Financial Instability and Monetary Policy:
The Swedish Evidence.

Speaking notes

Introduction

The background of our paper is the ongoing debate among policymakers and economists on the objectives of monetary policy, in particular whether and how monetary policy should respond to increases in financial instability. The Riksbank Act states that in addition to price stability, “the Riksbank shall promote a safe and efficient payment system”.

The purpose of our paper is to examine how price, interest rate and credit shocks affect financial instability in the Swedish economy. In this context, we also investigate whether price stability and financial stability are mutually consistent goals for monetary policy. Our paper contributes to the earlier literature by examining the sources of financial instability taking the linkages with price stability and monetary policy explicitly into account.

To start with, I would like to make some introducing remarks on how we define “financial stability”. Because no rigorous theory of what characterises financial instability exists, no theoretical and empirical definition has been agreed upon.

Banking crises have traditionally been considered the greatest threat to the functioning of the financial system, as banks’ operations are important to all of the main functions of the financial system. Therefore, financial stability in general is often defined as a situation with absence or little risk of banking crises. This has sometimes led both theoretical and empirical studies to regard financial stability as a binary variable which assigns a value of one to periods of crises and zero otherwise.

Mishkin (1991) has developed an influential theory of financial crises based on asymmetric information. According to this information approach of financial instability, the underlying cause of financial instability is the breakdown of information flows, which increases adverse selection, moral hazard and credit rationing. Changes in the nature and degree of credit rationing are a key element regarding financial crises. According to this definition, financial stability is viewed as different degrees of credit rationing and corresponding repercussions to the real economy. In our study, we apply this continuous view on financial stability.[1]

However, given the prominent role of banks in the role of intermediation, measures for

[1] It is important to note that this view clearly questions the separation of financial and output stability as different monetary policy objectives. The issue of financial stability may rather be considered as an additional channel of the monetary transmission mechanism. The effect of a credit crunch on the real economy for example is then mainly regarded as the credit channel of monetary policy rather than a loss of financial stability.

financial stability should particularly reflect the stability of the banking sector. The fragility of the banking sector is closely reflected by the financial soundness of its customers. Banking crises tend to manifest themselves by heavy credit losses. Hence, time series on loan losses can be considered as a suitable crises indicator. However, quarterly data on Swedish bank's credit losses are not available for the whole sample we examine. One variable that could serve as an approximation of credit losses is the number of business failures, which generally trigger credit losses for the banks that lent to these businesses. Business failure statistics have the advantage of being published regularly, without a major time lag and available on a higher frequency.

Over recent decades, movements in property prices have been central to the most pronounced financial cycles and banking system problems. In part, this reflects the important role that property plays as a source of collateral for bank loans.

These considerations suggest that firm bankruptcies and excess return on housing can be used to construct an index of financial instability. Following Bordo, Deuker and Wheelock (2001), we construct two measures of financial instability using data on firm bankruptcies and excess returns on housing investments computed as the difference between the return of housing and the return from a long–term government bond. In addition, we also apply firm bankruptcies alone as a measure of financial instability.

A common feature of practically all existing theories on financial crises is the important role played by credit expansions, price and interest rate shocks for explaining increases in financial distress.

Our empirical methodology is based on the standard trivariate vector autoregression (VAR) model comprised of output, consumer prices and the central bank rate, used to examine the effects of monetary policy. The underlying theoretical model consists of three equations, one IS equation, a Phillips curve and a Taylor rule. The model is extended to include three measures of the degree of financial instability, namely the two measures of financial instability, previously outlined, and company bankruptcies (4 dimensional models). We also extend our model by including lending to the non–bank sector (5 dimensional models). The interaction between price stability, financial stability and monetary policy are analysed by means of Granger causality tests within reduced form VAR models and impulse responses functions and variance decompositions within structural VAR models.

<u>Empirical work</u>

The basic data set is comprised of quarterly observations on GDP, the underlying price Level, the central bank interest rate, three different measures on financial stability and lending to the non – bank private sector. The sample is 1982:1 to 2001:3.

Figure 1 in the paper shows plots of the data series we use in our empirical analysis. Looking first at GDP, we observe the sharp downturn during the first part of the 1990's and the rapid upturn following the abandonment of the fixed exchange rate policy in November of 1993. The downturn in GDP coincides with a period of considerable degree of financial instability and the banking crisis where, for example, bankruptcies increased sharply from 1989 to its peak in 1994. This same pattern is also noted for our other two measures of financial instability. The following positive macroeconomic development with relatively high growth and low inflation during the latter half of the 1990's also show up in the central bank rate which has decreased from about 15% in 1983 to 4% in 2001.

