confirmed that the monetary policy decisions of the Federal Reserve and the European Central Bank do have an impact on the long-term government bond yields in the sample. Several alternative specifications and robustness tests confirmed this result, which turned out to be robust. On the other hand, the Bank of Japan has no systematic impact on emerging financing costs.
- Monetary policy spillovers have been analyzed in the context of regional disparities. The regional impact of monetary policy changes was approached in several ways. It was found that the Federal Reserve has a general impact on emerging financial markets, which is similar to the findings of other papers. Central European markets tend to react more heavily to euro rate changes, while (based on one of the estimations) USD changes appear to be significant only via the risk-taking channel. In the dynamic model, the reactions were more balanced, CEE yields reacted similarly to USD and EUR shocks. The response of Latin American markets to EUR shocks is also relatively large. Generally, Latin American markets are sensitive to both USD and EUR shocks. Asian rates appeared to be relatively resilient to interest rate shocks in the static models, only responding to USD changes mildly, but the dynamic model showed a more intense response.

- However, point estimates appeared to vary in certain regions, in statistical terms, the effect is surprisingly uniform. Even more, several attempts were made to create similar groups of countries, based on the characteristics of the emerging countries, to jointly measure their responsiveness to advanced market rate shocks, but the results suggest that even these groups may not be able to show the differences efficiently enough in statistical terms. A series of simple hypothesis tests revealed that the difference between regional variables and the coefficients that relate to emerging market characteristics is often not significantly different in statistical terms (but does differ from zero). Therefore, the monetary spillover effect appears to be more homogeneous than it was previously believed.
- **Hypothesis 3** was formulated as follows. **Advanced central banks have a larger impact on emerging markets, which are tied to them more directly proxied by regional groups. An advanced central bank influences more emerging government bond yields in countries in the same region. A larger influence is suspected from the Fed to Latin America, the ECB to CEE region, and the Bank of Japan to Asia.** Based on the modifications of the previous panel models, **the hypothesis was partly accepted.** The statement holds in relation to the Federal Reserve and Latin America, but none of the ECB and BoJ has an explicitly higher impact in the region where they are located: ECB has a similar impact on Latin America, and the Bank of Japan has no impact on Asian rates. On the other hand, in statistical terms, these differences are not significant, which called for an additional step to examine the responsiveness of emerging countries to external financial shocks on individual level.
- A broadly understood concept of monetary policy, thus, interest rate and FX rate sensitivity of emerging countries were examined with the help of custom sensitivity indices. This concept is broader, because not only those factors are considered that arise due to changes in monetary policy in advanced general responsiveness to interest rate and FX rate shocks. These custom indices were contrasted with a set of variables thus the impact of macroeconomic, institutional, and policy variables was tested systematically. Regarding the macroeconomic variables, the regressions showed that a higher inflation rate increases interest rate sensitivity while worsening growth and higher unemployment drive FX rate sensitivity up. Also, an important caveat is that worsening financial position increases both interest rate and FX sensitivity.

- It turned out that emerging markets' general yield and exchange rate sensitivity to the evolution of global interest and exchange rate conditions roughly corresponds to what is described in the trilemma theory. However, the sensitivity of countries with freely floating exchange rates and, therefore, higher inflation and interest rates to advanced interest rate changes is nominally higher, but after controlling for initial levels, the view of trilemma theory is found. In the case of currencies with a floating exchange rate, they react more decisively to external exchange rate shocks, while countries with a managed exchange rate are better prevented from affecting the exchange rate.
- **Hypothesis 4** was formulated as follows. **Country-specific factors, such as the macroeconomic environment, institutional variables, and monetary policy framework, influence certain countries' sensitivity to global shocks. The hypothesis was partly accepted based** on a series of regressions on the custom sensitivity indices. Some macroeconomic variables and the monetary policy framework influence the interest rate and FX market sensitivity of emerging countries, though institutional variables are mostly insignificant.
- The result of the thesis is a synthesis of two different views of Réy and Aizenman: although monetary policy shocks do create "waves" in the capital markets, which spread roughly uniformly, the sensitivity of individual countries to external shocks differs for many reasons, including their monetary framework.

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