NBP Narodowy Bank Polski

NBP Working Paper No. 314

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Narodowy Bank Polski
Warsaw 2019

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This is a translation of the NBP publication: *Ewolucja strategii celu inflacyjnego w wybranych krajach* – reviewed and updated. The cut-off date for the analysis is 2018.

The authors would like to thank Wojciech Bogdanowicz, Dawid Durejko, Piotr Szczerba and Anna Wojtyniak for excellent research assistance.

Published by:
Narodowy Bank Polski
Education & Publishing Department
ul. Świętokrzyska 11/21
00-919 Warszawa, Poland
www.nbp.pl

ISSN 2084-624X

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Abstract

Over the last three decades, inflation targeting has become one of the most widespread monetary policy frameworks used in economies striving to conduct independent monetary policy. However, the recent global financial crisis provoked criticism of the way monetary policies had been conducted, including under an inflation targeting strategy, and called for some adjustments to the monetary policy regimes. Against this background, the report is aimed at showing that introducing changes to inflation targeting has been an ongoing process. This is illustrated by discussing the key modifications that have been applied to the inflation targeting framework over the last decades, as well as by pointing to some less commonly reviewed adjustments of the strategy as practiced by some central banks in the past. While quite a number of more recent studies on inflation targeting emphasise lessons learnt from the global financial crisis, this report looks at the full 30 years of experiences with the regime and covers rather diversified array of issues relevant for understanding the strategy, reaching also for more distant examples of its modifications. Importantly, the focus is put on strategic elements of the framework, and consequently the topics related to macroprudential policy and monetary policy instruments are discussed rather briefly.

JEL Codes: E31, E52, E58, E61.

Key words: Monetary Policy, Central Banking, Policy Design.

Introduction

Witold Grostal, Joanna Niedźwiedzińska

Over the last 30 years, inflation targeting (IT) has become one of the most widespread monetary policy frameworks used in economies striving to conduct independent monetary policy.[1] Whereas the key features of the strategy have remained broadly unchanged since its beginnings, some aspects of the regime have evolved. In the first decades of its implementation the process of adjusting the strategy was, to a great extent, driven by the accumulation of experiences made by inflation targeters with various modifications of the framework. This has helped to develop what can be called a fully-fledged inflation targeting regime that offered an efficient set-up for ensuing price stability across quite a heterogenous group of countries. At the same time, the global financial crisis proved that this was insufficient to guarantee the overall macroeconomic and, in particular, financial stability of inflation targeting economies. Therefore, in recent years, the strategy has been subject to further evolution, which primarily concerned the role of financial stability in monetary policy considerations and the scope of non-standard instruments used to provide monetary policy accommodation. More generally, the changes can be seen as testing the flexibility of inflation targeting as a monetary policy framework, with the strategy turning out to be quite well suited for accommodating new challenges. For those reasons the supporters of inflation targeting are still numerous, with a number of central banks adopting this regime after 2008 and with some others preparing to become inflation targeters in the years to come. The opponents of the framework argue, however, that inflation targeting contributed to the accumulation of imbalances and the outbreak of the global financial crisis.

[1] Exchange rate targeting continues to be the most commonly used monetary policy strategy, but it is applied predominantly by small economies.

The discussion between supporters and opponents of the regime is still far from being concluded, but its current state indicates that one of the biggest and indisputable advantages of inflation targeting proved to be, indeed, its flexibility, which can be a decisive factor speaking in favour of keeping its leading position among monetary policy regimes. Most likely some modifications introduced to the strategy in the aftermath of the global financial crisis – related to putting more emphasis on financial stability and extending central banks' toolkit – will be kept as an integral part of the regime, without however the need to substitute inflation targeting with a different monetary policy framework. Therefore, there are good reasons to look closely at the history of the inflation targeting regime, since it may facilitate drawing some conclusions about its future developments.

Against this background, the report is aimed at showing that introducing changes to inflation targeting has been an ongoing process. This is illustrated by discussing the key modifications that have been applied to the inflation targeting framework over the last decades, as well as by pointing to some less commonly reviewed adjustments of the strategy as practiced by some central banks in the past. While quite a number of more recent studies on inflation targeting emphasise lessons learnt from the global financial crisis, this report looks at the full 30 years of experiences with the regime and covers rather diversified array of issues relevant for understanding the strategy, reaching also for more distant examples of its modifications. Importantly, the focus is put on strategic elements of the framework, and consequently the topics related to macroprudential policy and monetary policy instruments are discussed rather briefly.

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When speaking of inflation targeting, it is useful to recall the background against which monetary policy strategies used currently by central banks were forming. The collapse of the Bretton Woods system and the end of the US dollar convertibility into gold in international settlements in the early 1970s marked the beginning of a

worldwide monetary instability. In the 1970s many central banks pursued monetary policy stimulating economic growth. However, oil shocks combined with excessive monetary accommodation led to high inflation and de-anchoring of inflation expectations. Therefore, in subsequent years, the attempts to peg exchange rates were renewed, but without great successes.[2] Under these circumstances, starting from the mid-1970s, major central banks tried to stabilise the value of money by controlling monetary aggregates. Yet, the lack of a stable relationship between monetary aggregates and inflation, among others due to financial innovations hindering appropriate measurement of money supply, prevented this strategy from earning a widespread recognition.[3]

Amid rising popularity of a floating exchange rate regime and the limited success of monetary targeting, at the end of the 1980s a new monetary policy framework emerged, namely inflation targeting. It aimed at stabilising inflation at the level of a publicly announced target, without setting any intermediate targets. Since the 1990s inflation targeting has been adopted by successive countries, as it turned out to be an effective way to ensure price stability, while simultaneously allowing for flexible responses to shocks which resulted in temporary deviations of inflation from the target. The initial positive experiences of advanced countries in implementing monetary policy within an inflation targeting framework encouraged emerging market economies to reach for this regime as well.[4]

However, the recent global financial crisis provoked criticism of the way monetary policies had been conducted in the previous decades, including under an inflation

[2] Fixing of the exchange rates was meant to support the development of international trade. At the same time, it had a major impact on the conduct of monetary policy.
[3] At the same time, in the case of the central banks of Germany and Switzerland, controlling monetary aggregate turned out to be relatively effective in ensuring prices stability.
[4] In the case of emerging market economies, an inflation targeting regime was often initially used as a way to complete disinflation, which was successfully done in many countries (e.g. in Poland).

targeting strategy.[5] Some researchers argued that a too accommodative monetary policy stance, together with its narrow focus on preserving price stability and ensuring sustainable economic growth were among the causes of the considerable macroeconomic imbalances building up in a number of economies, and, ultimately, led to the outbreak of the economic crisis.[6] Following this criticism, and with the view of combating both the slowdown in economic activity and the threat of deflation (in particular, under the zero lower bound for nominal interest rates), the discussion on the adequate monetary policy framework was resumed.

Despite the ongoing discussions on possible alternatives, virtually no country has so far exited from inflation targeting, and in the aftermath of the crisis two of the largest countries, i.e. the United States and Japan, have even formally brought their monetary regimes closer to inflation targeting by publicly announcing their inflation targets.[7] What is more, further central banks of emerging market economies are preparing themselves for adopting inflation targeting (e.g. the Central Bank of Egypt), or even have recently started to officially apply this regime (e.g. the Central Bank of the Russian Federation, the Reserve Bank of India, the National Bank of Ukraine).[8]

It should be emphasised that since its beginning, an inflation targeting regime has been evolving. In many cases, the strategy was adapted to the specific conditions of the individual economies. It was also modified in response to the developments

[5] J. Frankel even announced the death of inflation targeting (Frankel, 2012).
[6] Importantly, the United States did not pursue inflation targeting before the crisis and China, i.e. the second largest economy, as well as many commodity exporters maintained their currencies pegged to the US dollar, which, in fact, expanded the geographical impact of the US monetary policy. These facts contradict the thesis that inflation targeting itself was one of the major reasons for the global financial crisis.
[7] The only exception is Argentina, which introduced an inflation targeting regime in 2016, but already in October 2018 decided to target monetary aggregates. However, Argentina was not fully prepared for conducting monetary policy in line with an inflation targeting framework. In particular, the Central Bank of Argentina was not publishing inflation forecasts, which is key for an inflation targeting strategy.
[8] Ahlund (2014), IMF (2013c).

occurring in the financial system, including the global financial crisis. In particular, the so-called "liquidity trap" faced by some countries after the crisis, meant that the monetary policy frameworks had to be revised. Besides, due to the significant expansion of financial intermediation over the recent decades (reflected, among others, in a markedly higher ratio of financial assets and liabilities to GDP, both in the public and the private sector), monetary policy seems to be increasingly focused on financial stability objective. Reviewing the adjustments introduced to an inflation targeting framework in various countries over the last years enables an *ex post* assessment of the effectiveness of these modifications. This is particularly important in the context of critical comments addressed to inflation targeting.

* * *

The report has the following structure: after the presentation of a historical background and key characteristics of an inflation targeting regime (Chapter 1), major – i.e. the most widespread among central banks – directions of its modifications are described (Chapter 2). Those modifications include increasing transparency of monetary policy and incorporating financial stability considerations within policy deliberations.

Further on, adjustments of inflation targeting which have been adopted by only some of the central banks are presented (Chapter 3). Examples analysed in this part can be divided into the following groups: incorporating operational targets into an inflation targeting framework, extending the strategy by introducing additional monetary policy objectives, changing the formulation of the inflation target, and subordinating monetary policy to other goals of the central bank. For each analysed examples the rationale for the modification and its effects are discussed, as well as challenges which have prevented those alterations from becoming a common practice.

A description of an inflation targeting regime in Poland concludes the report (Chapter 4). It shows that Poland was among countries that introduced many –

nowadays widely recognised – changes to the framework quite early, i.e. before most other central banks did it. Accordingly, the current National Bank of Poland (NBP) monetary policy framework does not deviate significantly from the standards set by central banks of the advanced economies.

The Annex reviews the main features of monetary policy regimes of 41 central banks – fully-fledged inflation targeters,[9] and the ECB and the Swiss National Bank, as well as the US Fed (which announced quantitative targets for inflation under their slightly different monetary policy frameworks, but for all practical purposes can be regarded as inflation targeters).

It should be once again stressed that this report focuses on changes introduced to the monetary policy regime in a strict sense, i.e. understood as strategic elements related mainly to objectives. Consequently, issues concerning macroprudential policy or changes in monetary policy instruments are addressed to a limited extent.

[9] Countries analysed in the report include Albania, Armenia, Australia, Brazil, Canada, Chile, Colombia, the Czech Republic, the Dominican Republic, the euro area, Georgia, Ghana, Guatemala, Hungary, Iceland, India, Indonesia, Israel, Japan, Kazakhstan, Korea, Mexico, Moldova, New Zealand, Norway, Paraguay, Peru, the Philippines, Poland, Romania, Russia, Serbia, South Africa, Sweden, Switzerland, Thailand, Turkey, Uganda, Ukraine, the United Kingdom, the United States.

1. Inflation targeting as a monetary policy framework

Witold Grostal, Joanna Niedźwiedzińska

Inflation targeting was first applied by advanced countries. Later on, it spread gradually also to emerging market economies. The regime involves stabilising inflation at a given level that is publicly announced. Although price stability is explicitly recognised as the primary objective of this monetary policy framework, it is usually applied in a flexible manner, i.e. allowing for the support of other goals (mainly, stabilising the output gap and/or reducing the risks of imbalances building-up in the economy). The distinguishing feature of inflation targeting is the commitment to high transparency and accountability standards.

1.1. Rationale for adopting an inflation targeting regime

Inflation targeting emerged as a monetary policy framework in the 1990s. Its introduction was fostered by the increasing popularity of the new Keynesian school and the new neoclassical synthesis, that assumed the absence of money neutrality, particularly in a short-term perspective and a significant role of inflation expectations as a factor determining inflation. In central banking, the expansion of inflation targeting was supported by recognising price stability as the key goal of monetary policy and by diminishing the importance of other (indirect) objectives whose accomplishment could be incompatible with the primary objective.

1.1.1. Historical perspective on an inflation targeting regime

Viewing the issue from a historical perspective, some key changes in thinking about the role of monetary policy which took place in the second half of the 20th century should be mentioned. An important moment was the collapse of the Bretton Woods system. It meant that the majority of currencies had lost their nominal anchors, since they were no longer pegged to the US dollar and the US dollar – to gold. At the same

time, central banks and governments freed themselves from a binding monetary constraint. This enabled them to pursue discretionary monetary policies, which in the 1970s were aimed at stimulating economic activity by mitigating the impact of oil shocks on the real economy. Almost inevitably this led to excessively accommodative monetary policy, resulting in relatively high inflation and de-anchoring of inflation expectations, while GDP growth remained sluggish. Failures in applying the Keynesian approach – which assumed striving for full employment at the expense of accepting somewhat higher inflation – encouraged central banks in the 1970s and 1980s to renew attempts to fix their exchange rates or – given increasing evidence that fixed exchange rates cannot be maintained in a long term (re-fixing of exchange rates finally failed) – to adopt proposals advocated by the monetarists.

Monetarists argued that monetary policy could not boost economic activity permanently and the best it might do to contribute to a sustainable GDP growth was to ensure price stability. In their opinion, the stability of prices was to be achieved through keeping the growth of money supply at a rate compliant with GDP growth (Friedman, 1968). Moreover, the theory of rational expectations, developed in the 1970s, stated that low inflation could be easier achieved if inflation expectations of economic agents were anchored at a low level. Anchoring of inflation expectations was to be attained by using the so-called nominal anchor (target) and focusing central bank activities at meeting this target.[10] Thus, monetarists advocated stabilising the value of money through controlling its supply. Following this approach, major central banks decided to pursue monetary policy based on controlling monetary aggregates. One of the biggest advantages of the new policy framework was a possibility to verify whether monetary authorities did meet the announced targets, since the data on money supply were available with only a short lag. This was meant to strengthen the anchoring effects, and hence help to stabilise inflation. However, in practice the relationship between inflation and monetary aggregates did not turn out

[10] The nominal anchor could be a defined target value of selected variable, e.g. money supply, exchange rate or inflation.

to be stable. What is more, central banks frequently were not able to control the rate of money growth, as its supply was, to a large extent, driven by endogenous factors. Problems with meeting the targets for inflation or monetary aggregates made it difficult for the public to understand monetary decisions, which significantly reduced the potential benefits of the adopted strategy (Box 1). As a consequence, monetary targeting did not gain a widespread recognition.

Increasing problems with stabilising inflation through controlling monetary aggregates urged central banks to develop a new monetary policy framework. Amid growing popularity of a floating exchange rate regime and with anchoring of inflation expectations at monetary targets turning out ineffective, monetary authorities came to an idea to simply use an explicit inflation target as a nominal anchor of its own. This is how inflation targeting emerged in the late 1980s.[11] Anchoring inflation expectations directly on the publicly announced inflation target and the absence of any other nominal anchors were its essential elements. The popularity of an inflation targeting regime was supported by the increasingly common – among both the economists and the public – recognition of price stability as a main objective of monetary policy. Another supporting factor was a wave of currency crises which ultimately confirmed that long-term fixing of exchange rates was impossible under free capital flows and the simultaneous efforts to maintain independent monetary policy.

The new monetary policy regime was expected to preserve the advantages of the monetarist approach, while helping to avoid its shortcomings (Grostal *et al.*, 2010):

- The announcement of an inflation target referring to a commonly known price index facilitated understanding of the monetary policy objective by economic agents. Thus, the new regime was potentially more effective in anchoring inflation expectations.

[11] Its foundation was the new-Keynesian approach, which indicated again that – due to rigidities present in the economy – monetary policy might affect real variables.

- Monetary policy was based on the analysis of a much broader set of data and information, which was supposed to contribute to achieving better results.
- Meeting the inflation target was no longer dependent on the existence of a stable relationship between the growth of monetary aggregates and inflation. It meant, in particular, that changes in the velocity of money – arising, e.g. from innovations in the financial system – ceased to influence the effectiveness of monetary policy. At the same time, it is worth emphasising that the currently quite widely accepted consensus regarding the key role of central bank's interest rate as the main monetary policy instrument has only developed over time.[12]
- The possibility to analyse the current and past inflation developments allowed to hold central banks accountable for meeting the announced targets.[13] The accountability mechanism was additionally enhanced by the fact that inflation data were most often calculated and published by statistical offices independent of central banks (whereas monetary aggregates were usually calculated by central banks themselves).

Box 1: Experiences of advanced economies with controlling money supply

In the 1970s central banks of some industrialised countries, including the United States, Canada, the United Kingdom, as well as Germany and Switzerland, adopted monetary targeting as their policy regime (Cobham, 2012).

The new monetary policy strategy was successfully implemented in Germany and Switzerland. In the 1970s and 1980s inflation in those countries was low compared

[12] For instance, in New Zealand, upon adopting an inflation targeting framework, the main monetary policy instrument was the level of commercial banks' reserves in the central bank (*settlement cash*). The short-term interest rate became the Bank's operational target only after negative experiences associated with the application of the MCI as an operational target in 1997-1999.

[13] Due to the instability of the relationship between money supply and inflation, central banks using the monetarist approach had to allow for deviations of monetary aggregates from the announced targets in order to achieve the desired level of inflation. Under such circumstances, holding banks accountable for adopted objectives was significantly hampered. In particular, it was not clear which objective is more important – an intermediate target, i.e. the growth rate of monetary aggregate (affecting expectations and indirectly, the credibility of the primary objective) or the ultimate objective, i.e. the inflation level.

to other advanced economies, which suggested that under favourable conditions – particularly when central banks are regarded as highly credible – controlling money supply might be an effective way of ensuring price stability. Some economists attributed the effectiveness of monetary targeting pursued by the Bundesbank and the Swiss National Bank (SNB) to their flexibility and the significant role of communication in their monetary policy conduct, as well as the relatively stable function of money supply in Germany and Switzerland at that time (Mishkin, 2000a; Łyziak *et al.*, 2012).

The positive experiences of the two banks, made them quite reluctant to abandon monetary targeting. The Swiss National Bank adopted inflation targeting as a new monetary policy framework only in 2000, whereas conclusions from Bundesbank's activities were taken into account while defining the ECB monetary policy regime and resulted in including two pillars in the ECB strategy, one of which was a monetary pillar (Laidler, 2009).[14]

Experiences of the Anglo-Saxon countries associated with the implementation of monetary targeting differed significantly from those of Germany and Switzerland. In the period when their central banks were officially declaring themselves as monetary targeters, their policies proved ineffective in combating high inflation. It could have partly resulted from the fact that, in practice, those banks did not demonstrate excessive commitment to the new policy regime – they did not announce their targets regularly, set targets simultaneously for several aggregates, and exceeded adopted fluctuation bands without explaining reasons for not meeting the targets (Mishkin, 2000a; Łyziak *et al.*, 2012). Moreover, the effectiveness of monetary targeting in those countries was limited due to the growing instability of a relationship between money and key macroeconomic variables. The Anglo-Saxon countries relatively quickly changed their monetary policy strategy and their experiences with controlling monetary aggregates were accurately summarised by G. K. Bouey, the former Governor of the Bank of Canada: "*We did not abandon the monetary aggregates – they abandoned us.*"

Despite the successes of the central banks of Germany and Switzerland, the prevailing view in the literature is that monetary targeting was rather ineffective (Laidler, 2009; Svensson, 2009b). This opinion was even shared by M. Friedman – the main proponent of this regime – who in his interview for *Financial Times* of

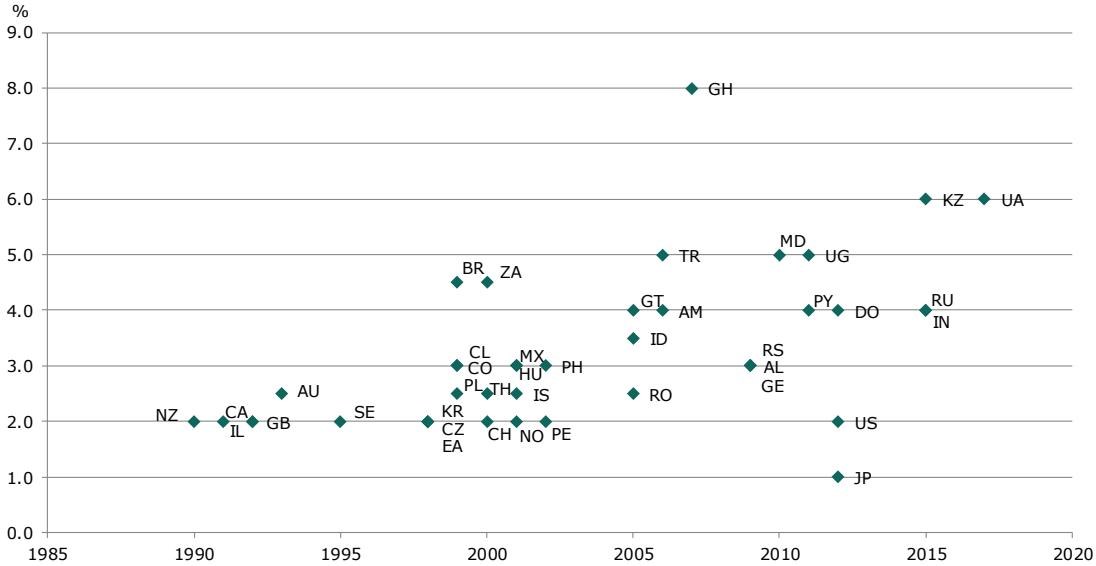
[14] Bringing inflation to the target level in 1995, after a period of increased wage demands and expansive fiscal policy following the German reunification, is one of the often reported proof of the effectiveness of the Bundesbank (Mishkin, 2000a).

June 2003 admitted "*The use of quantity of money as target has not been a success*" (Keegan, 2003 after Friedman, 2003).

1.1.2. Expansion of inflation targeting as a monetary policy framework

At present, around 40 central banks implement an inflation targeting regime as their monetary policy framework. The majority of them are banks from emerging market economies (Figure 1).

Figure 1. Dates of adoption of an IT framework and the current level of the inflation targets



Source: Own compilation based on information from central banks.

Notes: For countries with the inflation target expressed as a range, the mid-point of the band is marked at the chart. The chart does not distinguish between different measures of inflation targeted by central banks (e.g. headline inflation, core inflation, PCE).

The first country to adopt an inflation targeting regime was New Zealand in 1989 (Box 10).[15] At the beginning of the 1990s, following New Zealand, inflation targeting was adopted by successive advanced economies: Canada, Israel, the United Kingdom, Sweden. Emerging market economies from South-Eastern Asia, Latin America and Central and Eastern Europe started to join the group of fully-fledged inflation targeters at the end of the 1990s and the beginning of the 2000s. Currently,

[15] Some banks explicitly define their monetary policy framework as a flexible inflation targeting (e.g. Sweden).

further central banks (e.g. of Egypt) prepare themselves for the introduction of this framework. Alan Bollard, the former Governor of the Reserve Bank of New Zealand, called inflation targeting one of the flagship exports of the country (Bollard, 2008).

The motivations of individual central banks to adopt inflation targeting varied. As already indicated, this regime was often chosen in response to negative experiences related to the application of other monetary policy regimes, i.e. after failures of controlling money supply or fixing the exchange rate, or disappointments related to discretionary policy, i.e. a policy not following any defined rules, nor using any specified nominal anchors (Cobham, 2012).

Moving to an inflation targeting regime was often preceded by currency crises. In Europe, it was the crisis of the (European) Exchange Rate Mechanism (ERM) of 1992. In its aftermath, Sweden, the United Kingdom and Finland were forced to choose a different nominal anchor for their monetary policies than the exchange rate (Bernanke and Mishkin, 2007; Riksbank, 1993). In the case of South-Eastern Asia, the currency crisis of 1997-1998 became the catalyst of changes, as inflation targeting was adopted by countries most affected by the crisis, including Korea, Thailand, the Philippines and Indonesia. Countries of Latin America joined the group of fully-fledged inflation targeters after the financial crisis of 1998 (Roger, 2010).

In the case of Central and Eastern Europe, adopting an inflation targeting framework was one of the elements of broad systemic reforms (Roger, 2010). However, in the Czech Republic, the first country of the region to join the group of fully-fledged inflation targeters in 1998, the shift towards the new strategy resulted also from the necessity to abandon the fixed exchange rate regime as a consequence of a currency crisis (CNB, 2001a).

Interestingly, the central banks of the major economies (the US Fed, the ECB) have not formally adopted an inflation targeting regime. Nevertheless, since the establishment of the euro area in 1999, the ECB has been pursuing a policy which, in

fact, does not deviate significantly from inflation targeting. Similarly, the US Fed by announcing its numerical inflation goal in 2012 brought its monetary policy frameworks closer to inflation targeting (Grostal *et al.*, 2012; Ciżkowicz, 2012; Box 2).

Until now, practically none of the IT central banks have decided to abandon inflation targeting[16], whereas the alternative monetary policy regimes applied after the Second World War were not that lasting (fixed exchange rates under the Bretton Woods system, controlling monetary aggregates, in particular in the Anglo-Saxon countries; Box 1). According to some economists, this proved the success of an inflation targeting framework (Rose, 2006; Laidler, 2009). At the same time, the outbreak of the global financial crisis in 2008 triggered criticism of inflation targeting, mainly for being ineffective in counteracting macroeconomic imbalances, especially in the financial sector (Borio 2012; De Grauwe, 2007; Giavazzi and Giovannini, 2010; Leijonhufvud, 2008; Reichlin *et al.*, 2013).

1.2. Main features of an inflation targeting framework

Inflation targeting was introduced at the beginning of the 1990s by the Reserve Bank of New Zealand, which for the preceding two decades (in the 1970s and 1980s) had failed to reduce and stabilise inflation at a low level. The new monetary policy framework was adopted to underline the Bank's commitment to ensure price stability, despite unsuccessful earlier attempts to lower inflation. Under inflation targeting the central bank did not apply any nominal anchor besides making a promise to deliver inflation at a given level.

[16] As already noted, the only exception is Argentina, which was, however, not fully prepared to adopt inflation targeting in the first place.

1.2.1. Key elements of inflation targeting

Inflation targeting has no precise definition. However, in the literature there is a consensus about its key elements based on the experiences of inflation targeters (Mishkin, 2004b; Hammond, 2012). Before the crisis these elements included:

- recognising price stability as the primary objective of monetary policy,
- public announcement of a numerical target for inflation,
- taking into consideration many economic indicators, including inflation forecasts, in the decision-making process,
- transparency (communication with the public),
- democratic accountability of central banks for meeting the targets.

Recognising price stability as the primary objective of monetary policy follows from the monetarists' view – at present commonly accepted by most economists – that monetary policy cannot permanently increase GDP growth (Blanchard *et al.*, 2010). Thus, the aim of central banks should be to create favourable conditions fostering a balanced economic growth that in itself is determined by other factors. Translating it into potential monetary policy objectives, it was considered that the best contribution monetary authorities can make to achieve a sustainable output growth would be to ensure price stability. This is because high and volatile inflation may distort the allocation of resources in the economy, adversely affecting decisions of economic agents and – in consequence – economic growth.

The purpose for the public announcement of a numerical target for inflation is to provide a clear nominal anchor for expectations. The anchoring effect should be enhanced by the fact that the target refers to an indicator commonly known and understood by the public (Bernanke and Mishkin, 1997). Announcing a specific targeted level for inflation should directly affect inflation expectations, as well as inflation performance in the longer term.

Regarding policies aimed at meeting inflation targets, two approaches to inflation targeting can be distinguished: strict and flexible. In its strict form, inflation targeting assumes that the central bank concentrates exclusively on stabilising inflation at the target level, disregarding the cost of its policy for the real economy. Whereas in the flexible version, inflation targeting assumes that the central bank strives to stabilise inflation at the target level, while at the same time trying to keep economic activity – i.e. production and employment – in line with the potential. Thus, it refers to the loss function of the central bank incorporating both inflation and output stabilisation (Ingves, 2011; Svensson, 2009a).[17]

In practice, the vast majority – if not all – of IT central banks apply the flexible approach to inflation targeting. Inflation targeting in its strict version is not used, since it would cause negative consequences comprising, among others (Bernanke and Woodford, 2005; Svensson, 1997; 2007; Walsh 2009):

- a possible deeper decline in output and employment under negative supply shocks when output growth and inflation move in opposite directions;
- a substantial volatility of economic indicators, including the exchange rate, interest rates as well as output and employment, following the attempts to bring inflation quickly back to the target in the case of shocks causing its temporary deviation from the target;
- a potential instrument instability problem, where a too narrow focus on keeping inflation at the target and no tolerance for temporary deviations from the target, would force the central bank to adjust interest rate very often with frequent changes to the direction of the adjustment which – contrary to the intentions of the monetary authorities – would have a destabilising impact on inflation;

[17] The standard loss function of the central bank comprises both deviation of inflation from the target and deviation of the product from its potential (Svensson, 2002b). Therefore, monetary authorities strive to meet the inflation target, as well as stabilise production, whereas the weights attributed to both factors may not be the same. In a broader sense, the loss function may also comprise other variables, in particular, the volatility of interest rates.

- a loss of public understanding of the central bank decisions resulting from frequent and radical changes in monetary policy, with an adverse effect on central bank's credibility.

Under flexible inflation targeting, every time a shock hits the economy, monetary authorities decide how fast inflation should be brought back to the target. The level of flexibility, i.e. a possibility to extend the period of meeting the target depends on the credibility of the central bank, as well as its preferences in this respect. Typically high credibility allows for a considerable degree of flexibility.

In order to assess what monetary policy decision should be adequate in specific circumstances, inflation targeting requires taking into consideration many economic indicators, including inflation forecasts. This should ensure a proper response of monetary policy to shocks and allow for forward looking monetary policy. The right reaction to a shock depends on many factors, including the strength, persistence and source of the shock, thus all the relevant aspects need to be analysed before making a decision. At the same time, the need to pursue forward looking monetary policy results from lags in the monetary policy transmission mechanism.

Considering many economic indicators is not equivalent to treating them as intermediate targets (Bernanke and Mishkin, 1997). Although inflation targeting does not exclude the use of intermediate targets (related, e.g. to monetary aggregates or exchange rate), they should influence monetary policy decisions only to the extent they are consistent with meeting the inflation target in the medium term. It means that potential intermediate targets should be subordinated to achieving the primary objective, i.e. the targeted inflation level.

Since shaping inflation expectations is an essential element of inflation targeting, the credibility of the central bank plays a key role in this regime. The link between anchoring inflation expectations and credibility of the bank is important because it helps to reduce the cost of keeping low and stable inflation. The credibility is

primarily established through accomplishment of monetary policy objectives, i.e. mainly by ensuring price stability, however, it can also be supported by proper communication. For that reason, IT central banks put great emphasis on transparency and democratic accountability.

The justification for democratic accountability of central banks stems from the fact that they had been granted more independence than other public institutions. Independence should enable them to conduct monetary policy in such a way, as to increase welfare for the society at large. However, due to the need to guarantee monetary authorities the adequate legitimacy, they should be appointed by democratically elected institutions, have a limited term of office and regularly inform the public about their intentions and the effects of the implemented policies. Therefore, transparency plays an important role in fulfilling accountability requirements.

Central banks are usually accountable for the pursuit of monetary policy directly to the government or parliament, and thus, ultimately, to the public. Most typically, central banks regularly provide explanations on the following issues (BIS, 2009):

- inflation developments in relation to the adopted inflation target, as well as the causes of inflation deviating from the target;
- inflation outlook, also against the adopted inflation target;
- measures aimed at bringing inflation back to the target, if it deviates from the target.

1.2.2. Preconditions for the effectiveness of inflation targeting

It is worth recalling that initially inflation targeting was adopted by advanced economies. Therefore, its key elements listed above did not include conditions, which were later recognised as necessary to ensure the credibility of the target and, consequently, the effectiveness of the new regime. They refer mainly to:

- the independence of the central bank;
- no fiscal dominance;
- an adequate level of financial market development and a limited scale of dollarisation/euroisation of the economy;
- no simultaneous exchange rate target;
- adequate analytical resources, including macro-models allowing for forecasting.

Independence of the central bank has been advocated since the problem of time inconsistency of economic policies was noticed, along with the resulting so-called inflationary bias (Kydland and Prescott, 1977). Independence of monetary authorities should prevent a situation when monetary policy would be used to achieve short-term political objectives, leading to significant costs in a medium- and long-term perspective (Bernanke and Mishkin, 1997). What is important, independence has been seen as a factor supporting effectiveness of monetary policy not only under inflation targeting, but also under other monetary policy frameworks.

Independence has many aspects (ECB, 2006). In particular, one can distinguish functional independence (i.e. providing the central bank with a clear and legally certain primary objective and the necessary instruments to achieve this objective independently of other authorities), institutional independence (i.e. prohibiting other authorities to seek to influence the central bank's decision-making bodies), personal independence (i.e. ensuring the security of tenure for members of the decision-making bodies, among others, through an adequately long term of office and limited reasons allowing for their dismissal) and financial independence (i.e. safeguarding sufficient financial resources at the disposal of the central bank to fulfil its tasks and limiting the possibility of monetary financing of the state budget).

The last of the aforementioned elements of central bank's independence is closely related with another precondition for adopting inflation targeting, i.e. the lack of

fiscal dominance (Heenan *et al.* 2006).[18] An extreme case of fiscal dominance is direct financing of the public sector deficit by the central bank. However, a problem may arise even in the absence of such direct financing, as significant fiscal imbalance, accompanied by high levels of deficits and public debt may significantly limit monetary policy autonomy (BIS, 2012). In the case of fiscal dominance, an increase of interest rates – justified by the need to meet the inflation target – could lead to insolvency of the country, posing a threat to its macroeconomic stability. It means that under such circumstances the central bank would not be in a position to independently adjust its monetary policy instruments, which may jeopardise achieving the adopted inflation target.

The next important issue concerns transmission of central bank's decisions to the economy. The effectiveness of monetary policy – under all regimes – clearly benefits from a well-functioning transmission mechanism. It allows the decisions of monetary authorities to influence actions of other economic agents, ultimately leading to the achievement of the central bank's targets. Taking into account the fact that inflation targeting usually has relied on using a short-term interest rate as the bank's main instrument, the prerequisites for its effectiveness include an adequate level of financial market development and a limited scale of dollarisation/euroisation of the economy (Mishkin, 2004). The absence of significant dollarisation/euroisation of the economy is a necessary condition that enables the central bank to take policy decisions related to domestic interest rates in an autonomous way (i.e. without the need to stabilise the exchange rate) and to ensure that those decisions will have a

[18] Another issue is the appropriate coordination of the monetary and fiscal policies (the policy mix). The policy mix should be understood as such a combination of a country's monetary and fiscal policy which leads to achieving the intended economic goals, e.g. price stability and sustainable economic growth, while minimising costs of reaching the objectives, Wasiak (2008).

significant impact on other economic agents' actions (in particular, by affecting credit availability).[19]

The issue of dollarisation/euroisation is strongly linked with the role of exchange rate in conducting monetary policy, which may be significant and depends on many factors, including, above all, the degree of trade openness of the economy. The exchange rate plays an important role in an inflation targeting regime (as a transmission channel, a source of shocks, but at times also as a shock-absorber), however, under this framework, a high degree of exchange rate flexibility is postulated. It should protect the central bank from the conflict of targets, i.e. from a situation when meeting the inflation target would require other central bank's actions than those striving at stabilising the exchange rate.

Lastly, as inflation targeting assumes conducting a policy that is as much forward looking as possible, its effectiveness should be supported by the availability of adequate analytical resources at the central bank (Debelle, 1997; Masson *et al.*, 1997). The central bank should, in particular, develop a macroeconomic model that can be used for preparing regular medium-term forecasts.

