MONETARY TRANSMISSION MECHANISM IN ESTONIA

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Introduction

Monetary transmission mechanism (MTM) is a description of the means how changes in monetary policy – a change in central bank interest rates or in money supply – transmit into the domestic economic activity and domestic inflation. According to the traditional view, monetary policy decisions affect interest rate level and liquidity conditions on domestic financial markets. Those changes pass on to domestic real sector activity and have therefore an impact on aggregate demand and inflation level.

There is no consensus among economists on the exact functioning of this mechanism. The main reason is that the impact of monetary policy may transmit into the financial sector and into the real sector in several different ways. Different transmission channels may overlap, which makes it difficult to distinguish them empirically. An additional difficulty stems from non-measurability of several significant factors that affect monetary transmission, for example, there is no direct measure for the expectations of economic agents. Thus, conclusive interpretation of monetary transmission mechanism is still under debate and different views may contradict.

In the case of Estonia, additional difficulties arise from the lack of active monetary policy: the latter is based on currency board arrangement (CBA) with the euro being the anchor currency (originally, the anchor was the German mark). This means that Eesti Pank does not make independent monetary policy decisions (eg it does not change central bank interest rates), which could be interpreted as exogenous changes in monetary policy stance. At the same time, most of academic research on MTM focuses on evaluating the impact of central bank steps on real economy. Since anchor-currency monetary policy plays a significant role under the CBA, in Estonia the relevant studies have concentrated on the impact of external monetary shocks on Estonian economy.

The article is based on the research on Estonian MTM, which was published in the series of Working Papers of Eesti Pank in the end of 2001[2]. This article provides an overview of the above research.

[1] The views expressed are those of the authors and do not necessarily represent the official view of Eesti Pank. The author would like to acknowledge Rasmus Pikkani, whose research paper (R. Pikkani, Monetary Transmission Mechanism in Estonia – Empirical Model. Working Papers of Eesti Pank, No 5, 2001) has been a significant basis for the article.

[2] See Lättemäe, R. Monetary Transmission Mechanism in Estonia – Some Theoretical Considerations and Stylised Aspects. Working Papers of Eesti Pank, No 4, 2001 and the research paper mentioned in Footnote 1. Both papers are accessible on Eesti Pank home page: http://www.bankofestonia.info

Monetary Transmission Mechanism

Two different approaches can be used in analysing MTM. **In the first approach, different transmission channels are distinguished pursuant to the financial indicators responsible for monetary transmission to the real economy.** Those transmission channels usually involve interest rate channel, bank lending channel, asset prices channel and exchange rate channel.

Interest rate channel transmits changes in the central bank monetary policy rates into money market rates, further on to lending rates and through the lending rates into real sector investments and consumption. In the case of **bank lending channel,** it is not so much the interest rate change that affects real sector activity, but rather a change in availability of bank lending. This channel assumes that in tighter monetary conditions credit institutions restrict lending to specific customer groups. According to **asset price channel,** a change in interest rates involves changes in financial asset (eg stocks) prices, affecting real sector's wealth and ultimately also economic activity. In the **exchange rate channel,** changes in central bank interest rates bring along a change in the exchange rate. The latter will have an impact on external competitiveness and also on domestic prices (due to changes in import prices).

In the second case it is not the transmission channels that are distinguished but inter-sectorial relationships. According to this approach, a change in central bank interest rates would affect financial asset prices in the financial sector. The price change of different assets depends on financial sector structure and relations between financial intermediaries. From the financial sector the impact spreads to the real economy. The impact of monetary policy and the transmission lags depend on the nature of the relationships between those two sectors.

Estonian Monetary Policy – Currency Board Arrangement

The main monetary policy goal in Estonia is to maintain the stability of the national currency. In achieving this goal, Estonia's monetary policy has been based on currency board arrangement since 1992.

Under the currency board arrangement, Eesti Pank does not conduct active monetary policy. The price stability objective is tied to the anchoring role of the exchange rate and all the necessary adjustments are left to the market. Eesti Pank does not pursue active interest rate policy and has no other operational monetary policy targets in addition to fixed exchange rate. Under the CBA, the fixed exchange rate serves as a nominal anchor for domestic prices and interest rates. In the long-term, the fixed exchange rate can encourage convergence between domestic and anchor-currency prices and interest rates.

Under the currency board arrangement, Eesti Pank does not conduct active monetary policy.

