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Monetary policy transmission in Switzerland: Headline inflation and asset prices

MASTER'S THESIS

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Executive Summary

Question

Originally, the Swiss National Bank (SNB) steers interest rates in the money market to implement its monetary policy (SNB, 2017). In response to the financial crisis, the SNB lowered short-term interest rates substantially in order to ease monetary conditions. By doing so, the SNB aimed to stabilise the financial system, avoid a looming deep recession and counter deflationary expectations (Jordan, 2012). Due to an ongoing strengthening of the Swiss franc, the SNB decided to implement further expansionary measures (Jordan, 2018). Interest rates at their lower bound forced the SNB towards unconventional monetary policy measures (e.g. foreign exchange market interventions). Over the same time period, headline inflation stayed low while asset prices (housing and equity prices) increased.

Macroeconomic theory expects expansionary monetary policy to lead to an increase in prices (see e.g. Mishkin, 1996). This theory is confirmed by previous empirical studies on the Swiss monetary transmission using data before the financial crisis (e.g. Assenmacher, 2008, Berlemann and Freese, 2010). However, developments in headline inflation and monetary policy indicators after the financial crisis in Switzerland do not fulfil this prediction at first sight. One might hypothesise that expansionary monetary policy over the past decade has led to an increase in asset prices, but not in headline inflation. This thesis focuses on estimating the impact of the SNB's monetary policy on headline inflation and asset prices, especially in the light of the recent financial crisis. Monetary transmission is investigated for the existence of a structural break in the relationship between inflation and the policy rate. To this end, the effects of monetary policy on inflation and asset prices are estimated over pre- and post-crisis subperiods.

Procedure

This thesis evaluates the impact of the SNB's monetary policy on headline inflation and asset prices, while paying special attention to the developments over the past decade. For this

purpose, this thesis estimates Vector Autoregressions (VARs) (Sims, 1980). Data is retrieved from the databases of the SNB, SIX Swiss Exchange, Bank of International Settlements (BIS), Organisation for Economic Co-operation and Development (OECD) and Datastream. As is standard in the literature, implemented time series are in logs of real, seasonally adjusted values, except for inflation and interest rates. The empirical analysis is performed using the software MATLAB.

Before estimating VARs, the relationship between inflation and the policy rate is analysed for structural breaks. First,this thesis argues for the financial crisis as an adequate candidate for a structural break with a narrative approach. Hereby, insights of Kilian and Lütkepohl (2017) are considered, who suggest to define a breakdate based on extraneous information on the economy. Second, in order to confirm the narrative approach, Chow and Quandt likelihood ratio (QLR) tests for structural breaks are conducted. The tested relationship is similar to the corresponding equation described in the VAR models (headline inflation as depended variable and the policy rate as explaining variable). This analysis reveals a structural break around the financial crisis. Additionally, the study indicates substantial disturbances in monetary conditions in the late 1980s and early 1990s. Because linear VARs are local approximations within a given time window (Kilian and Lütkepohl, 2017), VARs are estimated over pre- and post-crisis subperiods from 1993:Q4 to 2006:Q2, and respectively from 2007:Q2 to 2018:Q1. Results of the VAR analysis rely on the estimates of four different models using quarterly data. The first model is the baseline model, which incorporates headline inflation, real output, the policy rate and real M3 over a sample period from 1988:Q3 to 2018:Q1. Additionally, the model is estimated over pre- and post-crisis subsamples. The baseline model estimates the impact of the SNB's monetary policy on headline inflation. The SNB's policy rate is employed as an indicator of conventional monetary policy, as is standard in the literature (Bernanke and Blinder, 1992). Impulse response functions (IRF) to identified nonsystematic movements in the policy rate are estimated. These shocks are identified using a Cholesky decomposition on the variance-covariance matrix of reduced form residuals, and thereby imposing timing restrictions on endogenous variables. By doing so, this thesis follows the recursiveness aussumption described in Christiano et al. (1999), a standard approach in

