The transmission mechanism of monetary policy at the beginning of the third millennium

Kateřina Šmídková[1]

ABSTRACT

In last decade, three important challenges – the introduction of new strategies for monetary policy, the observed differences in anatomy of financial crisis between developed and emerging economies, and the emergence of the EMU – gave rise to new focus of debate about transmission mechanism of monetary policy. Three stages of transmission have been distinguished more clearly. The emphasis has been given to several transmission channels that had not been in the core of the previous debate. The differences in transmission mechanism of monetary policy across countries have been analyzed, and consequently, more attention has been paid to risks when deriving lessons from one country experience for another economy. An overview of the theoretical foundations, three main stages and channels of transmission mechanism provides background for illustrations of cross-country differences. The specific problems of transmission mechanism of monetary policy in emerging economies are discussed in more detail.

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[1] Kateřina Šmídková, Adviser to the Board, Czech National Bank. This is an up-dated English version of the paper published in the Czech Journal of Economics and Finance [in Czech] in 2002. The opinions in this paper are those of the author and do not necessarily reflect the views of the Czech National Bank.

I. Three new challenges when thinking about the transmission

The past decade has posed three new challenges for the professional literature on the transmission mechanism of monetary policy[2]. First, the strategies that central banks used for attaining its ultimate monetary policy target have changed. Stronger emphasis has been put on the explicit expression of the final target, and the views on employing operational monetary policy instruments have been consolidated. As a result, the initial and final points of the transmission mechanism were crystallised. Secondly, the differences between developed and emerging-market economies during monetary and financial crises intensified the debate on the variance between the transmission mechanisms of the individual economies[3]. Thirdly, the emergence of the European Monetary Union (EMU). This has brought to the forefront a series of analyses of the asymmetric effects of common monetary policy on the EMU member countries.

These three challenges have influenced thinking about the transmission mechanism in several ways. The three phases of transmission have been more clearly defined. In addition, transmission channels that were not originally emphasised in classical studies are now given full attention. During the financial crises, the role of the asset price channel increased, which led, in turn, to the debate on whether or not central banks should expand the price index, which also targets asset prices. The most dynamic monetary policy strategy – inflation targeting – took into account the important role of inflation expectations in the transmission mechanism by introducing explicit inflation targets. The differing effect of the transmission channels in the various countries became more evident along with the need for discretion when applying the knowledge of one economy's transmission mechanism to other countries. Even within the EMU, it has been shown that the transmission mechanism in the national economies displays very different dynamics and strength.

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[2] For brevity's sake, the transmission mechanism of monetary policy shall be shortened to *transmission mechanism* and the channels of the transmission mechanism of monetary policy to *transmission channels*.

[3] In this article, the group of emerging-market economies includes a relatively wide category of countries that have medium-high incomes (GDP per capita) and that show tendencies towards developed economies. These include, in particular, transitional economies and countries from South America and East Asia.

This paper attempts to organise the knowledge of the contemporary literature relating to these particular challenges into a systematic survey and to specify the theoretical views on the transmission mechanism, its phases and the transmission channels. In addition, it illustrates interesting issues by using the results of international empirical studies. In part two, the development of monetary-policy strategy is put into context with the views and opinions on the transmission mechanism. In part three, careful attention is paid to classification of the transmission channels. Part four summarises the international comparison of factors that cause, in particular, discrepancies in the transmission mechanisms of specific economies. Finally, part five deals with the problems that emerging-market economies face when analysing the transmission mechanisms.

II. The monetary strategies and the transmission mechanism

Crystallisation of the transmission mechanism's initial and end points is clear from the latest studies on central bank strategies[4]. Most central banks consider their final target to be price or monetary stability. A standard central bank, of course, cannot determine this target directly, because it moves within the market environment and does not regulate prices in an administrative fashion. The only operational instruments available are monetary policy interest rates, mainly with one-week or two-week maturities, and the short end of the market yield curve is connected to these rates. Many central banks also strengthen the effectiveness of monetary policy by introducing an explicit target for a targeted variable. Therefore, the quantified final target fulfils the role of an active monetary policy instrument. The large distance between the operational instrument and the final target is overcome in three phases.

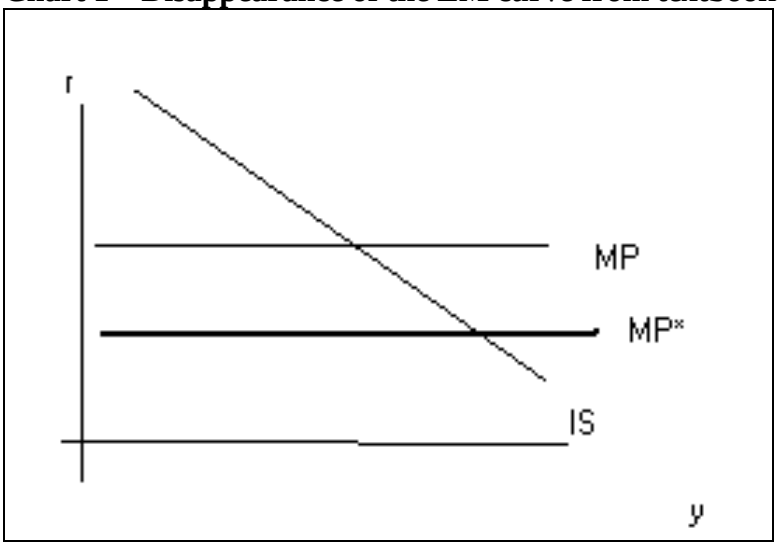
When describing the first phase of the transmission mechanism[5], we can rely on expert consensus. With the help of base rates, the central bank influences market interest rates on the short end of the yield curve, and real interest rates as well if nominal rigidities occur in the economy. The central bank also uses an explicit target for anchoring expectations in the

[4] A description of the historical development of monetary policy strategies and also the results of the CCBS's unique research on the choice of strategies, targets and monetary instruments can be found in Mahadeva, Sterne (2000).

[5] The three phases of the transmission mechanism are described, for example, in Els van, Locarno, Morgan, Villetelle (2001).

economy. Admittedly, this outlook is a sort of minor "revolution" in macroeconomic textbooks. Originally in IS-LM model textbooks, the central bank influenced the economy by changes in the volume of the money supply. Then the equilibrium on the money market was reached through a new combination of real rates and GDP. The theory takes reality into account only at a slow pace. Fortunately, though, in current models, the monetary policy instrument is not represented by a volume variable, but by a monetary rule that derives a change in interest rates directly from the output gap, the values of the final target and the forecast of the targeted variables[6]. Classical IS-LM models are on the way out. The second advantage of the current models (Chart 1) is that they do not need the explicit assumption of money demand stability, which conflicted with reality in the 1980s.