Box 2: Attitude of the major central banks to inflation targeting

Some of the major central banks, i.e. the Fed, the ECB and the Swiss National Bank, distance themselves from fully-fledged inflation targeting. Thus, although their monetary policy regimes are very similar to inflation targeting, in many reports those countries are not classified as inflation targeters.

- In the case of the Swiss National Bank there are no material difference between its strategy and the fully-fledged inflation targeting. A

[19] Under high degree of dollarisation/euroisation of the economy, raising domestic interest rates by the central bank may lead to strengthening of the exchange rate, which fosters acceleration of lending in foreign currency. It means that the bank's decisions aimed at tightening monetary conditions may not bring the intended results. Moreover, due to higher credit risk stemming from currency mismatch of liabilities and receivables – the risk for the whole financial system increases. Thus, dollarisation/euroisation of the economy significantly limits the autonomy of domestic monetary policy.

characteristic feature of the Swiss monetary policy regime that is not present in other IT central banks could only be seen in issues related to the operational framework, since the operational target of SNB has been defined in terms of 3M-Libor market rate and not central bank's interest rate.[20] This is, however, of secondary importance, as the operational targets may be defined in many different ways. Moreover, on 6 September 2011, the SNB significantly modified its operational framework by announcing an asymmetric exchange rate target and the readiness to conduct unlimited FX interventions in order to prevent the exchange rate from strengthening above the level of 1.20 EUR/CHF.[21] Whereas asymmetric exchange rate target is not a standard instrument used under an inflation targeting regime, it can be treated as an unconventional policy measure necessary for meeting the target when the main tool – short-term interest rates – have already reached their lower bound.

- Despite setting a quantitative target for inflation in January 2012[22], the Fed often emphasises the duality of its mandate and no prioritisation of the targets (Fed, 2012). In the Fed's view, treating both price stability and full employment as equally important distinguishes its monetary policy framework from inflation targeting (Grostal *et al.*, 2012). However, in many IT central banks mandates are also comprising several objectives without indicating the explicit primacy of price stability.
- The ECB – in terms of defining price stability and emphasising its primacy over other goals of the central bank – fulfils all conditions necessary to be classified as an inflation targeter. At the same time, following the positive experience of the Bundesbank with monetary targeting, the ECB decided to include monetary analysis (previously known as a monetary pillar) in its policy framework, which is not a typical practice among inflation targeters.

[20] The bank's operational target is a defined range of 3M-Libor market rate with the middle of the range indicated as a point (for some time the target was not set as the middle of the range as the rates were reduced to very low levels and before accepting the need to lower them to negative values the SNB found it necessary to narrow down the range). In other IT central banks the operational target is a short-term central bank's interest rate.

[21] The explicit asymmetric exchange rate target was abandoned in early 2015.

[22] Similarly, the Bank of Japan announced a numerical target for inflation in February 2012 – after two decades of rather ineffective monetary policy based, to a great extent, on increasing the monetary base. This brought its strategy closer to an inflation targeting framework, but – due to country specific factors – operationally the Bank's actions are still somewhat different than those of the fully-fledged inflation targeters (Ciżkowicz, 2012).

Overall, despite the indicated differences, monetary policy regimes of the above mentioned central banks are very similar to inflation targeting. Thus, this report, apart from analysing central banks explicitly pursuing inflation targeting, also includes the ECB and the Swiss National Bank, since inflation target plays a key role in their monetary policy frameworks. The Fed, although included in the Annex, is not analysed in detail, also because its target was announced only in 2012.

1.3. Inflation targeting in central banks' practice

Analysing the institutional setup and activities of central banks pursuing an inflation targeting regime indicates that although certain prevailing practices have developed in some areas related to the strategy, in other aspects still considerable differences have persisted. The major conclusions stemming from the overview of approaches to key elements of inflation targeting are presented below.

1.3.1. Recognising price stability as the primary objective of monetary policy

At present, in most cases the mandates of inflation targeters stipulated in legal acts indicate price stability as the primary objective of their monetary policy. Central banks are often also expected to support the government's economic policy, while this should not put at risk the price stability objective (hierarchical mandate, e.g. in the euro area). In a few cases where mandates include multiple objectives with no prioritisation (e.g. in Australia, Canada, and as of recently also New Zealand), central banks anyway emphasise the key role of inflation targeting in their communications.[23] It should be stressed that a multiple mandate without

[23] In the case of Australia, the *Reserve Bank Act 1959* specifies the following objectives: stability of the currency, full employment, economic welfare and nation's well-being. At the same time, the Bank of Australia indicates that those objectives are incorporated within an inflation targeting framework ("*Since 1993, these objectives have found practical expression in a target for consumer price inflation, of 2–3 per cent per annum.*", www.rba.gov.au.). On the other hand, the Bank of Canada shall support the financial and economic welfare of the country ("[…] *it is desirable to establish a central bank in Canada to regulate credit and currency in the best interests of*

prioritisation leaves more space for discretion than the hierarchical mandate (Orphanides, 2010).

Over recent years, some countries decided to expand central banks' mandates by incorporating financial stability objectives (e.g. Korea, the United Kingdom). This issue is related, in particular, to the arguments for and against including asset prices in the monetary policy reaction function. This topic, as one of the key dilemmas related to central banks' policies, is discussed in more detail in Chapter 2.

1.3.2. Public announcement of a numerical target for inflation

While comparing elements of the monetary policy framework related to the inflation target, the following observations can be made:

- At present, almost all inflation targeting central banks define the inflation target in terms of the annual growth of consumer prices, i.e. the CPI.[24] In principle, the CPI should reflect changes in the costs of living of an average household. Therefore it should cover prices of all goods and services consumed by households, for example prices of energy, food, clothing or telecommunication services. However, due to problems related to measuring some prices, there are differences in the construction of inflation indices in individual countries. Those relate, in particular, to consumer prices of housing services.[25]
- At the same time, central banks monitor, on an on-going basis, also developments in narrower inflation measures (core inflation) which should

the economic life of the nation, to control and protect the external value of the national monetary unit and to mitigate by its influence fluctuations in the general level of production, trade, prices and employment, so far as may be possible within the scope of monetary action, and generally to promote the economic and financial welfare of Canada.", *Bank of Canada Act*, 1985).

[24] Currently only in Sweden the target is not referring to headline inflation, but to CPIF (i.e. CPI with fixed interest rate) and in the United States it is expressed in PCE terms (i.e. price index of Personal Consumption Expenditures).

[25] The problem refers, in particular, to measurement of costs of owner occupied housing (OOH) incurred by housing owners. The reason is that such services are not subject to registered transactions (Leszczyńska, 2011).

better reflect the impact of changes in the demand pressure and, consequently, enable distinguishing transitional changes of the inflation index from more enduring changes of the price pressure. The construction of those measures – as in the case of the CPI – is not uniform, although those are usually indicators excluding changes in prices most sensitive to transitional supply shocks, i.e. the most volatile prices (Kosior and Wiesiołek, 2010).

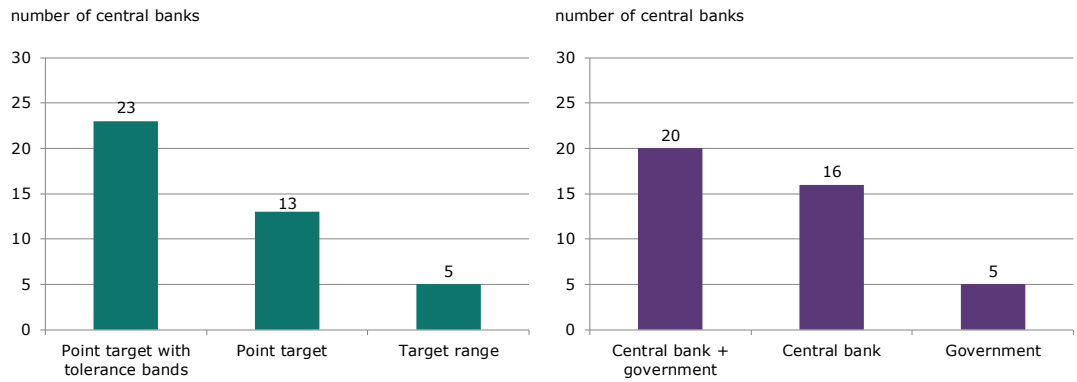
- As the CPI includes also prices of goods strongly responsive to shocks, central banks use various explanations for accepting transitional deviations of the CPI inflation from the target:
  - Central banks often underline the medium-term nature of the inflation target.[26]
  - Significant number of banks attach considerable attention to developments in core inflation measures in their communication. The importance of core inflation is confirmed by the fact that many central banks – besides CPI projection – publish also projections of core inflation.
  - Another solution used to cope with considerable volatility of the CPI is to announce a list of conditions justifying the lack of central bank's reaction to inflation temporarily deviating from the target due to a certain type of shocks (so-called escape clauses).
- The inflation target can be formulated in one of the three ways (Figure 2):
  - In most cases (23 central banks), the target is defined as a point target with a symmetric band for deviations, which is usually +/- 1 percentage point (p.p.).
  - Some central banks refer to a point target (13 central banks).[27]
  - Few central banks use a target range (5 central banks).

[26] In some countries an inflation targeting framework was introduced as an element of the disinflation strategy. In the period of disinflation the targets for inflation were often defined as the end-year targets and set at least one year in advance. In a few central banks a whole disinflation path was announced upfront. After the disinflation phase, the central banks generally move away from setting the end-year targets for inflation towards continuous targets.

[27] The euro area has been classified into this group, with its target defined as "*below, but close to, 2%*". Similarly, in Switzerland the target is defined as "*below 2%*".

- In the majority of advanced countries, the level of the inflation target is close to 2%, and it is lower than in emerging market countries, for which the range of 3-4% is more typical (Figure 3). At the same time, countries continuing disinflation have significantly higher, but gradually declining, targets.
- The target is most commonly determined jointly by the central bank and the government, or solely by the central bank, whereas only in a few cases it is set independently by the government (Figure 2).

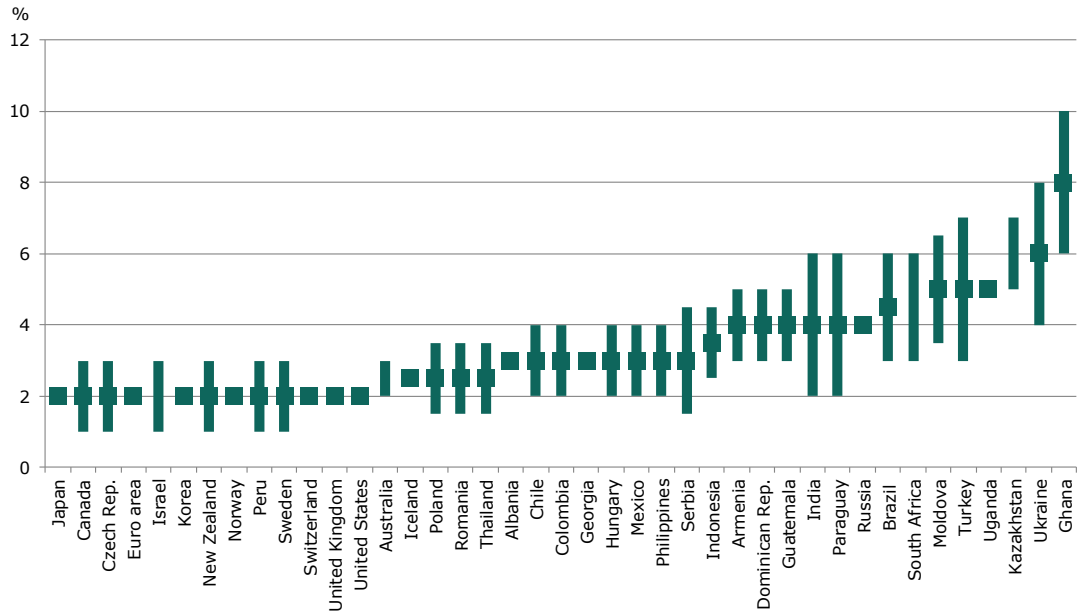
Figure 2. Types of inflation targets and entities setting them in inflation targeting central banks



Source: Own compilation based on information from central banks.

It is worth emphasising that the way IT central banks formulate their inflation targets is still not uniform. Moreover, in the past, in many countries the targets were subject to numerous changes. The modifications could refer to the levels of the targets (in some cases they were lowered and in some cased they were raised, e.g. in Korea, New Zealand), the types of the targets (for example target range was substituted with a point target, or annual target was changed to a medium-term one, e.g. in the Czech Republic, Sweden), or the targeted price indices (at first banks tended to focus on core inflation measures, i.e. excluding goods whose prices were strongly influenced by changes in indirect taxes or supply shocks, whereas later they moved towards headline measures, e.g. in South Africa, the United Kingdom).

Figure 3. Individual countries' inflation targets (as of 2018)



Source: Own compilation based on information from central banks.

As inflation targeting has become more widespread and better understood – not least due to communicating monetary policy decisions and explaining reasons behind inflation, at times, deviating from the target – almost all central banks have decided to set their inflation targets in terms of a headline consumer price index (CPI), simultaneously indicating that temporary deviations of inflation from the target are unavoidable.

Defining the inflation target in terms of the 12-month change in the CPI has several important advantages and currently is a common practice. First, the CPI inflation reflects a change in the cost of purchase of a basket of goods and services consumed by a representative household. Thus, it is a measure easy to interpret for the general public, and hence, fairly significant for the formulation of inflation expectations. Another important feature of the CPI is that it is available with only a short lag, and it is only rarely subject to subsequent data revisions. Moreover, the CPI is calculated by an institution independent from the central bank, namely by the statistical office,

and it is published, in the vast majority of countries, on a monthly basis.[28] Furthermore, expressing the target in terms of CPI inflation allows for easy verification of the effectiveness of central bank's policy. This should strengthen the commitment of monetary authorities to meet the announced target (Camba-Mendez 2003; Frankel 2010).

At the same time, the disadvantages of targeting the headline CPI include its quite substantial volatility in reaction to shocks, i.e. developments beyond the control of monetary policy and often of a temporary nature, which do not require a response of monetary authorities. Importantly, the deviation of inflation from the target triggered by a shock may undermine central bank's credibility. For that reason, central banks put emphasis on explaining the reasons of past changes in inflation, particularly when it deviates from the announced target over a longer period of time.[29]

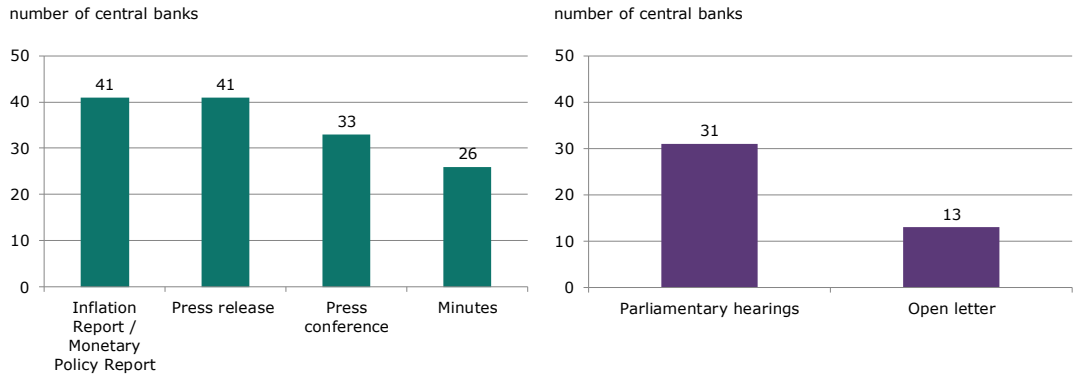
1.3.3. Transparency and democratic accountability

Moving on to central bank's communication, it should be underlined that its primarily role is to fulfil requirements related to democratic accountability. As institutions largely independent from other state authorities, IT central banks are expected, in all countries concerned, to explain their monetary policy decisions and indicate how those decisions are contributing to meeting their primary goal, i.e. ensuring price stability.[30] However, the need for greater transparency is not only

[28] Only in Australia and New Zealand the inflation data are published on a quarterly basis.
[29] In particular, various measures of core inflation are helpful in identifying factors affecting inflation. They usually exclude price categories that are most volatile and therefore those indicators are characterised by lower volatility than the CPI, and enable – at least in part – to distinguish transitional changes in inflation pressure from more permanent ones. At the same time, as core measures often exclude prices that significantly affect perception of inflation, they are usually not used to define the inflation target, although – especially in the past – some central banks referred their targets to core inflation, e.g. the Czech Republic.
[30] Some research concerning the correlation between central bank's independence and the macroeconomic outcomes suggests that the more independent a central bank is, the lower the country's inflation. At the same time, in a longer term central bank's independence does not

associated with central banks' independence, but also with the belief that the key task of the central bank is to manage expectations (Woodford, 2003b). Despite difficulties in assessing the effectiveness of individual communication tools (which transfers into some differences in central banks' communication strategies), currently it is widely accepted that communication plays a significant role in affecting the economy (Blinder, 2008).

Figure 4. Basic communication tools of inflation targeting central banks



Source: Own compilation based on information from central banks.

Notes: Press conferences include all regular press conferences (some central banks hold press conferences after all decision-making meetings, while others only when new projections are being published). Open letters include open letters or similar publications required from central banks when inflation deviates from the announced target.

For all the analysed inflation targeting central banks, the basic tool of communication with the public is an *Inflation report*[31] (Figure 4). In order to shape private sector's expectations in the most effective way, monetary authorities not only use *Inflation reports* to explain the motivation of their decisions based on the evaluation of historic data, but also to present medium-term forecasts.

lead to higher unemployment or lower economic growth. In the light of those results, in the 1990s some countries, including the United Kingdom and Sweden, decided to increase the level of independence of their central banks (Cecchetti, Schoenholtz, 2011; De Grauwe, 2012; Mankiw, Taylor, 2010). M. King defined the emphasis placed by central banks on communication and democratic accountability as the most distinguishing feature of an inflation targeting strategy: "[…] *the most important distinguishing characteristic of inflation-target regimes is the emphasis that they place on transparency and accountability.*" (King, 1997b).

[31] In some countries the name of the report was changed to *Monetary policy report*.

More than half of the fully-fledged inflation targeters fulfil obligations related to democratic accountability also through parliamentary hearings attended by the governor of the central bank or members of its decision-making body (e.g. Chile, New Zealand, and South Africa). Open letters explaining reasons for deviations of inflation from the target are used much less frequently (e.g. in Brazil, India, and the United Kingdom).[32] Additional tools of democratic accountability include speeches and statements made by members of the decision-making bodies.

At present, communication of most inflation targeting central banks also comprises press releases, press conferences and *Minutes* following each decision-making meeting, as well as annual reports on monetary policy.

Looking more broadly, it should be stressed that increasing the scope of central banks' communication was one of the most substantial changes in central banking in the 1990s and it referred not only to inflation targeters. Monetary authorities gradually disclosed more and more information, and addressed increasingly broader audience. The reasons behind greater transparency of monetary policy and its effects are discussed in Chapter 2.

1.3.4. Composition of decision-making bodies

An area where central banks' practices are still not homogenous is the composition of decision-making bodies and the process of decision-making itself (Figure 5). Whereas in the vast majority of banks monetary policy is a competence of a collegial decision-making body (except for Georgia and – until very recently – New Zealand[33], where decisions are taken solely by the Governors, although in both banks the

[32] Open letters are usually written by governors of the central banks on behalf of the decision-making body. For example, the Governor of the Bank of England is obliged to write an open letter if inflation deviates from the target by 1 percentage point –upwards or downwards (Roger, 2009).

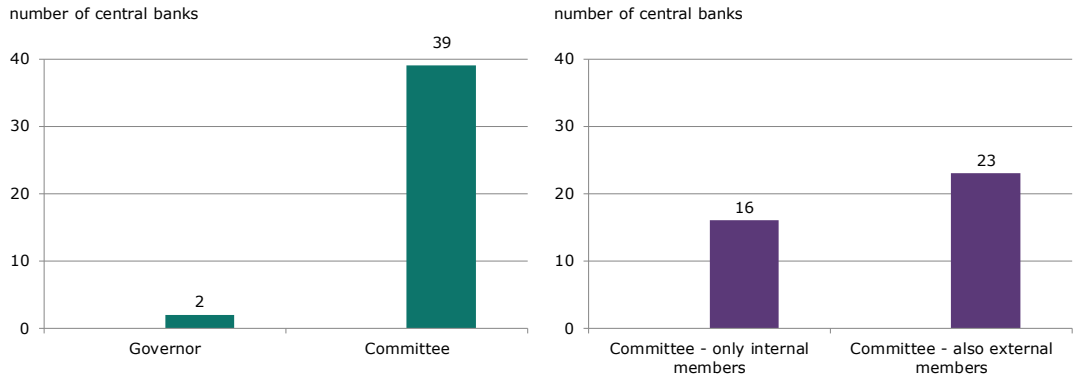
[33] In early 2019 the *Reserve Bank of New Zealand Act* was amended stipulating that conducting monetary policy will be a responsibility of a monetary policy council. Thus, New Zealand joined a group of IT central banks that have a collegial decision-making bodies.

Governors are supported by advisory committees), the composition of the committees and the way they arrive at decisions vary.

In particular, in about half of central banks, monetary policy decisions are taken by a committee consisting of internal members only, i.e. bank's officials (most commonly members of the Board, e.g. in Chile, Mexico and Sweden). However, committees including also external appointees are even more frequent nowadays, with quite a high share of external members in some cases (e.g. in Australia, Japan and Poland).

Currently, the dominant practise to reach a decision within a collegial decision-making body is by simple majority voting (e.g. in Brazil, Peru, Thailand). In the past, many banks tried rather to build a consensus around policy actions, which probably in some cases proved ineffective. Today only Canada, the euro area, Ghana and Indonesia claim to arrive at consensus decisions.

Figure 5. Decision-making bodies and their composition in inflation targeting central banks



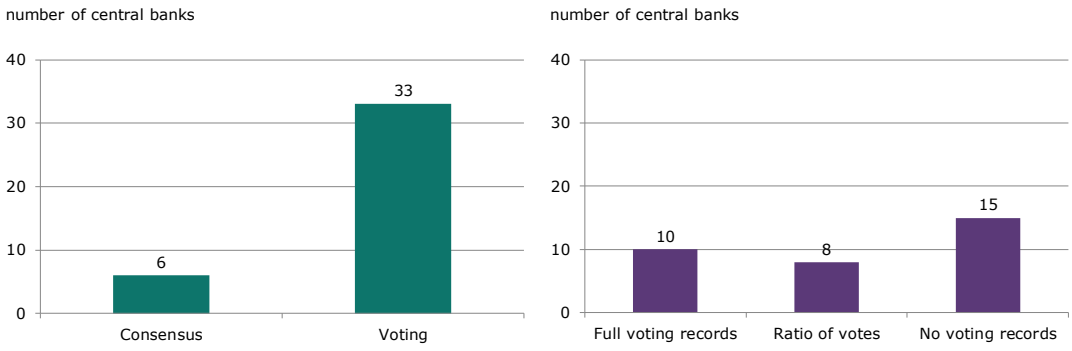
Source: Own compilation based on information from central banks.

Both the decision-making process and the composition of decision-making body have an impact on the bank's communication. The aim is to provide a high degree of transparency supporting monetary authorities' credibility. Committees taking decisions consensually tend to provide the public with a uniform message, without disclosing information on significant differences in opinions among their members

(e.g. Canada, ECB and Indonesia). At the same time, in banks with more individualistic committees, the scope of published materials is usually broader and differences in views that indicate dilemmas faced by monetary authorities are more openly discussed (e.g. in Sweden and the United Kingdom).

When monetary policy decisions are taken by voting, it is important how much information on the votes of individual committee members is disclosed (Figure 6). Although some banks publish either full voting records, i.e. including names (e.g. Chile, Hungary and Sweden), or a ratio of votes for and against the decision (e.g. Israel, Norway and South Africa), the majority of banks do not reveal any voting records (e.g. Australia, Peru and Turkey).

Figure 6. Decision-making processes and publishing voting records in IT central banks



Source: Own compilation based on information from central banks.
For two countries no information on decision-making process is available.

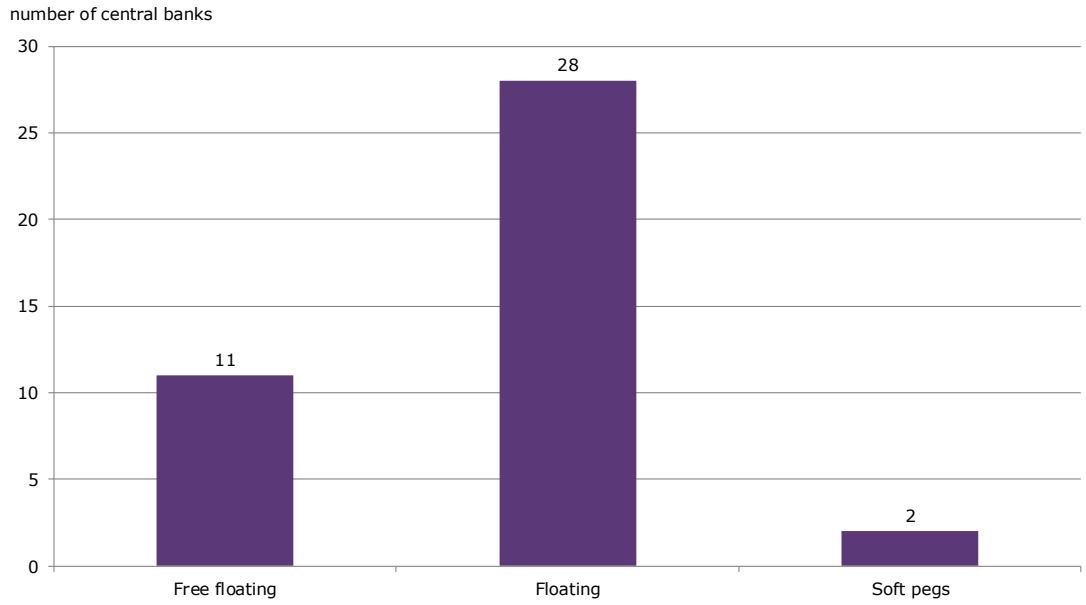
The majority of decision-making bodies gather at decision-making meetings 8 times per year, some meet on a monthly basis (11-12 times per year), and only a few do it less frequently than 8 times per year. The frequency of meeting should enable banks to analyse the incoming data on an on-going basis and adjust the monetary policy adequately. Moreover, in exceptional circumstances the banks have a possibility to call an extraordinary meeting during which binding decisions can be taken. A prominent example of such a situation were coordinated extraordinary meetings organised by the central banks of the United Kingdom, Canada, Switzerland,

Sweden, the United States, the euro area and Japan after the collapse of Lehman Brothers, when they all announced support for easing global monetary conditions and reduced their policy rates.[34]

1.3.5. Inflation targeting and the exchange rate regime

Looking at the official declarations, the majority of inflation targeting central banks pursue their monetary policy under a floating exchange rate regime. In most cases declared (*de jure*) FX regime is in line with actual (*de facto*) one (Figure 7).

Figure 7. *De facto* exchange rate regimes in inflation targeting central banks



Source: Prepared on the basis of *The Annual Report on Exchange Arrangements and Exchange Restrictions 2018*, IMF.

In the past, some central banks, particularly from emerging market economies, have adopted an inflation targeting framework before they officially fully floated their exchange rate (e.g. Poland) or tried to combine pursuing price stability with the accomplishment of the exchange rate target (e.g. Hungary). Greater commitment to more rigid exchange rate regimes in emerging countries was related, in particular, to

[34] The meetings took place on 8 October 2008. With rates already very low, the Bank of Japan supported the joint action of other central banks, but did not cut its own interest rates.

their stronger dependence on capital flows. However, the exchange rate regimes were gradually liberalised in order to avoid a conflict of targets.

Although in normal times, it is rather commonly accepted that the main monetary policy instrument of inflation targeting central banks is the short-term interest rate, all inflation targeters may also use currency interventions. FX intervention may be warranted as a mean to maintain price stability, however, some central banks see other reasons justifying their presence in the FX market. For instance, interventions may be targeted at limiting exchange rate volatility that would pose a threat to sustainable long-term economic growth (e.g. Canada) or at reducing the exchange rate deviation from the level warranted by fundamentals (e.g. Australia, Sweden). Some monetary authorities admit that they conduct FX transactions also to increase their currency reserves (e.g. Turkey).

It is interesting to note that, in recent years, Switzerland and the Czech Republic had decided to adopt, for some time, asymmetric exchange rate targets, which in both cases were aimed at providing further monetary easing when interest rates had already reached their effective lower bounds. Asymmetric exchange rate targets were supporting the return of inflation to the targets, which means that exchange rate policies of those countries were subordinated to the main goal of safeguarding price stability.

Also the activity of central banks from emerging market economies in the FX market has increased over the past years. This reflected their efforts to reduce risks associated with strong foreign capital flows, which had intensified due to both a decline of economic growth in advanced countries following the global financial crisis, and highly expansionary monetary policies of the major economies.

The above overview indicates a significant convergence across some important elements of central banks' practices under an inflation targeting framework (e.g. the choice of targeted inflation measure, or emphasising the flexibility of an inflation

targeting regime). However, in certain areas still different approaches are used (e.g. banks announce a point or a band target). It results, to a major extent, from experimenting and drawing conclusions from own or other central banks' experiences. The central banks' modifications of the framework are discussed in Chapter 3.

2. Major changes to an inflation targeting framework

Joanna Niedźwiedzińska, Elżbieta Skrzeszewska-Paczek, Grzegorz Wesołowski, Piotr Żuk

The experiences accumulated by the central banks pursuing inflation targeting for the last thirty years, and the changes in economic environment taking place in this period, which included the global financial crisis and its consequences, have led to the evolution of the framework. Before the crisis, the main direction of this evolution was to increase monetary policy transparency through expanding the scope of information communicated by the central banks to the public. During the crisis factors related to the financial system stability began to be much more strongly emphasised as an element that potentially should be taken into account in monetary policy decisions.[35] Finally, the monetary policy toolkit of several central banks had to be broaden in order to provide sufficient monetary policy accommodation despite limits of using instruments considered as standard for inflation targeters prior to the crisis.

[35]The evolution of an inflation targeting framework over the recent years was accompanied by the far-reaching changes in the area of the monetary policy implementation. Central banks abandoned the "*one target - one instrument*" principle used before the financial crisis. In line with that principle, the underlying objective of the central bank – maintaining price stability – was pursued with the use of a single instrument, i.e. the interest rate. In response to the financial crisis, major central banks have strongly eased their monetary policies, bringing the interest rates down close to zero, or even below zero. As a consequence, a possibility of boosting economic activity with the use of this conventional instrument was practically exhausted (the so-called zero lower bound or the effective lower bound). This encouraged the central banks to expand the set of monetary policy instruments, in particular, to launch financial asset purchase programmes. Through the purchase of various types of financial assets with longer maturities, the central banks gained a possibility to influence a broader spectrum of interest rates. The expansion of the central banks' instruments is, however, beyond the scope of this report.

2.1. Increasing monetary policy transparency

Central bank's communication with the public constitutes an integral part of an inflation targeting framework.[36] Its objective is to improve the understanding of monetary policy and, as a consequence, to increase its predictability and credibility which, in turn, should reduce real costs of maintaining inflation at the target.

Since the beginning of the 1990s the level of transparency of the central banks' activities has increased significantly, regardless of the monetary policy regime pursued. Various indices show that the central banks of the following economies are the most transparent: Sweden, New Zealand, Hungary, the Czech Republic, the United Kingdom, Israel, the euro area, Canada, the United States and Australia (Dincer, Eichengreen, 2013).[37] Thus, in a vast majority of cases these are the central banks pursuing an inflation targeting strategy that are devoting a lot of attention to communication. The gradual increase in transparency was accompanied by some convergence in the scope of communication tools applied by central banks.

An immediate publication of the decisions on interest rates has become a standard element of the communication strategies of all inflation targeters. It should be mentioned that even in the 1980s and at the beginning of the 1990s this practice was not common.[38] At present, as a rule, central banks announce information on the level of the interest rates directly after the meeting of the decision-making body and subsequently publish – usually only a few hours later – the press release explaining

[36] M. King – former Governor of the Bank of England – defined inflation targeting as a "*framework for decision taking and communicating*" (King 2005).

[37] Among a wide group of central banks for which Dincer and Eichengreen (2013) determined the value of the transparency index in 2010 (116 banks), only 19 were evaluated as more transparent than the National Bank of Poland.

[38] At that time, the practice of immediately informing about the decisions taken was strongly contested by governors of the US Fed, Paul Volcker and Alan Greenspan and other economists (Goodfriend, 1986; Blinder *et al.*, 2008).

the reasons for their decision.[39] A substantial proportion of monetary authorities also organises press conferences after the decision-making meetings (or when the *Inflation report* with the new projection is being published), during which the justification for the decision adopted is presented, including the assessment of both current and expected macroeconomic performance by the decision-making body.[40]

Minutes of the decision-making meetings (*Minutes*) have also become an important communication tool of many central banks pursuing inflation targeting. Their publication enables the public to follow the discussions at the decision-making meetings, understand arguments raised for and against changes of the interest rates, and – in case of some central banks – see the voting results as well (Svensson *et al.* 2002; Heikensten, Vredin, 2002). In the vast majority of central banks (except for the Swedish Riksbank), the views of each member of the decision-making body presented in the *Minutes* do not contain name attribution. It results from concerns that including such an attribution would have a negative impact on the discussion during the meetings, as it could encourage individual members to toughen their position or not react to others' arguments, or – on the contrary – to avoid disagreements. It may also provide incentives for having the real debate before, instead of during, the decision-making meetings.[41] Moreover, it would make it

[39] Until relatively recently, some central banks provided information only on the decision adopted, without its justification (it usually referred to the situations when the interest rate remained unchanged – as e.g. the Bank of England), unless the decision-making body recognised that the lack of justification may mislead markets or external commentators.

[40] The Riksbank and some other central banks initially called the press conferences only when the interest rates were changed. However, recently, press conferences became regular. The Riskbank decided to organise them after each decision-making meeting in 2007, recognising that explaining the reasons for keeping interest rates unchanged is equally important for understanding monetary policy as explaining the reasons for changing the interest rates.

[41] Furthermore, critics of the *Minutes* containing name attribution are concerned that readers could pay more attention to the opinions of individual members of the decision-making body than to economic arguments (and in the case of the ECB also introduce an evaluation of economic outlook from a national viewpoint, instead of a euro area wide perspective).

harder for a central bank to speak with one voice, which many monetary authorities deem desirable.

Voting records of the decision-making body[42] constitute a significant piece of information on the conducted monetary policy. These can be published either in the form listing the names (e.g. Chile, the United Kingdom, Poland), or by providing only the ratio of votes for and against a given decision (e.g. Brazil, Israel, Norway). Available studies (Gerlach-Kirsten, 2004; Horvath *et al.*, 2012; Weber, 2010) prove that publication of the voting results – regardless of its form – fosters better understanding of monetary policy, and enhances its predictability. In this context, supporters of providing names in the voting records point to, among others, the predictive value of information concerning dissenting votes, i.e. those disagreeing with the decision taken by the majority (Gerlach-Kristen, 2004; Gerlach-Kristen and Meade, 2010). However, it has also been argued that while a swift publication of the full voting records is desirable in the case of individualistic committees (where individual members speak in public on their own behalf), the benefits are less clear in the case of committees which are more collegial in nature (where each member represents the whole decision-making body; Blinder, 2007; 2009), since in the latter case it may trigger the so-called cacophony effect.[43] Moreover, different types of the decision-making bodies (individualistic or collegial) allow for various scopes of communication of its individual members with the public. Members of some decision-making bodies (e.g. in Sweden) present their individual views in public statements, interviews etc., whereas in the case of other central banks (e.g. Norway) such form of communication is not applied (Blinder, 2007; Mork *et al.*, 2014).