Another significant feature of the CBA is the convertibility rule that requires full backing of base money with foreign reserves. Also, strong legal commitments to preserve fixed exchange rate are characteristic of the CBA. The convertibility

rule means that the base money supply mechanism is automatic, as changes in the base money supply follow the changes in central bank foreign exchange reserves. Strong legal commitments for maintaining the fixed exchange rate provide additional long-term monetary stability.

The forex window means unlimited foreign exchange between the foreign currency (anchor currency) and the Estonian kroon, initiated by commercial banks.

The most important monetary policy instrument for Eesti Pank under the CBA is the *forex window* between the Estonian kroon and the German mark (since 1999, between the kroon and euro area currencies). *The forex window* means unlimited foreign exchange between the foreign currency (anchor currency) and the Estonian kroon, initiated by commercial banks. *The forex window* is also the mechanism for the base money issuance – a change in the base money supply is caused only by the corresponding operation in the forex window. **The other significant monetary policy instrument is the reserve requirement that should create sufficient liquidity buffers for the financial sector.** Under the CBA, banks should have larger liquidity buffers, as the central bank's lender-of-last-resort facility depends on excess reserves[3].

Transmission Mechanism under Currency Board Arrangement

Most studies related to monetary policy transmission treat some monetary policy exercise at the beginning of the transmission chain. Usually, a change in monetary policy interest rate is used as an exogenous starting point in monetary transmission. Some earlier papers have used a change in base money supply or a change in any other central-bank-controlled indicator in the same regard. However, under the CBA there are no active monetary policy exercises. This means that the central bank has no independent interest rate target, nor any other targets except the fixed exchange rate. In other words, the domestic interest rates adjust through market mechanisms according to arbitrage conditions between foreign and domestic interest rates. Also, the central bank does not affect base money supply – the money supply is endogenous corresponding to changes in base money demand. In brief, under the CBA, exogenous changes neither in interest rates nor in money supply arise from the monetary policy. Both indicators develop endogenously, subject to economic development, external financing and arbitrage conditions.

The most widespread explanation of the currency board transmission mechanism lies in automatic money-supply mechanism. Due to this, current account deficit is automatically transmitted to shrinking money supply, which leads to the increase in domestic interest rates. The changes in domestic interest rates will transmit into economic activity and price level through the usual transmission channels reducing thus current account deficit. Under fixed exchange rate regime and high capital mobility, the change in domestic interest rates will also

[3] Excess reserves are reserves that exceed the CBA cover.

lead to capital inflow because of interest rate arbitrage. All in all, the balance of payments will balance and the interest rate level will converge to the anchor currency interest rate level.

Hancke and Schuler[4] have studied currency board mechanisms and explain the CBA automatic money supply mechanism as follows:

> Market forces determine and limit expansion of the money supply [at the current interest rate level]. As long as it is [expected to be] more profitable to invest funds in the currency board country than elsewhere, commercial banks in the currency board system tend to increase their loans. They can do so because foreign investment tends to occur, bringing additional foreign reserves to the currency board system. Eventually commercial banks expand their loans in the currency board system to such an extent that making further loans there is less profitable than investing the funds abroad. At that point, commercial banks hold the supply of loans constant in the currency board system, and money supply ceases to increase. Because the exchange rate is fixed, arbitrage opportunities cause the money supply to adjust to current-account deficit.

This interpretation of the adjustment mechanism has also been called *automatic stabiliser of CBA*. But here we should consider at least two aspects. First, due to the risk premium, domestic interest rates are not completely pre-determined by external interest rates. Risk premium reflects country-specific (default risk, etc) as well as global and regional aspects. Regional risks – crises at emerging markets or other credibility-influencing global factors – may have adverse impact, not related to domestic fundamentals.

Second, the balancing mechanism of the *automatic stabiliser* does not necessarily mean prompt macroeconomic adjustment in the sense of lowering the current account deficit rapidly to consistent levels. Thus, capital flows respond to interest level changes more rapidly than trade flows. Most of the current account signals can be balanced by corresponding flows in capital account. Besides, foreign direct investments form a significant part of the capital account balance, financing current account deficit. Thus, the CBA's role as a macroeconomic stabiliser can be viewed rather as a long-run relationship between monetary and macroeconomic conditions and not as a rapid current account adjustment mechanism.

Transmission Mechanism in Estonia – Underlying Impacts

In the early years of transition, Estonian banking system depended largely on domestic deposits. In 1996–1997 the financial sector accessibility to foreign markets started to improve. This enhanced also the integration of Estonian financial sector with foreign financial markets,

[4] Hancke, S. H., Schuler, K. (1994), Currency Boards for Developing Countries: A Handbook. ICS Press, San Francisco, p 40.

raising the role of foreign components in the transmission mechanism. In other words, the importance of foreign monetary signals – mostly anchor-currency signals, but also regional and global factors – increased in developing Estonian monetary environment.