Chart 1 – Disappearance of the LM curve from textbooks



Note: The MP curve shows that the interest rate level (r) is associated with the inflation target. The IS curve is the analogy to classical textbooks but it captures all of the balanced combinations of interest rates and GDP growth (y) for the goods market. The MP* curve reflects the new equilibrium, for example, in reaction to the change in preference in relation to the value of the inflation target.

The second phase of the transmission mechanism has been more a subject of debate than the first phase. The current literature offers a number of alternative explanations for the transmission process based on various theoretical stances or various emphases put on the individual transmission channels. In the second phase, the financial sector reacts to the newly set short rates (nominal and real). All financial variables interact with the real economy,

[6] This "revolution" in macroeconomic textbooks is described in Romer (2000).

including creation of the long end of the yield curve and client rates[7], and aggregate supply and demand is formed on the goods market. The overall outlook on theoretical stances and transmission channels is taken up in part three. Finally, in the third phase of transmission, the interaction of aggregate supply with demand on the goods market is accounted for in inflation development, which is then compared with the final monetary policy target. There is general consensus that inflation development is determined to a large extent by the gap between GDP pulled by demand and the potential GDP. It is difficult in practice to differentiate the second phase from the third phase, because the economic variables affect each other in a complex system of links. However, most of the models working with monetary rules express in particular the first and third phases of transmission. The second phase of transmission is approximated to a highly aggregated level by a coefficient of GDP's sensitivity to real rates and a coefficient of inflation's sensitivity to the output gap[8]. This inevitably leads to a number of simplifications, and therefore all three phases should be kept in mind when discussing monetary policy.

The lower significance of demand for money in transmission mechanism studies reflects a decline in interest in money supply targeting as a monetary policy strategy. This parallel well illustrates the relationship between the choice of monetary policy strategy and knowledge of transmission. The transmission process determines how central banks will reach their final target. If a transmission channel is strong, it is a good candidate for one of the pillars of monetary policy. If a former important transmission channel is replaced by newly developed channels, it is then time to look into modifying the pillars of monetary policy. Thirty years ago, a good majority of central banks used money supply targeting or a fixed exchange rate regime with limited convertibility. Both of these strategies were one-pillar strategies. Their basic building block was one channel of transmission. Since the 1970s, monetary policy strategy has gone through some relatively dramatic developments.

During the last thirty years, the number of central banks employing a fixed exchange rate with limited convertibility has decrease by two thirds. Similarly, fewer and fewer countries are using money supply targeting as their strategy. In contrast, the number of central banks relying on a flexible strategy of the American type, known as "just do it", has tripled.

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[7] A more detailed look at the structure of interest rate transmission can be found in Angeloni, Kashyap, Mojon, Terlizzese (2002). The problem of transfer of the signal between the change in base rates and client rates typical for a transitional economy is analysed in Opiela (1999).

[8] Typical examples of models in this new class can be found in Taylor (1999).

The most modern and expansive strategy is inflation targeting, which has gradually been introduced in a number of central banks in developed as well as emerging-market economies. Inflation targeting and flexible monetary policy strategy have an important feature in common which is derived from the current outlook on the transmission mechanism. This is understood as a multi-dimensional, dynamic process that changes in character over time. The advantage of inflation targeting is the use of an explicit inflation target as an active instrument, which in turn, strengthens the effectiveness of monetary policy. Both modern strategy types are based on considering a combination of transmission channels and may even react to how the weight and speed of the channels change without any dramatic change in the overall strategy.

It is typical for inflation targeting in particular that the inflation forecast – functioning sometimes in itself as an intermediate target – involves regular assessment of various transmission channels[9]. If one transmission channel fails, the forecast still may not deviate too much from reality. This is, undoubtedly, an advantage over the one-pillar strategies. It is worth recalling the famous statement on the change in monetary policy strategy, "We did not abandon M1, M1 abandoned us"[10]. In addition to relying on a number of transmission channels at once, the second important feature of a modern monetary policy strategy is the use of explicit targets and emphasis on transparent monetary policy decision-making[11]. The explicit quantification of the value of final targets and active building of their credibility through increasing transparency gave central banks an "additional" monetary policy instrument that could directly influence the inflation expectations channel. According to the CCBS research mentioned earlier, 57% of the 97 central banks asked in 1990 used an explicit target. By 1998, this figure had increased to 95% of the central banks, while 50% directly announced an explicit target for inflation.

If we look into why such changes in monetary policy strategies occurred, we would be analysing the flip side of the coin concerning changes in the transmission mechanism. Rapid development of financial markets has brought with it a shift from monetary policy volume instruments to monetary policy price instruments. When the monetary base stops being an instrument of monetary policy, it becomes more difficult to target the money supply.

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[9] The inflation forecast was suggested by Svensson (1999) as the intermediate target of monetary policy in an inflation-targeting regime.

[10] Thiessen (2000) addresses the history of Canadian monetary policy.

[11] Geraats (2001), for example, discusses the role of explicit targets and transparency.

Financial innovations have limited the validity of the assumption of money demand stability. The widening spectrum of financial assets weakened the link between the money supply and the real economy[12]. The shift of the majority of countries to full convertibility connected the national financial markets to international market, and the subsequent growth of international capital flows limited the central banks' ability to sustain a fixed exchange rate over the longer term[13]. In addition, modern communication and computer technology have reduced the physical distance between the national markets and allowed players to react to impulses from around the world, and to formulate expectations on domestic economic development much faster than before. This has strengthened the role of expectations in the transmission mechanism and increased the amount of indicators that are relevant for assessing domestic economic development[14]. Reaching the final target with the help of one intermediate target started to be very difficult in this changed environment.

III. Classification of the transmission channels

The second phase of the transmission mechanism is most often categorised in the literature into "channels" of monetary transmission. The various authors approach this in different ways, and to make things even more complicated, their categorisation is based on three different schools. According to the traditional theory, the changes in base interest rates and the subsequent changes in the exchange rate are reflected directly and indirectly in aggregate demand. However, a number of empirical studies have shown that the models based on the demand view alone do not sufficiently explain the strength of the reaction that the economies of some countries have to changes in monetary policy instruments. In other words, to explain the effectiveness of monetary policy in full, it is necessary to find additional explaining factors which monetary policy employs to reach its final target.