[42] *Minutes* of some central banks do not contain voting results. This is, for example, the case in Poland, where due to legal restrictions voting records on resolutions are published first in the *Court and Economic Official Gazette* and then at the NBP website (not earlier than 6 weeks after the decision-making meeting).

[43] For example, Blinder (2004) draws attention to the fact that an excessive number of diverse votes within a decision-making body may lead to an information overload, and thus reduce the effectiveness of communication.

Inflation reports, that are usually published 2-4 times a year, represent a basic communication tool with the public for the central banks pursuing inflation targeting.[44] Although these documents differ slightly across countries, all of them contain the following elements: the evaluation of the current and future macroeconomic developments (e.g. concerning GDP and inflation), a balance of risk for the outlook, a justification of the decisions adopted, and the prospect of meeting the inflation target. The *Reports* have been subject to a gradual evolution, since at the beginning projections were not their integral part.[45] Over time, not least due to acknowledging the importance of forward looking approach to monetary policy, the central banks have begun to treat inflation, and often also GDP, projections as standard elements of their *Reports*. Some central banks started additionally to publish the interest rate path or forecast of other variables, but this has not been applied as a common practice by other inflation targeters.

At present, the projections of the central bank constitute an integral part of all *Inflation reports*[46] (Box 3). The relevance of the projections stems from the fact that they may help to explain the rationale for the decisions made by the central bank, and contribute to increasing the central bank's impact on inflation expectations.

[44] Banks publishing *Reports* twice a year include, e.g. the Bank of India, Israel and South Africa.

[45] The international reviews in which *Inflation Reports* of individual central banks were assessed and compared had contributed to a harmonisation of their structure and scope, e.g. Fracasso, Genberg, Wyplosz (2003).

[46] The projections published in the *Reports* are based on various assumptions regarding the interest rates. In general, fixed or variable interest rates are adopted. The interest rate path may be consistent with market expectations, implied endogenously from the model or consistent with the assessment of the decision-making body. The forecast horizon also differs and, at present, it usually amounts to 2-3 years. In terms of presenting the forecasts, at the beginning these were mainly point or band forecasts. However, they were gradually replaced by fan charts. Currently, this form has been used by the majority of the analysed central banks, with some of them additionally using the point forecasts.

Box 3: Publication of projections by the central banks

At present, all central banks pursuing inflation targeting publish their inflation projections, and most of them also GDP projections[47] (with GDP components in some cases). The scope of the projections has gradually increased and currently they often include also variables related, e.g., to the balance of payments, labour market, public finance. Importantly, some inflation targeters have decided to communicate additionally the path of interest rates or even of exchange rates.[48]

The projections published in the *Reports* are in most cases owned by the central bank's decision-making body or the central bank, but sometimes by the central bank's staff. Irrespectively of who is the owner of the projection, the members of the decision-making body rarely challenge the results presented. The only central bank where the individual members may indicate that they do not fully agree with the projection (reflecting the views of the majority of the decision-making body) is the Bank of Sweden. In the case of the Czech National Bank, in turn, the decision-making body (as a whole) presents its risk assessment for the projections. It should be emphasised that with respect to central bank's communication, the stronger the relationship of the decision-making body with the projection, the higher the weight financial markets attribute to it (Hammond, 2012).

For inflation targeters, the key question related to their projections is whether they are perceived as reliable by the public. For this reason central banks often analyse forecast errors in their *Inflation reports*, in particular, by explaining sources of the deviations of macroeconomic variables from their expected levels and comparing their forecasts to those prepared by other institutions or to market expectations.

From among the forecasted variables, the publication of the interest rate projections (that reflect the estimated or declared assessment of the monetary authorities' reaction function) by some central banks triggered the most lively discussions. The Reserve Bank of New Zealand was a precursor in this area (in 1997), followed by the central banks of Norway (in 2005), Sweden (in 2007), the Czech Republic and Israel (in 2008).[49]

[47] The GDP projections are not published, e.g. by the central banks of Guatemala, Iceland and Turkey.

[48] For example, the Czech National Bank (bilateral exchange rate) and the Swedish Riksbank (effective exchange rate).

[49] Since January 2012 also the US Fed has been publishing the specific form of the interest rate path, namely the *Fed funds* scores for the consecutive years, formulated by individual FOMC members (without name attribution). In addition, the Fed publishes individual assessments

The supporters of publishing the interest rate path mostly argued that it enhanced the effectiveness of monetary policy by increasing central banks' impact on the levels of medium- and long-term interest rates, and that it improved the quality of monetary policy decisions by shifting the focus from the short-term to the longer-term interest rates (Gosselin *et al.*, 2008; Kahn, 2007). In turn, many central banks opposed the publication of the interest rate path as they were concerned that the conditionality of the forecast might not be understood by the public.[50] Moreover, the opponents of the interest rate path suggested that the members of the decision-making bodies might feel bound by the published projection, which could make them less willing to change the interest rate path in response to new macroeconomic data (Goodhart, 2005; Kahn, 2007). Attention was also drawn to the practical difficulties related to determining the interest rate path, in particular, in the case of so-called individualistic decision-making bodies (the problem of aggregating diversified views of individual members; Goodhart, 2001).

Likewise, publishing the future path for exchange rates, especially of nominal bilateral exchange rates, was considered by most central banks as problematic. The key argument here was that it may be understood, at least, as a guidance – if not as a commitment – of future exchange rate movements.

Further issues related to publishing the future path for interest rates or exchange rates by the central banks became apparent during the recent global financial crisis. First, as the example of the Riksbank shows, it may turn out that market expectations on future monetary policy are closer to the actual developments than the interest rate path published by the central bank, which may result in credibility losses. Also the publication of the bilateral exchange rate path by the Czech National Bank turned inconsistent with the Bank's own communication on applying an asymmetric exchange rate commitment, which may result in credibility losses as well. Second, the publication of the future path of interest rates or exchange rates may promote risk taking in the financial system due to a lower risk perception by economic agents. This may turned out to be potentially very harmful for the financial system stability.

of the FOMC members of the expected timing of the upcoming interest rate change and the level of the long-term nominal equilibrium rate.

[50] Therefore, the central banks which decided to publish the interest rate path place great emphasis on explaining its conditional nature. For example, in the Riksbank, the presentation of the interest rate path is always accompanied by an explanation that it is not the commitment to conduct the specific monetary policy in the future but – like other projections – it may be modified if factors determining the outlook for inflation and economic activity change.

The scope of communication with the public on future monetary policy has increased in the aftermath of the global financial crisis, with some of the introduced tools considered as useful unconventional policy measures (Box 4; Box 7). This applies predominantly to forward guidance that is commonly associated with forward looking communication on the future interest rate policy that is quite close to central bank's commitment on certain policy course (e.g. as was the case in the United Kingdom and the United States). In practice, forward guidance was, however, also applied to several other monetary policy instruments, such as asset purchases (e.g. in the euro area) or exchange rate commitment (e.g. in the Czech Republic).

Box 4: Communication and monetary policy effectiveness

The experiences of the global financial crisis have shown that communication may reinforce the impact of measures undertaken by the central banks and it may directly influence asset prices. In particular, the studies analysing the effectiveness of quantitative easing (QE) and the response of financial markets to signals of a possible tapering of the monetary expansion indicate that the role of central bank's communication in shaping expectations of the public constitutes an important channel to affect economy (Joyce *et al.*, 2010; Krishnamurthy and Vissing-Jorgensen, 2011).[51] This is supported by the evidence concerning monetary policies of the ECB and the Fed:

- In August 2012, the ECB announced the Outright Monetary Transactions (OMT) programme (its technical features were set in September 2012), i.e. a treasury bonds purchase programme for the euro area countries most heavily affected by the debt crisis. The programme was the response of the ECB to the fragmentation of the euro area financial markets, and related significant differences in the cost of credit for companies and households between

[51] Against the background of historic low interest rates, the central banks of the largest economies – the Fed, the Bank of England, the ECB and the Bank of Japan – reached for unconventional monetary policy tools, undertaking measures directly increasing the supply of liquid reserves in the financial system, i.e. the so-called quantitative easing of monetary policy (Yellen, 2011; Joyce, 2011). Those measures took various forms: the unconditional and conditional purchases of financial assets, extending the maturity of the refinancing operations or expanding the list of securities to be used by the financial institutions as collaterals for loans taken in the central bank. The scale of quantitative easing was also different in individual economies.

individual member states. These differences were substantially undermining the monetary policy transmission mechanism to the real economy. The direct objective of the announcement of the OMT programme was also to provide a framework for intervening in the debt securities markets in the euro area in order to safeguard the singleness of the monetary union. Although the ECB has not used the OMT programme so far, the authorities highly evaluate the effectiveness of its announcement as a monetary policy tool. In line with the ECB intentions, financial markets have perceived the programme as a kind of insurance against the materialisation of the worst scenarios for the monetary union. Announcing the programme itself, combined with the relevant ECB communication, has thus turned out sufficient to mitigate the financial markets turmoil (e.g. led to a significant decline in yields on bonds of the peripheral countries and CDS spreads in all countries of the euro area).

- An example of the central bank's communication with the public that did not contribute to increasing predictability of monetary policy was the so-called QE tapering by the Fed, i.e. announcements on potential limitation of the scale of quantitative easing. Due to a gradual improvement of macroeconomic conditions in the United States, since May 2013 the Fed started to signal a possibility of reducing the monthly pace of asset purchases under the so-called QE3, suggesting at consecutive press conferences that it could take place still in 2013.[52] In view of better than expected incoming data from the American economy market participants assessed that the QE tapering may occur already in September 2013 and they incorporated this assessment into their asset valuation. Thus, the Fed communication regarding QE tapering itself affected the prices of assets, although the decision on the actual QE tapering by the Bank was taken only in December 2013.

The above review indicates that although the tools for communication with the public used by the inflation targeting central banks have largely converged, some differences between the banks still remain. It seems that currently the most important heterogeneity relates to the extent of the disclosed information concerning diversity

[52] In September 2012, the Fed announced launching the next quantitative easing programme, the so-called QE3 which, contrary to the earlier programmes, did not have a defined target value or date of termination, but only the monthly amounts of the asset purchases (USD 85 billion).

in views of individual members of the decision-making body (in particular, in the context the *Minutes* and the voting records), and communicating the central banks' intentions regarding future monetary policy (publication of the interest rate path, and application of forward guidance).

2.2. Including financial stability considerations in the monetary policy framework

In the aftermath of the global financial crisis, economists and central banks, including inflation targeters, have started to attribute a more prominent role to financial stability issues as a factor affecting monetary policy.[53] It referred, in particular, to a verification of some arguments stemming from the debate between the supporters of the so-called *mop up after* and *leaning against the wind* approaches.

2.2.1. Discussion on the role of asset prices in monetary policy before the crisis

Before the global financial crisis, a prevailing view was that central banks should not respond to a rise in asset prices beyond its impact on inflation and output gap. However, in the case of a bubble burst, monetary authorities should behave like a risk manager reacting to rare events, and provide a significant monetary policy accommodation in order to curb recession. This asymmetric response to assets prices was called the *mop up after* strategy or the Jackson Hole consensus.[54] Its main supporters comprised the representatives of the Fed and part of the academic community.

[53] More information on increased responsibility of the central banks for financial stability can be found in BIS (2011).

[54] The name of the Jackson Hole consensus was adopted due to the fact that the *mop up after* approach was several times postulated at an annual meeting of economists and central bankers in Jackson Hole (Blinder, Reis, 2005; Greenspan, 2002; 2005; Mishkin, 2007c).

Supporters of the *mop up after* approach argued that:

- Pursuing an inflation targeting framework, which is aimed at stabilising inflation and output gap, should reduce the risk premium and contribute to – and in view of some authors even lead to – to stability of the financial system (Schwartz, 1995).
- The central bank's main tool – a short-term interest rate – is ineffective in limiting asset price growth and preventing asset price bubbles from forming up. A long-term growth in asset prices is usually accompanied by investors' belief of their further growth. Against this background, increasing interest rates by the central bank may not bring the expected effects. In this context, examples of the short-term interest rate increases in the United States in the years 1989, 1994, 1999-2000 were indicated, as they had, at most, a weak impact on curbing the growth of equity prices (Greenspan, 2002). Likewise, the example of the Japan's economy in the 1980s showed that raising interest rates did not stop the asset price growth (Posen, 2011).
- A central bank can directly affect only short-term interest rates, while it is the long-term rate which is far more relevant for asset prices. Therefore, globalisation and potential global imbalances may significantly limit a possibility for the central bank to influence asset prices (Caballero, 2006).
- A sharp tightening of monetary policy, aimed at limiting the asset price growth would most probably lead to a severe recession. Assenmacher-Wesche and Gerlach (2008) estimated that the ratio of the response of output and the response of asset prices to the interest rate shock (defined as a rise of 25 basis points in the interest rates) ranges from 3 to 1. For this reason, the suppression of an asset price bubble may trigger a significant GDP fall.
- If a central bank decides to prick a bubble too late, given the lags in the monetary policy transmission, it may turn out that the monetary policy tightening will additionally hamper economic growth during the downturn (Kohn, 2006).

- Central banks do not have information advantage over other market participants which would enable them for an earlier identification of bubbles. This observation refers, in particular, to the initial phase of bubble creation, when the asset price growth may be explained by fundamental factors (productivity growth, liberalisation of the financial system, expectations of higher profits in the future). For example, Frait and Komarek (2006) claimed that real growth in the property prices in the Czech Republic, Hungary, Poland and Slovakia resulted from their previous undervaluation, and the risk of price bubbles in the real estate market prior to the global financial crisis was insignificant.
- Monetary policy is an effective tool for mitigating the effects of bursting the price bubble, as confirmed by the experiences of the stock market crashes in the United States in 1987 and 2000–2002 (Blinder, Reis 2005; Evanoff *et al.*, 2012).

However, in the literature the *mop up after* strategy has been criticised, mainly by the economists affiliated with the Bank for International Settlements (BIS) who opted for the so-called *leaning against the wind* approach. Admittedly, it was commonly agreed that the central bank should not stabilise assets prices at a specified level, and after a potential burst of the bubble it should provide liquidity to prevent the breakdown of the financial system and recession (Issing, 2011). However, the supporters of *leaning against the wind* additionally believed that the central bank should respond to asset prices growth beyond its impact on inflationary and demand pressures. Furthermore, monetary authorities should take into account issues related to financial system stability, including credit growth, when conducting policy. The main proponents of *leaning against the wind* argued that:

- Instead of attempting to prick the price bubble (which could turn out costly, and its positive effects uncertain), the central bank can tighten monetary policy in order to curb arising imbalances (excessive growth of asset prices, credit or monetary aggregates). Such intervention would be similar in nature to purchasing of insurance by the central bank. In the opinion of the supporters of

the additional intervention, its timing and scale should depend on many factors, including mainly: condition of the financial sector (the size of lending, banks' resilience to shocks), rules relating to financial market institutions (regulation and oversight), efficiency of the monetary policy transmission mechanism, the likely source of asset prices growth, and the risk of price bubble bursting in the immediate future.

- Focusing solely on inflation stability in a short-term horizon, amid well anchored inflation expectations, may result in overlooking the threat to price stability and economic growth in the medium and long term. This threat may be associated, in particular, with the imbalances forming in the financial system and in the asset markets (Borio, Lowe, 2002).
- Maintaining excessively low interest rates over a longer time may encourage financial institutions to invest in risky assets, in order to achieve higher rates of return in line with the shareholders' expectations. This process was illustrated by the growing scale of carry trade transactions (Sławiński, 2009).
- Changes in credit and monetary aggregates allow to identify a more harmful asset prices growth (Issing, Borio, Lowe 2004; Detken, Smets 2004). Due to its asymmetric nature, the *mop up after* strategy creates moral hazard, as it curbs expected losses of investors from betting on further growth of asset prices (implicitly, the put option for asset prices). Therefore, even if the *mop up after* approach initially works, it may pave the way for a greater crisis in the future through encouraging hazardous behaviours (Issing, 2011).

2.2.2. Lessons learnt on the role of asset prices in monetary policy

The global financial crisis has verified some of the views regarding the need to include factors associated with financial stability and asset prices in the central bank's decisions. The *mop up after* strategy has not only turned out insufficient to ensure financial and economic stability, but it has even increased the risk of instability *ex ante*. Such an opinion was expressed by the IMF (2009), as well as,

among others, by Bernanke (2010) – previously, the key supporter of this approach. In particular, the crisis has shown that:

- Price stability does not guarantee financial stability. Above all, a focus on price stability in the short and medium term may undermine longer-term price stability. Paying attention mainly to inflation and output gap may allow for a significant credit expansion, and thus may result in a build-up of risks in the financial system (IMF, 2009). It has been indicated that there exists a trade-off between the stability of the financial system in the medium term and the stability of output and inflation in the short term (Issing, 2011; King, 2013).

  According to Borio (2012) financial cycles are determined by the interactions of lending and real estate prices, and therefore the use of these variables as early warning signals may be useful in predicting financial crises. The length and the amplitude of a financial cycle depend on the financial and monetary regime and on the structural features of the real economy. Financial cycles reveal also a difference between potential output understood in two ways: as the one that does not trigger inflation, and as the one that is associated with sustainable growth.
- In some cases, an accommodative monetary policy after the burst of a bubble that is aimed at addressing the resulting crisis in the financial system, creates a risk of macroeconomic imbalances building-up in the future.

  This observation overthrows one of the main arguments of the *mop up after* supporters, who pointed to the effectiveness of monetary policy easing in the United States after the stock market crashes in 1987 and 2000-2002. The experiences of those times suggested that with accommodative monetary policy in place, a collapse of a bubble on equity markets does not generate serious consequences for the real economy. However, the global financial crisis of 2008 proved that the *mop up after* approach may, in fact, have contributed to accumulating imbalances going forward.

- Maintaining excessively low interest rates over a too long period – in particular, if it is not accompanied with adequate macroprudential policy – may trigger a sharp rise in asset prices and increase the risk of financial crisis.

  On a panel of 18 OECD countries and data for the 1920-2011 period, Bordo and Landon-Lane (2012) showed that monetary policy easing buoyed asset price growth, followed by its slump. Such a result was obtained for various assets, model specifications or control variables. Similarly, Ahrend *et al.* (2008) identified a link between negative deviations of interest rates from the Taylor rule and several measures of euphoria on the real estate market. The correlation between loose monetary policy and booms in the equity and commodities markets was also indicated by Assenmacher Weshe, Gerlach (2008), Caruana (2013), Anzuini *et al.* (2010), Taylor (2007; 2009).

- The global economy is more closely integrated than it was assessed before the crisis, making global or external factors increasingly important in influencing economic developments in individual countries.

  For several years before the recent global crisis, capital flows led to a sharp growth of global macroeconomic imbalances. In particular, a strong inflow of savings from emerging market economies with the exchange rate pegs to the US dollar fuelling asset markets of advanced economies (including mainly the United States), was contributing to persistently low long-term interest rates in advanced countries (Caballero, 2006).

  Moreover, despite the growing importance of emerging market countries in the global economy and the decoupling hypothesis promoted in 2007 (i.e. the expectation that emerging countries have become largely independent of business cycles in advanced countries), emerging market economies were affected by the financial crisis much stronger than expected (Subarrao, 2013).

  At the same time, after the crisis, the highly accommodative monetary policy and the related global liquidity has influenced credit growth and asset prices in emerging market economies. The empirical evidence of the relationship between

global liquidity and developments in emerging market economies has been confirmed by the studies performed by Becker and Ivashina (2013), Ioannidou *et al.* (2009) and Maddaloni and Peydró (2010).

However, some arguments speaking in favour of the *mop up after* strategy have not been rejected empirically. Considerable doubts still exist whether a short-term interest rate is the best or, at least, an effective tool to counteract price bubbles and imbalances forming up in the financial system and whether the costs of its application do not exceed the benefits under certain circumstances. This refers mainly to small open economies, which are vulnerable to capital flows. In such a situation, a monetary policy tightening encourages further capital inflows (Brzoza-Brzezina *et al.*, 2010). Therefore, a postulate stemming from the financial crisis is – besides more extensive inclusion of financial stability considerations in central banks' decision-making – to promote the use of additional instruments under the so-called macroprudential policy, as well as measures to control capital flows.

Macroprudential policy is supposed to supplement microprudential policy (that had been used for many years now), with an aim to oversee and regulate the overall financial system, not only its individual institutions. At present, among macroprudential policy tools that can be considered useful are, e.g. controlling credit growth with the use of such indicators as loan-to-value (LTV), debt-to-income (DTI), the variable risk-weighted capital ratios, the liquidity ratios, the stock market margin requirements or the reserve requirements (IMF, 2013b; Evanoff *et al.*, 2012). Many of these tools had been used earlier, although rather as supporting microprudential or monetary policies.

Macroprudential policy has not yet been empirically verified sufficiently well. Experiences with this policy comprise a short history of its application in Brazil, Bulgaria, Spain, Hong Kong, Israel, Korea, Peru, Poland, the United States, Turkey and some countries of Latin America (IMF, 2013b). The conclusions from these case studies are mixed. In the literature, Korea is often referred to a an encouraging

example (Box 19). It indicated that constraints on the leverage on FX derivatives brought about positive results, and that the introduction of the levy on the non-core liabilities in foreign currencies for foreign banks helped to limit the volatility of capital inflows to Korea in response to the global conditions (Bruno, Shin, 2013). By contrast, the example of Spain is pointed out, where anticyclical macroprudential policy did not prevent from excessive growth in lending, nor a construction boom (Rajan, 2013).

In view of the lack of clarity as to which macroprudential tools should be used, whether they are effective or not (the risk of regulatory arbitrage), and what effect they will generate (no sufficient experience), nowadays it is assumed that the central banks' policy of the short-term interest rates should take into account, at least, the medium-term consequences of changes in asset prices and issues related to financial stability (Bean, 2013; Caruana, 2013)[55].

However, fulfilment of the above postulate in practice seems challenging, since central banks in advanced economies for many years following the global financial crisis pursued highly accommodative monetary policy (i.e. they maintained interest rates close to zero and carried out the purchase of assets). With high public debt and unemployment, weak demand and potential destabilisation of financial markets due to the attempts to tighten monetary policy, using short-term interest rates to inhibit the growth of asset prices has not been a priority.

Box 5: FX interventions of the central banks

In the context of activities aimed at ensuring financial and macroeconomic stability, attention should also be paid to the intensification of discussions in recent years on the desired scope of the foreign exchange interventions. These discussions were

[55] There are also no uniform solutions on who should be responsible for pursuing this policy. In the increasing number of countries, institutions responsible for macroprudential policy are currently being established. In the majority of them, the central banks play a dominating role in this area.

stimulated by strong growth and increased volatility of private capital inflows to emerging market economies following the global financial crisis, which contributed to considerable fluctuations of their exchange rates (BIS, 2013).[56]

Although the opinion about the positive impact of floating exchange rates on macroeconomic stability of emerging market economies is well founded, excessive volatility of the exchange rate may contribute to increased volatility of demand and pose a risk for economic stability (Gadanecz, Mehrotra, 2013). The willingness to reduce the negative consequences of strong exchange rate fluctuations was an argument for an increased use of FX interventions by the emerging market countries (BIS, 2013).

A survey conducted by the BIS (2013) showed that more frequent interventions of the central banks after the global financial crisis were mainly aimed at limiting the volatility of the exchange rate, rather than at maintaining the exchange rate at a specified level. It should be stressed that such activities in the FX market – contributing to macroeconomic and financial stability – are consistent with an inflation targeting framework pursued by many central banks in emerging economies.

Inflation targeting central banks were changing their approach to financial stability slowly. Initially, in the official documents of most banks, there was no information on the role of asset prices in their monetary policies (Box 6). Nevertheless, gradually the issue of financial stability as a significant area of monetary authorities' interest found reflection in their publications.

- The Riksbank, in the document *Monetary policy in Sweden* published in June 2010, that described the main elements of its monetary policy framework, stated that while making decisions regarding the interest rates it may take asset prices into account (Box 17). However, it also emphasised that ensuring stability in asset markets is predominantly the task of regulatory policy and the oversight, with monetary policy playing a supplementary role.

[56] Those fluctuations were additionally strengthened by the investors taking speculative positions on the foreign currencies.

- The Reserve Bank of Australia, in the updated version of the document *Statement on the Conduct of Monetary Policy* published in September 2010[57], added a section about financial stability. It indicated that preserving financial stability is a long-term goal of the Bank, which strives to achieve it without violating the primary objective of its activity, i.e. price stability. At the same time, it was stressed that the Bank's responsibility for the financial system stability does not mean that it guarantees solvency of financial institutions.
- The European Central Bank also added a subsection on *Monetary Policy, Financial Stability and Asset Prices* in the update of the *Monetary Policy of the ECB* published in 2011, where it referred to the role of financial stability in pursuing monetary policy. The ECB noted that in the case of bubbles emerging in the asset markets, central banks in the their decision-making process should take into account long-term consequences of the imbalances in the financial system for price stability. Such an approach entails the necessity to prevent the build-up of imbalances, even at the cost of inflation deviating from the target in the short term beyond what would happen if the financial imbalances were ignored.
- The Bank of Turkey in its publication *Monetary Policy Under Global Imbalances*, emphasised the role of financial stability for macroeconomic stability and price stability in a medium and long term. As a consequence, while maintaining an inflation targeting framework, the Bank has introduced two intermediate monetary policy targets since mid-2010: counteracting short-term capital inflows and reining in domestic credit growth (Box 12).
- The amended *Bank of Korea Act*, which entered into force in December 2011, stipulated that while implementing the primary objective, i.e. supporting economic development through ensuring price stability, the Bank of Korea will also take into account the financial stability considerations.

[57] The previous version of that document was released in December 2007.

Box 6: The role of financial stability in monetary policy before the crisis

Before the crisis, the positions of central banks concerning the role of financial stability in their monetary policy could be learned only by analysing the statements and the publications of their representatives. Most commonly, it was emphasised that central banks monitored situation in the financial and housing markets (e.g. the Swiss National Bank, the Reserve Bank of New Zealand). It was also underlined that in case of identifying a threat to the financial stability, central banks may take into account asset prices while determining the level of interest rates (the Czech National Bank).

At the same time, some monetary authorities were ready to accept inflation temporarily running below the target in order to inhibit a rapid growth of asset prices and limit the risk of inflation falling significantly below the target in a more distant future, after the bubble burst (the Bank of Canada, the Bank of England, the Riksbank). However, others were of the opinion that identification of asset price bubbles requires arbitrary decisions and may undermine credibility of the inflation targeting central bank (the Bank of Chile).

In the statements of central banks' representatives, there were also suggestions made on how to upgrade inflation targeting by incorporating – at least indirectly – asset prices in the conducted monetary policy. This could take place, e.g. by extending the monetary policy horizon (the Czech National Bank), or including home prices in the CPI index (the Bank of England).[58] The ECB, in turn, claimed that the monetary analysis – due to its long-term perspective – allows to take asset prices into account while taking monetary policy decisions.[59] The experiences of Ireland and Spain have, however, shown how vain were the hopes placed in the monetary analysis, which was not only rather disregarded in the decision-making process, but also ignored the economic conditions in individual countries.

At the same time, the representatives of other central banks (e.g. the Swiss National Bank) continued to stress that monetary policy is too costly a tool for restoring

[58] It should be emphasised that in some of the central banks analysed in this report, the CPI index already includes home prices (in Australia, New Zealand and Iceland).

[59] However, according to Adrian and Shin (2008a), the usefulness of monetary aggregates depends mainly on the extent to which the financial intermediation model relies on the traditional banking. For example, if the banks that collect deposits to finance credit dominate in the financial system, the growth of their balance sheets will be an important premise for monetary authorities. At the same time, if the vast majority of lending is securitised and placed in the form of securities in the capital market, liabilities of the commercial banks will not be an adequate measure of money supply or leverage in the financial sector.

balance in the financial market, and significant adjustments of the short-term interest rates – aimed at preventing a further build-up of the bubble – may lead to a substantial decline in GDP. Accordingly, macroprudential instruments were indicated (e.g. capital regulations) as more adequate for limiting the volatility of asset prices (the Bank of Australia).[60]

The review above indicates that the global financial crisis has changed the approach of the central banks pursuing inflation targeting to the financial stability issues. It is nowadays undisputable that ignoring factors related to the financial sector may be detrimental for the macroeconomic stability in the longer term. The views and solutions applied so far by individual central banks in this regard depend on their experiences and the specific conditions under which they operate. It should be indicated that – in line with the central banks' declarations – all solutions recently introduced in this area remain within the scope of an inflation targeting framework, without compromising its underlying foundations.

2.3. Extending the scope of monetary policy instruments

The global financial crisis brought also another topic to the centre of the discussion on the proper monetary policy framework, namely issues related to monetary policy instruments. As a result, the division between standard and non-standard monetary policy measures has been introduced with some of the non-standard measures likely to stay with the central banks for still some time, at least as a valid option to be discussed and used in case of need.

2.3.1. Conventional monetary policy instruments

Before listing non-standard monetary policy measures, it is useful to note what instruments should be regarded as standard for inflation targeting central banks. When doing that, it should be, however, kept in mind that the consensus in that respect was forming for some time, with several operational targets being tested at

[60] Cecchetti *et al.* (2010) indicated, however, the limitations of those instruments as a substitute for interest rates.

the beginning of implementing inflation targeting in the 1990s. For example, in New Zealand, initially, settlement cash was the main policy instrument, substituted in the late 1990s with Monetary Condition Index (based on changes in interest rates and exchange rates), which only in 1999 was abandoned as an operational target.

With time, the experiences made with using various operational set-ups led to developing a widespread practice, followed rather homogenously by inflation targeting central banks. Looking at their monetary policy implementation prior to the global financial crisis it can be argued that a typical set of monetary policy tools of an inflation targeter includes only one measure – a short-term policy interest rate. This instrument has become key for all the analysed central banks.

Quite many monetary authorities also mention FX interventions as a belonging to their standard toolkit (e.g. Israel and Serbia). However, not all inflation targeters that consider occasional FX interventions as a policy instrument do make intensive use of them (e.g. Poland), and not all inflation targeters that do not point to occasional FX interventions as a monetary policy tool restrain from intervening on FX markets (e.g. Switzerland).

In some cases, there are also additional measures officially considered as conventional. Examples include the amount of funds in the money market indicated by the Bank of Japan, or the size and composition of the central bank's asset holdings and communications about the likely course of monetary policy in the future indicated by the US Fed. Regarding the two examples, those can be, however, already treated as belonging to less conventional measures.

Interestingly, while all inflation targeters do emphasise the role of communication in their monetary policy, which implicitly may be seen as recognising it as a policy instrument, it is rather not explicitly mentioned when describing implementational aspects of monetary policy. Despite this, communication cannot be disregarded when speaking of typical policy measures used by inflation targeting central banks.

2.3.2. Unconventional monetary policy instruments

In response to a sharp slowdown in economic growth, many central banks eased their monetary policies significantly by reducing the nominal interest rates to their historic lows. The monetary policy loosening was particularly marked in the largest advanced economies, where the interest rates were reduced to the levels close to, or even slightly below, zero. Consequently, the room for some central banks to support economic activity through applying conventional monetary policy instruments (i.e. a further lowering of the short-term interest rates) was practically exhausted. Therefore, the banks were encouraged to search for new tools which would stimulate economic growth. Another reason justifying the use of unconventional measures was improper functioning of monetary policy transmission mechanism that turned out to be a valid point in many economies.

The most general description of non-standard instruments would be that those are the measures directly aimed at lowering the cost and increasing the availability of external financing to banks and to non-financial sector (Bini Smaghi, 2009). However, whereas some tools can, in principle, be seen as conventional, their application may rather suggest that they should be regarded as, in fact, unconventional. This can be argued in the case of cutting nominal interest rates below zero, committing to certain interest rate policy in the future (forward guidance), and announcing an asymmetric exchange rate target. Considering the policies pursued by inflation targeting central banks in recent years, the following list of non-standard monetary policy instruments can be formulated:

- negative interest rate policy;
- forward guidance;
- asymmetric exchange rate commitment;
- credit easing;
- quantitative easing.

Negative interest rate policy has been pursued by bringing policy rates to mildly negative territory and keeping them at that low level for some time. It is possible since the cost of holding cash is positive, thus unless rates become significantly negative it may still be more profitable to hold deposits even at the cost of paying mildly negative interest on them. Interestingly, negative interest rate policy has been often accompanied by changing the interest rate being considered as the main policy rate. This options has been used e.g. in the euro area and Hungary.

Forward guidance can be seen as enhanced central banks' communication on interest rate policy. It was applied at some point by all the major central banks (Bernanke, 2012b; CEPR, 2013b). The idea behind the forward guidance is that a central bank communicates to the public its outlook for future monetary policy over the horizon longer than until the next meeting of its decision-making body (Box 7). The aim is mainly to indicate how the interest rates (or other monetary policy instruments, e.g. the scale of quantitative easing) are likely to develop in the future. Thus, publishing the future interest rate path can be seen as constituting a form of forward guidance, whereas currently, typically, forward guidance is understood as communicating by the central banks their expectations regarding the time horizon in which they intend to keep their interest rates at low levels. This tool is used to extend the period during which economic agents should expect very accommodative monetary policy to be continued. This should help anchoring medium- and long-term interest rates expectations at low levels and hence support economic recovery (Eggertson, Woodford, 2003; Woodford, 2012), since interest rates expectations of individuals and enterprises shape their current expenditure and savings decisions which, in turn, affect economic growth. Apart from the major central banks, forward guidance was used e.g. in Canada and Poland.

Asymmetric exchange rate commitment is understood as announcing unlimited FX interventions in order to weaken the exchange rate, or – at least – to halt its appreciation. This policy was adopted in the Czech Republic and Switzerland.

Credit easing should create incentives for commercial banks to grant credit to the private sector. This is done by offering banks medium-term liquidity as long-term refinancing operations, often under certain conditions related to the banks' lending behaviour. This tool has been used e.g. in the euro area, Hungary and Sweden. Some authors also include central bank's asset purchases directly from the private sector as a form of credit easing (Bini Smaghi, 2009), but those operations seems to belonging more to quantitative easing.

Quantitative easing is explicitly aimed at lowering longer-term interest rates, and encompasses central bank's purchases of various financial assets, but typically with a big share of government bonds. Large-scale outright purchases of longer-term assets result in increasing the prices of assets – both those being purchased and also other assets due to a portfolio rebalancing channel. Quantitative easing has been applied e.g. in the euro area, Hungary, the United Kingdom and the United States.

Box 7: Forward guidance in the central banks' practise

The central banks that decreased their interest rates to historic lows started to use different types of forward guidance (BoE, 2013), varying in respect to the way how the period in which they intends to maintain the interest rates unchanged was determined:

1. qualitative (or open-ended) forward guidance,
2. time-contingent forward guidance,
3. state-contingent forward guidance.

Two elements play a key role in the mechanism of forward guidance: understanding the central bank's intentions by the public and confidence that monetary authorities will fulfil these intentions. Clarity and credibility of forward guidance depend on its form.