There are several factors, which affect the transmission of external monetary signals into Estonian financial sector and further on to the decisions of corporate and household sectors. First, the structure of the financial system is significant in determining the transmission of short-term interest rates into other financial indicators – primarily into lending and retail deposit interest rates and asset prices. Second, relations between the financial and the real sectors are significant as well as the motivators of saving and investment decisions' in the real sector.

The Estonian financing system is banking-oriented and highly concentrated due to the low number of banks. Domestic financial and capital markets are relatively shallow and focus rather on short than long-term financing. Concentration may (at least theoretically) mean that domestic lending and deposit rates have a slower and more asymmetric response to changes in money market rates.

Since 1996–1997, the role of foreign capital for the financial sector has increased significantly. Foreign capital involvement could help the financial sector to compensate for shrinking domestic depositing. Close integration with external financial markets has affected also liquidity management in the financial sector. Credit institutions' foreign reserves are more important for the liquidity management than domestic money markets in Estonia. All these factors together with the small size and concentration of the domestic financial markets means that **the direct link between domestic money market rates and real sector deposit and loan rates can be quite weak in Estonia**. At the same time, most of the Estonian real sector loan rates are indexed to the anchor currency short-term money market rates (usually to 6 months Euribor). As a result, **external monetary signals are (at least partly) automatically passed to Estonian real sector loan rates, without domestic money market intermediation**. Assuming that for most of the time the external financing can be regarded as a substitute for real sector deposits, also the deposit rates may be linked to external interest rates not only through domestic money market but also directly.

Closer integration with external financial markets has affected also liquidity management in the financial sector, in which credit institutions' foreign reserves are more important than domestic money markets.

The interest rate channel concept claims, that real, not nominal, interest rates have a significant impact on real sector activity. The real interest rates are significant as investment and saving decision depend on the expectations of the economic agents. And the real interest rates are determined by inflation expectations. However, it is difficult to estimate real interest rates, especially in a transition economy where inflation expectations can be volatile and changing. Especially when economic agents are not able to interpret

market processes adequately. Therefore, backward looking decisions may prevail and perceived low or even negative real interest rates could diminish the overall role of interest rate signals for the real sector.

For the credit channel it is important whether bank loans are substitutable for the real sector (or domestic credit resources for the banks) with some alternative form of external financing or not. The credit channel works if banks refuse to extend loans to some real sector companies or private persons during restrictive monetary stance and they cannot borrow from alternative sources either. Under such circumstances, the development of domestic capital market (primarily bond market) is considered significant in determining the potential size of credit channel effects. In Estonia, the domestic capital market is fairly small (reaching 3–4 per cent of GDP in 2002) and its role as a substitute for bank lending is low. Leasing financing has developed rapidly over the recent years but this is also not the substitute for bank loans, as leasing companies are mostly bank-owned. Thus, deteriorating financing conditions for banks can not only push the interest rates upward, but also decrease the domestic credit supply.

Larger companies can borrow directly from foreign capital markets. Nevertheless, this is not an alternative for domestic lending, as smaller companies as well as private persons, as a rule, have no such possibility. However, such a financing source could in some cases mitigate tightened domestic monetary environment[5].

Empirical Analysis of Transmission Mechanism

Three different types of methods are usually used for the empirical study of monetary transmission mechanism: Vector Auto Regressive models (VAR), small structural macro models and large macroeconomic models. VAR-models and small macro models require relatively little data but their disadvantage lies in oversimplification. Large macroeconomic models attempt to present all more significant relationships and references. The disadvantage of large models lies in data-intensiveness; they are also less transparent. Besides, in large models, the results are highly dependent on theoretical assumptions of the model – misspecification in one part can lead to the failure of the whole model.

Model of Transmission Mechanism in Estonia

In order to study monetary transmission mechanism in Estonia Eesti Pank has put together a small structural macro model focusing on various aspects of the mechanism. The model consists of ten behavioural equations and eleven exogenous variables. The model tries to cover most important and obvious relationships in the economy. Equations of the model

[5] After the Russian crisis of 1998–1999 it was evident that the decrease in domestic bank lending was partly substituted with foreign borrowing in larger Estonian companies. However, the growth of real sector foreign borrowing was based on the credit from mother companies to their Estonian subsidiaries. Direct borrowing of companies from abroad remained difficult for the entire period.

define interest rate channel, credit rationing, real sector consumption and investment behaviour, formation of inflation expectations and developments in current account balance. Bank lending channel has been ignored and credit channel has been used instead.