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[12] Bowen (1995) shows in his analysis that this failure of the monetary aggregates was an impulse for the creation of inflation targeting in the UK.

[13] Svensson (1994) provides an analysis of exchange rate regime difficulties in developing financial environments.

[14] It was not too long ago that monetary turbulence spread from Asia to all segments of emerging markets, and in 1997, also affected the Czech economy. A description of the turbulence and an analysis of the reasons can be found in Šmídková (1998).

According to the credit theory, incomplete information and its implications for the credit market play a specific role in the second transmission phase. Higher interest rates, according to this theory, make the problem of moral hazard and adverse choice worse. This increases the probability that a company will apply for a loan that it has no intention of paying back. As a result, after interest rates are increased, financial conditions are tighter than the traditional theory would indicate, because, along with lower demand for credits from clients, the credit supply of banks will also slow down. In reaction to the higher probability of failure, commercial banks more carefully assess their clients and reduce their balance sheets. Some authors consider the effect of the credit market on the economy to be so strong that they classify it as an independent transmission channel[15].

The supply theory is based on the fact that the change in interest rates directly affects the supply side of the real economy, for example, through cash flow. Higher nominal interest rates burden companies with additional costs. Purchases of inputs and production factors are more restricted because of lower cash flow when financing these purchases through credit. According to this theory, increasing the nominal rates has a similar effect on the real economy as a negative shock in productivity. If the economy is dependent on credit even for financing wages, there could be a downward shift in the demand curve for labour due to higher nominal interest. The supply theory is, therefore, used to explain situations in which – contrary to the demand model's intuition – price growth was observed after increasing interest rates. With this growth, companies temporarily offset the decline in their cash flows.

The current literature stresses that these three theoretical bases – however different they may be – do not compete with each other. On the contrary, they should be understood as complements[16]. The credit and supply theories clarify which mechanisms strengthen the traditional transmission mechanism that rely on demand, and make monetary policy more powerful. Complementary theories explain why the impact of monetary policy is larger and more persistent than indicated by the demand models alone. Parallel usage of the three theories means that, in the second transmission phase, a simultaneous reaction of supply,

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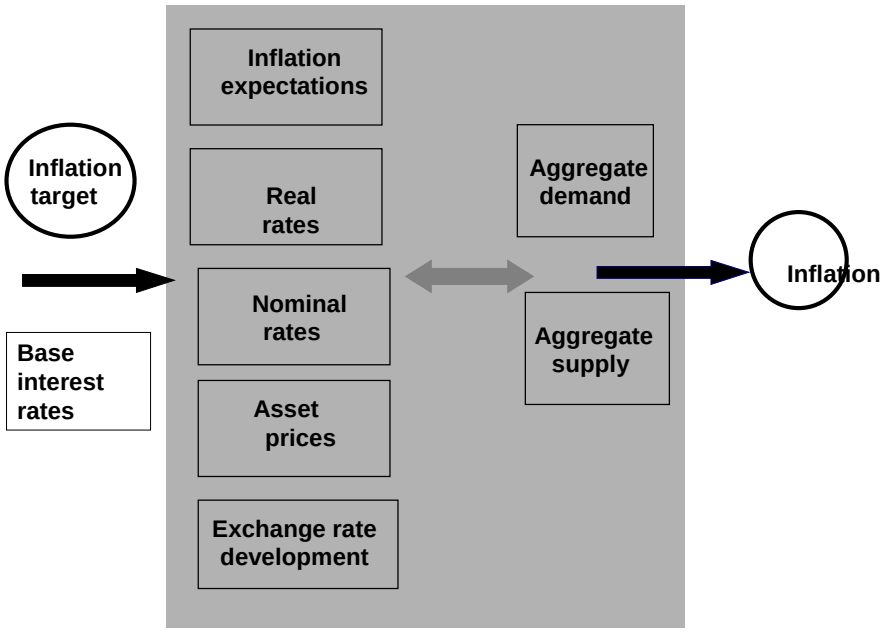
[15] This classified transmission channel in itself actually combines two channels – the interest rate channel and the asset price channel – with emphasis on the supply side of bank balance generation as seen in Bernanke, Gertler (1995).

[16] This is documented by the claims in the latest large ECB project, whose results can be found, for example, in Els van, Locarno, Morgan, Villetelle (2001).

demand and the credit market to changes in the monetary policy instruments can be expected. In the second phase of transmission, the effectiveness of monetary policy is derived from the level of functioning and the interaction of five basic transmission channels that operate through inflation expectations, real interest rates, nominal interest rates, financial asset prices and the exchange rate (Chart 2)[17].

Chart 2 – Monetary policy transmission channels



Note: The first phase of transmission describes the primary effect of changes to monetary policy instruments (interest rates and the target) on the financial sector and the economy. The second phase of transmission is highlighted in grey. In this phase, the financial sector interacts with supply and demand on the goods market. On the left, there are five transmission channels. The third phase of transmission expresses the link between the real economy and inflation.

Inflation expectations can be one of the fastest and most powerful transmission channels. While in most models the economic players know the loss function of their central bank, including the inflation target values, in the real world, this information is not directly available to them. Moreover, whether inflation expectations work in favour of the central bank or whether the central bank must fight against them depends on the credibility of the central bank, the transparency of its decisions and the character of economic shocks. If

[17] Of course, the individual studies use different classifications. For example, it is possible to compare the approach in Els van, Locarno, Morgan, Villetelle (2001) with that of Kamin, Turner, Van´t dack (1998). It should be mentioned that emphasis on the inflation expectations channel appears only in the newest studies.

inflation expectations are unstable – for example, resulting from political instability or an international financial crisis – they do not function as an economic stabiliser. In periods of rising inflation, inflation expectations can be accelerated, and this in itself tends to speed up inflation.

Announcing the explicit final target of monetary policy is an important instrument for influencing inflation expectations. As was mentioned earlier, more than half of the central banks now use an explicit inflation target as an instrument for anchoring inflation expectations more efficiently by increasing the accessibility of information on the central bank's loss function. However, it is clear that announcing the inflation target is only the first step. The public will not automatically expect inflation value to be the same as the inflation target. Nevertheless, this relatively new transmission mechanism phenomenon should be emphasised, because the central bank has two instruments as its disposal for lowering inflation – it can increase the traditionally stressed operational instrument (base interest rates) or use a "new" type of instrument and intentionally strengthen the credibility of the inflation target[18].