Ad. 1 ***Qualitative forward guidance***

The central bank defines a period of keeping interest rates unchanged using very general statements, e.g. by expressing the belief that it will not raise the interest rates "*for an extended period of time*" or that "*policy accommodation can be removed at a pace that is likely to be measured*". On the one hand, this allows for a greater flexibility in responding to unforeseen developments in the economy, but, on the other hand,

for the public the value added of such statements might be limited. Moreover, sometimes the wording can be misinterpreted (e.g. each person may understand the phrase "*extended period of time*" differently).

Qualitative forward guidance was the initial form of this monetary policy communication tool. It was applied, among others, by the Fed (between December 2008 and June 2011, as well as between September and December 2014) and the ECB (since April 2013 until April 2018).

Ad. 2 ***Time-contingent forward guidance***

In its press release, the central bank provides a date until which it will probably keep the interest rates unchanged. Therefore this type of forward guidance is easy to interpret. However, if economic situation changes, the date provided by the central bank may need to be changed as well, which undermines the credibility of the message. Furthermore, a central bank applying the time-contingent forward guidance usually does not clarify how it intends to respond to unforeseen economic developments in the future. Consequently, the interest rate path communicated in that way can be challenged.

Time-contingent forward guidance constituted the next stage in the development of forward guidance. It was used, among others, by the Fed (between August 2011 and October 2012) and the NBP (between September 2013 and June 2014).

Ad. 3 ***State-contingent forward guidance***

Instead of informing about the date of a potential change in its monetary policy, the central bank indicates economic conditions – often by setting threshold values for specific variables – which would induce it to change (or to consider to change) the interest rates. This type of forward guidance enables the banks to avoid the trap of tying its hands. It also enhances understanding of the public of how and why the central bank will respond to changes in economic conditions and, consequently, may allow for an adequate adjustment of private expectations.

However, state-contingent forward guidance also has drawbacks:

- Compared to time-contingent forward guidance, it may be more difficult to interpret for the public. The reason is that it is rather addressed to those who follow current trends in the threshold variables and have a view about their expected changes in the future. As such, this kind of forward guidance may have less effect on households and enterprises which do not monitor the developments in macroeconomic variables regularly.

- When applying state-contingent forward guidance, the central bank defines the variables and their threshold levels that will have a crucial impact on its monetary policy. To that end, the monetary authority needs to rely on credible economic forecasts. However, in the wake of the global financial crisis substantial structural changes took place in many economies (persistently weaker economic growth, persistently weaker inflation, stronger volatility of various macroeconomic variables), which made forecasting more difficult.
- No single economic variable gives a complete picture of the economy. Thus, it cannot be ruled out that despite meeting the conditions for an interest rate rise specified in forward guidance, the central bank does not hike due to its assessment of the overall economic circumstances. In order to mitigate this problem, the monetary authorities stress that the interest rate rise will not take place automatically after meeting the conditions set in forward guidance, but rather that in such a case they would only consider whether the hike is appropriate (BoE, 2013).

The state-contingent forward guidance was applied by two central banks: the Fed (between December 2012 and July 2014), and the Bank of England (between August 2013 and January 2014).

Applying forward guidance – regardless of its form – entails various risks. In the literature, the following potential problems are most commonly indicated:

- The central bank's declaration on maintaining the interest rates at a low level over a period longer than previously expected may be perceived by markets as a signal that economic outlook has deteriorated (particularly if markets believe that the central bank is not disclosing all information it holds). Under these circumstances, forward guidance may produce an effect opposite to the intended one, namely, it may trigger the expectations that real income will be lower in the future, which would limit economic agents' propensity to spend, and consequently deepen the recession.[61]
- Over the years, many central banks have emphasised that their goal is to maintain low and stable inflation. Since inflation has indeed remained relatively low and stable over the recent decades, economic agents have had a reason to trust central banks' declarations concerning their main objective. However, the new policy may be interpreted as a signal that the central banks have given up stabilising inflation at low level. If economic agents start to

[61] Woodford (2012) calls this a perverse effect of forward guidance and indicates that the only method to avoid it is the adequate communication policy, explaining the reasons for introducing and the mechanism of operating of the new monetary policy tool.

expect higher inflation in the future, it may translate into a faster growth of wage demands, and, consequently, lead to higher inflation.

- Forward guidance – especially in its time-contingent form – may pose a risk to central bank's credibility. If economic recovery turns out to be stronger than the central banks had previously expected, this will force the monetary authority to abandon the policy of low interest rates sooner, which economic agents could consider as breaking the commitment.

The Fed and the Bank of England – two banks applying state-contingent forward guidance – were confronted with those risks.

When introducing its guidance, the Fed announced that it would maintain the interest rate at a level close to zero (0.00-0.25%) at least until the unemployment rate was higher than 6.5%, the inflation forecast in the period of 1-2 years did not exceed 2.5%, and the long-term inflation expectations remained anchored. The Bank of England, in turn, declared that it would not raise the interest rates at least until the unemployment rate fell below 7%, unless the forecast annual CPI inflation in the 18-24 month horizon exceeded 2.5%, the medium-term inflation expectations were considerably higher than the inflation target and the stability of the financial system was threatened.

However, at the beginning of 2014, it turned out that both in the United States and in the United Kingdom the unemployment rate had decreased faster than both central banks had forecast and it approached the threshold levels. Nevertheless, it inclined the central banks of those countries neither to raise the interest rates, nor – contrary to the expectations of many commentators – to reduce the specified threshold values of the unemployment rate.

In January 2014, the Fed declared that it would probably maintain the interest rates at the former level well past the unemployment rate falls below 6.5%, particularly if the forecast inflation remained below the level of the long-term target, i.e. 2%. In March 2014, the Fed decided to update again its forward guidance, stressing that this did not represent any change of its original intentions regarding monetary policy. The update involved abandoning the quantitative thresholds, and, instead, communicating the Bank's intentions regarding the period of maintaining interest rates at low levels with the help of qualitative language. At the same time, it was indicated that when making monetary policy decisions a wide range of indicators would be considered, illustrating the situation in the labour market, inflation pressures and inflation expectations, as well as the situation in the financial market. Concurrently – based on the evaluation of those factors – the Bank repeated that it

still would take into account a possibility of keeping the interest rates low over a longer period after the completion of the asset purchase programme, particularly if the forecast inflation continued to stay below the target and inflation expectations remained anchored. Moreover, in the FOMC's opinion at that time, even if employment and inflation remained close to the Fed's mandate targets, economic conditions might justify maintaining the interest rates over a certain period of time below the level recognised by the central bank as natural in the long term.

The response of the Bank of England to the unemployment rate approaching the threshold value specified under the forward guidance was similar. The interest rates were not changed, which was justified with a margin of slack still remaining in the economy. In February 2014, the Bank announced that it would move to the next stage of forward guidance and while taking monetary policy decisions it would hereafter rely on a wide range of macroeconomic indicators. The projections of all those indicators would be regularly published (the first publication took place in the *Inflation report* of February 2014), which – in the Governor's view – would help the public to better understand and predict monetary policy. Regarding the outlook for the interest rate hikes it was indicated that before these take place, spare capacity that still existed in the economy despite the significant decline in unemployment should be used up. At the same time, it was indicated that the interest rate rises would be gradual and their future levels would be much lower than before the global financial crisis. The Bank also declared to maintain the stock of assets purchased at least until the first interest rate rise.

In the case of both the Fed and the Bank of England, the withdrawal from hinging the decision about the interest rates adjustment on the achievement of certain quantitative thresholds, and the shift to the system of analysing many economic indicators meant in practice an extension of the horizon for the declaration to maintain the interest rates at a very low levels. This was motivated by the drive to adequately anchor market expectations.

Although the Governors of the Fed and the Bank of England presented this move as part of a natural evolution of the state-contingent forward guidance, in the opinion of many commentators the update implemented by the Fed or moving to the next stage of forward guidance by the Bank of England was tantamount to admitting that the implementation of the first stage forward guidance was unsuccessful. Such an interpretation was justified by the fact that those Banks had not mentioned any stages while introducing forward guidance.

The enforced change in the relatively new communication strategy (in the case of the Bank of England after only 6 months of its application) put the credibility of both Banks at risk and could trigger unexpected reactions of financial markets. This was brought up, among others, by N. Kocherlakota, the only FOMC member who voted against introducing forward guidance. A critical opinion on the state-contingent forward guidance that relied on an excessive number of indicators, and thus might trigger a market turmoil, was also expressed, among others, by T. Jordan, the Governor of the Swiss National Bank.

It seems that the experiences of the Fed and the Bank of England confirmed concerns that the application of the contingent form of forward guidance might hinder communication. The primary challenge is an adequate selection of economic indicators and their threshold values justifying the change of monetary policy. Mistakes in this area may have negative consequences for the central bank credibility and the effectiveness of its monetary policy.

Non-standard monetary policy tools proved quite effective in providing more accommodative financial conditions under crisis circumstances. This was reflected in lowering longer-term interest rates or weakening the exchange rates (Bayoumi *et al.*, 2014). The impact was, however, clearly more visible in the case of financial market variables, compared to output and inflation developments. Whereas unconventional instruments were indisputable supportive for real activity and prices, the strength of their effects is difficult to assess, not least due to the fact that they were often applied simultaneously (NBP, 2019).

However, despite a rather widespread use of non-standard policy tools especially among advanced economies in the aftermath of the crisis, they can turn out to be problematic, especially if applied for a longer time (Bayoumi *et al.*, 2014). First of all, their effectiveness may depend on frictions prevailing in the economy hit by major shock and may diminish over time as economic conditions normalise. Moreover, asset purchases of central banks may distort price discovery mechanism, which is particularly worrisome when they apply to assets other than government bonds, i.e. are conducted in market segments that are generally relatively small. Purchasing assets issued by the private sector also implies that a central bank has to choose assets

it buys, meaning that it allocates funds to selected industries and companies, which may be subject to critique on being arbitrary. Also implementing exit strategies from applying those monetary policy instruments may be difficult without creating additional distortions. Finally, in particular in the case of purchases of government securities, there is a risk that those will be treated as a form of monetary financing, threatening central banks' credibility over the longer run. If monetary policy decisions related to using unconventional tools start to be regarded as aimed mainly at providing cheap financing for the government, central banks' independence would be undermined and fiscal dominance of monetary policy would follow.

Another line of argument is pointing to the increased risk of a misallocation of resources amid a low interest rate environment created with the help of non-standard policy measures. Under such accommodative conditions a disproportional higher share of funding might be allocated to less productive firms (Acharya *et al.*, 2015). Additionally, if interest rates are kept very low for a relatively long time, risks to financial stability may increase, since they may affect housing prices, situation of insurance companies, pension funds and banks. On top of that, unconventional tools – like conventional instruments – have redistribution effects, which may be more difficult to accept, especially when they are interpreted as helping debtors at the expense of creditors.

For the reasons mentioned above, Bean *et al.* (2010) claim that in normal times monetary policy should rely again on short-term interest rates as the operational target of monetary policy. A strong argument in favour of this view is that the monetary transmission mechanism of short-term interest rates is better explored and understood, and thus much more predictable.

In general, it seems that unconventional tools will remain, indeed, unconventional, and while they will be a part of an extended monetary policy toolkit, most likely they will be used only in periods of turmoil. Indirectly, the fact that recently almost all central banks that have been applying non-standard measures moved into the direction of implementing gradual exit strategies, is supporting such a conclusion.

3. Selected modifications of an inflation targeting framework

Magda Ciżkowicz-Pękała, Joanna Niedźwiedzińska, Ewa Stawasz-Grabowska, Piotr Żuk

Below, examples of modifications to inflation targeting in several central banks are presented. Those examples show how the change of specific elements of the regime influenced the conduct of monetary policy. Two cases of countries which experienced a breakdown of their banking system are also discussed – although those countries officially continued to pursue their monetary policy within an inflation targeting framework, at least temporarily, they placed much more emphasis on other targets.

The cases analysed can be grouped into the following categories:

- Introduction of operational targets into an inflation targeting framework:
  - introducing the reference value for M3 growth (the euro area);
  - using the MCI in the conduct of monetary policy (New Zealand).
- Introduction of additional monetary policy targets into the framework:
  - exchange rate target (Hungary);
  - counteracting excessive inflows of short-term capital and curbing credit growth (Turkey).
- Modifying the definition of the inflation target:
  - introducing core inflation as a targeted inflation measure and a set of escape clauses, i.e. factors justifying deviation of inflation from the target (the Czech Republic);
  - removal of the band for deviations from the target and its reintroduction (Sweden);

- multiple reformulations of the definition of the inflation target including, among others, changes in its level and horizon (Korea).

- Diminishing the role of the inflation target in favour of other targets:
  - nominal GDP (the United Kingdom);
  - *leaning against the wind* and stabilisation of exchange rate (Iceland).

Although some of the modifications turned out to be neutral in terms of the monetary policy implementation (e.g. removal of the band of deviations from the inflation target definition), most of them created certain inconsistencies, at least in terms of communication.

Some problematic areas have been identified, in particular, in the case of introducing operational targets and additional monetary policy targets (e.g. setting the reference value for M3 growth or implementing the concurrent exchange rate target). Adding operational targets (aimed at achieving the main objective, i.e. the inflation target) may pose challenges for central bank as those targets can, in fact, prove inconsistent with the primary objective (price stability). In turn, attempts to broaden monetary policy objectives may lead to tensions if those objectives trigger a conflict forcing the central bank to abandon one of them. In both cases, the result may be reduced ability and credibility of monetary policy to influence the economy. This indicates the necessity to take great care while modifying an inflation targeting framework, in particular, if it involves limiting its flexibility.

At the same time, examples of central banks which decided – at least temporarily – to focus more on the achievement of other objectives than the inflation target show that it did not entail the need to officially abandon inflation targeting. This reflects the significant flexibility of this framework, which is one of its biggest advantages.

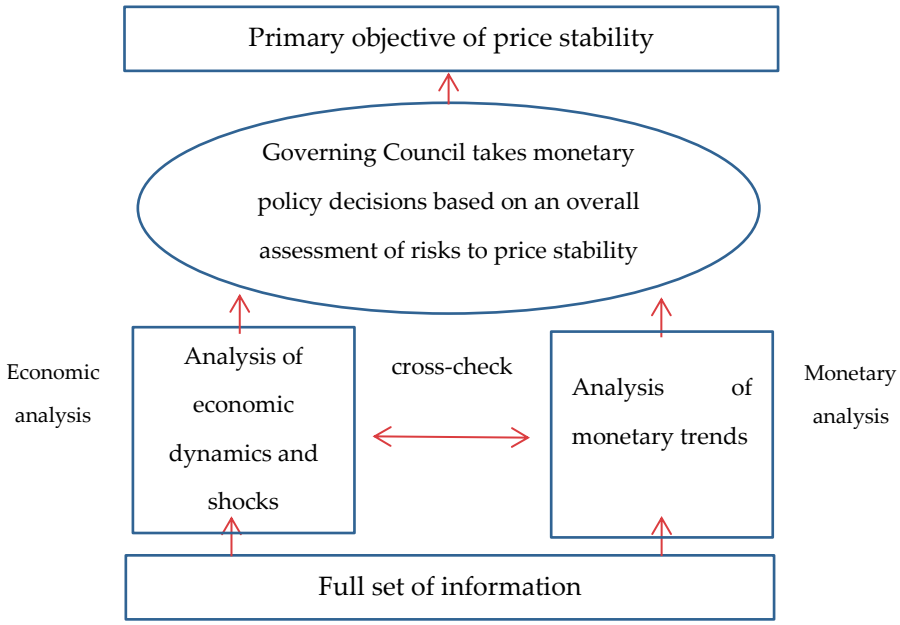
3.1. Euro area – setting the reference value for M3 growth

The ECB declares that its monetary policy strategy, and in particular its assessment of risks to price stability, is based on two pillars: economic and monetary analysis. In relation to the monetary analysis, which was subject to evolution, the reference value for M3 growth continues to apply, although in practice since 2003 the ECB has marginalised its role. Monetary analysis is not a typical element of an inflation targeting framework.

3.1.1. Monetary policy strategy of the euro area

Pursuant to the *Treaty on the Functioning of the European Union* (TFEU), the primary objective of the ECB is to maintain price stability. At the same time – without prejudice to the objective of price stability – the ECB should support general economic policies in the EU.[62]

Scheme 1. Monetary policy strategy of the European Central Bank



Source: www.ecb.europa.eu/mopo/strategy/html/index.en.html

[62] Precisely, the TFEU defines price stability as the primary objective of the European System of Central Banks (ESCB) which comprises the ECB and the national central banks of all EU Member States.

The monetary policy strategy of the ECB comprises two elements – a quantitative definition of price stability[63] and two perspectives for analysing risks to price stability (Scheme 1). The ECB assessment of risks to price stability is based on two pillars – the economic and the monetary analysis. The economic analysis focuses on the assessment of factors affecting developments in prices in the short and medium term, with special attention given to the activity in the real economy. In turn, the monetary analysis refers to long-term relationship between money growth and inflation. The ECB treats both perspectives of the analysis as complementary (ECB, 2004; 2011).

As mentioned before, the ECB strategy – despite including the majority of elements specific to inflation targeting, i.e. recognising price stability as the primary objective of monetary policy and providing its quantification, as well as putting emphasis on transparency – differs slightly from inflation targeting (Box 8). The principal feature distinguishing the ECB framework from fully-fledged inflation targeting is the role of money explicitly stated in the strategy that follows from the inclusion of the monetary analysis. However, although in its strategy the ECB continues to analyse money supply, the ECB does not pursue monetary targeting.[64]

Box 8: Selection of monetary policy strategy for the euro area

The formulation of the ECB monetary policy strategy, including the explicit role of money, should be viewed in the context of the specific situation at the end of the 1990s when the ECB – the new central bank of the European currency area – was established. The ECB had a possibility of defining the strategy independently, yet

[63] The quantitative definition of price stability as an element of the ECB monetary policy strategy was first specified by the ECB Governing Council in 1998 as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2% over the medium term (ECB, 1998a). In 2003, following the review of the ECB strategy, the Governing Council confirmed the quantitative definition of price stability, simultaneously clarifying that it will aim to maintain inflation rates below, but close to, 2% in the medium term. In that way, the ECB wanted to ensure its commitment to maintain a sufficient safety margin against the risks of deflation (ECB, 2003a).

[64] Particularly at the beginning of the euro area functioning, it was commented that the ECB had adopted monetary targeting, while giving it a different name.

it had to take into account that any failure in its formulation would be associated with significant reputational losses (Issing, 2006; 2008; 2009).

The ECB considered adopting one of the three options: monetary targeting, inflation targeting or a new solution:

- Monetary targeting, which, before the establishment of the euro area, had been pursued by the Bundesbank enjoying substantial authority (Box 1), was rejected, particularly due to the fact that its effectiveness was conditional on a stable relationship between a selected monetary aggregate and inflation. The existence of such a relationship could not be confirmed in the case of the new currency area due to the lack of data, among others, on monetary aggregates or inflation for the euro area as a whole (Issing, 2008). Moreover, the credibility of the ECB was assessed to be at risk if the newly established central bank does not meet the target for the growth of the selected monetary aggregate.
- Neither did the ECB opt for inflation targeting (in its pure form), which at the end of the 1990s had already been quite popular among advanced economies. The concerns here related to the effectiveness of this type of strategy for the euro area. The decision-making process in central banks pursuing inflation targeting was largely based on forecasts, which was seen as problematic due to the following reasons. First, according to the ECB, those forecasts did not sufficiently account for the information from, among others, the analysis of money supply. Secondly, forecasts reliability for the euro area as a whole – at the stage when a forecasting process was still under development – could raise doubts (Issing, 2009).
- Consequently, perceiving potential problems both with the application of monetary targeting and inflation targeting, the ECB decided to adopt a new solution which in practice is very close to inflation targeting.

3.1.2. The concept of the reference value for M3 growth in the euro area

In October 1998, the ECB Governing Council announced the main elements of the ECB strategy, including (ECB, 1998a):

- the quantitative definition of price stability, which constituted the primary objective of monetary policy (annual HICP inflation below 2%, which in 2003 was reformulated as below, but close to, 2%);

- a prominent role of money, which found reflection in:
  - determining the reference value for the growth of the broad monetary aggregate consistent with the achievement of the primary objective, i.e. price stability;
  - a regular analysis of money supply growth in relation to the reference value and communicating the results of this analysis in the context of monetary policy decisions;
- the assessment of future price developments based on a broad set of economic indicators.

In line with the earlier announcement, in December 1998 the ECB Governing Council defined both the reference value and the monetary aggregate it referred to. The reference value for the annual growth of the broad monetary aggregate M3 was set at 4.5%.[65] At the same time, the ECB announced that every year it would review the reference value (1998b). In total, four such reviews were conducted, each time leaving the reference value unchanged at 4.5% (ECB, 1999a; 2000a; 2001a; 2002a).

The ECB, particularly in the first years of the functioning of the euro area, invested a lot of effort to explain its strategy. This was a response to the considerable interest of external observers in the newly created central bank and the interpretation of the ECB framework oriented at achieving two targets simultaneously – the monetary and the inflation target. The ECB placed special emphasis on informing that price stability in the medium term constitutes the primary objective of its monetary policy, whereas the role of both the monetary and the economic analysis is to provide information

[65] While setting the reference value, it was assumed that in the medium term, the annual growth rate of real GDP in the euro area will range from 2% to 2.5%, whereas the velocity of money circulation will fall at a rate of 0.5%-1.0% per annum. In the ECB opinion, in order to ensure the consistency with the quantitative definition of price stability, the adoption of the aforementioned assumptions translated into the reference value for aggregate M3 growth rate at 4.5% (ECB, 1998b).

necessary for the decision-making process oriented to achieving the primary objective (ECB, 2000b).

On the basis of the ECB communication, predominantly in the form of reports, public statements as well as *Introductory Statements* of the President of the ECB, the following properties of the reference value for monetary growth can be indicated:

- the reference value was defined as a point, instead of a band; the ECB justified its decision on this issue by stating that defining the reference value as a band could be wrongly interpreted as the obligation of automatic change in the level of interest rates if the actual growth rate of M3 moved outside the band (ECB, 1998b; 1999b);
- significant or prolonged deviations of monetary growth from the reference value – under normal conditions – were to signal risks to price stability in the medium term (ECB, 1999b);
- the reference value was established for a broad monetary aggregate, since in the euro area the broad aggregate – contrary to narrow money measures – exhibited properties of a leading indicator of developments in the price level (ECB 1999b);
- the results of the monetary analysis, while concentrating on reviewing developments in M3 growth in relation to the reference value, also comprise the analysis of developments in other money measures, components of M3, as well as credit aggregates (ECB 1999b).

In May 2003, following the review of the monetary policy strategy, the ECB Governing Council made the decision on certain modifications of its framework, which, apart from reformulating the price stability definition,[66] referred also to the two-pillar approach to risk analysis. Changes in the scope of risk analysis translated

[66] As already noted, the ECB has confirmed that it strives to maintain the annual HICP inflation in the euro area below 2% in the medium term, specifying, however, that inflation should stay close to 2%.

into the renewed structure of *Introductory Statements*, where the order of presenting the conclusions from both pillars was changed.[67] Starting from May 2003, conclusions of the economic analysis aimed at identifying risks to price stability in the short and medium term are presented first, whereas the conclusions of the monetary analysis based on a long-term relationship between money and the price level are presented as second. Thus, the monetary analysis became a declared form of cross checking – from a long-term perspective – of the conclusions stemming from the economic analysis (ECB, 2003). With respect to the reference value for the M3 growth, the Governing Council has confirmed its long-term nature and decided to discontinue its annual reviews.[68]

The modifications introduced in May 2003 were widely commented. In particular, the changes in the structure of *Introductory Statements* were interpreted as a clear downgrading of the monetary analysis, i.e. the (former) 1st pillar. Abandoning the annual reviews of the M3 reference value was, in turn, recognised as an indication that the reference value was not a separate objective of the ECB monetary policy. Moreover, the diminished role of the M3 aggregate in the analysis, that followed from putting more emphasis on the assessment of other variables related to money and credit, was noted (Gali *et al.* 2004; EC, 2008).

In subsequent publications related to the ECB monetary policy strategy – *The Monetary Policy of the ECB* issued in 2004, as well as its update of 2011 – the ECB kept indicating the prominent role of money in its monetary policy strategy. In the ECB assessment, the relationship between monetary growth and the medium- and long-term price developments enables an identification of inflation trends in the horizon which is typically not covered by inflation projections. In 2011, the ECB also

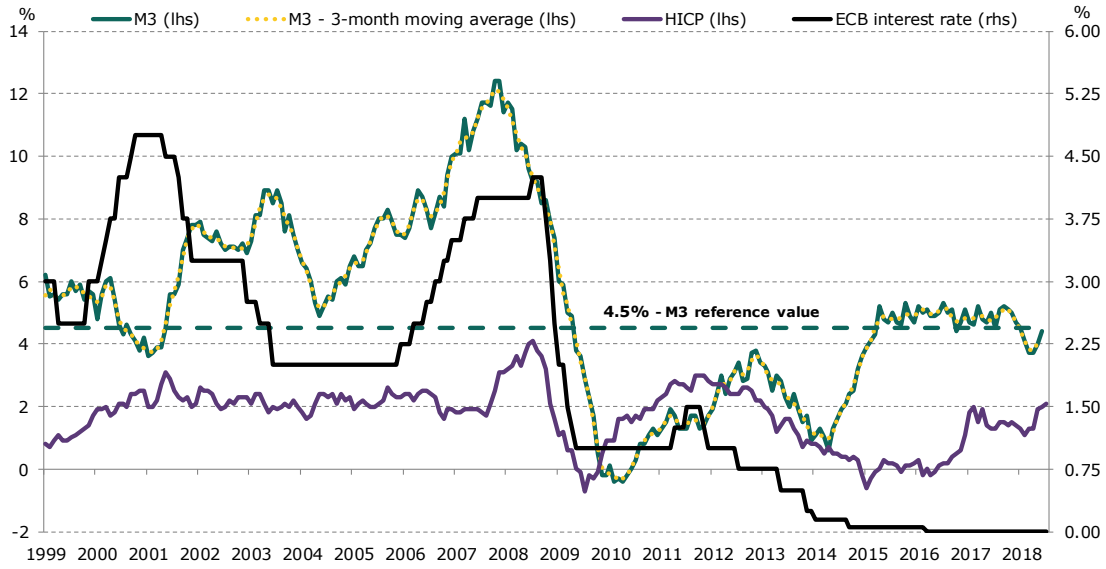
[67] Since May 2003, in the *Introductory Statements* the conclusions of the economic and monetary analysis are presented. The terms: 1st and 2nd pillar are no more used.
[68] However, it was indicated that the analysis of the assumption underlying the reference value would be continued (ECB, 2003). Nevertheless, the ECB has not decided to make any change in this respect so far.

emphasised the role of the monetary analysis in the evaluation of the financial sector stability.[69] In this context, the monetary analysis can support the *leaning against the wind* approach against financial imbalances (ECB, 2011; Chapter 3).

3.1.3. Reference value and price stability in the euro area

The ECB is quite effective in meeting the adopted objective, i.e. maintaining price stability over the medium term. Since 1999 the average HICP inflation in the euro area has amounted to 1.7%. This value can be regarded as being compliant with the quantitative definition of price stability, or – if anything – as slightly lower than the desired level close to 2%. At the same time, for most of the time, the growth rate of M3 deviated significantly from the reference value, with upward shits being more propounded and persistent then some downward deviations (Figure 8).

Figure 8. HICP inflation and M3 growth against the reference value in the euro area



Source: Own compilation based on Bloomberg data.
ECB interest rate refers to the ECB interest rate on main refinancing operations.

[69] In 2007 the ECB Governing Council decided to launch a project aimed at deepening the monetary analysis. In the report published in 2010 entitled *Enhancing Monetary Analysis*, the conclusions of the ECB studies were presented (ECB, 2010a). In the summary it was stressed that the analysis of monetary and credit aggregates was necessary for conducting effective monetary policy, particularly under the crisis circumstances, which justified assigning the prominent role to money in the ECB strategy.

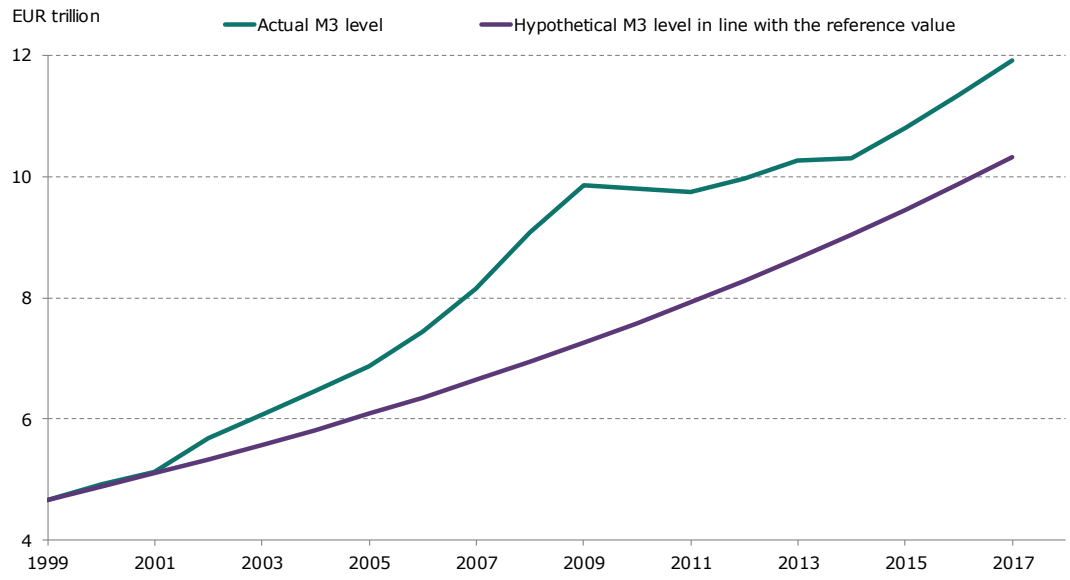
Although developments in money measures should enable the identification of risks to price stability in a longer perspective, some economists argued that the reference value for M3 growth did not make it easier for the ECB to explain its current monetary policy decisions (Ehrmann, Fratzscher, 2005; De Haan, Eijffinger, 2000; De Haan *et al.*, 2005).

For example, since the establishment of the euro area, there have been periods when M3 growth was persistently visibly higher than the reference value, whereas inflation remained close to the inflation target. In turn, periods of elevated or depressed inflation in the euro area tended to be associated rather with external shocks (e.g. surges in global commodity prices[70] and the global financial crisis) than with past monetary developments:

- Since 1999 until 2007, i.e. before the outbreak of the global financial crisis, the average M3 growth in the euro area amounted to 7.2%, thus was significantly higher than the reference value (Figure 8). At the same time, the average HICP inflation in this period stayed at 2.1%. Therefore – despite a clear difference between the actual growth of M3 and the reference value (including long periods of very high M3 growth rates) – inflation in the euro area remained broadly in line with the ECB definition of price stability.
- During the global financial crisis, i.e. in the years 2008-2014, M3 growth declined and its average in that period amounted to 3.1%, thus it was visibly lower than the reference value. At the same time, the average HICP inflation declined only moderately to 1.7%, although it had become much more volatile – its sharp initial increase (associated with the rise in commodity prices) was followed by a decline (associated with the base effects and consequences of the crisis).

[70] Some economists claim that the growth in commodity prices was not independent of the global monetary conditions related to the monetary policy of major central banks.

Figure 9. Developments of M3 in the euro area (actual level *vs.* level in line with the reference value)



Source: Own compilation based on Bloomberg data.

The analysis of those two sub-periods shows that although the growth rate of M3 since the beginning of the functioning of the euro area had significantly deviated from the adopted reference value (both before the global financial crisis and after its outbreak), the ECB managed to stabilise the HICP inflation at a level close to 2% quite effectively. At the same time, more recently, while M3 growth has been hovering around 4.5%, without displaying any significant deviations, the euro area inflation has been persistently weak.[71]

3.1.4. The role of money in the ECB strategy and communication issues

The assignment of a prominent role to money by, among others, setting the reference value for M3 growth, has been a source of challenges for the EBC since the very beginning (Berger *et al.*, 2006; De Grauwe, 2003; 2004). The greatest problem seems

[71] Especially core inflation in the euro area has been subdued, with the headline measure being supported by relatively high energy prices.

to be a lack of consistency in the ECB communication with regard to the role of the reference value in the decision-making process concerning interest rates.[72]

- For example, in November 2001, the ECB decided to cut interest rates by 0.5 percentage points, despite the fact that the growth rate of M3, which had been increasing steadily since the beginning of 2001, reached the highest level since the establishment of the euro area, substantially exceeding the reference value (by 3.3 percentage points). The ECB justified the decision on the interest rates cut by pointing to diminishing inflationary pressures. This views was based, in particular, on the assessment stemming from the economic analysis (including unfavourable outlook for the GDP growth in the euro area amid the global growth weakness). Referring to the monetary analysis, it was briefly stated that its conclusions confirmed the appropriateness of the decision made at that time.[73] It was additionally noted that although M3 growth had accelerated, it did not pose a risk to price stability in the medium term, since the acceleration followed from temporary factors. Also in subsequent periods, the ECB repeated this interpretation when referring to M3 growth continuing to run above the reference value.
- In November 2007, when M3 growth amounted to 12.4%, thus reaching record highs, the ECB left interest rates unchanged. Also in this case, the ECB recognised that a sharp increase in money and credit stemmed from temporary factors, although this time it noted the risk of accelerated price growth (ECB, 2007).

The examples quoted above show that the ECB has been inconsistent in interpreting developments in M3 against the reference value. It seems that the ECB decisions are

[72] Moreover, as already mentioned, the ECB had to undertake many initiatives to explain its strategy, particularly in the first years of its operation, since some commentators interpreted the ECB framework as a certain modification of the monetary targeting.
[73] "*[…] while information relating to the first pillar was also judged consistent with today's decision*." (ECB, 2001b).

mainly based on the economic analysis, whereas the role of the reference value for M3 growth remains unclear. On an *ex post* basis, it is difficult to avoid the impression that despite repeated declarations concerning the importance of the monetary analysis, the ECB – particularly prior to the crisis – ignored it in its monetary policy decisions.

3.1.5. Monetary analysis and identification of asset price bubbles in the euro area

One of the arguments for conducting the monetary analysis, which – in the ECB opinion – became particularly important during the global financial crisis, was that this analysis allows for identification of the build-up of imbalances in asset markets. The studies quoted by the ECB in this context indicate that bubbles in asset markets were often accompanied or preceded by strong credit growth. Thus, taking into account conclusions from the monetary analysis may reduce the risk of conducting too accommodative monetary policy that would foster imbalances in asset markets.

Some ECB representatives saw including the monetary analysis in the ECB monetary policy framework as indicating its superiority over inflation targeting, in particular in its strict version (Issing, 2005; Stark, 2007). However, even assuming that central banks should monitor developments in asset markets and communicate to what extent those developments influence their monetary policy decisions, setting the reference values for monetary growth still raises important doubts (Aghion *et al.*, 2008). The OECD notes that although slumps in asset markets have often been preceded by a sharp growth of money supply, yet, it has not always been the case (OECD, 2007). Moreover, in the OECD opinion, if the central bank recognises an asset price bubble, it seems more appropriate to raise interest rates and communicate this decision in an adequate way instead of merely stressing the role of analysing money supply (OECD, 2007).