In order to study monetary transmission mechanism in Estonia Eesti Pank has put together a small structural macro model, which consists of ten behavioural equations and eleven exogenous variables.

As already mentioned above, interest rate signals are largely exogenous and dependent on external factors in Estonia. Thus, the transmission of the official rate of the European Central Bank (ECB) into Estonian economy is simulated with the model. It is assumed that foreign money market interest rates transmit directly into Estonian credit market interest rates, without the intermediation in domestic money market. This means that in longer-term loan rates depend only on fundamentals-associated risk premium and ECB interest rates but not on domestic demand. However, short-term adjustment in interest rates is also related to domestic factors. Besides transmission of interest rate shocks into interest rates only, banks can use loan rationing, ie a part of domestic credit demand may remain unsatisfied.

However, the equations of the model should not be treated as channel-specific – the modelling is more concerned with relations between various economic agents and sectors than singling out different channels.

Analysis of Transmission Mechanism – Empirical Model

The above model has been used to study several monetary shocks. Here we discuss the impact of one percentage point once-for-all increase in ECB main refinancing rate on the Estonian real sector economic activity. The impact of other shocks (eg, exchange rate shock) as well as more detailed study of ECB official rate shock is published by Eesti Pank in its working papers series[6].

According to simulations, the ECB interest rate shock is accompanied by the **sharp increase in domestic lending rate** (see Figure 1). As inflation expectations adjust more slowly in the model, almost as high initial increase in real interest rates occurs. The hike in interest rates will start to fade within three months. In a year the impact on Estonian lending rates has levelled to about 0.8 percentage points in nominal rates and about 0.9 percentage points on real rates. As a result of higher rates, domestic lending will shrink and the average level of indebtedness will also decrease.

[6] See Pikkani, R. Monetary Transmission Mechanism in Estonia – Empirical Model. Working Papers of Eesti Pank, No 5, 2001.

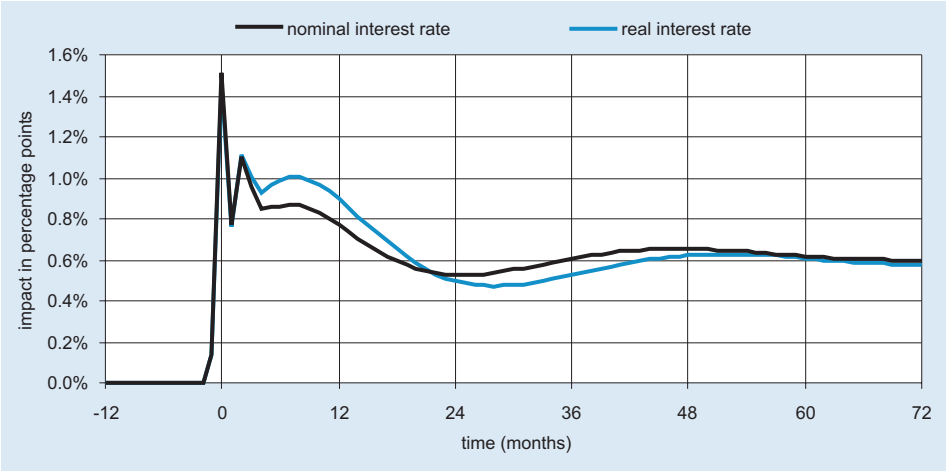

Figure 1. Impact of the ECB monetary policy interest rates increase on the Estonian loan interest rates (in percentage points)

Higher real rates will lead to lower domestic lending and will decrease domestic demand. Contraction will peak at -1.6 per cent in private consumption and at -6.5 per cent in investment (see Figure 2), making private domestic demand decline by 2.2 per cent. As a marginal stabilising factor, public expenditure will rise by around 0.5 per cent to compensate the decrease in private sector activity. Caused mainly by the fall in domestic demand (together with price competitiveness impacts), external balance will improve in the extent close to 1 per cent of GDP, making aggregate domestic output to decline by slightly less than 1.5 per cent (value added in private sector will decline by slightly more than 1.5 per cent). The highest impact of the ECB rate hike on domestic activity will be achieved in about six months after the shock.