monetary literature. The robustness of the identification in the baseline model is tested by model augmentations of exchange rate and long-term interest rate variables. The second model is the asset price model, which extends the baseline model with a housing and equity price variable. The asset price model evaluates impacts of monetary shocks on asset prices. The third and fourth model are the modified baseline model and modified asset price model, which implement the SNB's balance sheet as an indicator of unconventional monetary policy measures and the implied stock market volatility index (VIX) as an indicator for financial and economic turmoil. The modified models investigate effects of unconventional measures after the financial crisis. By doing so, this thesis follows the approach suggested by Gambacorta et al. (2014). This procedure enables an overview of the SNB's monetary policy after the crisis, which was mostly shaped by interest rate and unconventional measures that have significantly affected the SNB's balance sheet (e.g. foreign currency purchases) (Jordan, 2018).

Results and general evaluation

The analysis of the relationship between inflation and the policy rate reveals a structural break around the financial crisis and disturbances in the monetary conditions in the late 1980s and early 90s. Identified IRFs over pre- and post-crisis subsamples, spanning from 1993:Q4 to 2006:Q2, and respectively from 2007:Q2 to 2018:Q1, support this result and find that Swiss monetary transmission has experienced notable changes after the recent financial crisis. The results suggest that the SNB has lost its ability to impact headline inflation after the financial crisis. In particular, neither conventional nor unconventional expansionary measures have increased headline inflation over the past decade. Before the crisis, this impact is estimated to be positive in the long-run. On the other hand, asset prices respond mostly positive to expansionary over pre- and post-crisis subsamples. While there are variations in the size, timing and source (conventional or unconventional) of the impact on equity and housing prices, the core result that an expansionary monetary policy shock increases asset prices at some point is valid in the pre- and post-crisis subperiod. Some of these positive effects are only temporary and disappear again after some years, such as the equity prices before the crisis. Others, such as the housing prices after the crisis, are persistent. Over the past decade,

the expansive monetary policy by the SNB is found to have led to increases in asset prices (in particular housing prices), but not in headline inflation.

Several model specifications indicate the existence of a price puzzle (i.e. decreasing prices in the short-run after an initial expansionary monetary policy shock). Price puzzles are commonly due to omitted variables that include information on inflation-forecast (Sims, 1992). Furthermore, rental prices are found to contribute to price puzzles. Since rental prices are part of the CPI, the indexing of rents to short-term interest rates explains a negative effect on headline inflation after a drop in interest rates (see also Assenmacher, 2008).

Overall, the results of the investigation correspond to the expectations formulated at the beginning. The financial crisis is indeed found as a structural break in the monetary transmission to headline inflation. Additionally, expansionary monetary measures in the past decade have indeed lead to increases in asset prices, but not in headline inflation. An ominous implication of the results is that the SNB is found to be unable to respond to a deflationary shock with the measures it has executed up to the present (primarily foreign currency purchases). In the case of a deflationary shock, the SNB is found to be incapable of accurately fulfilling its statutory mandate with the current set of monetary policy instruments. In other countries, alternative unconventional measures, such as quantitative easing, have been found to increase headline inflation (Borio and Zabai, 2016). Therefore, the implementation of alternative unconventional monetary policy measures by the SNB (e.g. asset purchase programs) might impact headline inflation differently. In this regard, a disaggregated investigation on the effects of unconventional monetary policy measures might expand the results of this thesis.

On the other hand, reasons for these structural changes in Swiss monetary transmission are rarely discussed. Plausible causes are changes in the conditions in the money market (negative interest rates) or changes in the way the SNB is conducting its monetary policy (unconventional measures). A study on disaggregated monetary transmission channels, especially in light of unconventional monetary measures, can provide answers on why headline inflation has been unaffected by expansionary measures in the past decade (see e.g. Kuttner, 2018).

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