Box 9: ECB measures related to the financial crisis

The ECB measures undertaken in response to the 2008 crisis show that in recent years the ECB has moved beyond the traditional mandate of maintaining price stability, increasing the scope of its responsibility for macroeconomic stability, including the stability of the financial system. This is why these activities will be briefly discussed, even though they do not belong to the main focus of this study.

Firstly, the ECB extended the function of the lender of last resort to the commercial banks of the euro area.

- In October 2008, the ECB introduced the fixed-rate full allotment tender procedure. This procedure applies both to main refinancing operations (MROs) and longer-term refinancing operations (LTROs). It also covered LTROs launched as a response to the liquidity needs of banks. Under the LTROs the ECB initially provided liquidity for 6 months, then for 12 months, and in December 2011 and February 2012 for 36 months.
- The ECB extended the list of assets accepted as collaterals in the Eurosystem credit operations, particularly by lowering the minimum credit threshold from A- to BBB- for the majority of assets eligible for use as collateral (ECB, 2008).

As a consequence of these measures, commercial banks gained unlimited access to central bank liquidity (in exchange for collateral), including for a longer term.

Secondly, the ECB extended the function of the buyer of last resort through the purchase of Member States' assets.

- In May 2010, the ECB announced Securities Markets Programme (SMP), which stipulated interventions in debt securities markets of the euro area countries. The SMP was terminated upon the announcement of the programme of Outright Monetary Transactions (OMT).
- The OMT programme, announced in September 2012, assumed purchases of sovereign bonds only in the secondary market and, contrary to SMP, it did not introduce any restrictions concerning the size of those purchases. However, no operation under the OMT has been performed so far.
- In September 2014, the ECB announced the third Covered Bond Purchase Programme (CBPP3) and Asset-Backed Securities Purchase Programme (ABSPP), extended in January 2015 by Public Sector Purchase Programme (PSPP), and supplemented in March 2016 by Corporate Sector Purchase Programme (CSPP). All those programmes were aimed at purchasing public and private assets by the Eurosystem at secondary markets in order to loose

financing conditions in the euro area. They were terminated at the end of 2018.[74]

The ECB stressed that the rationale for introducing those measures was the need to improve the functioning of the monetary policy transmission mechanism, and that they were temporary in nature. However, of key importance is the fact that without these interventions, yields on sovereign bonds of some euro area Member States would probably have reached a level threatening the debt service by their governments.

The better functioning of the monetary policy transmission mechanism – in particular the credit channel – was also indicated as the main motivation for a number of other measures announced by the ECB in June 2014, including:

- conducting series of targeted longer-term refinancing operations (TLTROs) with the maturity of up to four years, in the case of which the maximum amount a given financial institution was entitled to borrow depended on the size of lending extended by this institution, excluding housing loans to households[75];
- suspension of liquidity absorption provided by the ECB to commercial banks by purchasing bonds under SMP;
- extension of the period of conducting MROs by the ECB at a fixed rate, while accepting all offers submitted by banks (fixed-rate full allotment tender procedure).

In addition, in November 2014, the ECB took over the oversight of significant credit institutions under the Single Supervisory Mechanism (SSM), representing the first pillar of the banking union.

3.1.6. Conclusions from the experiences of the ECB

The example of the ECB shows that including elements into the strategy, which may prove inconsistent with the primary objective of the central bank, triggers problems, at least, in the monetary policy communication. The intention to strengthen the credibility of monetary policy may justify setting and announcing of a specific

[74] Though the ECB has been still reinverting the principal payments from maturing securities purchased under the Eurosystem asset purchase programmes.
[75] The first series of TLTROs was announced in June 2014, the second series in March 2016, and the third in March 2019.

numerical reference values for a given variable. However, if a given variable permanently deviates from the reference value without evoking the response of the monetary authorities, the intended outcome in terms of establishing central bank's reputation is not reached.

3.2. New Zealand – using MCI in the conduct of monetary policy

In 1989, the Reserve Bank of New Zealand (RBNZ) – as the first central bank in the world – introduced inflation targeting. The RBNZ was also among the first central banks which applied a Monetary Conditions Index (MCI) in conducting the monetary policy. The role of the MCI, in the case of the RBNZ, was significantly strengthened in 1997, when it was adopted as the operational target of the Bank.

3.2.1. Various definitions of the MCI

The application of the MCI in the conduct of monetary policy followed from the view that the central bank affects aggregate demand and inflation via two main channels: the interest rate channel and the exchange rate channel.[76] The MCI is a synthetic measure of changes in both those variables, since it is defined as a weighted average of changes in short-term real interest rates and real effective exchange rates against a selected base period, whereas the weights for individual variables reflect the strength of their impact on the aggregate demand (Kot, 2003). The basic argument for the use of the MCI in monetary policy is that it should allow for a more comprehensive assessment of the restrictiveness of monetary conditions in the economy than the indicators taking into account only the level or changes of interest rates.

Despite this appealing advantage of the MCI, a number of factors limiting its usefulness have been indicated in the literature:

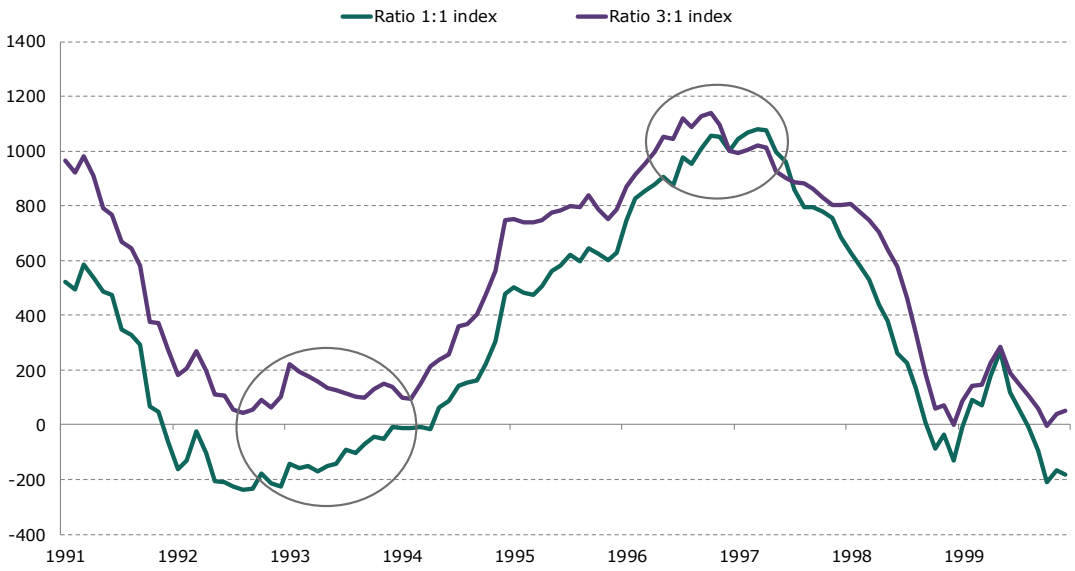
- Weights associated with interest rates and exchange rates components are not directly observable and their estimates are strongly dependent on the macroeconomic model used (Eika *et al.*, 1996). Moreover, the sensitivity of demand to changes in interest rates and exchange rates may be subject to change

[76] At the same time it should be noted that exogenous changes of the exchange rate may have a significant impact on setting interest rates.

over time, whereas the weights used to compute the MCI are fixed (King, 1997a). This is highly problematic, since the adopted weights have a significant impact on the MCI: differences in their value may result not only in amplifying or dampening the scale of index changes, but sometimes also in changing the direction of those changes (Figure 10).

- Short-term interest rates and exchange rates are not the only channels of monetary policy transmission working in the economy. In particular, long-term interest rates and asset prices also play a significant role. As the MCI does not take into account the impact of those variables, it does not allow for a full evaluation of restrictiveness of monetary conditions (Peeters, 1999).
- The application of the MCI as an operational target may encourage the central bank to react automatically to observed changes in the level of the index and – in certain cases – lead to undesirable economic outcomes. In particular, the response of the central bank to changes in the MCI related to exchange rate movements is not always appropriate, and should depend on the reasons for exchange rate fluctuations. However, since assessing the causes of observed changes in the exchange rate on a continuous basis is often difficult, the decisions of the central bank aimed at adjusting the MCI are often taken without the full understanding of the ongoing macroeconomic developments. Thus, a significant uncertainty is inevitable, which may increase the risks of making wrong decisions, as evaluated *ex post* (Deutsche Bundesbank, 1999).
- The central bank must decide on the time horizon within which the adjustment should take place in order to bring the MCI to the desired level. On the one hand, in view of potentially high volatility of floating exchange rates, the intention to keep the index permanently at the specified level could result in a high volatility of interest rates (Svensson, 2001). On the other hand, however, accepting considerable or persistent MCI deviations from the declared target could decrease the credibility of the operational target and – as a consequence – of the central bank itself (Ericsson *et al.*).

Figure 10. MCI for New Zealand



Source: Own compilation based on data of the Reserve Bank of New Zealand.

Box 10: Introducing an inflation targeting framework in New Zealand

The Reserve Bank of New Zealand (RBNZ) was the first to adopt an inflation targeting regime. The example of this Bank shows which conditions were recognised as crucial for the effectiveness of the new policy framework.

Until the mid-1980s, New Zealand recorded one of the highest inflation rates among the OECD countries (the annual inflation rate had exceeded 10% for more than a decade), although the low price growth was one of the objectives of the RBNZ. Other objectives included, among others, employment and economic growth. The multiple mandate was claimed to be contributing to the unfavourable economic situation in New Zealand in that period, as indicated by D. Brash – the Governor of the RBNZ whose term of office was marked by the adoption of inflation targeting.[77] This problem was addressed by the *Reserve Bank of New Zealand Act of 1989*, which indicated price stability as the primary objective of the Bank, that at the same time constituted one of the most fundamental features of inflation targeting (Orphanides, 2010).

New Zealand was also among the first countries to grant the central bank considerable degree of independence which made transparency and accountability the key elements in inflation targeting. It was argued, at that time, that greater

[77] "*The legislation under which we operated required us, in formulating our advice, to have regard for the inflation rate, employment, growth, motherhood, and a range of other good things*." (Brash, 1999).

independence of the central bank fosters lower inflation, which was based on positive experiences of such countries as Germany and Switzerland. Accordingly, the *Reserve Bank of New Zealand Act of 1989* stipulated full operational independence of the central bank of New Zealand that was to be accompanied by higher accountability and transparency standards.

There were several accountability and transparency mechanisms introduced. Firstly, the law obliged the governor of the RBNZ and the minister of finance to conclude the *Policy Target Agreement* and publish it each time the new governor was assigned. At the same time, any amendments to the *Policy Target Agreement* were to be also known to the public. Second, the governor of the RBNZ was to prepare, at least at a semi-annual frequency, a report explaining inflation developments, as well as the undertaken measures aimed at ensuring price stability (currently the RBNZ presents the *Monetary Policy Statement* four times a year). Moreover, the governor of the RBNZ was obliged to appear regularly before the Parliament. Finally, the law stipulated that the governor of the RBNZ might be dismissed if the conditions agreed in the *Policy Target Agreement* were not met[78], which made him personally accountable for achieving the inflation target (Brash, 1999).

At the one hand, accountability and transparency were allowing for a democratic control that was necessary for legitimising RBNZ independence. On the other hand, they were also to guarantee that the monetary policy would not be used for political purposes (Brash, 1999).

3.2.2. Reasons for adopting the MCI as an operational target in New Zealand

In 1989 the RBNZ adopted inflation targeting, by declaring price stability as its primary objective. It was initially assumed that the basic instrument for the accomplishment of this objective would be the control of the level of commercial banks' reserves with the central bank (settlement cash).[79] In reality, in view of increasing doubts about sustainable relationship between the level of reserves and monetary conditions, the implementation of the RBNZ monetary policy was mainly

[78] The document in which the governor of the RBNZ and the minister of finance of this country define the inflation target.
[79] At the same time, the RBNZ indicated that the interest rate used for open market operations should not be interpreted as reflecting monetary policy stance.

based on the Bank's communication (Archer *et al.*, 1999). When the RBNZ saw that monetary conditions deviate from the desired level, it signalled its assessment, which led to adjustments at the markets without the necessity to change the target level of reserves (Sullivan, 2013). While assessing the monetary conditions, the Bank mainly took into account the developments of interest rates and exchange rates, and – for internal purposes – set band targets for those variables (comfort zones). Maintaining the value of the analysed variables inside the determined bands was to be consistent with achieving the inflation target in the medium term.

However, such a form of communication with the market turned out problematic, since changes in interest rates and exchange rates often had an opposite impact on inflation developments. For example, in October 1996 interest rates and exchange rates moved quite strongly, reaching the internal limits of the bands within a short time interval. This forced the RBNZ to issue an announcement signalising the need – first – to tighten monetary conditions, and – only 10 days later – to ease monetary conditions. At the same time, the Bank increasingly recognised drawbacks of communicating only the direction of the desirable changes in monetary conditions. Another argument against setting band targets was the intention to discourage investors from speculating on the New Zealand dollar, which was based on the assumption that the Bank would intervene in order to keep the exchange rate within the band (Brash, 2002).[80]

In view of the aforementioned problems, the RBNZ searched for a tool enabling a precise (numerical) determination of the desired monetary conditions, and reflecting the aggregate impact of developments in interest rates and the exchange rates on the economy (RBNZ, 1998b).

It encouraged the Bank to adopt in June 1997 the MCI as the operational target. Based on the quarterly projections, the Bank determined and communicated in the

[80]Although the RBNZ did not publish the adopted bands, the markets were often able to estimate them by observing the activities of the Bank.

Monetary Policy Statement the desired level of the MCI that, in the Bank's opinion, was consistent with meeting the inflation target in the medium term. A significant deviation of the MCI from the desired level could result in adjusting the level of commercial banks' reserves.[81] In reality, the RBNZ continued to implement its monetary policy mainly through communication, signalling when monetary conditions deviated from those desired, and awaiting their automatic adjustment at the market. In order to improve its communication, starting from 1998, the RBNZ issued statements concerning developments in monetary conditions in weeks when the MCI deviated from the desired level (so-called *Wednesday morning window*). No announcement meant that in the given period the level of the MCI was compliant with the desired one (RBNZ, 1998).

3.2.3. Effects of using the MCI as an operational target in New Zealand

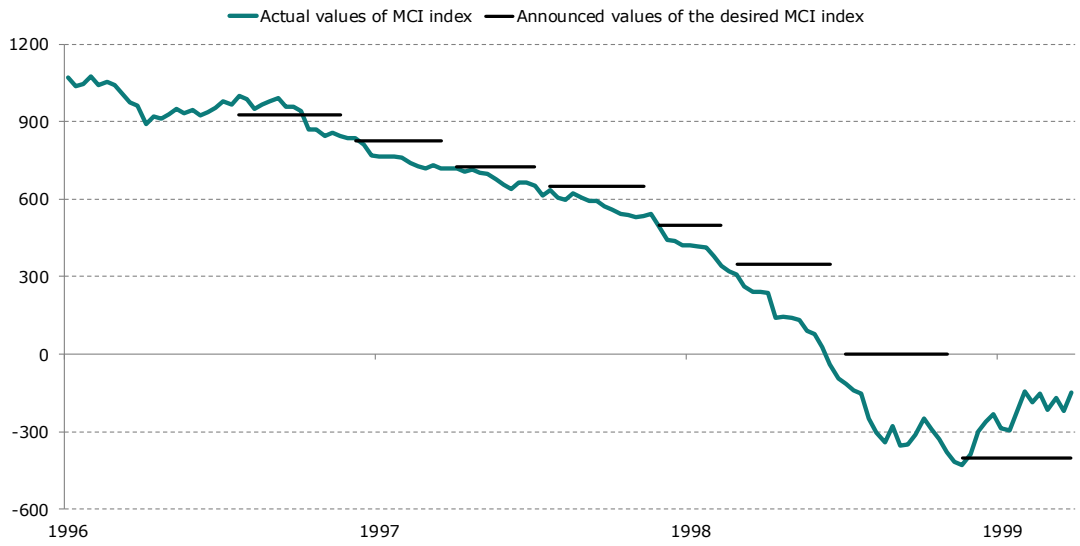
Considering the fact that the described changes in monetary policy implementation were designed to improve communication with the market, these should be recognised as moderately effective. The actual levels of the MCI – despite verbal interventions by the RBNZ – stayed below levels indicated as consistent with meeting the inflation target in the medium term throughout most of the time (OECD, 1999; Figure 11). It probably resulted from the fact that markets took into account the data incoming in between the successive forecasting rounds, and anticipated the decisions of the Bank. Thus monetary conditions were adjusted even before the publication of the next *Monetary Policy Statement*, containing a new value of the desired MCI level (RBNZ, 1998a).[82] At the same time, part of market observers argued

[81]The RBNZ was hesitant to explicitly determine the band of acceptable deviations from the desired MCI level. The Governor of the Bank stressed that both the scale and the duration of deviations accepted by the Bank depend on many factors, including the reasons of the exchange rate movements and the time that elapsed since the publication of the previous projection. Eventually, the Governor indicated that according to a rough estimate the band may be determined as +/-50 basis points against the desired value of the index (as included in the press announcement after the publication of the *Inflation Report*, June 1997, RBNZ).

[82] At the same time, it should be noted that in the second half of 1998, actual monetary conditions deviated from desired conditions stronger than in previous periods. It resulted from increased tolerance to such deviations by the RBNZ (Brash, 2002).

that the RBNZ was actually adjusting the desired MCI levels to their actual values (RBNZ, 1997).

Figure 11. Actual and desired level of MCI



Source: Own compilation based on data of the Reserve Bank of New Zealand.

The lack of explicitly determined bands of acceptable deviations from the desired MCI level also gave rise to certain problems. In particular, it resulted in tensions in periods when markets tested the extent of the Bank's tolerance for the MCI deviation from the target (OECD, 1999). Moreover, initially, the tolerance of the RBNZ for the MCI deviations was relatively limited, which led to the necessity of frequent verbal interventions. The increasing Bank's tolerance in the subsequent period resulted, in turn, in a diminished significance of the desired MCI level as announced by the Bank and, consequently, in the reduced effectiveness of signalling the excessive MCI deviations by the RBNZ (RBNZ, 1998b).

Besides the difficulties described above that were related to communication with the market, the adoption of the MCI as the operational target also had other negative consequences:

- It led to high volatility in short-term interest rates in the initial period of applying the MCI as the operational target, resulting from relatively limited tolerance of the RBNZ for deviations of the MCI from the desired values.
- It focused markets' attention on short-term changes in monetary conditions instead of the medium-term outlook for inflation developments (Archer *et al.*, 1999).

Moreover, the use of MCI also led to an inappropriate response of the RBNZ to the depreciation of the New Zealand dollar in 1997-1998 (Figure 12). Clearly, not enough attention was put to analysing the reasons behind changes in the exchange rate at that time.

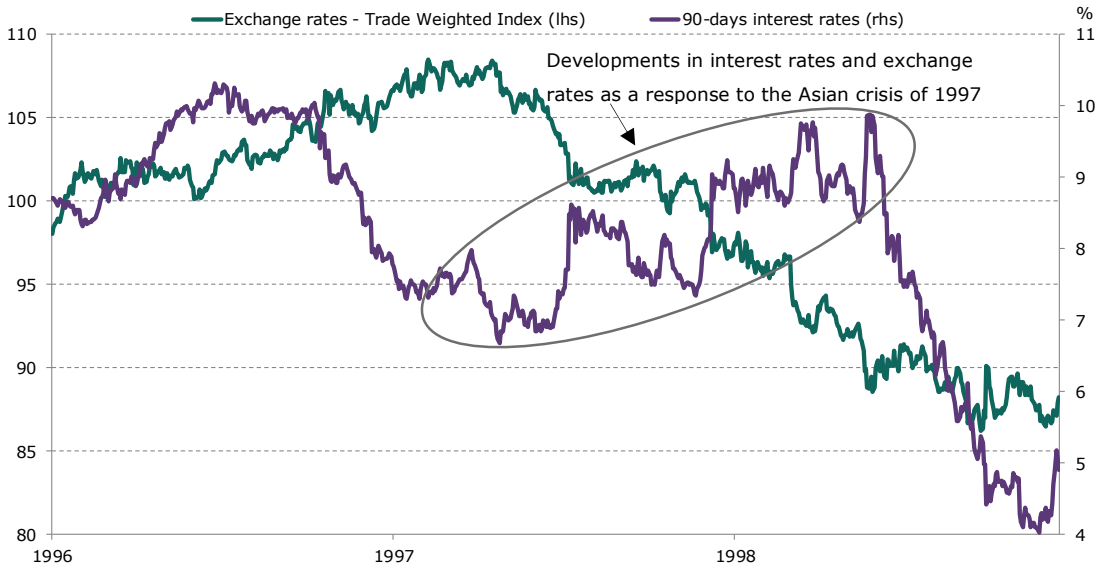
After the period of a relatively fast GDP growth in New Zealand lasting since 1992, in 1997 an economic slowdown begun, and in early 1998 the country faced a recession. Deterioration of business conditions was, to a large extent, driven by the Asian crisis, which had an adverse impact on economic growth (both directly – through undermining exports, as well as indirectly – through higher uncertainty and deteriorating sentiment). Unfavourable tendencies in foreign trade were additionally intensified by a drought which caused a substantial decrease of agricultural production (OECD, 1999).

In the second half of 1997, the RBNZ indicated that the aforementioned shocks warranted only a minor easing of monetary conditions. At the same time, the deterioration in financial market sentiment and the negative assessment of the economic outlook for New Zealand resulted in a strong depreciation of the exchange rate (which had a severe downward effect on the MCI). The Bank's efforts to lower the MCI level only slowly triggered a significant rise in interest rates (Figure 12), which amid the substantial deterioration of economic conditions was undesirable (Brash, 2002).

The reason for the inappropriate response of the RBNZ could stem, among others, from the mechanical approach to determining desired levels of the MCI. As in the previous period, the Bank assumed that a gradual reduction of the MCI was justified, without considering the factors contributing to the exchange rate changes and their impact on the economy (Svensson, 2001).[83]

In view of the significant shortcomings of applying the MCI as the operational target, in March 1999 the RBNZ decided to change its operational framework and adopted the official interest rate as the operational target. Yet the MCI was still expected to be used for the assessment of monetary conditions (RBNZ, 1998b). Over the next year, the MCI indeed continued to be published in the *Inflation reports* as one of the indicators monitored by the monetary authorities. However, as of December 2000 this measure ceased to be analysed.

Figure 12. Exchange rate and interest rates



Source: Own compilation based on data of the Reserve Bank of New Zealand.

[83] The Reserve Bank of New Zealand indicated that the reason of too limited scale of easing the desired monetary conditions was the incorrect assessment of the impact of the Asian crisis and the drought on the economic activity in New Zealand (Drew, 2001). Similarly, according to Svensson (2001), the underestimation of the impact of indicated phenomena on the economy of New Zealand partially explains the Bank's error.

3.2.4. Conclusions from the experiences of the Reserve Bank of New Zealand

In the years 1997-1999, within its inflation targeting framework, the Reserve Bank of New Zealand adopted the MCI as the operational target of monetary policy. According to the Bank's declarations, the main aim of this arrangement was to improve the communication with the market. However, the experience of the RBNZ shows that this solution was not successful in achieving the intended objective. At the same time, automatic reaction of the Bank to MCI deviations from the desired level contributed to decisions destabilising the economy in response to the Asian crisis, which exacerbated the economic recession at the beginning of 1998.

3.3. Hungary – conflicts between inflation target and exchange rate target

Since 2001, the National Bank of Hungary (MNB) has been pursuing an inflation targeting strategy. However, in the years 2001-2008, this strategy was implemented by applying concurrently two targets. The MNB strived to achieve a predetermined inflation target, while at the same time maintaining the exchange rate within a set band.[84] *This strategy was, in fact, focused on meeting the inflation target only in periods when the exchange rate remained within the set band.*

3.3.1. Implementation of the exchange rate target under inflation targeting

The introduction of the exchange rate target into an inflation targeting strategy was practised mainly in the 1990s when the discussion on the need to take a broader account for the exchange rate movements in inflation targeting strategy was still ongoing.[85] In that period arguments were raised that the exchange rate changes should be assigned considerable weight, beyond the extent resulting from their impact on inflation developments. In the case of developing countries, a strong impact of exchange rate developments on inflation expectations was a significant factor supporting such an approach (Amato, Gerlach, 2001).

[84] A similar approach was adopted, among others, in Chile (1990-1999), Israel (1992-1997), Poland (1998-2000) and Slovakia (2005-2009; Freedman, Otker-Robe, 2009). In the case of Chile and Israel, the inflation targeting strategy including the exchange rate target was used in the initial years of pursuing IT, which can be seen as transitory period from the old to the new monetary policy regime. This was also the case in Poland, where also procedural factors were responsible for maintaining the crawling band for some time after introducing of the inflation targeting strategy (Kokoszczyński, 2001). In turn, in Slovakia introduction of the band for exchange rate deviations was related to the country's accession to the ERM II. In Chile and Israel the applied modification of the inflation targeting strategy triggered analogical problems as in the case of Hungary, i.e. resulted in conflicts between the inflation target and the exchange rate target. Despite the difficulties, also in those countries abandoning the exchange rate target took some time (Morande, Tapia, 2002; Bufman, Leiderman, 1999).

[85] Currently, among the analysed inflation targeters, all declare using a floating exchange rate regime, although some of them, in fact, conduct a policy of stabilising their exchange rates (this is the case, for example, in the Dominican Republic and Serbia).

However, the usefulness of the exchange rate target under inflation targeting strategy depends on the central bank's capacity to influence developments in the exchange rate. If the exchange rate remains under a significant impact of global and regional factors, keeping the exchange rate within the set band may be difficult to achieve, and it may require strong adjustments of interest rates.

It should also be highlighted that the implementation of dual target (inflation and exchange rate) with the use of a single instrument (short-term interest rate) may lead to conflicts between targets, particularly considering the impossible trinity problem. This approach is, in fact, equivalent to focusing on a single target – either inflation or exchange rate target – which changes depending on the conditions – sometimes emphasis is put on the inflation target, and sometimes on the exchange rate target. As long as the exchange rate remains within the band of acceptable fluctuations, a central bank strives to achieve the inflation target. However, if the exchange rate reaches the bound of the band, the central bank changes its focus, trying to bring the exchange rate back to the predetermined level (Stone *et al.*, 2009). If the interest rate adjustment aimed at stabilising the exchange rate is not conducive to reaching the inflation target or stabilising the economic conditions, such a decision could be detrimental for central bank's credibility.[86]

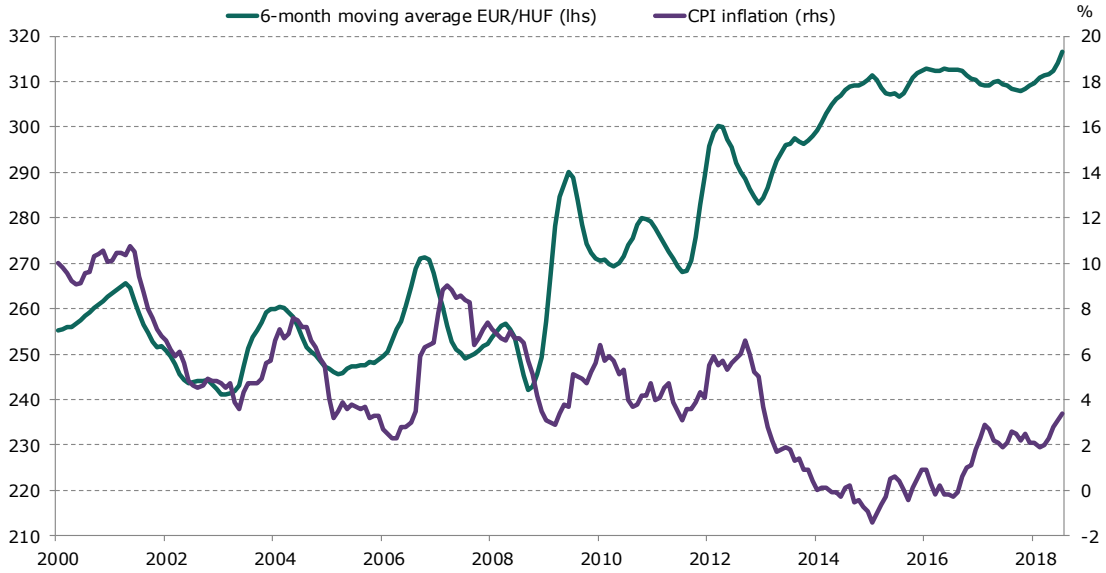
3.3.2. Introduction of dual target for inflation and exchange rate in Hungary

Prior to adopting an inflation targeting strategy, monetary policy in Hungary (between 1995 and 2001) was conducted under the crawling peg system with a fluctuation band of +/- 2.5%. Since mid-1995 inflation in Hungary had been gradually declining, from 31% to 10% at the end of 1998. However, in the consecutive years the

[86] Leidermann and Svensson (1995) demonstrate that such a strategy could be implemented if the central bank explicitly indicated that in the case of conflict between the targets, price stability would have a priority. However, Masson, Savastano and Sharma (1997) present the opinion that the central bank is not able to communicate the priority *ex ante* in a reliable way, and it may only indicate it by undertaking adequate measures in the case of actual conflict between implemented targets.

disinflation process slowed down. Rising concerns over inflation persisting at elevated levels, as well as increasing costs of sterilisation of capital flows, necessitated the change of the monetary policy strategy (Kiss, 2005).

Figure 13. Inflation *vs.* forint exchange rate



Source: Own compilation based on data of the National Bank of Hungary.

In May 2001, the MNB, in agreement with the government, expanded the band of exchange rate fluctuations to +/- 15%.[87] Consequently, the exchange rate stopped to be a nominal anchor. Subsequently, in June 2001, the MNB adopted an inflation targeting strategy, indicating that ensuring price stability would be its main objective. Under the prevailing strategy, the Monetary Council of the MNB was expected to set interest rates so that the exchange rate of the forint stayed at a level consistent with reaching the inflation target. At the same time, in the initial period the Monetary Council regularly communicated a narrow (approximately +/- 2%) desired forint exchange rate band, which was aimed at stabilising inflation

[87] Additionally, in October 2001 further devaluation of the forint was discontinued.

expectations (Stone *et al.*, 2009).[88] However, the MNB refrained from direct interventions on the FX market (OECD, 2002).

The MNB emphasised that the exchange rate policy – conducted in agreement with the government – must not jeopardise delivering the Bank's main objective (i.e. the stability of prices). Although maintaining of the band for acceptable exchange rate fluctuations constituted a factor constraining monetary authorities' decisions, it has been justified by two arguments:

- preparing for a quick accession of Hungary to the ERM II mechanism (planned by the authorities), whose construction was very close to the solution adopted by the MNB (Csermely *et al.*, 2007);
- a significant role of the exchange rate channel in the monetary policy transmission mechanism, with a limited importance of the interest rate channel (OECD, 2002).

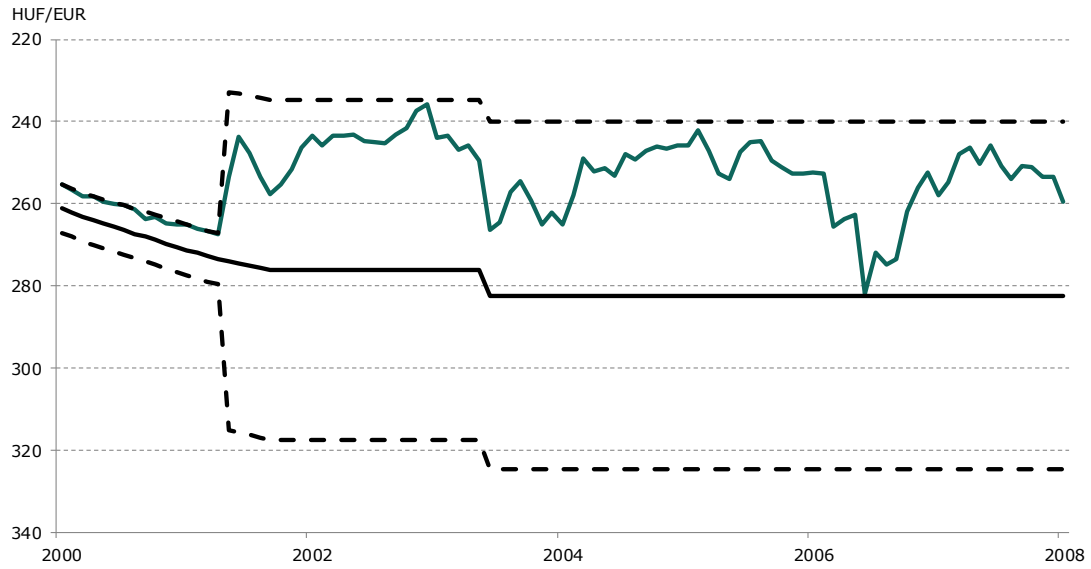
3.3.3. Implementation of the monetary policy strategy in 2001-2008 in Hungary

The new monetary policy strategy enabled re-acceleration of the disinflation process (Figure 13). In 2001 and 2002, the MNB reached the set inflation targets, and at the end of 2002 the CPI inflation was running at a level of 4.8%.

However, the success of the MNB strategy proved to be short lived. In 2002, the forint exchange rate kept appreciating, and at the end of the year came close to the limit of the acceptable fluctuation band (Figure 14).

[88] However, indicating a narrower desired band for the exchange rate deviations resulted in communication problems. In particular, markets recognised that the MNB would not allow for any deviations of the exchange rate from the indicated band (Csermely *et al.*, 2007).

Figure 14. HUF/EUR exchange rate against the band of acceptable fluctuations



Source: Own compilation based on data of the National Bank of Hungary.