The last graph in Figure 1 plots lending to the Swedish non–bank sector as a ratio of nominal GDP. The solid line is lending by banks to the private non–bank sector ($B1$) whereas the dashed line is lending by all credit institutions to the private non–bank sector ($B2$). The Swedish credit expansion following the deregulation of the credit markets in 1983–85 is clearly evident in these graphs. The rate of change in bank lending was almost 8% per year on average during the period 1983–87 and over 16% per year on average from 1987 to 1990. From 1992 to 1995, lending fell by on average 5% per year. Lending from all credit institutions shows a similar development during these years.

Note, that the banking crisis at the beginning of the 1990's completely dominates the variation in our measures of financial stability.

Our empirical models are further specified with a constant, a linear trend and a dummy variable for the currency crises in the third quarter of 1992. Formal tests for cointegration show that we can reject non-stationarity. We have experimented with alternative model specifications allowing for non-stationarity and cointegration. Our results are qualitatively unchanged when using these alternative model specifications.

Table 2 in the paper reports the results from testing various Granger causality hypotheses. We are testing both for direct and total Granger causality. The direct or standard Granger test examines, for example, whether the coefficients associated with the price level in the equation for financial stability are equal to zero. The total Granger causality test examines further if effects from the price level to financial instability are transmitted through the other variables in the system.

For our 4 dimensional models and the 5 dimensional model with bank lending, we can reject the null hypothesis that parameters for the price level are equal to zero in the equation for financial instability at the 10 percent level for two of our three definitions of financial instability. The null hypotheses that the interest rate does not directly Granger cause financial instability can be rejected at the 10 percent level for all three measures on financial instability.

These results change, however, when including lending from all credit institutions to the non–bank sector. For these model specifications we cannot reject any null hypothesis that the price level does not Granger cause financial instability. The results for the interest rate however are unchanged. For lending we find some (but not strong) evidence suggesting that lending affects financial instability.

In order to be able to compare the direction, magnitude and duration of shocks to the price level, the interest rate and lending on financial instability we turn to structural VAR analysis where we examine impulse response functions and variance decompositions.

In order to identify structural shocks, we use a Cholesky identification scheme. We assume, as is common in the literature, that the monetary authority uses contemporaneous information on output and prices when conducting monetary policy. Output and prices do not contemporaneously respond to monetary policy shocks. Output, prices and monetary policy are assumed not to respond contemporaneously to financial instability shocks. Financial instability is assumed to respond contemporaneously to all shocks in the system. To identify the lending shock within the five variable VAR model, we assume that a shock to financial instability cannot affect lending in the first period. We also assume that there is no contemporaneous effect from lending shocks on GDP, the price level and the interest rate.

These assumptions assume the following ordering of the variables where the first variable is fully pre-determined in the first period and the last variable fully endogenous: GDP, prices, interest rate, lending and financial stability. Note that all variables have to be interpreted as deviations from a linear trend.

Figure 2 in the paper shows impulse response functions of our three measures of financial instability to a one standard deviation price and interest rate shock. We also include 90% confidence intervals. In general, we find that the impulse response functions are quite similar regardless of how we measure financial instability. Both price and interest rate shocks significantly raise the degree of financial instability. Contractionary monetary policy shocks lead to a higher degree of financial instability in the short–run. Note, that the effects from price shocks are very long–lived compared to the effects from monetary policy shocks.

We also note that a one standard deviation shock to the price level and the interest shock give about the same size of the effects on financial instability. Calculations reveal however, that the magnitude (the standard deviation) of the monetary policy shock is far greater than the magnitude of the price level shock. The standard deviations of the structural price level shocks are of the order 0,1 percentage point, whereas it is above 1 percentage point for the monetary policy shocks. This implies that a small shock to the price level yields approximately the same response of financial instability as a large shock to monetary policy. In other words, a one percentage point shock to the price level leads to a larger effect on financial instability than a one percentage points shock to the interest rate.

This piece of evidence together with the more long–lived effects of price shocks lend support for the view price stability is more important to financial stability than interest rate stability.

Figure 3 in the paper shows responses of the price level and the interest rate to financial instability shocks. Shocks to financial stability tend to lower prices in the medium term. Interestingly, a positive shock to financial stability initially tends to lead to tighter monetary policy in the short run. This indicates that monetary policy has contributed to financial instability throughout our sample. One possible explanation is that monetary policy until the end of 1992 was tied up by defending the fixed exchange rate regime.

Table 3 in the paper reports the forecast error variance decomposition of financial instability. The table shows, for the number of quarters ahead indicated, the fraction of the forecast error of financial instability attributable to shocks to the price level, the interest rate and financial instability. We have also included the forecast error variance of the price level and the interest rate attributable to shocks to financial instability.

In general, the forecast error variance decompositions largely confirm the main results of the Granger non causality tests and the impulse response analyzes. Price level and monetary policy shocks explain 18 to 37 percent of the forecast error variance of financial instability at the 1 year horizon. This fraction increases somewhat for all models when increasing the time horizon. For longer time horizons, price shocks seem to explain a larger fraction of this forecast error. Price shocks explain 17 to 32 percent of the forecast error variance in financial instability at the 3 year horizon whereas monetary policy shocks only explain 7 to 13 percent.