How does the inflation expectations channel work? Let's say that the central bank announces the explicit inflation target whose value is lower than the currently observed inflation value. In this way, the expectations of the public can be changed. Public of course does not modify its expectations totally in line with the announced target because it can expect some inflation surprise from the central bank, but it adjusts its expectations on future inflation slightly downward. Just this initial change in expectations itself causes monetary policy to tighten, because – if all other variables remain unchanged – real short rates will increase *ex ante*. In addition, there is a direct effect on prices. In a low-inflation environment, all economic players raise prices in a more cautious manner than in an economy with higher inflation, so that rash decisions do not undermine the competitiveness of their products. Of course, the opposite situation could occur producing unfavourable developments. For example, a political crisis could threaten the credibility of the inflation target so much that inflation expectations would begin to accelerate at a fast pace. In an extreme case, the

[18] To use an example from Czech history, the credibility of the inflation target can be strengthened by reaching consensus with the Government on the manner of setting the inflation target, as described in Hrnčíř, Šmídková (2000).

economy could be hit with hyperinflation. Hyperinflation is a very clear example in which the expectations channel overpowers all other transmission channels[19].

The most traditional transmission channel is, without doubt, real interest rates, which determine the relative price of current and future consumption. If real rates are increased, current consumption decreases according to the traditional view on the transmission mechanism and savings increase. In addition, the effect of increasing costs on capital acquisition, which slows investment, is added to this substitution effect. Along with real rates, Tobin's q also increases. The capital market reacts to rate increases by a decline in share prices. On such a slowed capital market, less financial resources can be acquired with an offer of new shares. Moreover, higher real rates contribute to the problems relating to incomplete information. Banks are more prudent with lending, so even the second alternative source for financing new investment (credit) becomes less accessible. In such a situation, substantial tightening of monetary policy could have unexpectedly strongly effects due to contraction of the capital market and bank balance sheets.

Nominal interest rates are an independent transmission channel that strengthens the effect of real rates in certain cases and, in turn, the central bank's influence on the economy. Thanks to the nominal rates channel, the central bank can have an effect on the economy even if real rates – after a change in nominal rates – remain at the original level in relation to the change in inflation expectations. The nominal rates channel works through the cash-flow effect and the income effect. An increase in nominal rates worsens the cash flow of economic players who are burdened with (net) debt. As a part of the cash is cut off, due to paying higher debt services, the ability of these players to invest or purchase input and production factors from their own resources is limited. However, a rise in nominal rates helps improve the nominal income of the players who are holders of (net) financial assets linked to interest rates. The larger the share of products with flexible rates on the financial markets, the stronger this effect will be. Because the effect of cash flow works against the effect of nominal income, it is difficult to say what the actual effect of an increase in nominal rates is on the economy at the aggregate level. The total effect depends on the structure of the economy or the relative importance of the sectors that are holders of net financial assets or net liabilities. If the effect of indebted economic players is predominant in the economy, the effect of monetary policy on the economy is stronger than when considering the real rates channel alone.

[19] The principle of hyperinflation is described in the classic article by Cagan (1956).

It should be realised that the structural effect is significant in all cases, even if the aggregate effect is neutral. A typical example of the sector effect of a change in nominal rates is the effect on the performance of the public sector, which is a traditional holder of net liabilities. The public sector deficit is linked to the values of nominal interest rates, and debt services can consume a significant percentage of GDP[20]. In the case of a highly indebted country, this direct link between nominal rates and the fiscal deficit – when in need of tightening monetary policy – could even be a reason for dispute between the central bank and the Government. The second typical sector, which is always directly affected through the nominal rates channel by tightening monetary policy, is mortgage holders. Increased nominal rates complicate the running of households. If a substantial part of the population finances their housing with mortgages, the segment of the market with real estate is especially sensitive to abrupt changes in interest rates[21]. In view of the effect of the nominal rates channel, periods of international financial turbulences are especially dangerous. In such periods, central banks must defend the domestic currency with relatively high nominal rates that could significantly affect, if only in the short run, the flow of cash and nominal income of some sectors[22].

A significant part of the transmission mechanism is the effect of changes in net wealth on the behaviour of economic players. At the beginning of the 1990s, attention was drawn once again to the asset price channel when fears mounted concerning the effects of bursting bubbles on the financial markets. The subsequent debate focused on the issue of whether or not monetary policy should react to the bubbles and how. For example, including asset prices in the targeted price index was considered[23]. The asset price channel (sometimes called the equity channel or the wealth channel) maps out how the change in interest rates affects the relative prices of financial assets (government and corporate bonds or shares) and other non-financial assets (real estate and commodity prices). A rise in rates usually causes a decline in

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[20] See the IMF Country Reports for the debt services of specific countries.

[21] For example, the Bank of England excludes mortgage payments from its targeted index in order to avoid any direct reaction to the reality that increased nominal rates cause an immediate rise in the consumer price index. Mortgages create a significant element of the consumer basket for British households. Explanations can be found in the Inflation Reports.

[22] Again as an example, we offer the experience with Czech monetary turbulence described in Šmídková et al. (1998).

[23] Bernanke, Gertler (1999), for example, deal with the issue of the effects of asset market bubbles on the economy.

share prices, so the value of firms' equity is lower and leads to deterioration of firms' good standing on the credit market. The household sector can be affected in a similar way if its net wealth is negative. In such this case, households react to lower asset prices resulting from increased rates by lowering consumption, because they feel that their security against any future economic shock has decreased. Therefore in the case of increasing rates, the asset price channel causes the monetary policy impact to strengthen through an additional reduction in consumption and investment.

Fluctuations in asset prices affect the financial sector most, because it is confronted with a strong multiplicative effect. Changes in the net wealth of financial institutions are reflected in the development of the whole economy, and the effects whirl back to the financial sector like a boomerang. Research on the anatomy of financial crises in developed economies clearly documents that the multiplicative effect must not be neglected in monetary policy decision-making[24]. In developed economies, a typical impulse of financial turbulence is often a decline in share prices on the capital market, which could cause banks to increase their prudential lending practices so much that it would lead to a substantial growth slowdown in the economy. This is followed by worsening of clients' ability to pay off previously granted loans, and the share of bad loans rises in the portfolios of banks. To comply with capital adequacy terms, banks are forced to slow the growth of their balance sheets even further by creating additional provisions and reserves. If the multiplicative effect is strong, this cycle could ultimately lead to a financial crisis.

