Essays in International and Monetary Macroeconomics: Exchange Rates and the Financial Crisis

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Preface

In this thesis, I discuss the role of exchange rate developments in the context of both the build-up phase and the aftermath of the global financial crisis of 2007-2009, which is considered to be the most severe financial crisis since the Great Depression. The trigger of the crisis was the burst of the bubble in the US subprime mortgage market in late 2006. The expansion of this market was encouraged by the prevailing low interest rates in the years preceding the financial crisis. These low interest rates were the outcome of two things: first, a very expansionary monetary policy. Second, the global "savings glut" – the surfeit of saving over investment – which led to large capital inflows into US safe assets, particularly from emerging economies, and especially from China. In addition to the low interest rate environment, shortcomings in supervision and regulation had allowed for irresponsible lending and for high risk concentration not only in the mortgage market, but in the financial sector in general.

In response to the financial crisis and the subsequent Great Recession, many of the world's leading central banks continuously lowered their policy rate to very low levels, with the aim of stabilizing the financial system, mitigating the economic downturn and countering deflationary risks. However, these measures were not enough to accomplish a satisfactory recovery of the economy. Liquidity provided by the central banks did not reach the private sector as there was a significant disruption in financial intermediation, which led to a credit market freeze and an associated widening in credit spreads. For countries like Switzerland, Denmark or Israel, this turmoil on global financial markets brought along an additional challenge: they faced intense appreciation pressure on their currencies and therefore a further tightening of monetary conditions.

With policy rates already being at the effective lower bound, many central banks were forced to react to these developments by implementing unconventional measures, such as providing direct liquidity to key credit markets through acquisition of domestic longer-term securities

(i.e., credit easing), or foreign exchange interventions.

Related to these issues, the first part of this thesis, chapters 1 and 2, focus on countries where a substantial appreciation of their currency during and after the financial crisis led to a further tightening of monetary conditions in a time when a relaxation was needed, and assess the use of unconventional monetary policy to stem this appreciation pressure. The second part, chapter 3, investigates the role of China's fixed exchange rate regime for US asset price inflation in the build-up phase of the financial crisis.

Unconventional Monetary Policy under Appreciation Pressure

Chapters 1 and 2 of this thesis (both co-authored with Jessica Leutert) deal with unconventional policy under appreciation pressure. In the first chapter, we assess potential external sources of appreciation pressure in times of financial turmoil and focus on unconventional measures that a central bank can take to stem the appreciation pressure and the undesired tightening of monetary conditions. For this purpose, we develop a simple two-country model with imperfect financial intermediation. Financial frictions have received a lot of attention in the past few years and have become an important modelling tool as frictions in financial markets are considered to be one of the main reasons for the strong spreading of the financial crisis. On the one hand, they provide a plausible explanation for spreads in credit rates. On the other hand, they generate a portfolio balance channel through which unconventional monetary policy measures, such as credit easing and foreign exchange interventions, can be effective. Our model combines elements of the models of Gertler and Karadi (2013) and Gabaix and Maggiori (2015). In both of these models, financial frictions represent the key model feature. While the former study investigated the effects of quantitative easing (including credit easing), the latter analyzed the effects of foreign exchange interventions. By presenting a framework that allows directly comparing the usage of both of these two policies, we fill a gap in the literature. As in the two benchmark studies, financial frictions are endogenized by the introduction of limited commitment of banks. As a result of the agency problem, banks are balance sheet constrained and face limits to arbitrage leading to positive excess returns (over the riskless rate) in the investment markets and a deviation from the interest rate parity in the international credit or foreign exchange market. The latter reflects a safety premium on domestic currency bonds. Central bank intermediation, i.e., credit easing and foreign exchange interventions, can reduce financial frictions and the associated excess returns (including the safety premium) when banks are balance sheet constrained.