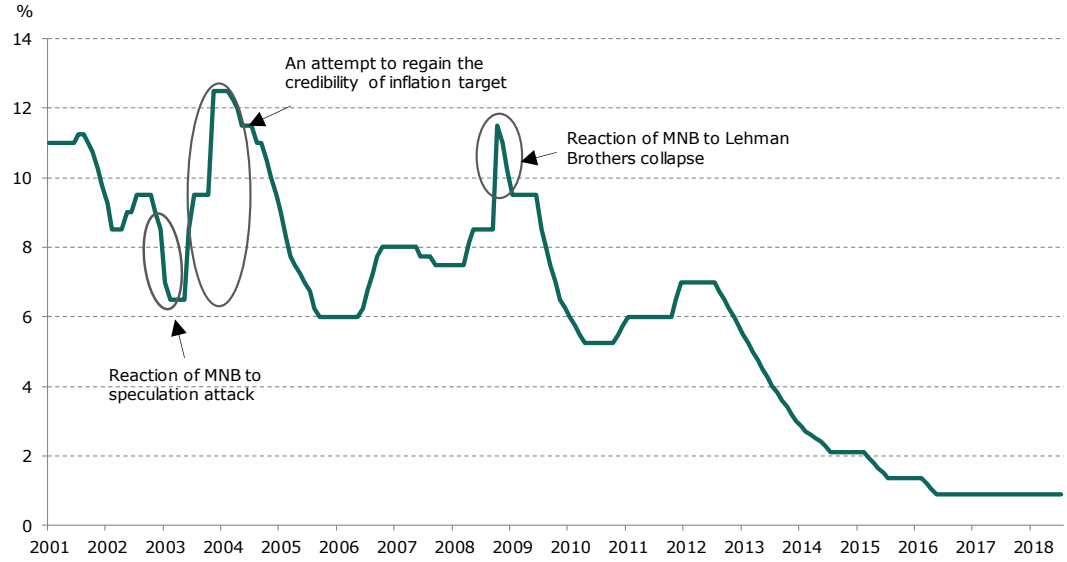
In January 2003 a speculative attack on the FX market took place. Investors anticipated that the MNB, striving to achieve the inflation target, would permit a further appreciation of the exchange rate beyond the band. In turn, the MNB – facing the opposition of the government that was afraid of losing the competitiveness of Hungarian products – intervened on the FX market and decreased interest rates by 2 percentage points (Stone *et al.*, 2009; Figure 14). The resulted depreciation of the exchange rate combined with the interest rate cut contributed to higher inflation in the consecutive quarters. In addition, in June 2003, the MNB in agreement with the government, decided to devalue the fluctuation band for the forint by 2.3%.[89]

Although elevated inflation in 2004 stemmed partly from factors beyond the direct control of monetary policy (a VAT and excise tax rise), nevertheless, the decisions of the MNB aimed at defending the exchange rate in 2003 also contributed to the increase. The MNB actions were interpreted by the market participants as a breach of the disinflation commitment, which led to an increase in the risk premiums and a

[89] It was one of the measures introduced to support exports and counteract further speculation aimed at strengthening the forint (Kiss, 2005; Csajbok, Csermely, 2004).

sharp forint depreciation. In mid-2003, to curb further weakening of the currency and to emphasise the Bank's determination to achieve the inflation target, the MNB raised interest rates by 3 percentage points (Figure 15; Kiss, 2005). Despite subsequent interest rate rises (in November 2003 by another 3 percentage points), inflation in the following months kept rising, reaching 5.5% in December 2004, i.e. a level significantly above the upper limit for deviations from the target (set at 3.5% +/-1 percentage points; Figure 16).[90]

Figure 15. MNB interest rates



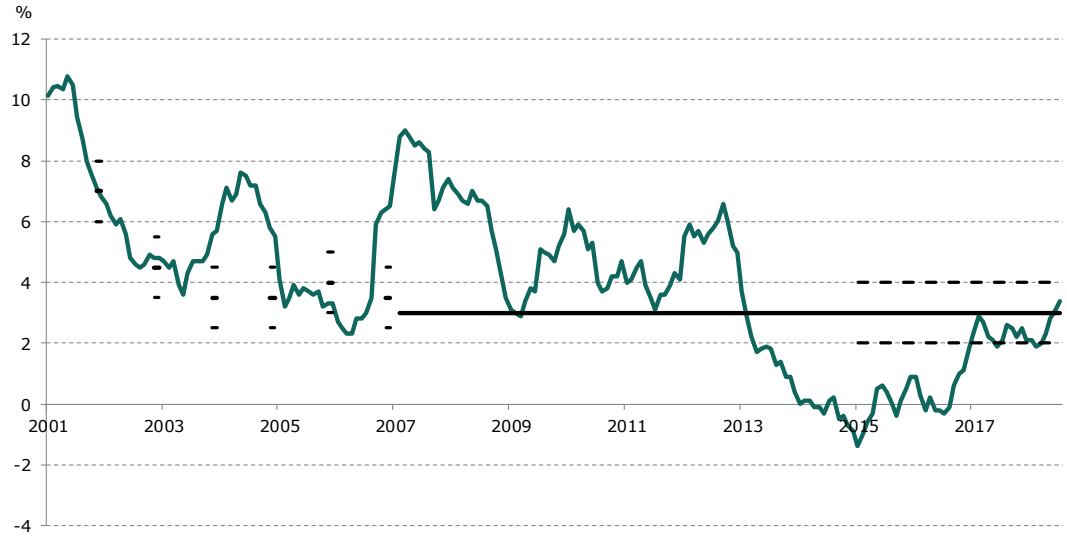
Source: Own compilation based on data of the National Bank of Hungary.

In 2005 the IMF recommended the MNB to abandon the exchange rate fluctuation band, in order to restore the anti-inflationary credibility of the central bank and support anchoring of inflation expectations (IMF, 2005). The MNB did not adhere to the recommendation.[91] In the following years, despite repeated recommendations of international institutions to abandon exchange rate target, the Hungarian authorities

[90] The rise of inflation encouraged the monetary authorities to raise the inflation target at the end of 2005 against its level at the end of 2004 (OECD, 2004).
[91] At the beginning of 2004 the MNB resigned from indicating a narrower desired fluctuation band for the exchange rate (OECD, 2004).

continued to stabilise the forint (IMF, 2007).[92] However, in the years 2004-2007, the MNB decisions aimed at maintaining the exchange rate within the fluctuation band, did not conflict with the implementation of an inflation targeting strategy.

Figure 16. CPI inflation against the target



Source: Own compilation based on data of the National Bank of Hungary.

In June 2005 – in agreement with the government – the MNB adopted a continuous inflation target of 3% (effective since 2007). This step was perceived by markets as aimed at strengthening the commitment to maintain price stability in a situation when postponing the planned accession to the euro area[93] weakened the authorities' determination to reach the Maastricht criteria and could limit the government's support for maintaining low inflation (AIG, 2007).

The continuous inflation target of 3% took effect in 2007. In turn, on 26 February 2008, the band for exchange rate fluctuations was abandoned. The rationale for this decision was to create better conditions for meeting the inflation target, and, at the

[92] Some press reports indicated that the MNB supported abandoning the exchange rate target, however, such a change of monetary policy strategy was blocked by the government.
[93] In May 2004 the date of the planned adoption of the euro was postponed from 2008 to 2010 (OECD, 2005).

same time, fulfilling the Maastricht criteria (MNB, 2008b). The following additional considerations supported the introduction of a floating exchange rate regime:

- The MNB needed to tighten monetary conditions amid an extended period of inflation persisting above the target, whereas the move to the floating exchange rate was expected to result in a forint appreciation which, considering the strength of the currency channel, was a more effective way of increasing the restrictiveness of monetary conditions than interest rate rises (Deutsche Bank, 2008).
- Volatility of the forint exchange rate increased in the second half of 2007, which was associated with financial market disturbances after tensions in the mortgage market in the United States, that was followed by the outbreak of the global financial crises.
- The timing of floating the exchange rate was probably additionally determined by the depreciation of the forint at the beginning of 2008, which mitigated the adverse impact of its earlier appreciation on the competitiveness of Hungarian exports. Decreasing concerns related to losing the competitiveness of the economy as a result of abandoning the exchange rate target might have facilitated the government's approval to introduce the floating exchange rate by the MNB (Goldman Sachs, 2007).

Despite resignation from stabilising of the exchange rate of the forint – given Hungary's relatively high foreign debt level, including foreign currency loans of households – the developments in the exchange rate remained a significant factor influencing MNB decisions (Box 11). Consequently, for example in October 2008, in response to a depreciation of the forint which in the MNB assessment resulted from speculative transactions, the Bank increased interest rates by 3 percentage points to support the currency, even though most central banks were rather considering introducing monetary policy accommodation at the time (Bank of Austria, 2009).

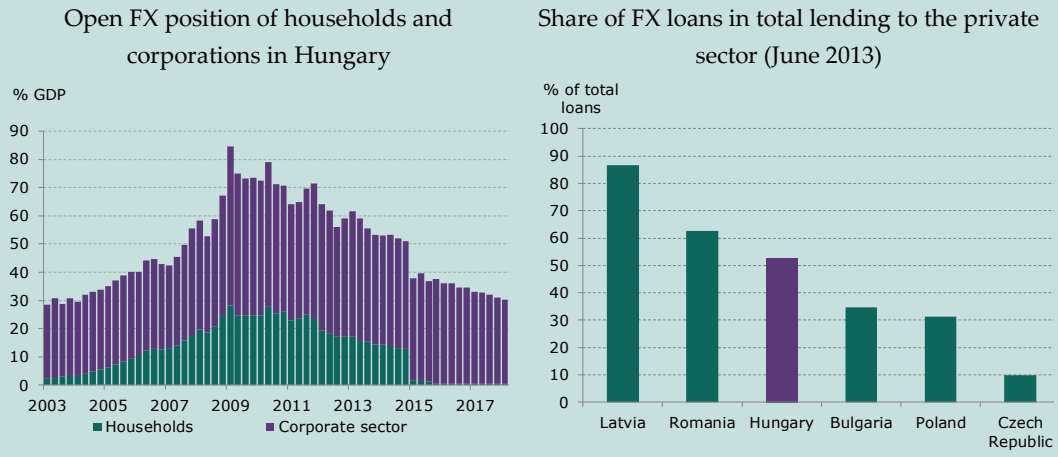
Box 11: Exchange rate and private sector debt in foreign currency in Hungary

Until 2008, the monetary policy strategy of the MNB – apart from aiming at ensuring price stability – was also geared towards stabilising the exchange rate within a specific band for deviations. For the private sector this could mean a lower foreign exchange risk: in the case of exchange rate approaching the lower or upper limit of deviations, one could expect the MNB to step in, and to maintain the exchange rate inside the declared band.

At the same time, until the outbreak of the global financial crisis, many emerging market countries, including Hungary, experienced appreciation pressures on their currencies. Thus, the exchange rate of the forint remained closer to the stronger limit of the band for deviations and after the introduction of the floating exchange rate started strengthening rapidly. This made the public to underestimate the risk of a significant forint depreciation.

These factors encouraged the banking sector to offer loans in foreign currency which – after disregarding foreign exchange risk that was perceived as low – seemed significantly cheaper to the real sector, including households. Therefore, economic agents in Hungary became relatively highly indebted in foreign currency (particularly in the Swiss franc; Figure 17).[94]

Figure 17. FX debt in Hungary



Source: Own compilation based on data of the National Bank of Hungary and EcoWin data.

[94] Foreign currency loans were popular in almost all countries of the Central and Eastern Europe, whereas it was most widespread in economies with relatively high inflation or where the monetary policy comprised the exchange rate target.

The global financial crisis triggered significant capital outflows from emerging market economies (including the region of Central and Eastern Europe), and led to a rapid depreciation of their currencies. This meant a sharp rise in the value of debt denominated in foreign currency. Being concerned about the stability of the financial system, in October 2008 – when many other central banks eased their monetary policy – the MNB raised interest rates by 3 percentage points, rather unsuccessfully trying to stabilise the exchange rate of the forint (Figure 18).

Despite introducing a ban on granting foreign currency loans in August 2010, the level of debt denominated in foreign currency in the Hungarian economy remained very high for sill some time (MNB, 2013).[95] In 2011, the government adopted several programmes aiming at reducing the problem related to the repayment of this type of debt (MNB):

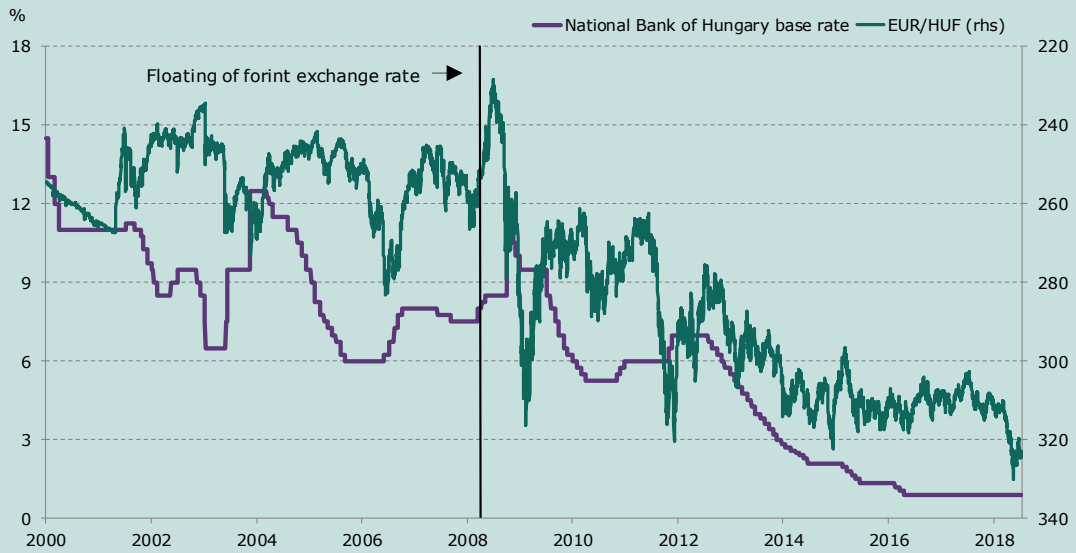
- A possibility was introduced to repay the total outstanding debt denominated in foreign currency, after first converting its amount at a predetermined preferential exchange rate (i.e. significantly stronger than the market rate). This programme was effective between September and December 2011.
- A possibility to repay a foreign currency loan was offered for the period of 60 months, at the predetermined preferential exchange rate (i.e. markedly stronger than the market rate). In this period, the difference between the level of instalments paid and their potential level calculated at a market rate was recorded on a separate account as a loan in forint, with the principal amount to be repaid by the borrower after 60 months (throughout the period remaining for the repayment of the foreign currency loan), whereas the interest payments were covered by the financial institutions jointly with the central budget, or by the central budget only (depending on the future value of the forint market rate).
- Quarterly limits of the number of real estates which may be subject to enforcement were introduced. The aim of this action was to reduce the impact of real estate auctions on prices of housing and to decrease the number of

[95] In July 2011 the rules related to loans denominated in foreign currency were liberalised slightly. This change was introduced since the European Commission had recognised that the prohibition of granting such loans in Hungary infringed the principle of free capital movement within the EU. At present, a person may obtain a loan in currency other than the forint if he or she receives remuneration in the currency in which the loan is denominated and, moreover, only if the level of gross remuneration (expressed in the forint) exceeds 15-fold the minimum wage in Hungary. Thus, in practice, the rules still introduce a ban on granting foreign currency loans.

evicted debtors. The limits were gradually raised (from 2% of the value of non-repaid loans in 2011 to 5% in 2014) and they applied until the end of 2014.

- The National Agency for Asset Management was established, with the task of buying the dwellings of debtors who were not repaying their loans. Such dwellings are subsequently rented to debtors occupying them (at preferential rates) and the loan is remitted.

Figure 18. Central bank interest rate and forint exchange rate



Source: Own compilation based on EcoWin data.

Despite the measures taken, the percentage of impaired loans in foreign currency in Hungary at the end of 2013 exceeded 20%, which posed a threat to the stability of the Hungarian financial system. The high burden of loan repayment was also a factor inhibiting economic growth. Moreover, a consequence of the significant indebtedness in foreign currency was the limited freedom of monetary policy, which continuously had to take into account the impact of the interest rate policy on the level of the exchange rate. In recent years the MNB introduced a number of non-conventional measures, aimed at addressing some of the related issues.

3.3.4. Exchange rate target *vs.* equilibrium rate in Hungary

Although in the years 2001-2008 the band of acceptable exchange rate fluctuations was relatively broad, for most of the time the forint remained close to the stronger limit of deviations. It suggested that the difficulties with implementing the analysed modification of an inflation targeting strategy could have partially resulted from

inadequate selection of the central parity. [96] Possibly, selecting a stronger exchange rate would reduce the probability of reaching the limit of the fluctuation band and facing the conflict between the exchange rate and the inflation targets.

Empirical studies, indeed, show that throughout most of the period 2001-2007, the exchange rate of the forint remained near its equilibrium exchange rate (IMF, 2006; IMF, 2008; Alberola, Navia, 2007). Thus, the central parity of the band was probably weaker than the exchange rate justified by fundamental factors, which contributed to continuous pressure on the forint to stay closer to the upper limit of deviations, and constrained a possibility of tightening the monetary policy stance in periods when a rise in interest rates would support the accomplishment of the inflation target (Szilagyi *et al.*, 2013).

3.3.5. Conclusions from the experiences of the National Bank of Hungary

In the years 2001-2008 the MNB tried to simultaneously implement an inflation targeting strategy and stabilise the exchange rate within the announced fluctuation band. When maintaining the forint exchange rate within the band was at risk, the exchange rate target had priority over the inflation target. Such behaviour of the MNB was perceived as undermining the Bank's commitment to price stability objective, dragging on its credibility. The strategy contributed to reducing the MNB's effectiveness in meeting the inflation target, and required at times rapid changes of the interest rate, which could have negatively affected the economic conditions.

[96] However, given examples of long-term persistence of the market exchange rate at a level incompatible with the exchange rate determined on the basis of fundamental factors, one cannot be sure that adopting the equilibrium exchange rate as central parity would allow for preventing tensions on the FX market.

3.4. Turkey – counteracting excessive capital inflows and credit expansion

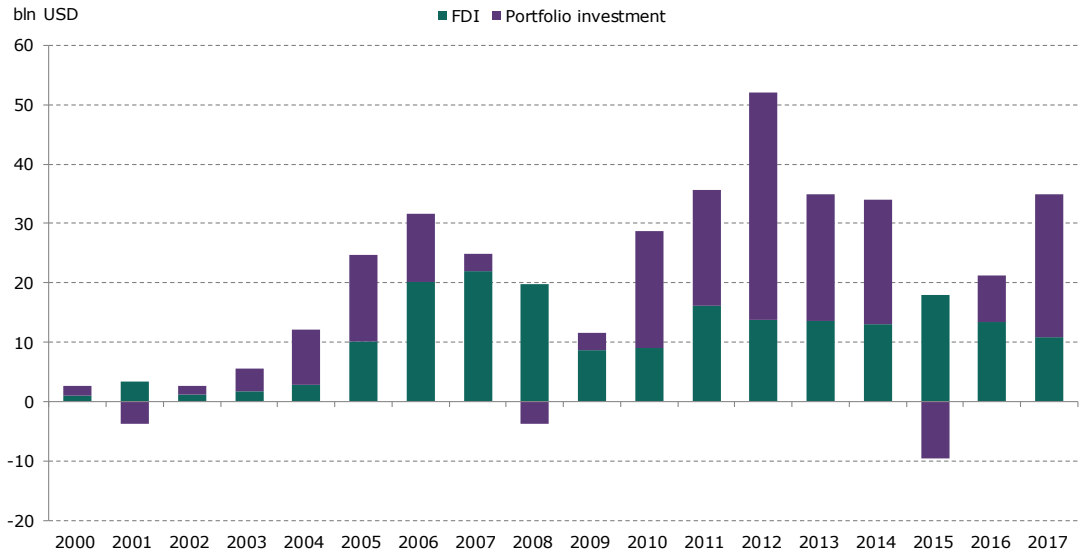
After the economic crisis of 2001, economic policy in Turkey was significantly changed. In particular, public debt was curbed, the central bank gained independence and the main objective of monetary policy was set as maintaining low inflation. Those changes contributed to the growth of country's credibility and increased inflows of foreign capital to Turkey. In 2010, the Bank of Turkey (BT) recognised that the inflows of capital contributed to the imbalances in the real economy and the financial sector, as well as made the economy vulnerable to changes of sentiment in the global financial markets. One of the potential instruments which could be used for counteracting those phenomena was introducing capital controls. However, the adverse effects of capital controls encouraged the BT to search for alternative solutions. Ultimately, the BT changed the set of its instruments, supplementing it by tools limiting the excessive inflows of short-term capital and growth of lending. Those proved to limit the identified problems only to some extent, with imbalances still accumulating in Turkey in subsequent years.

3.4.1. Problems related to inflows of short-term capital in Turkey

Starting from mid-2010 the Bank of Turkey operated amid strong inflows of foreign capital, comprising mainly of short-term portfolio investment (Figure 19), driving up bank loans which was, to a great extent, aimed at financing imports (Figure 20).

In that period, inflows of capital contributed to an appreciation of the Turkish lira, at the same time fuelling imbalances in the real economy and the financial sector, increasing vulnerability of Turkey to changes of sentiment in the global financial markets. After the experience of 2009, when GDP had decreased in real terms by 4.8% due to capital outflows, the BT was concerned about renew sudden outflow of capital and its consequences. Therefore, in mid-2010, the BT started to emphasise the role of financial stability in its communication.

Figure 19. Inflow of portfolio capital and foreign direct investment



Source: Own compilation based on data of the Bank of Turkey.

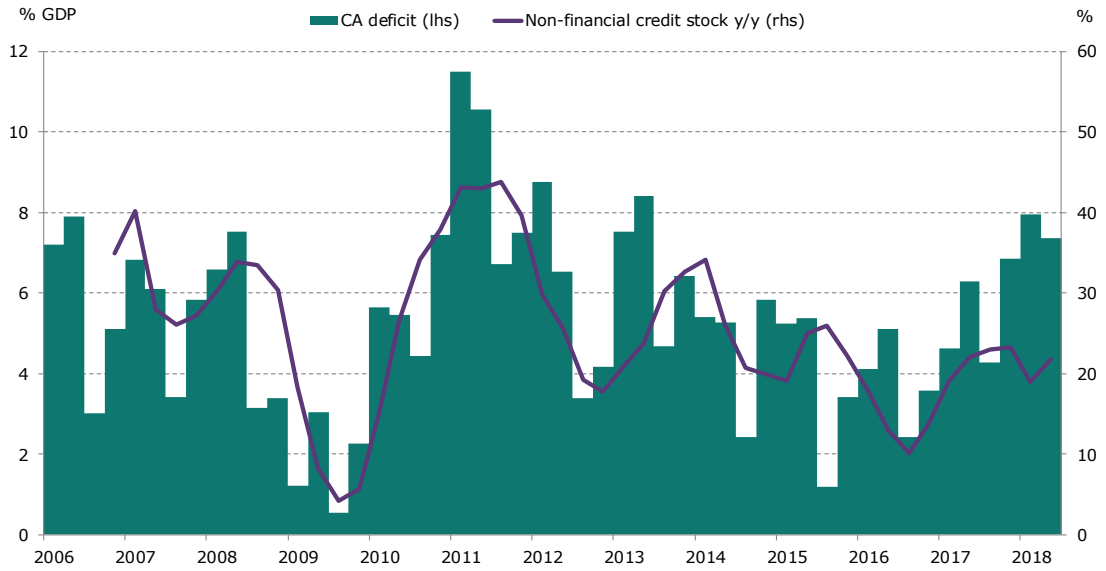
Recognising the significance of financial stability issues underpinned the modification of the monetary policy strategy pursued by the BT since then, which – besides ensuring price stability – was also to accomplish complementary objectives:

- limiting capital inflows and changing their structure – from mainly short-term flows to long-term flows;
- limiting excessive growth of bank credit.

Although since mid-2010 concerns over the increasing lending were present in the Bank's communication, the desired pace of credit growth was initially not explicitly quantified.[97] It was first the *Monetary and Exchange Rate Policy for 2013* that stated that the lending growth in 2013 that would be consistent with the price stability mandate, current account deficit objective and financial stability considerations amounted to 15%.

[97] E.g. in the *Minutes* of December 2010 the following sentence was included: "*Committee members have underscored that one of the goals of the current policy mix should be reducing the pace of credit growth*".

Figure 20. Current account deficit and lending growth



Source: Own compilation based on data of the Bank of Turkey.

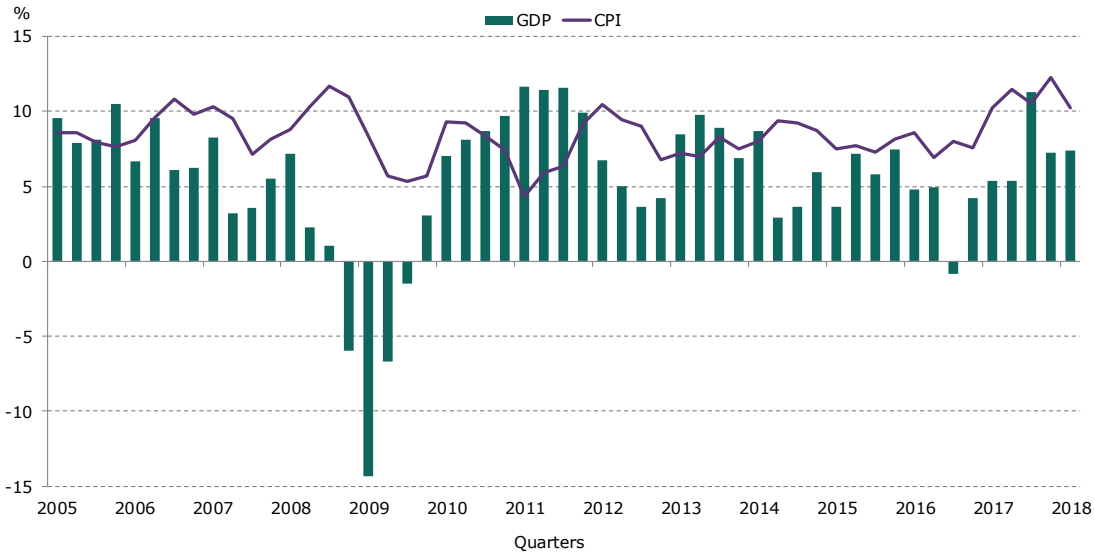
At the same time, the BT deemed the main policy interest rate to be an insufficient instrument to ensure both external and internal equilibrium. In the Bank's assessment, attempts to curb inflation pressure by raising the interest rate would be counterproductive since it would foster stronger inflows of foreign capital (especially short-term) and, at the same time, boost credit growth and increase demand pressure.

In order to accomplish the aforementioned complementary objectives, the Bank of Turkey decided, in particular, to undertake the following measures (Box 12):

- It changed rates on standing facilities frequently, significantly and without reference to the changes of the basic policy rate, asymmetrically narrowing or expanding the width of the corridor of market interest rate fluctuations (interest rate corridor instrument);
- It frequently changed the terms of reserve requirement, also by introducing different reserve requirement ratios depending on the maturity of liabilities (required reserve instrument);

- It enabled maintaining part of the required reserve calculated in the Turkish lira in gold or in foreign currency (Reserve Option Mechanism, ROM).

Figure 21. Annual GDP growth



Source: Own compilation based on data of the Bank of Turkey.

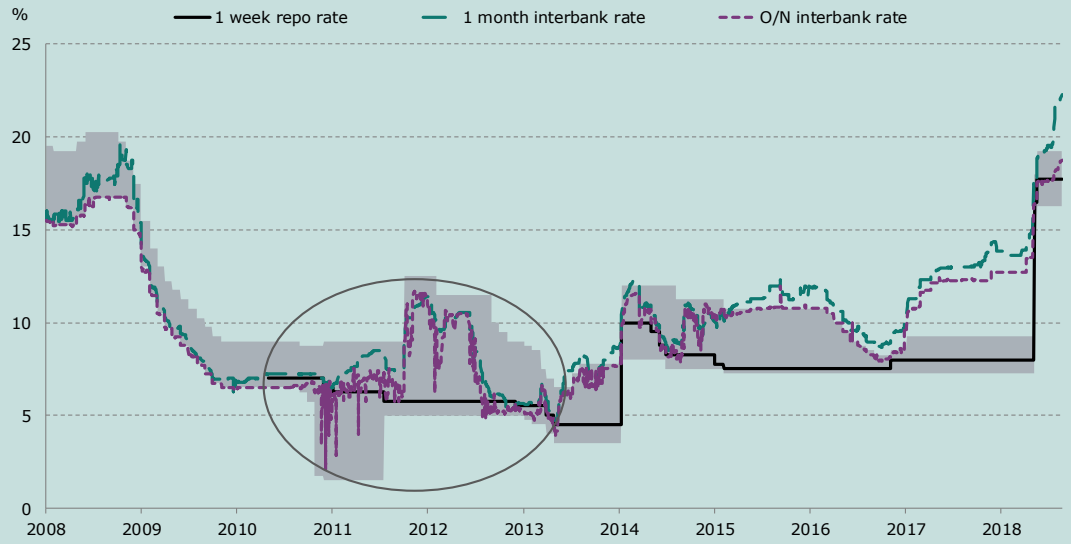
Box 12: Instruments used to limit the capital inflows and credit growth in Turkey

The BT decided to actively use the interest rate corridor in combination with the required reserve and the Reserve Option Mechanism (ROM) in order to counteract excessive capital inflows and limit credit growth. Although issues related to monetary policy instruments are not the main subject of this report, the tools used by the BT are shortly discussed.

- **Interest rate corridor**

In the years 2010-2013, the BT performed frequent and considerable changes to its standing facilities (not always related to the changes in the basic interest rates). Changes in the width of the corridor affected the level and volatility of market rates and the relative attractiveness of transactions with the central bank (Figure 22). Moreover, due to the fact that loans granted to the private sector were indexed to the lending rate (equal to the lombard rate), changes in this rate directly influenced lending conditions in the economy (Alper *et al.*, 2012).

Figure 22. Interest rates and the corridor of standing facilities of the Bank of Turkey



Source: Own compilation based on Bloomberg data and data of the Bank of Turkey.

Through asymmetrical changes in the width of the corridor of interest rate fluctuations, the BT strived to increase the volatility – and hence uncertainty – around short-term interest rates. This effect was compounded by the Bank's communication policy based on the principle of constructive ambiguity (the term controlled ambiguity was used in April 2011 by H. Kara, the Head of Department of Research and Monetary Policy of the Bank of Turkey, Kara, 2011), i.e. intentional lack of clarity in interest rates and liquidity policy.

With these measures, the Bank aimed at increasing the short-term interest rate risk, which, on the one hand, was to raise the cost of short-term speculative transactions of foreign investors and, on the other hand, to discourage domestic banks from refinancing lending and the required reserve. In turn, limiting refinancing loans to the real economy out of central bank funds was supposed to curb credit growth or enforce financing it from more sustainable sources. Those measures were accompanied by informal pressure on banks to reduce credit expansion in line with the monetary authorities' intentions.

- **Reserve requirement**

Another important tool used by the BT was the required reserve (imposed also on FX liabilities), the rate of which was increased several times. Simultaneously, the

required reserve was made dependent on the maturity of deposits (the shorter the term of the liabilities, the higher the rate) and its remuneration was suspended.

The non-interest-bearing required reserve is – in economic terms – a tax imposed on banks. The BT expected commercial banks to transfer the cost of this tax on their clients – borrowers and depositors. This would lead to a rise in interest rate on loans and a decline in interest rate on deposits, i.e. to a segmentation of the financial market. In particular, taking into account that some part of banks' financing originated from foreign investors, this was to result in raising interest rates for domestic borrowers, and in reducing interest rates obtained by foreigners. Consequently, a tightening of the monetary policy without attracting external capital inflow would take place.

In turn, making the value of the required reserve dependent on the maturity of the liabilities – making banks suffer higher costs (in terms of lost benefits), if they held shorter liabilities – was meant to encourage banks to reduce the mismatch between the maturities of assets and liabilities, which would mitigate the liquidity (refinancing) risk and the interest rate risk.

- **ROM mechanism**

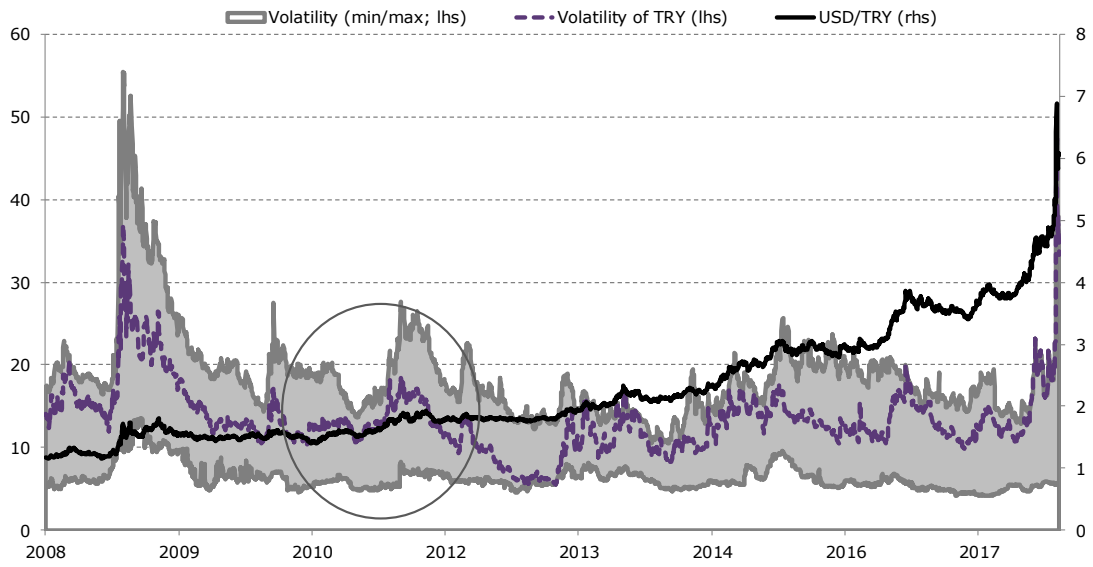
Enabling banks to maintain part of the required reserve in the form of gold or foreign currency, instead of domestic currency, under the ROM was also a significant and quite unconventional modification of the required reserve policy. Due to the fact that over 35% of deposits and 25% of loans in Turkish banks were denominated in foreign currency, the banks have a short net currency position on their balance sheets (i.e. they are sensitive to a depreciation of the Turkish lira), which they close by exchanging foreign currency deposits into funds in domestic currency by means of off-balance sheet FX swap transactions. The aim of the ROM mechanism was to encourage banks to use FX deposits to fulfil the required reserve obligations, instead of swapping them. This was expected to contribute not only to the stabilisation of the exchange rate, but also to limiting short-term off-balance sheet FX swap transactions (which may generate the interest and foreign exchange risk if they are used to hedge longer-term assets), and closing the short currency position on banks' balance sheets (reserve in foreign currency would increase FX assets).[98]

[98] The Bank of Turkey had also undertaken more direct measures in order to stabilise the exchange rate in the form of two-directional interventions (in 2011 the Bank sold 15% of its reserves in order to defend the Turkish lira), that were additionally strengthened by the public declarations of Bank's representatives concerning the fundamentally justified level of exchange rate.

3.4.2. Effects of the measures applied by the Bank of Turkey

The BT policies had both positive and negative consequences. Moreover, apart from their short-term effects, also more lasting impact should be considered.

Figure 23. Implied volatility of Turkish lira compared to minimum and maximum for currencies of emerging market economies*



Source: Own compilation based on Bloomberg data.

* The group of emerging market economies comprises: Brazil, Poland, South Africa, Korea, Mexico, Chile, Hungary, Malaysia and Thailand.