It is important to realise that the impulse for the drop in share prices (or other assets) can be totally independent of monetary policy measures. Financial turbulence can be caused by a loss of domestic capital market credibility after the collapse of one large financial institution or general uncertainty on global financial markets. A change in the rules of financial sector supervision may also generate a massive adjustment of the financial sector's balance sheet having an effect on the whole economy. Monetary policy must assess all of these occurrences and react to them so that the asset price channel does not overpower the other channels during transmission and interfere with reaching the final monetary policy target. This is why the debate on asset market bubbles led to considerations on expanding the targeted price indices.

[24] The anatomy of a financial crisis in a developed economy is described by Mishkin (1997).

The last of the five transmission channels also belongs to the area of asset prices, but because it affects the whole economy, it has been given exclusive status. The exchange rate channel has three dimensions. Exchange rate appreciation is first transmitted directly to export prices and then to consumer prices. Within a short period of time, monetary policy measures influencing the exchange rate can very quickly affect the segment of tradables in the consumer price index. The second dimension is connected to the domestic economy's competitiveness. Exchange rate appreciation contributes to a relative increase in the prices of domestic products in comparison with foreign products and slowing net export. The third dimension is the effect of the exchange rate on the financial balance sheets of all economic players that hold foreign assets or liabilities in their portfolios and that are, therefore, exposed to exchange rate risk. Exchange rate appreciation improves the players' balance sheets having net foreign liabilities, while the holders of net foreign assets must consider reducing their net wealth (denominated in the domestic currency).

With the exchange rate channel – as with the nominal interest rate channel – it is difficult to say what the effect on the national economy will be at the aggregate level. This channel also affects each sector in a different way. The effect across the balance sheets of economic players could work in the opposite direction of the direct price effect, provided the country is indebted in a foreign currency. In such a case, currency depreciation leads to an increase in import prices (and then inflation) and to a rise in demand pressure on inflation due to higher competitiveness, causing in turn, a rise in foreign demand for domestic goods. On the other hand, currency depreciation leads to a reduction in the national economy's net wealth. Reducing net wealth causes such a decline in total demand that its effect on the economy exceeds all other impulses. This mechanism is cited as an explanation for why recession instead of expected recovery can in some situations be observed following devaluation[25].

[25] Vulnerability in the exchange rate area caused by unsecured foreign debt pulled some Asian economies into recession in 1997, despite depreciation of their exchange rates. Fisher (1998) documents the sensitivity of this problem.

IV. Differences in the transmission mechanism

The general description of the transmission mechanism laid out in the previous section is valid for all countries. However, the five basic transmission channels have different weights depending on the analysed economy, and the outcome of their interaction may be very specific. To make things even more complicated, the weight of the channels changes over time, so the hard-to-come-by knowledge on the transmission must be constantly confronted and reassessed with new information. The effect of monetary policy in the individual countries depends primarily on the level of economic openness, the general framework for creating economic policies, the level of the financial sector and other structural characteristics. The differences in these important factors are significant across countries[26].

For example, the transmission mechanism in open economies, whose important economic variables (e.g. price development) are significantly affected by the exchange rate, is usually quicker than in more closed economies, because the exchange rate channel, with a higher weight, works faster than the traditional channel[27]. Economies, whose openness measured by the share of foreign trade in GDP is around 20% (Chart 3), do not need to spend so much time discussing the effects of the exchange rate channel, while economies with a level of openness exceeding 120% have their hand full with the exchange rate. The differences in the level of openness are clearly evident in the group of developed and emerging-market economies.

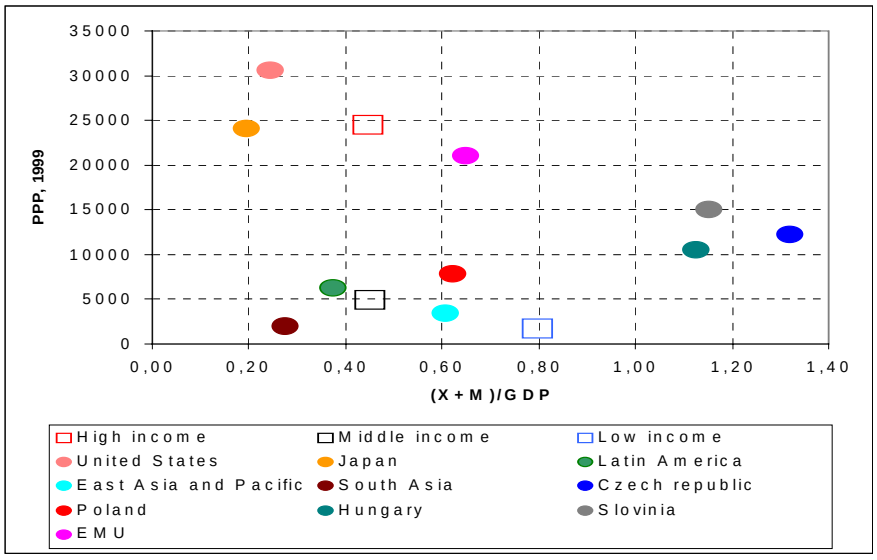
The effect of the inflation expectations channel is to a great extent linked to the credibility of economic policies. A good indicator of credibility is the willingness of foreign investors to lend financial resources to a certain economy. If the investors' assessment is favourable, monetary policy can be expected to be credible and the inflation expectations channel will play a stabilising role. Therefore in a period of accelerating inflation, economic players automatically expect a slowdown in price development for the future. Economic

[26] The most obvious differences can be found between the group of developed countries, emerging-market economies that include transitional economies and other economies with developing markets and the group of countries with low incomes. For this reason, the following charts group the characteristics by the standard of living indicator (GDP per capita in purchasing power parity).

[27] Comparison of the Czech and UK monetary transmission in Mahadeva, Šmídková (1999) confirms this hypothesis.