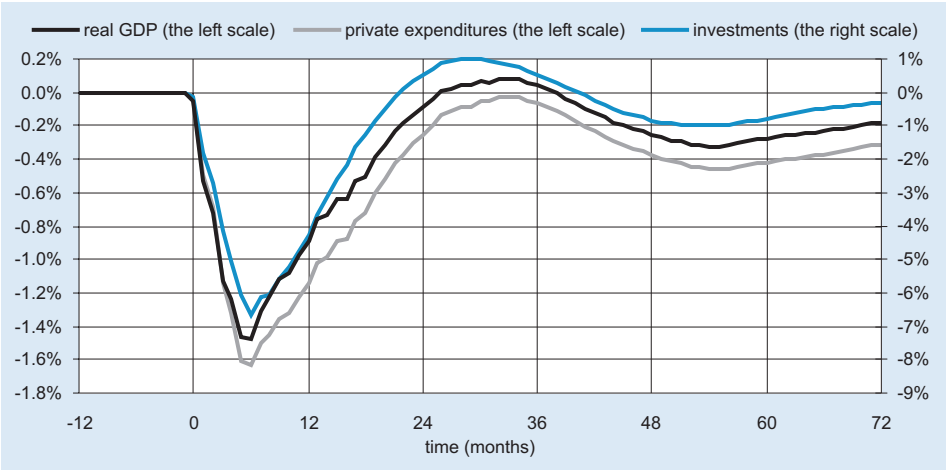

Figure 2. Impact of the ECB monetary policy interest rates increase on the private expenditures, investments and GDP (in percentage points)

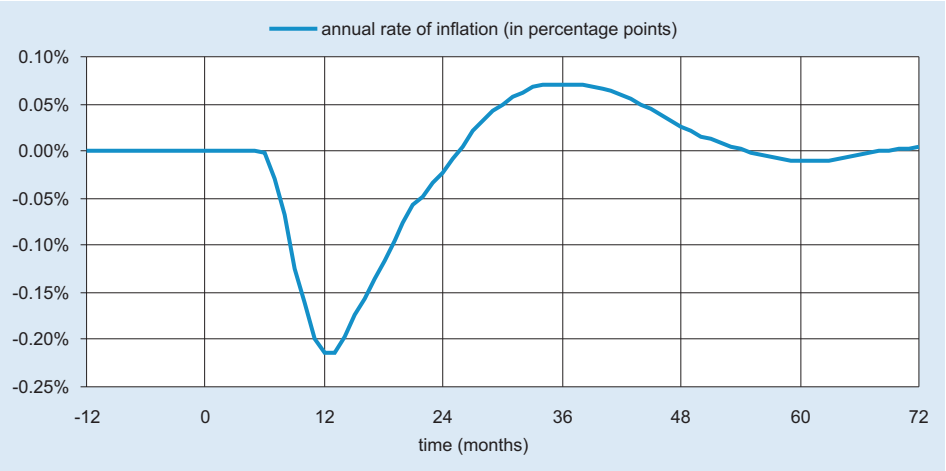

Figure 3. Impact of the ECB monetary policy interest rates increase on the annual rate of inlation

The transmission of monetary policy shock into inflation will take a little longer (see Figure 3). The maximum impact on inflation will be achieved in a year, reaching its top with the decline by 0.2 percentage points. For the end of the second after-shock year, the initial rate of inflation will recover followed by the slight over-adjustment. The latter can be explained through the overall price convergence: slower growth in some periods is to an extent compensated over the following periods.

As a side effect coming from lower level of investments (the labour market is excluded from the model, making the overall model rely on the assumption of constant potential employment), domestic potential output will slightly fall. The negative impact on production potential will peak at 0.23 per cent in eighteen months.

In two or three years, domestic demand and external balance will recover the pre-shock level. Both domestic nominal and real rates will stay 0.6 percentage points above the pre-shock level. Also, the stock of loans outstanding and potential output will not move back to their original levels and will remain 3.2 and 0.16 per cent lower, respectively.

Summary

Several factors influence monetary transmission mechanism. The efficiency of the various transmission channels depends largely on the development of the financial system and the market structure. Diversity of factors that affect the MTM and structural changes make the evaluation of the mechanism difficult even for most advanced economies.

Under currency board arrangement, Estonian monetary conditions are closely linked to European monetary conditions and to monetary policy conducted by the ECB. The

transmission of European monetary signals into Estonian real sector depends on the structure of Estonian economy. The underlying structure of the financial and real sector in Estonia as well as the reliance on CBA allow to assume that European monetary signals may transmit into Estonia at least through interest rates and credit channels. The empirical study of the monetary transmission mechanism in Estonia has confirmed this assumption. The study revealed also that Estonian economy adjusts itself to external monetary shocks relatively rapidly.