The main positive effects of the activities undertaken by the BT in 2010-2012 included:

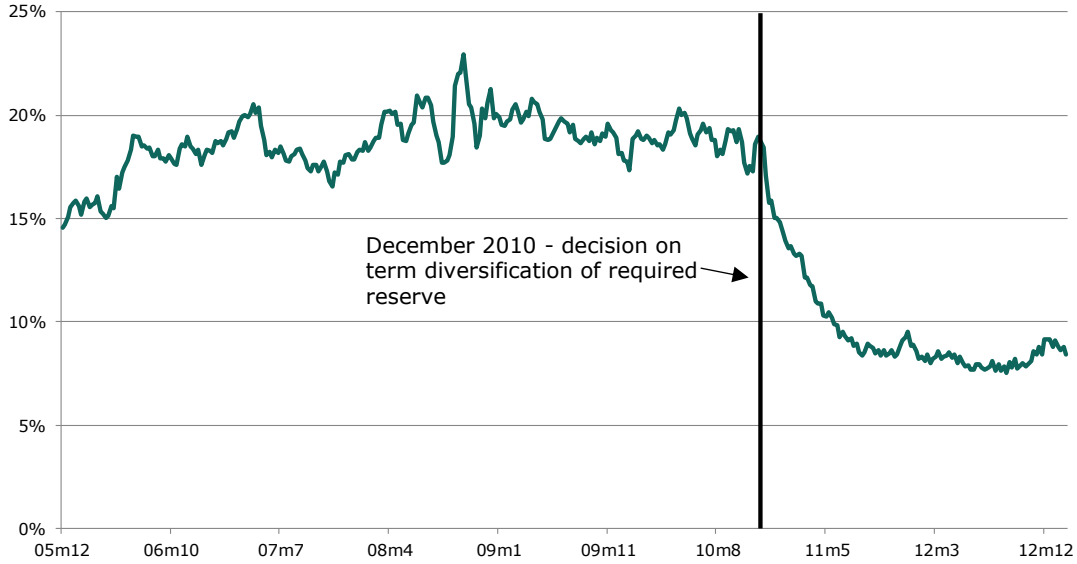
- A relatively stable – compared to other emerging market economies – exchange rate (Figure 23). Counteracting the Turkish lira appreciation helped to curb the current account deficit, although the deficit was mostly reduced by the economic downturn. Stabilising the exchange rate and lowering the current account deficit turned out, however, not to be lasting. Turkey is experiencing periods of strong depreciation pressures, as it is still characterised by a considerable imbalances.
- Extending the term of commercial banks' liabilities (the share of deposits with maturity below 1M dropped from 15% in December 2010 to 7% in the first half of 2011). This reduced interest rate and liquidity risk in banks' balance sheets.

- Limiting short-term FX swap transactions conducted by Turkish banks with non-residents in order to close short FX positions on their balance sheet (a large dependence on those transactions generated interest rate risk due to the duration gap between banks' assets and liabilities).

At the same time, BT's actions resulted in some unintentional effects:

- By applying numerous and not always consistent tools, the Bank caused communication noise and jeopardised the understanding of the monetary policy stance by market participants.
- The unconventional measures did not bring the BT closer to achieving the main target – i.e. inflation close to 5.0%, and, in fact, by deteriorating communication the Bank made the anchoring of inflation expectations more difficult (prior to introducing the new policy, inflation expectations were running at the level being the average of the declared inflation target and the current inflation outcomes, however, thereafter they increased to 7%, i.e. reached the upper limit of deviations from the target, and have stayed elevated).
- Raising the required reserve and suspending its remuneration boosted the share of commercial banks' assets not generating income, which encouraged banks to strive to increase profitability of other assets and, as a consequence, to reduce their liquidity (as of December 2010 the share of Treasury bonds in banks' balance sheets decreased significantly and, at the same time, regulatory liquidity ratios deteriorated).
- Increases in required reserve translated into lower interest rate on deposits and limited the growth of the domestic deposit base, pushing commercial banks to acquire financing in foreign currencies, i.e. to increase the short FX position, which the BT intended to counteract.

Figure 24. Share of deposits with maturity below 1M in the total deposits of Turkish banks



Source: Own compilation based on data of the Bank of Turkey.

The policy of the BT did not contributed to a lasting reduction of external imbalances in Turkey. Even considering only the 2010-2012 period, it should be noticed that the external conditions were changing considerably at that time which influenced movements of both the exchange rate and the current account balance. For example, after the appreciation of the lira in 2010, which the BT wanted to counteract, a depreciation of the exchange rate occurred, and the Bank was forced to undertake measures aimed to curb it (the changes in the exchange rate were at that time mostly associated with the situation in international financial markets). Attempts aimed at limiting the scale of the depreciation of the Turkish lira at the end of 2011 resulted in depletion of 15% of the country's foreign currency reserves, while the improvement of the current account balance and change in the structure of capital inflows occurred only in 2012 (i.e. 1.5 year after applying the first unconventional instruments), and probably resulted mainly from a significant slowdown in the domestic demand. In subsequent years external imbalanced started to accumulate again, which clearly showed low effectiveness of the Bank's policy.

The usefulness of the required reserve instrument together with the ROM mechanism in curbing credit growth was somewhat less questionable. At the one hand, the oligopolistic structure and high profits of the banking sector allowed it to absorb, to a large extent, the tax stemming from higher costs related to changes in the required reserve system. Consequently, the adjustments of deposit and credit rates were limited which mitigated the impact of credit growth. At the other hand, however, in periods of high capital inflows, increasing required reserve applied to FX liabilities and allowing to meet required reserve obligations using foreign currency, redirected some of the inflows away from financing credit growth.

Box 13: Changes in monetary policy of Turkey in recent years

The consequence of the US Fed embarking on a QE tapering was a sharp depreciation of many emerging market currencies, including Turkey. Between mid-May 2013, i.e. the moment when the Fed signalled a possible start of phasing out its asset purchases, and 27 January 2014, the Turkish lira depreciated by 33%, reaching an all-time low at that time.

In view of the dependence of the Turkish banking sector on foreign financing, the sharp depreciation of the exchange rate triggered financial stability concerns. Moreover, the depreciation of the lira created an upward pressure on inflation, which reached 7.4% in December 2013 (with the inflation target set at 5% +/- 2 percentage points).

Trying to counteract the lira depreciation, the BT tightened the monetary conditions. Amid the limited independence of the Bank, and the objections from the Prime Minister against raising interest rates, the BT initially used its non-standard instruments. In November 2013, the Bank suspended the monthly *repo* operations and limited the weekly ones, simultaneously forcing commercial banks to use the *overnight* operations and raising significantly the average cost of liquidity provided by the central bank. Also in November 2013, it changed the key interest rate from a lower weekly *repo* rate (4.50%) to a higher *overnight* lombard rate (7.75%).

Despite those decisions, in January 2014 the depreciation of the lira intensified. In order to defend the exchange rate, the BT launched extensive FX interventions. The

amount of the intervention reached approximately USD 3 billion, i.e. about 10% of foreign currency reserves, but did not stop the lira depreciation.

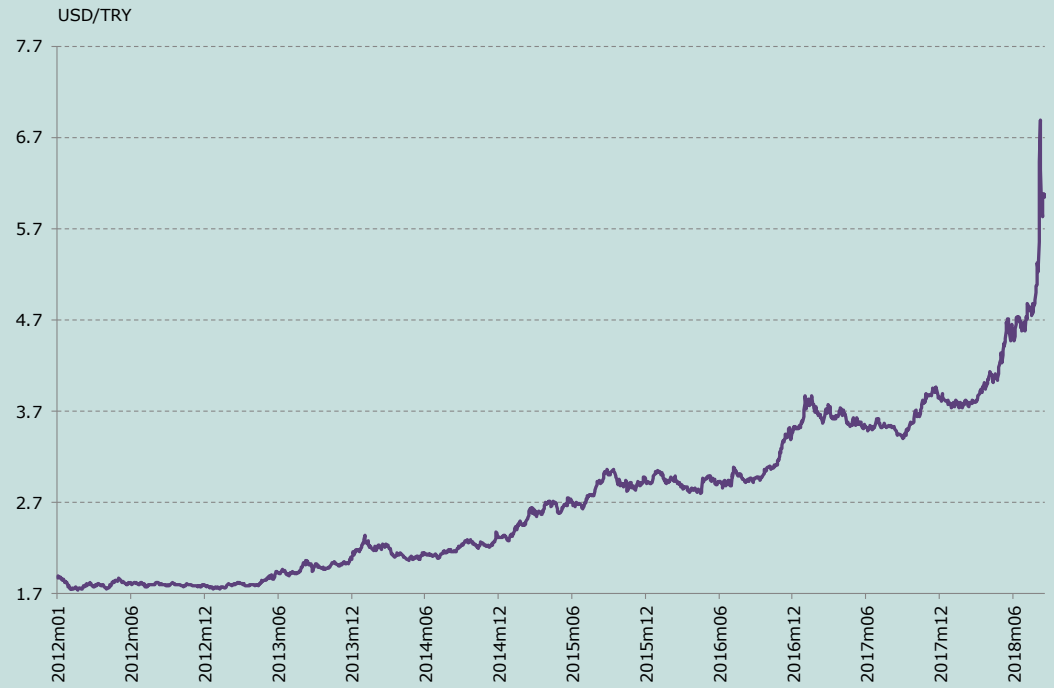
After the ineffective foreign exchange intervention, at the extraordinary meeting held on 28 January 2014, the BT decided to substantially raise interest rates. The weekly *repo* rate was increased from 4.5% to 10.0%, whereas the *overnight* lombard rate – from 7.75% to 12.0%. Due to the simultaneous change in the basic interest rate (again to the *repo* rate), the actual increase in the cost of financing at the central bank amounted to 2.25 percentage points. At the same time, the BT declared moving in the direction to simplifying its monetary policy implementation procedures.

The interest rate rise was accompanied by strengthening of the lira (Figure 25), although the exchange rate remained markedly weaker than in the period preceding its depreciation in January 2014. However, it is difficult to assess the impact of the interest rate rise itself on the exchange rate, since at that time – along the improvement of sentiment on the financial markets – other emerging market currencies also strengthened.

In late 2016 the lira experienced renewed depreciation pressures that again translated into higher inflation. In response to those developments in January 2017 the BT suspended the *repo* transactions and limited the availability of lombard credit. At the same time, the Bank introduced a *late liquidity window facility* whose interest rate was visibly higher than the lombard rate. This significantly increased market interest rates, which was supposed to limit inflation that persistently exceeded its target level. It seems that further modifications of the Bank's monetary policy implementation framework were driven by an attempt to avoid political pressures aimed at maintaining possibly accommodative monetary policy stance.

Risks associated with limited independence of the BT, amid other political uncertainties, and accumulated external imbalances contributed to making Turkey very susceptible to changes in financial market sentiments. As a result, the BT came repeatedly under pressure to defend the lira, in particular in mid-2018. However, at that time, instead of reaching for further non-conventional measures designed to tighten the monetary conditions without openly increasing the policy rates, the Bank decided to simplify its monetary policy implementation strategy by reintroducing *repo* transactions (simultaneously raising its costs) and a symmetrical interest rate corridor (announcing the deposit and lombard rate distance from the *repo* rate).

Figure 25. Exchange rate of the lira against the US dollar (increase means depreciation)



Source: Own compilation based on Bloomberg data.

3.4.3. Conclusions from the experiences of the Bank of Turkey

The BT introduced to its inflation targeting strategy two additional, complementary objectives – to curb excessive inflows of short-term capital and to limit excessive credit growth. In an attempt to achieve these objectives, the BT considerably expanded or modified the monetary policy instruments used. Frequent changes and the lack of consistency of the individual instruments rendered the BT's activities unclear. The communication policy of the BT probably hinged on the constructive ambiguity principle, which could have an additional adverse effect on its understanding by the public, although it was simultaneously meant to discourage the inflows of short-term capital. Indisputably, transparency of monetary policy decreased by introducing the additional tools. This could contribute to a low effectiveness on the BT to meet its inflation target.

The effects of the BT's activities are very difficult to evaluate, especially taking into account the volatility of external conditions over the analysed period, which strongly affected, among others, the directions of capital flows. Moreover, meeting partly the assumed objectives (e.g. extending the maturity of commercial banks' liabilities and limiting short-term FX swap transactions) triggered other negative phenomena (a drop in liquidity and an increase in the short FX position of the banking sector). At the same time, the Bank's policy was not able to solve underlying problems of the Turkish economy with external imbalances remaining its weak point, which to some extent can be explained by limited actual independence of the Bank (Box 13). Accumulated imbalances made Turkey susceptible to changes in financial market sentiments.

3.5. Czech Republic – introducing the target for core inflation

The currency crisis which hit the Czech Republic in May 1997, forced the Czech National Bank (CNB) to introduce a floating exchange rate of the Czech koruna and consider the choice of another nominal anchor. In December 1997, as the first central bank of transition economies, the CNB introduced an inflation targeting strategy. In 1997-2001 the Bank implemented this strategy with a target referring to core inflation. This modification to inflation targeting, in various periods, was also applied by other banks (Box 14). At the same time, the negative experiences of the Czech National Bank with using core inflation target encouraged the Bank to introduce a list of so-called escape clauses, i.e. factors which could justify no reaction of the central bank to inflation deviating from the target. The list of escape clauses was kept even after changing the definition of the inflation target from core inflation to headline inflation.

3.5.1. Using core inflation in the inflation target definition

Core inflation has no single definition that would be commonly accepted and homogeneously applied. It is supposed to show persisting inflation which does account for temporary changes in the price level, or – put differently – it is supposed to show shifts in the overall level of prices in the economy which ignore changes in relative prices (Rogers, 1998). In both definitions, core inflation is considered as a measure illustrating changes in prices significant for the conduct of monetary policy. An important feature of core inflation should be its lower volatility compared to the volatility of headline inflation.

From practical point of view, the construction of core inflation measures is often based on some simple exclusion criteria applied to price categories. For example prices exhibiting high volatility due to the impact of weather conditions or global developments (such as food or oil prices) tend to be disregarded, or prices that are set by regulators and thus not necessarily reflect market forces (such as administered prices). While there are reasons to select the given exclusion criteria they are far from

perfect, not least due to the fact that they should not exclude too many prices. As a result, central banks usually use several core inflation measures, instead of relying on single indicator.

Core inflation is commonly used by central banks as an analytical and communication tool (Wiesiołek, Kosior, 2010). At the same time, the appropriateness of using core inflation to define the inflation target in the case of banks implementing an inflation targeting strategy remains disputable.

The following arguments may support the choice of core inflation as an indicator to which the inflation target refers to:

- Due to the fact that central banks are held accountable for meeting the announced inflation target, it is justified to define the target with respect to the inflation measure excluding prices beyond the direct influence of monetary policy (Blinder, 1997).
- Setting the inflation target in terms of core inflation may also lead to better communication of the central bank with the market, since, in particular, it may help to explain why monetary policy is generally not adjusted in response to temporary fluctuations in headline inflation, which do not translate into tangible changes in core inflation (Bernanke *et al.*, 1999).
- Defining of the target in terms of core inflation may help to channel the attention of the public to the enduring changes to inflation and – through reducing shifts in inflation expectations in response to temporary price changes – facilitate maintaining price stability (Johnson, 1999).
- Emphasising monetary authorities' focus on core inflation may allow for avoiding an incorrect reaction to temporary changes in price momentum. For example, a supply shock may have a temporary effect on inflation and, as such, it will not require a reaction on the part of the central bank (Mishkin, 1997).

At the same time, there are also several arguments raised against defining the inflation target in relation to core inflation:

- In particular, it is stressed that core inflation – excluding changes in prices of some products and services included in the CPI basket – does not reflect changes in total costs of living incurred by households that affect their inflation expectations. In the case of significant or lasting deviations of core inflation from headline inflation, as perceived by households, determining the target for core inflation may make anchoring of inflation expectations more difficult (Kim, Kim, 2009).
- The concept of core inflation is less intuitive and more difficult to understand for economic agents than the CPI inflation (Hammond, 2012).[99] Thus, it is necessary to put more emphasis on explaining the construction of this measure, justifying its selection and clarifying its relations to headline inflation (Bernanke, Mishkin, 1997).

Thus, the selection of the inflation measure to which the target refers to (headline inflation *vs.* core inflation) may be important for the credibility of the target. Among the aforementioned characteristics of inflation indicators, it seems that the credibility of the target depends mainly on its consistency with the living costs as perceived by households, which speaks in favour of the target for headline inflation. However, the credibility is also influenced by the ability of the central bank to affect the inflation rate by its monetary policy, which would rather support the target expressed as a measure of core inflation.

[99] Moreover, the CPI index is a measure of inflation often used in wage contracts or for indexation of public benefits (McCauley, 2007).

Box 14 Expressing inflation targets with respect to core inflation

In the past, a number of central banks expressed their inflation targets with respect to core inflation. However, most of them ceased to target core inflation and started to announce inflation targets relating to the headline measure.

Initially, when inflation targeting was proposed as a new way to conduct monetary policy, the credibility of the framework had not yet been established. Under such circumstances, some central banks clearly preferred to target core inflation measure. Apart from the Czech Republic, this was the case, e.g., in Australia. Such a choice was supposed to limit the risk of missing the target, which could be detrimental for the reputation of monetary authorities. In turn, reputation was thought to be crucial for the success of inflation targeting that was heavily dependent on the public believing in delivering the announced target. After accumulating experiences with implementing the new strategy, those central banks judged, however, that the benefits of setting the target in terms of a headline CPI – a measure far more familiar to the public – outweighed its potential weaknesses related to higher volatility (Cockerell, 1999). Thus, the Czech Republic turned to headline inflation target in 2002, and Australia in 2003.

Apart from those countries also Korea and Thailand used to define their inflation targets in terms of core inflation. They switched to the headline measures in 2006 and 2014, respectively. When discontinuing setting the target with reference to core inflation, the Bank of Korea argued that if the Bank took measures to stabilise an inflation measure whose changes deviated from changes in the costs of living as perceived by economic agents, this might hurt the credibility of the Bank (Kim, Kim, 2009).

The Bank of Norway, while never having declared this officially, is also pointed out as a central banks setting its target in terms of core inflation. In 2001-2003 the Bank did not state precisely to which measure of inflation its target refers to. From 2003, the Bank underlined the focus on CPI inflation excluding energy prices and the impact of tax changes (CPI-ATE; Norges Bank, 2003). However, in 2004 the Bank specified its definition of the target, indicating that it referred to the CPI inflation, although the CPI-ATE measure was still of great significance (Norges Bank, 2004).

It should also be noted that in some cases core inflation is measured by CPI inflation net of interest payments (McCauley, 2007). Such an index was used in setting the inflation target in the United Kingdom (1992–2003), South Africa

(2000–2008), and currently is used in Sweden (since 2017).[100] As the methodology of computing CPI inflation is not the same across countries, not all inflation targeters face a similar problem of including or excluding interest payments. In most countries the headline measure simply does not incorporate interest payments.

The analysed modification of an inflation targeting strategy, namely setting the inflation target with respect to the core inflation measure, is currently implemented only in Uganda. Since the start of inflation targeting in that country in 2011, the target refers to inflation excluding food crop prices.

3.5.2. Introducing an inflation targeting strategy in the Czech Republic

In the initial period of the systemic transition, the monetary policy in the Czech Republic was conducted under a fixed exchange rate system. Following the dissolution of Czechoslovakia, in May 1993 the exchange rate of the Czech koruna was pegged to a basket of currencies with a narrow band for fluctuations (+/- 0.5%).[101] In February 1996 the Czech National Bank modified its monetary policy strategy by broadening of the band for fluctuations for the exchange rate of the Czech koruna (to +/- 7%), which was accompanied by the introduction of the target for M2 money supply growth (Josifidis *et al.*, 2009).[102] In May 1997, deteriorating sentiment in the financial markets and the negative assessment of the economic situation of the Czech Republic resulted in the currency crisis, forcing the CNB in agreement with the government to introduce a floating exchange rate (Brada, Kutan, 1999). Over the next

[100] Using a kind of exclusion measure of inflation to define its inflation target follows from the construction of the headline CPI measure in Sweden that includes interest payments. Those costs are directly affected by changes in interest rates (they are rising whenever interest rates are rising, and they are declining whenever interest rates are declining), but move in the opposite direction compared to the traditional transmission mechanism of interest rate to prices (inflation, *ceteris paribus*, should be depressed by rising interest rates, and boosted by declining rates). Since incorporating interest payments in the CPI would imply misleading signals when assessing the impact of monetary policy on prices, in Sweden inflation target refers to CPI with fixed interest rate.

[101] In the years 1993-1995, a complementary objective of the Czech National Bank was the growth of money supply.

[102] Broadening the band for fluctuations was aimed at limiting the inflows of foreign capital through increasing the uncertainty regarding exchange rate developments.

6 months, the Bank analysed alternative monetary policy strategies, considering returning to the fixed exchange rate regime, establishing the target for money supply growth, or adopting an inflation targeting strategy. Significant shortcomings of the first two strategies encouraged the Czech National Bank to opt for inflation targeting, despite virtually no previous experiences related to its implementation in emerging countries (Smidkova, 2008a, 2008b). A key argument supporting the introduction of an inflation targeting strategy was the need to anchor inflation expectations, which would help to complete the disinflation process (Hampl, 2010). Alternative strategies used by the Czech National Bank in the past did not manage to permanently reduce inflation expectations (Hrncir, Smidkova, 2003).

In December 1997, the CNB announced a mid-term inflation target (with the horizon until the end of 2000) at a level of 4.5% +/- 1 percentage point, with an aim to complete the disinflation process. At the same time, the Bank decided to announce an additional indicative target for the end of 1998 at 6% +/- 0.5 percentage point, which was to increase the effectiveness of the strategy through anchoring of inflation expectations in the short term, and influence the developments in wages. In contrast to most developed countries implementing an inflation targeting strategy, the inflation targets indicated by the Czech National Bank referred to core inflation (net inflation). The Bank set targets for the so-called net inflation defined as the CPI inflation excluding regulated and administered prices and eliminating the impact of changes in indirect taxes and subsidies on other categories of prices.[103]

Defining the target in terms of core inflation was motivated by the particular situation of the transition economy with the ongoing process of gradual price de-regulation. This resulted in significant differences in the growth of regulated prices and other prices included in the consumer good basket. The impact of price de-regulation as well as changes in indirect taxes and subsidies remained outside the

[103] Net inflation illustrated changes in about 663 categories of goods and services prices, whereas the CPI included 754 categories of prices (Hrncir, Smidkova, 2003).

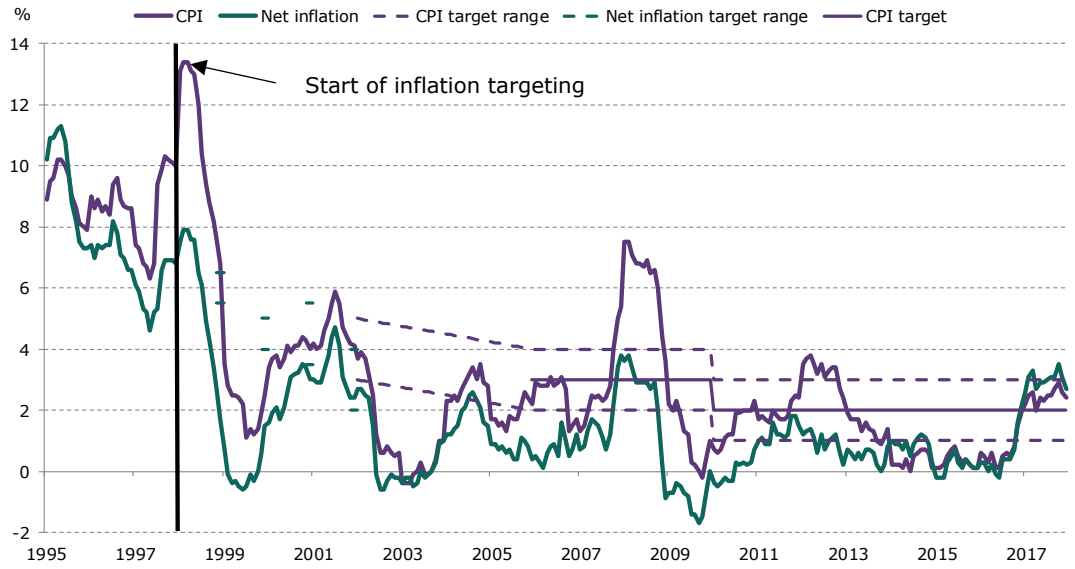
control of monetary policy, whereas they could potentially visibly affect inflation developments in view of parliamentary election falling in mid-1998 (Hrncir, Smidkova, 2004; CNB, 2000).[104]

At the same time, the Czech National Bank recognised that defining the inflation target with the help of a narrower inflation measure than the CPI index may trigger negative consequences for the effectiveness of monetary policy (CNB, 2000). The reason for the concern was that the net inflation measure demonstrated certain undesirable features, in particular:

- Net inflation was a new concept, created for the needs of implementing an inflation targeting strategy, and thus poorly recognised by the public.
- The net inflation measure did not comprise changes in prices of goods and services significant from the perspective of households, such as electricity, gas, telecommunication services, sewage disposal, heating. The excluded goods constituted around 25% of the consumer basket (CNB, 1998). As a consequence, the index did not fully reflect changes in the living costs, which could undermine the role of the target as the anchor for inflation expectations.
- Changes in net inflation deviated from changes in CPI inflation (particularly in the initial period of implementing an inflation targeting strategy; Figure 26). What is more, the Bank expected that such a divergence would be a long-term issue. This factor increased the risk that anchoring of inflation expectations would be unsuccessful.

[104] According to the Czech National Bank, only in the case of announcing a long-term, binding strategy concerning de-regulation of prices and changes in indirect taxes, it would be justified to express the inflation target in relation to the CPI.

Figure 26. Core inflation and headline CPI inflation against the inflation target



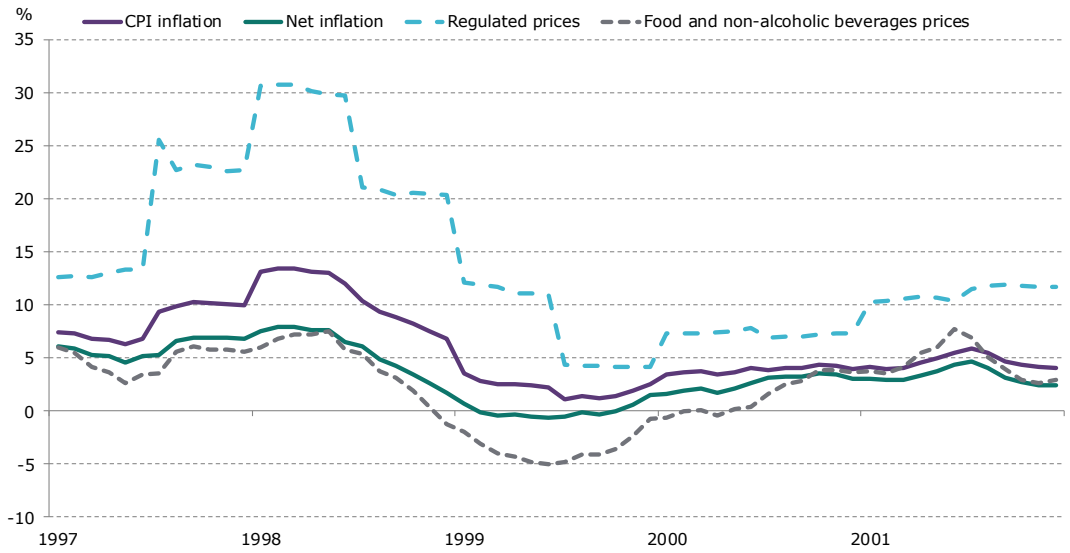
Source: Own compilation based on data of the Czech National Bank.

The measure of core inflation used by the CNB – in contrast to core inflation measures used by some other central banks – did not exclude changes in the highly volatile categories of prices, such as prices of food and energy, or prices of imported products. At the same time, in the case of the Czech economy, shocks to external prices had a significant impact on inflation, similarly as shocks to food and energy prices. With those price categories remaining beyond the direct impact of monetary policy, their exclusion would be justified (Hrncir, Smidkova, 2000). However, the Bank was afraid that it would narrow down the core inflation index excessively and further undermine its correlation with the CPI inflation (Jonas, Mishkin, 2004).

3.5.3. Inflation targeting in 1998-2001 in the Czech Republic

An inflation targeting strategy was introduced in the period of economic downturn in the Czech Republic which – despite high interest rates – was accompanied by high inflation and high inflation expectations. Thus, the most important task faced by the Czech National Bank in the years 1998-2001 was the completion of the disinflation process and the anchoring of inflation expectations.

Figure 27. CPI inflation and its components



Source: Own compilation based on data of the Czech National Bank.

In the first months following the introduction of the new strategy, inflation expectations of economic agents remained at an elevated level, which – in view of their adaptive nature – was mainly the result of rising administered prices (Hrncir, Smidkova, 2000). From June 1998, a net inflation (as well as the headline CPI measure) started to decline markedly. This trend was continued in subsequent months, and in December 1998 net inflation dropped to 1.7%, i.e. clearly below the inflation target of 6.0% +/- 0.5 percentage point (Figure 26). By April 1999, net inflation had dropped to -0.6% and despite a certain acceleration in the second half of the year, at the end of 1999 it stood at 1.5%, i.e. remained significantly below the inflation target of 4.5% +/- 0.5 percentage point. The main driver of the rapid disinflation in this period, simultaneously contributing to inflation staying below the target, was the decline in the global prices of commodities, accompanied by the appreciation of the Czech koruna (Smidkova, 2008; OECD, 2000).

In the first two years of pursuing an inflation targeting strategy, the accomplishment of assumed CNB goals was unsuccessful:

- Even though inflation decreased significantly, this did not mean the completion of the disinflation process. The main reason for the decline in inflation was the shock to external prices and – taking into account the considerable volatility of those prices – a rebound in inflation could have been expected as trends in global commodity prices reversed.
- Net inflation stayed visibly below the inflation target, which could damage the credibility of the target. Whereas in the case of headline CPI inflation a decline in the general price level resulting from a slump in commodity prices was hampered by the simultaneous rise in administered prices (as a result CPI inflation in 1998 remained at the target level, and in 1999 it was only slightly below the target), net inflation fully reflected shocks to external prices. As a consequence, significant discrepancies between the developments in headline and net inflation became apparent which, according to the OECD (1998), could undermine the capacity of monetary policy to influence inflation expectations.
- Although the decline in inflation was followed by a drop of inflation expectations, in view of the adverse impact of missing the inflation target on the credibility of the Czech National Bank and the abovementioned discrepancy between the change in net inflation and the change in the cost of living – anchoring of inflation expectations at a low level could turned out to be short lived.

The initial experience of implementing an inflation targeting strategy encouraged the CNB to modify the strategy at the end of 1998. At that time, the Bank introduced the list of so-called escape clauses, i.e. the list of factors which could justify deviations of inflation from the target without triggering a monetary policy response, since such a response aimed at mitigating shocks to prices would be too costly (Hrncir, Smidkova, 2000). Escape clauses included (CNB, 2000):

- significant deviation of commodity prices in the world markets from their forecast levels;

- significant deviations of the exchange rate of the Czech koruna from its forecast level, not associated with domestic economic factors;
- significant changes in the conditions for agricultural production;
- natural disasters.

The aim of introducing the set of escape clauses[105] – through indicating situations when the deviation of inflation from the target may be accepted by the Bank – was to produce a similar effect as excluding some price categories from the inflation measure to which the inflation target referred to, without the need to further narrow the targeted measure.

From mid-1999 net inflation started to rise, and in December 2000 – following a reversal of trends in external prices and the improvement of economic conditions in the Czech Republic – it approached the lower limit of deviations from the target (OECD, 2001). At the same time, a relatively stable growth of regulated prices contributed to a reduction of the difference between net inflation and CPI inflation. In April 2000, when announcing the inflation target for the end of 2001, the Czech National Bank once again slightly modified its strategy, supplementing the net inflation target with a consistent CPI inflation target. This step was possible due to closer coordination of activities of the Bank and the government with respect to setting the inflation target and adopting by the government a mid-term scenario for changes in regulated prices, taxes and other charges[106] (CNB, 2000b; IMF, 2000). The CNB emphasised that such a solution may be a transitional stage leading to defining the inflation target simply in terms of headline CPI inflation.

In line with those signals, the change of the definition of the inflation target took place a year later, i.e. in April 2001. The Czech National Bank decided to replace the

[105] Similar solutions (escape clauses) were also used by other central banks (Mishkin, Schmidt-Hebbel, 2001), but currently are only listed in Romania.
[106] The scenario envisaged by the government was, however, often based only on initial estimates, and its horizon was limited to 2002 (CNB, 2000b).

target expressed in terms of net inflation by the target expressed in terms of CPI inflation (CNB, 2001a). At the same time, changes in regulated prices (whose impact on CPI inflation exceeded 1-1.5 percentage point) and in indirect taxes were included in the list of escape clauses communicated by the Bank (Jonas, Mishkin, 2004). Such a strategy change was driven by the intention to increase the transparency of monetary policy and to anchor inflation expectations while enhancing the effectiveness of monetary authorities' actions (Central Banking, 2001).

Box 15: Introducing exchange rate commitment by the Czech National Bank

Since the introduction of an inflation targeting regime, the Czech National Bank (CNB) decreased its inflation target level on several occasions (Figure 28).[107] The last revision took place in 2010, and since then the inflation target of the CNB has stood at 2.0% +/-1 percentage point.[108]

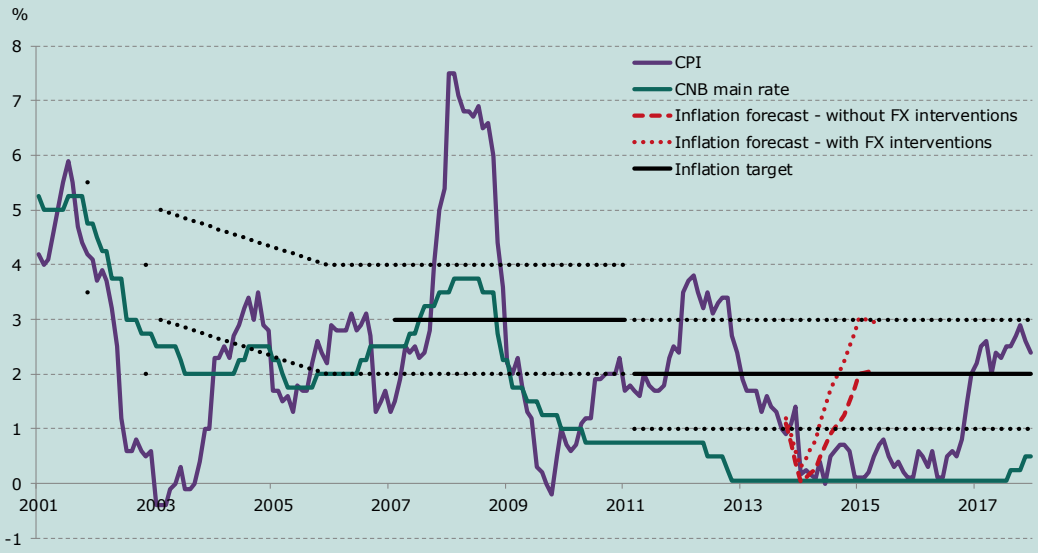
The lowering of the inflation target in 2010 created the risk that amid deep recession and low inflation the central bank's capacity to stimulate the economy through reducing the real interest rate – due to the zero lower bound for the nominal interest rate – would be limited. This risk did materialise in the aftermath of the global financial crisis.

From the end of 2012, the CNB maintained its policy interest rate slightly above zero. Despite the historically low interest rate, GDP growth in 2013 remained negative, while inflation was falling rapidly and ran significantly below the target. The forecasts of the CNB from the end of 2013 indicated a 50% risk of deflation in the subsequent quarters, as well as a high probability that inflation will remain below the target in a medium term (CNB, 2013b).

[107] While the change took place in 2010, it was announced already in 2007. Moreover, in 2007 the Czech National Bank decided also to change the type of the target used – by replacing the target range with the point target with a tolerance band.

[108] A higher level of the target in the initial years of pursuing an inflation targeting strategy was to take into account the pressure on appreciation of the real exchange rate of the Czech koruna related to the convergence process. Through higher inflation the Czech National Bank wanted to reduce the appreciation pressure on the nominal exchange rate (Figure 29).

Figure 28. Inflation target, interest rate and inflation forecasts of the Czech National Bank from November 2013 (prior to the introduction of the asymmetric exchange rate commitment)



Source: Own compilation based on data of the Czech National Bank.