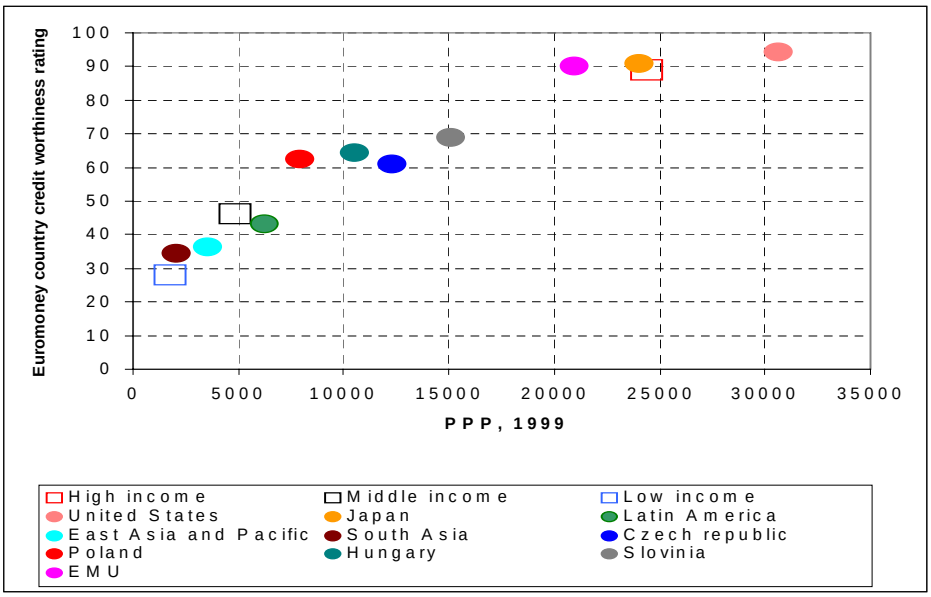
policies in developed economies in particular can rely on this advantage (Chart 4). In emerging-market economies, economic policies do not necessarily need to be as credible, and for this reason, the inflation expectations channel can play a destabilising role under unfavourable conditions.

Chart 3 – Differences in the openness



Note: The PPP is an indicator of per capita GDP in purchasing power parity according to the World Bank's methodology in 1999. (X+M)/GDP is an indicator of the openness of an economy (volume of foreign trade to GDP).
Data source: The World Bank (1999).

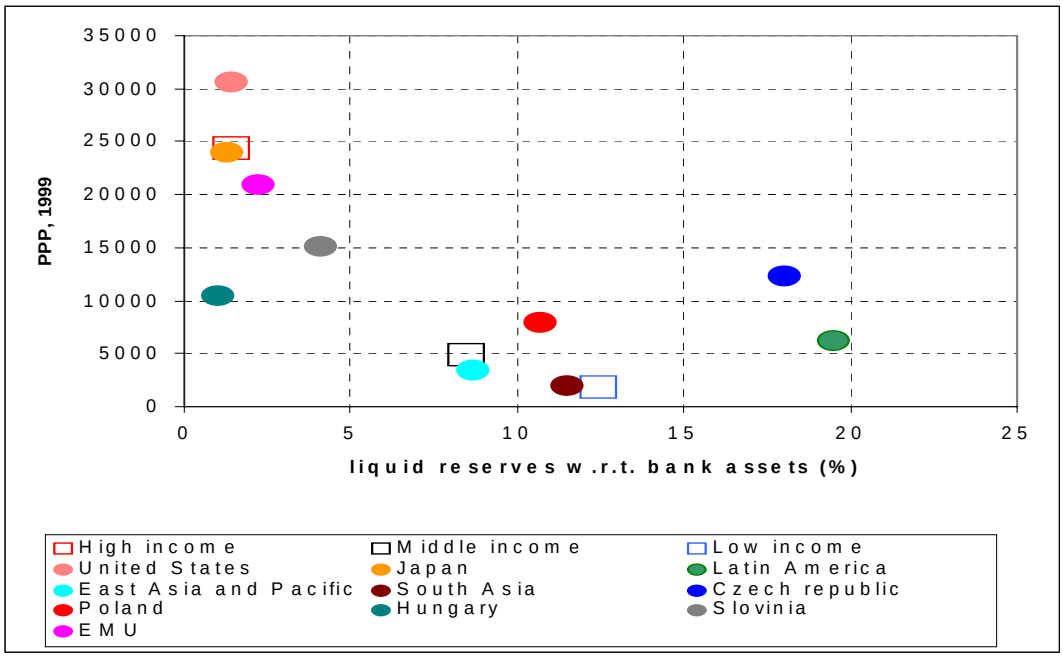
Chart 4 – Differences in the credibility of economic policies



Note: The "Euromoney Rating" shows the assessment of economic policy credibility according to foreign investors. The PPP is an indicator of per capita GDP in purchasing power parity according to the World Bank's methodology in 1999.
Data source: The World Bank (1999).

The level and structure of the financial sector determines what role the channels of nominal and real interest rates play in the transmission mechanism and what weight the asset price channel has. The basic pre-condition of the effectiveness of monetary policy is the existence of a functioning banking sector. If the banking sector is in the embryonic stage of development, which could be reflected by its strong orientation to short-term investment activity, the transmission of monetary policy measures to the real economy is less effective. This is especially common in emerging-market economies whose banks have a large part of their portfolios allocated in short-term instruments (Chart 5).

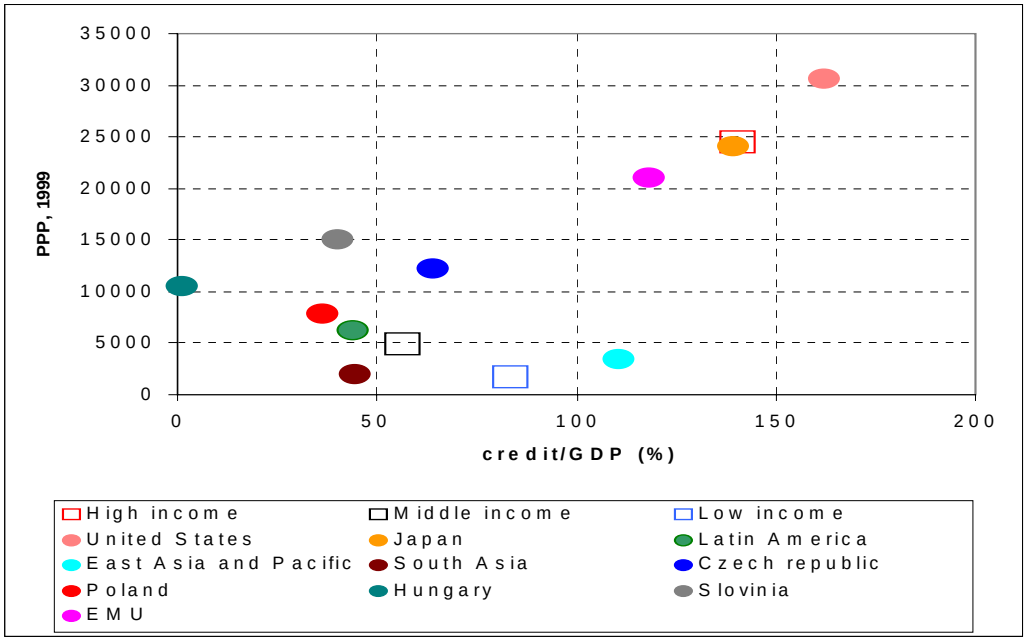
Chart 5 – Differences in the time horizons of banking sectors



Note: The share of liquid assets in the total assets of the banking sector indicates to what extent the activities of the banking sector are short term in nature. The PPP is an indicator of per capita GDP in purchasing power parity according to the World Bank's methodology in 1999.
Data source: The World Bank (1999). Data for Hungary were not available in the database.