Within our framework, we identify three external sources of appreciation pressure. The first one is financial frictions on the foreign investment market, which can be interpreted as turmoil on major financial markets abroad. The second one is financial frictions on the international credit market as they can arise when markets start to distrust a certain foreign currency, and the last one is capital inflows. We show that the resulting appreciation does not necessarily involve a safety premium, but that foreign exchange interventions only are effective if one exists. More precisely, foreign exchange interventions can reverse the resulting exchange rate movements and misallocations of capital only in the two latter cases. Furthermore, we show that under certain conditions, foreign exchange interventions and credit easing are substitutes since asset purchases in one market reduce the excess returns in both of the markets. Finally, we recommend that the central bank's intervention should target the market that exhibits the highest excess returns as this will make sure that the balance sheet expansion of the central bank needed to reach its goal will be minimized.

Within the context of appreciation pressure during and after the financial crisis, the second chapter of this thesis puts a particular focus on Switzerland, a country that had experienced a particularly strong appreciation of its currency and whose central bank has, from March 2009 on, adopted unconventional monetary policy tools to stem this appreciation pressure and the resulting tightening of monetary conditions. The purpose of this chapter is to analyze whether the Swiss National Bank's (SNB) unconventional measures between 2009 and 2011 were effective.

To analyze the effectiveness of the SNB's unconventional monetary policies, we apply the so-called synthetic control method developed by Abadie and Gardeazabal (2003) and Abadie et al. (2010, 2015) to the EUR/CHF exchange rate. We do this by looking at announcements that represented a change in the SNB's monetary policy during the mentioned period, e.g., an increase in the supply of Swiss franc liquidity by, amongst other measures, purchases of Swiss franc bonds issued by private sector borrowers and purchases of foreign currency on the foreign exchange markets.

The synthetic control approach is very popular in the field of political sciences, but relatively new in the literature of foreign exchange interventions. It provides a solution to the endogeneity (simultaneity) problem that studies in the latter field face. This endogeneity problem results from the fact that central banks tend to intervene just during episodes of strong appreciation (or depreciation) pressure. The synthetic control approach allows to construct a synthetic or counterfactual EUR/CHF exchange rate, i.e., an EUR/CHF exchange rate that would have

been observed in the absence of SNB policy measures. The basic idea is to first build a pool of possible comparison units that exhibit similar behaviour to the EUR/CHF exchange rate prior to the date of intervention, but are not exposed to the SNB's interventions. We use two such pools of comparison units, where the first one consists of other exchange rates and the second one contains other safe assets like gold and government bonds. The choice of the second pool is motivated by the Swiss franc's role as a safe haven currency. The synthetic control approach then provides a systematic way to assign positive weight to those comparison units that are best able to reproduce the behaviour of the Swiss franc in the pre-intervention period, considering not only time-series but also static information.

The obtained counterfactual EUR/CHF exchange rate can then be compared to the actual EUR/CHF exchange rate evolution after the interventions. If the actual exchange rate is higher than the synthetic exchange rate, this indicates that the SNB's policy measures were effective.

Our findings suggest that, overall, the synthetic control approach is well applicable to the Swiss franc. An exception is the period in spring 2010 for which a statistical factor analysis suggests that there is only low comovement between the EUR/CHF exchange rate and other exchange rates or safe assets. Thus, the results of the synthetic control approach for this period, which suggest that the interventions led to a further appreciation of the Swiss franc, should be interpreted with care. For the other considered periods, however, the results are very robust. They suggest that the March 2009 announcement led to an immediate depreciation of the Swiss franc (although this effect disappeared again after a few days), and that the series of announcements in August 2011, triggered a significant depreciation of the Swiss franc.

US Asset Price Inflation and China's Fixed Exchange Rate Regime

While the first part of this thesis (chapters 1 and 2) covers exchange rate topics related to unconventional monetary policy during and after the financial crisis, the second part, chapter 3, focuses on the role of exchange rates, in particular exchange rate regimes, in the build-up phase of the crisis.