Shocks to financial instability explain only small parts of the forecast error variance of prices and interest rates. Using the reported standard errors, we find that neither the price level nor the interest rate are significantly explained by shocks to financial instability.

Figure 4 - 6 in the paper report impulse responses for the five dimensional VAR models, including the amount of lending to the non–bank sector as a fraction of GDP. As expected, a credit expansion in the short–run leads to a higher degree of measured financial stability as higher lending increases short–term aggregate demand and the level of economic activity. In the medium term, however, there is a statistically significant increase in financial instability. In general, the effects are significant from 1 to 5 years. The effect of price shocks on financial distress is similar, but less significant than in the four dimensional system.

The estimated standard deviation of monetary policy shocks in our five variable system is considerably larger than both lending and price shocks. As the maximum response of the three shocks are of about the same magnitude, we again find evidence supporting the view that it is more important to bring inflation under control and prohibit excessive lending expansions than to maintain a stable interest rate.

Table 4 in the paper reports the forecast error variance decomposition of financial instability for the five dimensional models. The evidence in this table suggests that credit expansions only explain rather small portions of financial instability. The only exception is for the model with bankruptcies per capita where lending shocks explain 21 and 27 percent of the forecast error at the 4 year horizon. The fraction of financial stability explained by own shocks increases somewhat in the 5 dimensional models. Also interesting is that the fraction explained by price shocks only, sharply decreases.

Given the much stronger negative effects on financial instability from both price and lending shocks compared to shocks to monetary policy, we argue that our results can be interpreted as giving support to the view that monetary policy should aim at bringing inflation under control and prohibit credit expansions as this policy also promotes financial stability.

Our models can also be used to shed light over possible causes of the Swedish banking crisis during the early part of the 1990's. We decompose actual behaviour of financial instability prior to and during the Swedish banking crisis into the parts attributable to the shocks we have estimated using the four and five dimensional VAR models.

In the paper, these historical decompositions are shown in Figures 7 and 8. The historical decompositions of the four dimensional models is shown in Figure 7. A general result is that price shocks explain more of the actual behaviour in financial instability compared to interest rate shocks regardless of how we measure financial instability. Output shocks and own shocks to financial instability dominate. Comparing the contributions of these two shocks, our results suggest that own shocks are more important than output shocks, suggesting that other factors not modelled in our VAR analysis explain the main part of the Swedish banking and currency crisis during the first part of the 1990's.

Figure 8 shows historical decompositions of financial instability in the five variable VAR models. Adding lending to our systems affect our conclusions above considerably. Price shocks are not that important any longer for explaining the increase in financial fragility. Lending shocks, on the other hand, tend to have negligible effects on the increase in financial instability. Monetary policy shocks are also increasingly important compared to the estimates from the four dimensional models. This result is consistent with the variance decomposition analysis above. Similarly to the results for the four dimensional models, we find that output shocks and particularly own shocks to financial instability dominate.

Summary and conclusions

Within a four variable structural VAR model comprised of GDP, the price level, funds rate and financial instability, we find that positive price shocks exert a strong influence on financial instability. Monetary policy shocks are also important but their influence is absolutely weaker and more short–lived.

Extending the four variable model to also include measures of lending to the non–bank sector in the Swedish economy, we find that a credit expansion tends to increase financial instability in the medium term horizon, from 1 to 5 years ahead. This finding is consistent with earlier empirical results.

Dependent on how we measure lending, i.e., if we use lending by banks or by all credit institutions, we find that lending shocks can explain up to 27 percent of the forecast error variance of financial instability at the 4 year horizon. Nonetheless, price level and monetary policy shocks are, in general, more important for financial instability. In this respect, our results lend more support to the asymmetric information theory than to models suggesting that exogenous credit expansions are important factors explaining increases in financial instability.

Shocks to the price level are less important than monetary policy shocks within the five variable models compared to what we find in the four variable models. However, comparing the persistence and size effects we still find that small price and lending shocks lead to larger increases in financial instability than monetary policy shocks of the same size. These results do suggest that it is important that prices are stable and that excessive credit expansions are prohibited to maintain a stable financial system.

Looking more closely on the Swedish banking and currency crisis during the 1990's using historical decompositions we find that price shocks were more important than monetary policy shocks in explaining the increase in financial fragility during the first part of the 1990's within our four dimensional models. When we add lending to our models, monetary policy shocks became more important and price shocks less important. However, the main part of the sharp increase in financial fragility is explained by own shocks to financial fragility and output shocks. In this respect, our results suggest that other factors (other than price and monetary policy shocks) explain why the Swedish banking and currency crisis emerged in the early 1990's.