The effectiveness of monetary policy is further conditioned by the size of the banking sector in relation to the real economy. In this respect, central banks have an easier position in economies with a high ratio of credits to GDP, while in economies with a credits-to-GDP ratio of around 50%, the position of central banks is more difficult (Chart 6).

Chart 6 – Differences in credit dependency

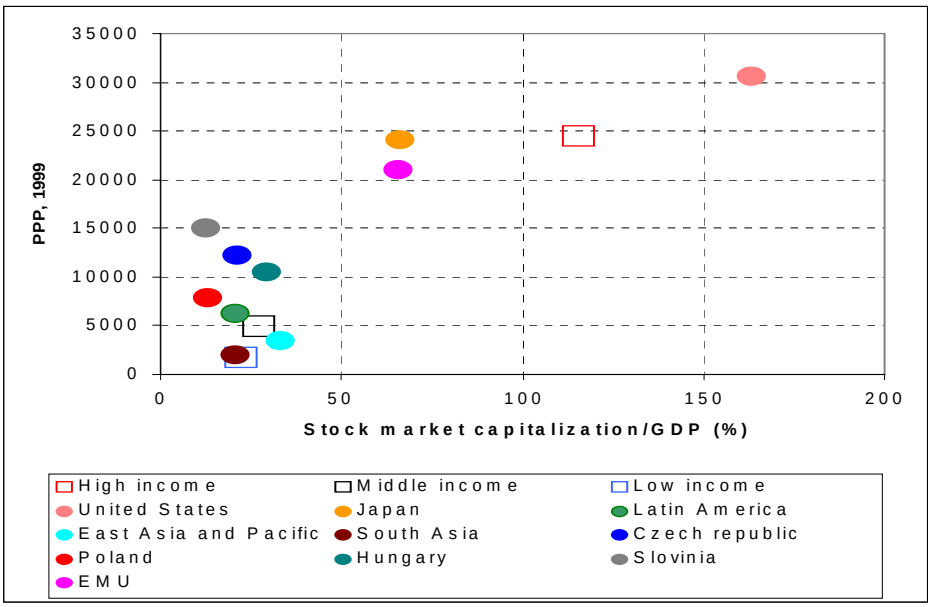


Note: The share of credits to GDP approximates the dependency of the economy on the banking sector. The PPP is an indicator of per capita GDP in purchasing power parity according to the World Bank's methodology in 1999.

Data source: The World Bank (1999). Data for Hungary and Estonia are not available in the database.

The effectiveness of monetary policy can be strengthened by the impact of a developed capital market, which provides a higher weight to the asset price channel. Capitalisation of developed economies measured by the volume of trade on the capital market in relation to GDP exceeds 100% on average (Chart 7). Clearly, the existence of a developed capital market strengthens the price asset channel most profoundly in the US economy. The capital market in the European Monetary Union (EMU) is about half this size. Despite this lag in comparison with the USA, the EMU is ahead of emerging-market economies by a similar margin. The developing capital markets of these emerging-market economies provide about 25% capitalisation to their economies.

Chart 7 – Differences in the size of capital markets



Note: Capitalisation of the economy shows the share of the volume of trade on the capital market in relation to domestic GDP. The PPP is an indicator of per capita GDP in purchasing power parity according to the World Bank's methodology in 1999.
Data source: The World Bank (1999). Data for Estonia were not available in the database.

The dramatic differences in the effect of the capital market on the transmission mechanism cannot be ignored, and therefore, the nature of the debate on monetary policy is also different for each country. The President of the Federal Reserve Bank most frequently discusses the issue of bubbles on the capital market[28]. It is interesting that the differences between the structure of the US and European financial sectors are about as large as the differences between the individual countries within the EMU[29]. Capitalisation of the US economy was 193% of GDP in 1999, while only 90% in the EMU. Capitalisation of the Italian economy was only 66% of GDP, but in France, this figure was at 111% of GDP.

An international comparison of economic factors that determines the characteristics of the transmission mechanism shows that even in the group of developed economies, which is already considered to be relatively homogenous, significant differences exist. This comparison is especially relevant when considering that developments in the 1990s reopened the discussion on just how much these international differences are problematic for transmission. After creation of the EMU, Europe will need to deal with this issue in a very

[28] The lecture by the current FED President is an interesting example – see Greenspan (1999).

serious way, because implementing common monetary policy will, of course, be problematic if transmission in the member states takes a different course and if monetary policy measures affect the key variables in the national economies differently.

According to the most recent study on the EMU transmission mechanism, a rise in the base rates of 100 basis points caused a decline of 0.4% in the EMU's GDP[30]. The period of maximum effective transmission is two years for GDP. The impact of the same monetary policy measures on inflation in the EMU has a similar value of 0.4%, but the time period is four years in this case. During the first two years, the role of the exchange rate channel is stronger. In the following two years, the traditional channel of real interest rates is more effective. This result is, of course, conditioned by the model used. However, the structure of the model is the same for all the national economies, so relative comparison among the national economies is fairly robust. Significant differences can be detected among the EMU countries. In some countries, the influence of monetary policy on the real economy and price development is moderate. In other countries, however, monetary policy measures have a substantial effect on key economic variables (Table 1).

Table 1 – Monetary policy effectiveness in the Eurozone

Country	Reduction in GDP in p.p. (after two years)	Country	Reduction in inflation in p.p. (after four years)
Belgium	0.2	Luxembourg	0.1
Finland	0.3	France	0.2
Ireland	0.5	Greece	0.4
Spain	0.6	Germany	0.6
Greece	0.8	Spain	0.9

Note: The table shows which EMU countries will be affected the most and the least by raising base rates by 100 basis points in relation to GDP and prices.
Source: Els van, Locarno, Morgan, Villetelle (2001).