As emphasized by Caballero and Krishnamurthy (2009), large and sustained capital inflows into US safe assets might have contributed to the securitization process that supported the mortgage market boom and the asset price inflation in the US. A large part of these capital inflows came from Asian emerging markets such as China, who operate a one-sided peg against

the US dollar. Given the potential contribution of large inflows from China to the rise in US safe and risky asset prices before the crisis, the third chapter investigates the extent to which China's prevailing unilateral peg has played a role in this context. In particular, I assess if it matters for movements in US asset prices whether China has a fixed instead of a floating exchange rate against the US dollar, and if the prevailing fixed exchange rate regime amplified the US asset price inflation before the outburst of the financial crisis.

For this purpose, I compare asset price responses to economic shocks under alternative exchange rate regimes (flexible versus unilateral peg). A similar exercise was done by Dellas and Tavlas (2013). A shortcoming of their model is, however, that the portfolio allocation – which is of importance when analyzing asset prices – is ad hoc. Their model abstracts from endogenous portfolio choice for technical simplicity. I overcome this shortcoming by making use of a newer method for analyzing portfolio choice in DSGE models proposed in Devereux and Sutherland (2011). I use a simple two-country general equilibrium model and consider the response of equity and bond prices to productivity and monetary shocks.

From my analysis, three main findings emerge. First, and similar to the findings in Dellas and Tavlas (2013), asset price responses to economic shocks differ across exchange rate regimes. More precisely, asset prices in both countries are more responsive to shocks in the home and less responsive to shocks in the foreign country, when the foreign country operates a unilateral peg instead of having a floating exchange rate regime. Second, while the differences in the shock responses of home asset prices tend to be small, the differences in the responses of foreign asset prices are more pronounced. Third, the differences are stronger for nominal relative to real shocks.

Applied to the US and China, my findings suggest that prices of US bonds and stocks are more responsive to domestic shocks under China's prevailing unilateral peg than under a floating USD/CNY exchange rate, but the extent of this amplification is limited. The reason for this stronger response of US asset prices under the peg is that, in response to a positive US monetary or productivity shock, China relaxes domestic monetary conditions to prevent an appreciation of the Renminbi. Given that prices are sticky in the short run, this slightly amplifies the shock response of US consumption and therefore also of US asset prices. Thus, under the prevailing unilateral peg, the Fed's expansionary monetary policy before the financial crisis resulted in a slightly but not substantially stronger US asset price inflation relative to the one that would have been observed under a floating USD/CNY exchange rate.

Contents

Chapter 1

Unconventional Monetary Policy under Appreciation Pressure - The Role of Financial Frictions

Aregger, Nicole, and Leutert, Jessica, (2017) 'Unconventional Monetary Policy under Appreciation Pressure - The Role of Financial Frictions.' Working Paper 17.03, Study Center Gerzensee.

Chapter 2

Policy Evaluation by the Synthetic Control Approach: The Case of the Swiss Franc

Aregger, Nicole, and Leutert, Jessica, (2017) 'Policy Evaluation by the Synthetic Control Approach: The Case of the Swiss Franc.' Working Paper 17.02, Study Center Gerzensee.

Chapter 3

Asset Prices under Alternative Exchange Rate Regimes

Aregger, Nicole, (2018) 'Asset Prices under Alternative Exchange Rate Regimes.' Working Paper 18.01, Study Center Gerzensee.

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Selbständigkeitserklärung

Ich erkläre hiermit, dass ich diese Arbeit selbständig verfasst und keine anderen als die angegebenen Quellen benutzt habe. Alle Koautorenschaften sowie alle Stellen, die wörtlich oder singemäss aus Quellen entnommen wurden, habe ich als solche gekennzeichnet. Mir ist bekannt, dass andernfalls der Senat gemäss Artikel 36 Absatz 1 Buchstabe o des Gesetzes vom 5. September 1996 über die Universität zum Entzug des aufgrund dieser Arbeit verliehenen Titels berechtigt ist.

Bern, 24. August 2017

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