The differences between the transmission mechanisms of EMU member states conceal a potential danger. These differences could, in fact, slow the convergence process, because the economies of countries on the periphery are more sensitive to common monetary policy

[29] An analysis of the structure of the European financial system in relation to the monetary policy transmission mechanism is taken up in Ehrman, Gambacorta, Martinez-Pagez, Sevestre, Worms (2001).

[30] Last year, the European Central Bank published the first results of an extensive long-term project on the transmission mechanism of monetary policy. See Els van, Locarno, Morgan, Villetelle (2001) for a summary.

measures than the economies of "core" countries. Germany, Finland and the Benelux countries have the lowest substitution effect between inflation and GDP volatility, so for them, tightening of monetary policy is less costly than for countries with a high substitution effect. According to the available estimates, the main countries with a high substitution effect are Greece and Portugal. The countries that need to grow faster than the "core" countries in the interest of convergence have an extra obstacle to get over in periods of overall European growth. In the future, the unbalanced distribution of costs for common monetary policy among member states could bring with it a number of other problems.

V. The specific problems of emerging-market economies

While the launch of the EMU prompted discussion of the monetary policy transmission mechanism in developed economies, in emerging-market economies, the financial crises in the 1990s drew attention to the specific characteristics of their transmission mechanism. These crises shaped the development of emerging-market economies and were considered to be a new type of crisis, because of their very specific character[31]. While in the past, a capital market crash was the typical impulse for the onset of a crisis in developed economies, global financial turbulence or a domestic exchange rate crisis was the typical impulse in emerging-market economies. Due to their lack of domestic financial resources, emerging-market economies depend more on interaction with the global financial system. The anatomy of a financial crisis reflects very precisely some of the specific problems of emerging-market economies with the monetary policy transmission[32].

The first important characteristic of the transmission mechanism for emerging-market economies is the higher volatility of economic variables and higher vulnerability to financial cycles, which is caused by strong dependence on global developments and strengthened by the problem of incomplete information. Emerging-market economies depend more on

[31] An analysis of the typical progression of financial crises in developed and emerging-market economies is available in Mishkin (1997).

[32] See Kamin, Turner, Van´t dack (1998) for the specific characteristics of the monetary policy transmission mechanism in emerging-market economies.

financing domestic investment needs through foreign financial resources[33], and therefore, their financial variables react to the wide range of indicators that are monitored by global foreign investors. In extreme cases, the process of the domestic transmission mechanism can be drowned out by financial crisis caused by mere contagion from another country. In view of the higher level of openness of these economies, the exchange rate channel always plays a relatively important role and, as mentioned before, speeds up the entire transmission process. Emerging-market economies are faced with the increased problem of adverse selection and moral hazard, because collection and assessment of economic information is less effective than in developed economies that have a wide range of market institutions at their disposal[34]. One good example is the problem of collateral evaluation in the financial inter-mediation process. In view of the lack of information, it is difficult to determine the collateral value and therefore, financial institutions relying on adaptive expectations, due to a lack of information, have more of a tendency to worsen the economic cycle by their behaviour than in developed economies. During economic recovery, collateral values are normally highly overvalued, and at the start of a recession, there is a sharp correction in the evaluation that causes bank balance sheets to contract and contributes to acceleration of the recession.

The second serious problem concerning emerging-market economies is the initial low level of development of the financial sector and financial markets, which affects the monetary policy transmission. Low money market liquidity, the high concentration of the banking sector, the large share of bad loans to bank assets and higher uncertainty in relation to overall future economic development are all factors that limit the sensitivity of client interest rates to changes in the central bank's base rates. The traditional transmission channel could, for example, be overpowered by shocks – the introduction of new regulatory rules, new types of financial assets (e.g. pension insurance) or emergence of new financial institutions (e.g. mutual funds). Of course, such shocks cause many more changes in the balance sheet structure of economic players than changes in the central bank's base rates.

Still a possible reason for reduced effectiveness is the sluggish privatisation of the banking sector or of some of its sectors that, after a certain period of time, limits competition when setting client rates. The economic players are faced with the monopolistic behaviour of the banking sector. The effectiveness of monetary policy in emerging-market economies is

[33] The importance of external financial restrictions is described in Fry (1994).

further complicated by the absence of a functioning capital market. The lack of alternative investment opportunities weakens the asset price channel. In addition, the central bank cannot rely on the effect related to Tobin's q. Domestic companies cannot take advantage of the favourable situation on the capital market, which was caused by a reduction in the base rates for financing investment projects through the issue of new shares. Moreover, households do not have shares in their portfolio, and therefore, an increase in the prices of shares does not support – through an additional leverage effect – consumption growth spurred on by lowered rates.

Although the level of the financial sector in emerging-market economies can be a factor limiting the transmission of monetary policy, the effectiveness of monetary policy is not necessarily lowered. The real economy's closer connection with the domestic banking sector can more than sufficiently offset a number of temporary defects. In every case, though, the economy's high reliance on bank credits makes the economic variables more volatile and interferes with the functioning of the economic cycle. Generally speaking, the nominal rates channel can be expected to have more of an effect in emerging-market economies, especially through the effect of cash flows in companies that do not have a source for financing its operations and investments other than bank credits. The asset price channel can be influenced by the interaction between real estate prices and bank balance sheets more than in developed economies, because real estate creates a substantial part of the available collateral.

In conclusion, we can also mention the problem of economic policy credibility. For central banks from emerging-market economies, this complicates monetary policy decision-making. In the case of a credibility crisis, the inflation expectations channel can overpower the other transmission channels. There are two possible reactions to this type of situation. Some countries search for solutions by "importing" credibility from abroad and resort to extreme solutions by introducing "currency boards". The second group of countries resolves the problem by establishing credibility from internal sources. They announce an explicit target (in most cases, an inflation target) for monetary policy and then gradually increase the transparency of their decision-making. The first resolution type brings quick results, but its existence is rather short-lived. The second resolution type lasts longer, but helps eliminate the problem of lowered credibility in a slower fashion. The longer existence of the second type is

[34] Notions on the absence of information in emerging-market economies are based on Stiglitz (1990).

the reason why inflation expectations in emerging-market economies have recently been anchored more by explicit inflation targets than by the introduction of currency boards[35].

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