As further lowering of the nominal interest rates could not be continued, in November 2013 the CNB launched FX interventions with the aim of weakening the Czech koruna exchange rate against the euro to at least approximately EUR 27/CZK[109] (which meant a 5% depreciation; Figure 29).[110] The Bank declared that the asymmetric exchange rate commitment would be maintained until the risks of inflation persisting below the target decrease significantly, which was initially expected to occur, at the earliest, at the end of the second quarter of 2015 (CNB 2013d). According to the CNB forecasts the weakening of the Czech koruna was to raise the inflation path by approximately 1 percentage point (CNB 2013b), i.e. close to the target, within about a one year horizon, and thus to reduce substantially the risk of deflation.[111]

When assessing the impact of the asymmetric exchange rate commitment on economic developments in the Czech Republic, it should be indicated that it was maintained for a much longer period than originally expected. Only in April 2017, the CNB decided to discontinue its FX interventions under the commitment.

The asymmetric exchange rate commitment used by the CNB appeared to be an effective tool in containing deflationary trends in the Czech economy. Due to the high degree of trade openness, the CNB policy acted mainly through the FX channel leading to a pick-up in the import price growth. Between late 2013 and early 2017, the aggregate increase in consumer and producer prices in the Czech

Republic turned out to be approximately 1 percentage point higher than in the euro area, which is its key trading partner.

The asymmetric exchange rate commitment used by the CNB appeared to be an effective tool in containing deflationary trends in the Czech economy. Due to the high degree of trade openness, the CNB policy acted mainly through the FX channel leading to a pick-up in the import price growth. Between late 2013 and early 2017, the aggregate increase in consumer and producer prices in the Czech Republic turned out to be approximately 1 percentage point higher than in the euro area, which is its key trading partner.

However, the CNB policy resulted in a sharp rise in foreign reserve assets stemming from FX interventions. During the three and a half years the reserve assets of the CNB increased 3.5-fold (from EUR 34.8 billion prior to the announcement of the exchange rate commitment in November 2013, to EUR 124.6 billion at the time of abandoning this tool in April 2017).[112] This could be a source of a downside risk to the CNB future financial result, since a possible further

[109] In its communication, when announcing interventions, the Czech National Bank indicated that the target for the exchange rate for the Czech koruna is the level of approximately 27 EUR/CZK ("*The CNB will intervene on the foreign exchange market to weaken the koruna so that the exchange rate of the koruna against the euro is close to CZK 27*"; CNB, 2013a). In the subsequent documents published on the CNB website it was noted that the exchange rate commitment would be treated asymmetrically, i.e. the Czech National Bank would tolerate weaker exchange rate above the level of 27 EUR/CZK, whereas it would intervene in the case of exchange rate strengthening below the level of 27 EUR/CZK ("*The CNB regards the commitment as asymmetric* (…) *On the stronger side of the CZK 27/EUR level, the CNB is preventing the koruna from appreciating further* (…) *On the weaker side of the CZK 27/EUR level, the CNB is allowing the koruna exchange rate to float*."; CNB, 2013d).

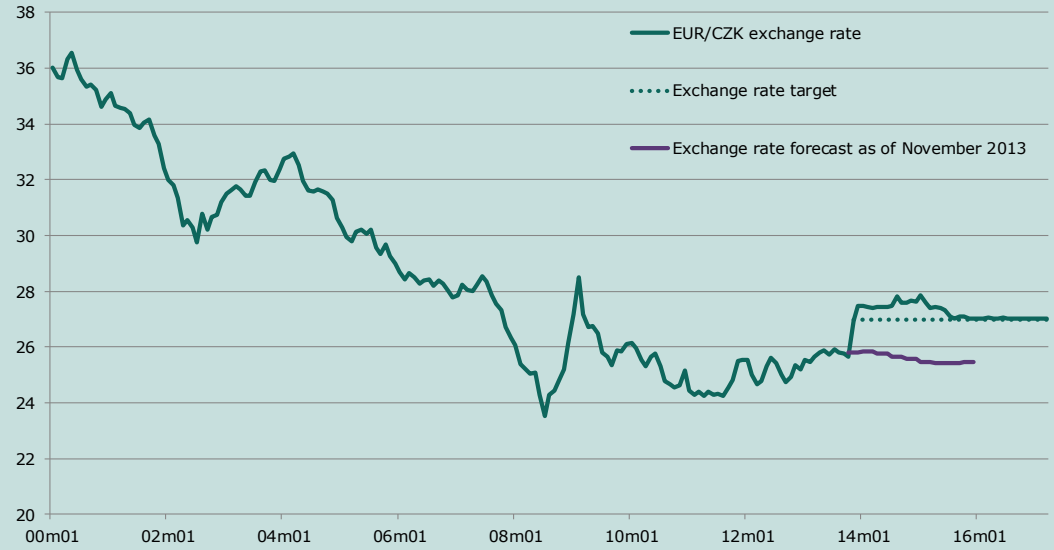
[110] Earlier (in September 2011), the asymmetric exchange rate commitment was also introduced by the Swiss National Bank (SNB, 2011). However, there were differences in the application of this tool by the Czech National Bank and the Swiss National Bank. First of all, the Czech National Bank did not provide an exact limit for the exchange rate, the exceeding of which would not be tolerated (the desired Czech koruna exchange rate against the euro was only defined as "*approximately EUR 27/CZK*"). Secondly, the Czech koruna exchange rate was close to the estimated equilibrium exchange rate (IMF, 2013), whereas the exchange rate of the Swiss franc was assessed as significantly overvalued (SNB, 2011).

[111] The introduction of the asymmetric exchange rate commitment led to some inconsistency in the communication of the CNB. In accordance with the Bank's forecast, published in the *Inflation report* of November 2013, i.e. when the decision on FX interventions aimed at weakening the exchange rate were announced, the Czech koruna was to appreciate. In order to avoid further inconsistencies, the forecasts of the nominal exchange rate of the Czech koruna against the euro stopped to be published until mid-2017, i.e. the Bank returned to publishing them only after abandoning an asymmetric target for the exchange rate.

[112] In April 2017, the CNB foreign reserves constituted about 71% of GDP.

appreciation of the Czech koruna could result in substantial changes in the value of foreign exchange reserve assets.[113]

Figure 29. Exchange rate of the Czech koruna against the euro (increase means depreciation)



Source: Own compilation based on data of the Czech National Bank.

3.5.4. Conclusions from the experiences of the Czech National Bank

Experience of the Czech National Bank shows that defining the inflation target in terms of inflation excluding some price categories which are highly volatile and beyond the direct impact of monetary policy may be insufficient to ensure meeting the inflation target. A strong unexpected shock in one of non-excluded categories may result in inflation running outside the target. At the same time, eliminating all categories of prices with significant volatility may lead to an excessive narrowing of the inflation measure and undermining the capacity of the monetary policy to influence inflation expectations. As a consequence, it seems more justified to define the target in terms of headline CPI inflation and conduct monetary policy under flexible inflation targeting.

[113] Already back in 2015, i.e. when foreign exchange interventions were still moderate, the CNB recorded a negative financial result driven primarily by a loss on currency operations.

Introducing a set of escape clauses by the central bank may strengthen the credibility of the inflation target, since it enables to clarify the lack of monetary policy response to inflation deviations from the target resulting from certain types of shocks. However, difficulties related to foreseeing all relevant escape clauses support the idea of indicating types of shocks which do not justify the adjustment of the monetary policy in a rather general way.

3.6. Sweden – changing the definition of the inflation target

In May 2010, the Bank of Sweden (Riksbank) decided to modify its definition of the inflation target by removing the band of deviations from the target. Thereby, the Bank changed its definition of the inflation target from a point target with the band for deviations (2% +/- 1 percentage point) to a point target (2%). The modification was minor, particularly taking into consideration that the Riksbank had emphasised the 2%-level of its inflation target ever since it started applying an inflation targeting framework. However, the change occurred amid strong turbulences in the financial markets and heavy movements in commodity prices translating into a significant volatility of inflation. Under such circumstances the modification could have posed a risk of overinterpretation. Interestingly, in September 2017, the Bank of Sweden reintroduced the band for deviations of +/- 1 percentage point to its definition of the inflation target.

3.6.1. The role of the band for deviations from the inflation target

Since 1995, the Bank of Sweden has been pursuing its monetary policy under an inflation targeting regime. When introducing the new strategy, the Bank defined its target as stabilising the CPI inflation at 2% +/- 1 percentage point. The use of the band for deviations was motivated by the Riksbank as an explicit indication that inflation deviations from the point target are probable, but the Bank would aim at limiting them.

When modifying the definition of its inflation target in 2010, the Bank assessed that after years of experiences with an inflation targeting regime, the public understood that monetary policy was conducted under uncertainty and inflation might deviate from the target even by more than 1 percentage point. At the same time, the Bank of Sweden has repeatedly emphasised that it applied an inflation targeting framework in its flexible version which implies that transitional deviations of inflation from the target could be acceptable if they are conducive to stabilising output and employment (Box 16; Riksbank, 2010c, 2011a).

The Bank also referred to inflation expectations of economic agents and, in particular, whether deviations of inflation from the target influenced the credibility of the target. The Riksbank noted that since the introduction of an inflation targeting regime until 2010, in approximately half of the cases when the CPI deviated from the 2% the deviation was exceeding 1 percentage point. However, according to the Riksbank, this did not undermine the trust in the inflation target (Riksbank, 2010c).

When explaining its decision to adopt the point target, the Riskbank also indicated that it performed regular assessments of inflation developments in relation to the target in the *Monetary Policy Reports*, irrespective of whether inflation was within the band for deviations or exceeded it. As a consequence, the Bank of Sweden considered that the removal of the band for deviation from the definition of the inflation target would not have a bearing neither on the conduct, nor on the communication of monetary policy (Grostal *et al.*, 2011).

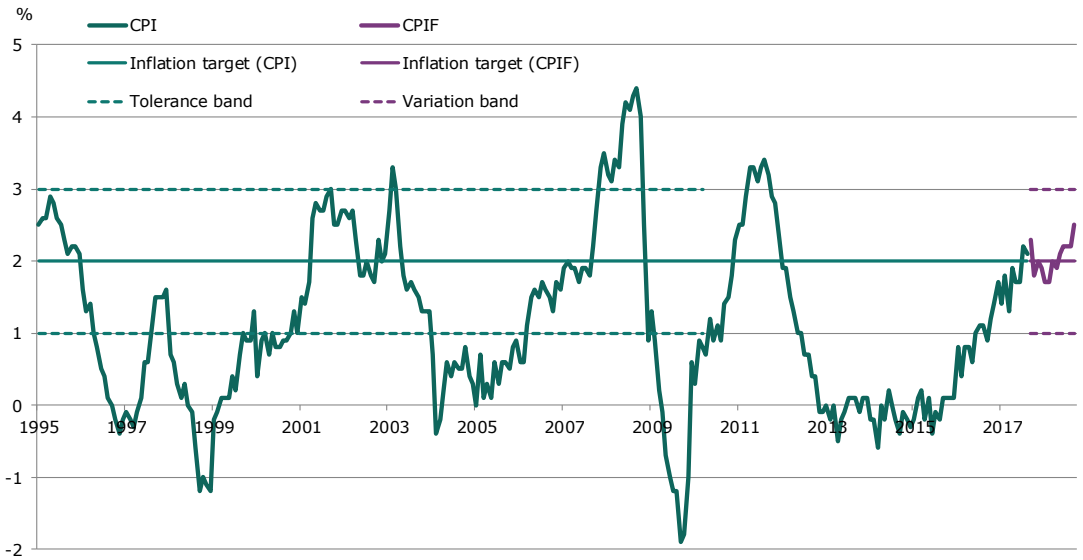
Although the modification of the target introduced by the Riksbank was minor, it took place when inflation was very volatile, which could pose the risk of overinterpretation. On the one hand, the public could have read it as an attempt to anchor inflation expectations at the 2%-level more strongly. On the other hand, abandoning the band of +/- 1 percentage point which has been often exceeded since mid-2007, could have been seen as a signal of a greater tolerance for larger deviations of inflation from the 2%. This, in turn, might have undermined the anchoring of inflation expectations.

3.6.2. Reasons behind the decision to remove the band in Sweden

The decision to remove the band for deviations from the inflation target was preceded by a period of the highest volatility of inflation since the introduction of inflation targeting by Sweden. In 2007 Q3, the CPI index exceeded the upper limit of the tolerance band, for the first time since the adoption of an inflation targeting

framework, and remained at the elevated level over the next 4 quarters (Figure 30).[114] Acceleration in inflation followed from significant increases in food and energy prices in the global markets (Riksbank, 2009). In turn, in 2008 Q4 a rapid decline in CPI inflation started, which continued throughout most of 2009. The fall in inflation, apart from base effects, resulted from the pronounced consequences of the global financial crisis and a sharp drop in the world commodity prices in this period (Riksbank, 2009). Since 2009 Q4 until the announcement of the decision to eliminate the band for deviations, inflation in Sweden was again on the rise.

Figure 30. CPI and CPIF inflation and the inflation target in Sweden



Source: Own calculations based on Bloomberg data.

High volatility of inflation could have had some impact on the Riksbank's decision to modify the inflation target, although high reputation of the Bank reduced a risk that its credibility would be threatened for that reason. This was confirmed by firmly anchored inflation expectations at low levels (Figure 31; Figure 32).

Following the modification of the inflation target definition introduced in May 2010, the CPI inflation in Sweden has been somewhat less volatile than in the preceding

[114] Previously, only in 2001Q3, the CPI inflation amounted to 3.02%, thus, it reached a level marginally above the upper limit of the band for deviations from the target.

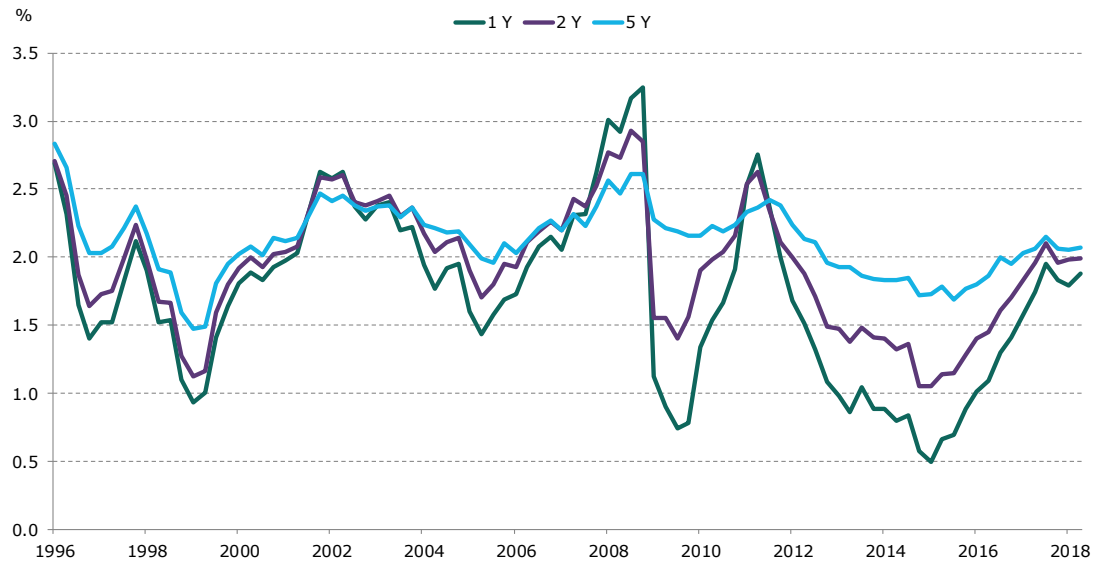
period. However, given the heavily changed external conditions, which largely determined inflation processes in many countries at that time, it is difficult to make any comparisons of the effectiveness of the Riksbank's monetary policy before and after 2010 only on that ground.

Figure 31. Inflation expectations for 2009 as of in 2007 (left panel) and inflation expectations for 2010 as of in 2008 (right panel)

Source: Riksbank, 2008; 2009.

According to the Riksbank's assessment, inflation expectations were well anchored before the Bank decided to modify the inflation target definition (Riksbank 2008; 2009), even though they increased slightly with the rise in inflation in 2007 (Figure 31). Similarly, after the removal of the band, inflation expectations remained on average close to the target, although – particularly in the case of inflation expectations in the one- and two-year horizons – they were somewhat more adaptive to the past inflation (Figure 32). By 2015 inflation expectations declined significantly, which could indicate the lack of confidence in the Bank's ability to stimulate the economy and inflation, amid highly unfavourable external economic conditions. The Riksbank responded to those developments with lowering interest rates to negative territory and announcing purchases of Swedish government bonds in early 2015, which supported the increase of expected inflation. Nevertheless, given the strength of shocks affecting the Swedish economy, long-term expectations deviated from the Riksbank's inflation target only slightly throughout the entire analysed period.

Figure 32. Inflation expectations in Sweden in a one-year, two-year and three-year horizons



Source: Own compilation based on data of the Riksbank.

Thus, it seems that the modification of the inflation target introduced by the Riksbank in mid-2010 was not interpreted by the public as a change to the conduct of its monetary policy, especially since the Bank has always stressed that it applies inflation targeting in its flexible version, i.e. accepting temporal deviations of inflation from the target, unless they pose a threat to the medium-term price stability (Box 15).

However, in late 2017, the Bank of Sweden decided to reintroduce the band for deviations of +/- 1 percentage point to its definition of the inflation target.[115] The Bank pointed to the need to illustrate in a simple way that monetary policy cannot fully control inflation and keep it at a given level, and that deviations of inflation from the target are unavoidable. While explaining the reasons for adopting +/- 1 percentage point band, the Riskbank noted that three-quarters of the monthly inflation outcomes in the period since mid-1995 until mid-2017 were within the range of 1-3%. At the

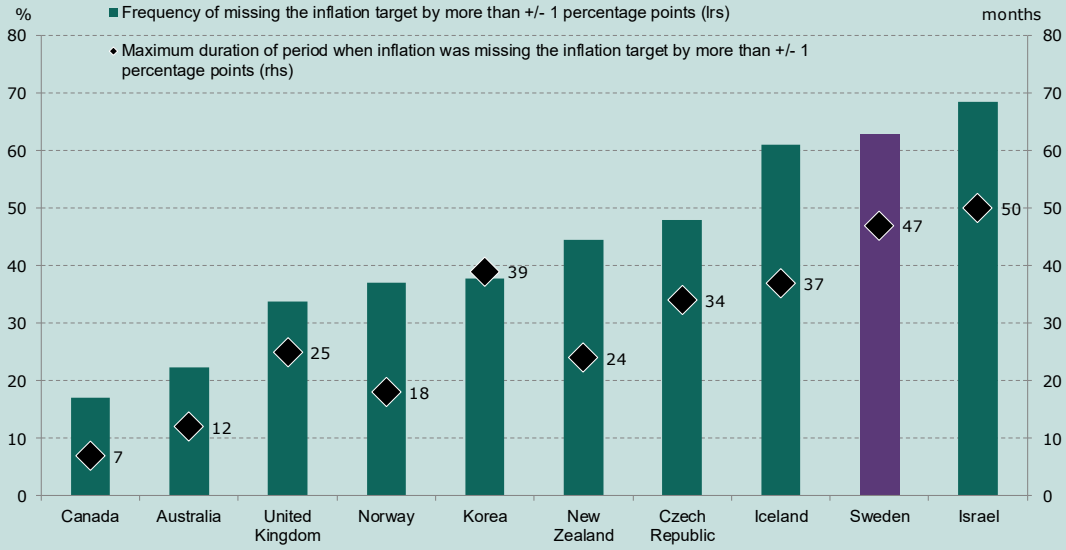
[115] At the same time, the Bank changed the inflation measure to which the target referred to – substituting the CPI inflation with the CPIF measure (the consumer price index with a fixed interest rate).

same time, it was communicated that the width of the band may need to be reviewed in the future if, for example, inflation becomes more stable than it was historically. The Bank also emphasised that the change in the inflation target definition did not affect the formulation of monetary policy.

Box 16: Flexibility of the Bank of Sweden monetary policy framework

When discussing Riksbank policy, it is worth noticing that its monetary policy framework has been very flexible. The Bank has been allowing temporary deviations of inflation from the target in order to strive for output and employment stabilisation, or to protect financial system stability by applying a *leaning against the wind* approach (Riksbank, 2010c, 2011a).

Figure 33. Inflation outturns against the target in advanced economies pursuing inflation targeting in the period January 2004 - July 2018*



Source: Own calculations based on Bloomberg data.

* For countries with inflation target range, its central value was taken as a target.

This is apparent when looking at the frequency of inflation remaining outside the band for deviations (to enable the comparability of the results between countries a band width of +/- 1 percentage point for all examined economies is applied), as well as the maximum length of the period (i.e. the number of months) during which inflation remained outside the band in Sweden and in other inflation targeting advanced economies. Over the past 15 years, both indicators have been higher in Sweden than in most of other countries (Figure 33).

At the same time, a firm anchoring of inflation expectations – particularly long-term ones – at the inflation target indicates that flexibility of the Riksbank monetary policy has not significantly undermined its credibility.

3.6.3. Inflation target in communication policy of the Bank of Sweden

In its communication policy the Riksbank referred to 2% (i.e. the mid-point of the target), also prior to the modification of the inflation target definition. This was visible, in particular, in the way the Bank explained its decisions on interest rates and reasons behind inflation deviating from the target. The band for deviations was included in the target definition only to draw attention to the fact that the central bank is not always able to achieve the level of the target. In addition, the band was intended to show that excessive or prolonged deviations of inflation from the target cannot be tolerated if the target is to be reliable (Riksbank, 2009).

The change of the target definition to a point target and later again to a point target with fluctuation bands did not introduce significant modifications in the Riksbank communication policy. The press notices after the decision-making meetings in the part mentioning the target remained the same.[116] Similarly, the comparison of other documents of the Riksbank, including *Minutes* and annual reports, allows for concluding that the Bank has not changed the way of communicating its inflation target.

[116] For example, in the press notice of April 2009 (i.e. prior to the modification of the inflation target of 2010), the Riksbank justified the reduction of interest rates as follows: "*The Executive Board of the Riksbank has decided to cut the repo rate (…) to dampen the fall in production and employment and to attain the inflation target of 2 per cent*". In December 2011 (thus after the modification of the target definition in 2010), the interest rate path of the Riksbank was explained in the following way: "*Such a repo-rate path will gradually stabilise inflation around 2 per cent and resource utilisation in the economy around a normal level*". In February 2018 (i.e. after the latest modification of the target definition in 2017) the Riksbank stated: "*Economic activity in Sweden is strong and inflation is close to the target of 2 per cent. But the forecast for inflation in the coming year has been revised down slightly. Monetary policy needs to remain expansionary for inflation to stabilise close to the target going forward*."

Box 17: Role of financial stability in monetary policy of the Bank of Sweden

In Sweden, several institutions, including the ministry of finance and the financial supervision authority, are responsible for the stability of the financial system. The Riksbank should also undertake measures aimed at safeguarding financial stability, since – besides maintaining price stability – its mandate also comprises ensuring safe and efficient payment system.[117]

Swedish economic authorities became particularly interested in the financial stability issues after the banking crisis at the beginning of the 1990s.[118] At that time, the Bank of Sweden launched ongoing monitoring of the financial system and in 1997 – as the first central bank in the world – started to regularly prepare *Financial Stability Reports*. Moreover, in 2006 – also as the first central bank in the world – the Riksbank published results of its stress tests for banks.

Despite those measures, the Bank of Sweden failed to prevent the renewed excessive rise of private sector's debt, most likely fuelling another bubble in the real estate market.[119] The private sector's debt as of 2018 Q3 was close to 250% of GDP, with enterprise debt approaching 160% of GDP and household debt being almost at 90% of GDP.[120] In May 2012, the European Commission officially

[117] In particular – under crisis circumstances – the Riksbank may act as the lender of last resort, providing banks with temporary liquidity support.

[118] The de-regulation in the banking sector conducted at the beginning of the 1980s is considered to be the main source of the crisis. At that time, limits related to granting loans were waived, creating conditions for excessive lending growth. The loans financed investment in real estate and equity, which led to creating a bubble in the asset markets. The burst of the bubble in 1991, triggered, in particular, by the rise in real interest rates (following raising nominal interest rates by the Riksbank in response to recurring speculative attacks on the exchange rate of the Swedish krona under the ERM), translated into considerable losses of the banking sector. Stabilising the situation in the banking sector required the intervention of the government which, among others, introduced the system of guarantees for deposits and liabilities of the banking sector (Jonung, 2009; Kohlbacher, 2009).

[119] At the time of the global financial crisis, the Riksbank openly admitted that it had not foreseen it. It was particularly visible in the decision on raising interest rates taken on 4 September 2008, accompanied by the announcement of the further monetary policy tightening (Riksbank 2008b; Oberg, 2011). After the bankruptcy of Lehman Brothers interest rates were decreased, and the Riksbank had to radically revise its earlier announced interest rate path for the consecutive quarters (Riksbank 2013c).

[120] Corporate debt temporarily declined from above 100% of GDP in 1992 to around 85% of GDP as a consequence of deleveraging after the crisis at the beginning of the 1990s. Similarly, household debt fell from the level exceeding 60% of GDP at the beginning of the 1990s to approximately 45% of GDP after the crisis. However, currently the indebtedness of both sectors is again high. In the case of corporate debt the problem is slightly less worrisome as its major part is loans within capital groups that are characterised by lower risk.

confirmed the existence of macroeconomic imbalances in Sweden, and it has sustained this assessment in subsequent years (EC, 2012a).

The Riksbank has been aware of the problem and has tried to apply the *leaning against the wind* approach. This was noted, in particular, in the report evaluating the Riksbank monetary policy in the years 1995-2005 (Giavazzi, Mishkin, 2006), where it was indicated that – exactly due to concerns regarding debt and real estate prices – since autumn 2003 the Bank had conducted a more restrictive monetary policy than justified in terms of stabilising consumer inflation at the target. In their assessment, Giavazzi and Mishkin (2006) stated that such policy made identifying the central bank's response function more difficult. They argued that the Riksbank decisions could have been interpreted as aiming at achieving additional targets related to private sector debt and real estate prices. The uncertainty about the role of those additional variables could have contributed to quite frequent misinterpretation of the Riksbank announcements by market analysts (between mid-2010 and late 2013 16.5% of economists incorrectly read signals sent by the Riksbank, whereas in the same period, the equivalent indicator for the ECB reached only 8.2%; Carlstrom, 2013).

The moderate scale of monetary policy easing introduced by the Riksbank since 2012 implies that the Bank still tries to counteract growing imbalances, at the expense of extending the period of bringing inflation back to the target and maintaining lower production and higher unemployment.[121] However, the impact of monetary policy on debt levels seems to be limited. As the EC indicates (2013), regulatory tools are more effective in affecting the propensity of the private sector to incur debt. For example, households in Sweden may deduct the whole cost of mortgage loan instalments from their capital income. Also enterprises may deduct costs of loans from their tax, which, combined with a relatively high tax rate in Sweden, creates clear incentives for Swedish firms to increase substantial their debt.

[121] The disagreement on an adequate response of the Bank to excessive growth of debt and fuelling the bubble on the asset markets, was the reason for resignation of L.E.O. Svensson from running for the next term as the Deputy Governor of Riksbank in May 2013 (Riksbank, 2013a). According to Svensson monetary policy should be focused solely on achieving the inflation target while minimising fluctuations in output and employment. In his opinion, reduction of the debt level should be handled by the financial supervision authority which has instruments more suited for that purpose (Svensson, 2013b). However, the majority of other members of the MPC supported the *leaning against the wind* approach. They argued that despite inflation remaining close to 0% for several quarters monetary policy should not be excessively expansionary in order to counteract imbalances in the economy.

3.6.4. Conclusions from the experiences of the Bank of Sweden

The Riksbank resignation from the band for deviations in the definition of the inflation target, and it subsequent reintroduction seem not to have affected its monetary policy. In particular, it did not change the communication strategy of the Bank, which continues to explain the reasons of inflation deviating from the target understood as 2%.

When assessing the strength of anchoring of inflation expectations, it should be kept in mind that the Riksbank resigned from the band for deviations amid strong turbulences in the global markets (associated with the global financial crisis) that calmed down significantly at the time when the band of deviations was reintroduced. Therefore, more volatile inflation expectations in Sweden between 2009 and 2018 – especially in the horizon of 1-2 years – have been linked to external factors and major changes in domestic economic activity rather than to the Bank's definition of the inflation target. It is worth stressing that the longer-term expectations – in a 3 year horizon – have remained close to the inflation target of 2%, despite substantial fluctuations of the inflation rate.

Moreover, the example of Sweden suggests that the *leaning against the wind* approach may not be effective, if regulatory issues have a greater impact on the private sector's incentives to take up loans than borrowing cost. At the same time, the Bank's decisions compliant with the *leaning against the wind* approach may be understood as extending monetary authorities' objectives by including those related to limiting the private sector debt and curbing real estate prices. This may jeopardise the identification of the monetary authorities' response function, with negative consequences for the predictability of the Bank's decisions.

3.7. Korea – changes in the definition of inflation target

The Bank of Korea (BK) adopted inflation targeting in April 1998. During the 15 years of its implementation, the Bank modified the definition of its inflation target on several occasions. The changes involved manipulations of the target level, the width of the band, changing target horizon and target type, as well as altering the inflation measure to which the target refers to.

3.7.1. Modifying the inflation target in Korea

In April 1998, in line with the amended *Bank of Korea Act*, the Bank of Korea officially adopted an inflation targeting regime. At that time, the target was set for 1998 as CPI inflation at the level of 9%.[122] The choice of the CPI index was motivated by its wide recognition among the public, and its consistency with inflation forecasts published by the government in cooperation with the IMF (BK, 2013b)[123]. In the next year, amid a sharp decline in inflation associated with the waning effects of the earlier considerable exchange rate depreciation following the Asian crisis, the inflation target was lowered to 3%+/- 1 percentage point. Since then, up until 2016, the target had remained at a level close to 3%, and it has been lowered to 2% only starting from 2016. However, apart from that change, over the last 20 years the Bank introduced quite many modifications of the target definition (Figure 34; Table 1).

The changes in the definition of the target in Korea involved its level (over most of the period it was close to 2-3%), the index it referred to (CPI or core inflation), target type (point target with a band for deviations or band target), the width of the band (a narrower or broader band), and the horizon of the target (annual targets or 3-year targets). Thus, basically all elements of the target definition have been modified.

[122] The Bank of Korea was to set the target with an annual horizon, in agreement with the government.
[123] The government forecast referred to changes in the CPI index.

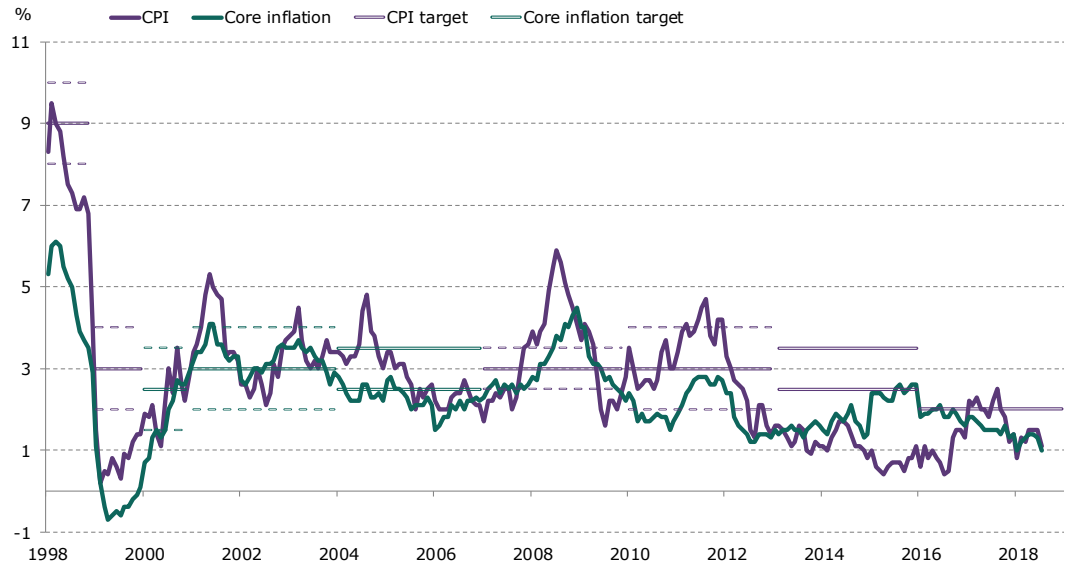
Table 1. Inflation targets of the Bank of Korea

	1998	1999	2000	2001-2003	2004-2006	2007-2009	2010-2012	2013-2015	Since 2016
Inflation measure	CPI	CPI	core	core	core	CPI	CPI	CPI	CPI
Upper limit of the band	10%	4%	3.5%	4%	3.5%	3.5%	4%	3.5%	-
Point target	9%	3%	2.5%	3%	-	3%	3%	-	2%
Lower limit of the band	8%	2%	1.5%	2%	2.5%	2.5%	2%	2.5%	-
Target type	Point	Point	Point	Point	Range	Point	Point	Range	Point
Band width	+/-1 p.p.	+/-1 p.p.	+/-1 p.p.	+/-1 p.p.	-	+/-0.5 p.p.	+/-1 p.p.	-	-
Target horizon	annual	annual	annual	annual	3-year	3-year	3-year	3-year	3-year

Source: Own compilation based on data of the Bank of Korea.

Importantly, over the analysed period, the Bank many times returned to the solutions that it had used previously. For instance, it had given up CPI inflation as a target measure in favour of core inflation that it considered to be a better choice, but later it reverted to the CPI index. Similarly, it switched between the point target with tolerance band and the target range several times.

Figure 34. CPI and core inflation against inflation targets



Source: Own compilation based on data of the Bank of Korea.

The analysis of the documents motivating the modifications introduced to the definitions of the inflation target indicates that the perception of the Bank changed significantly from year to year. In some periods the BK stressed primarily its commitment to the efforts aimed at anchoring inflation expectations, while in other periods it emphasised the need for flexibility in the conduct of monetary policy. In addition, the adjustments of the target often resulted from current macroeconomic conditions and the expected developments in inflation in the subsequent quarters.

The changes in the inflation target definition were justified as follows:

- In 2000, the lowering of the inflation target (to 2.5% +/- 1 percentage point) was accompanied by a change in the targeted measure – the target was to be expressed from then on in terms of core inflation. The selected core inflation indicator excluded changes in prices of fuel and some agricultural products. The main argument for excluding those prices was an observation that they exhibited significant short-term fluctuations triggered by factors largely independent from the domestic monetary policy (BK, 2003).
- The inflation target for 2001 was raised slightly: to 3% +/- 1 percentage point. The raising of the target was motivated by the expected increase in core inflation resulting from the increases in administered prices and the Korean won depreciation (BK, 2003).
- In 2002-2003 annual inflation targets were kept unchanged.
- In 2004, the Bank extended the inflation target horizon to 3 years, arguing that a mid-term inflation target was consistent with the lags in the monetary policy transmission mechanism, and ensured the flexibility in response to temporary shocks (BK, 2004).[124] Moreover, the inflation target for 2004-2006 was set in the form of a target range (2.5-3.5%), as opposed to the point target with a band for deviations applied in previous years. This change of the target definition was

[124] This change was possible due to the amendment to the *Bank of Korea Act*, which removed the provision requiring setting the inflation target on an annual basis.

explained by indicating that the inflation rate consistent with maintaining macroeconomic stability was "*around 3%*", and noting that projected inflation would remain at that level in the horizon of the next 2-3 years (BK, 2004a). At the same time, the target range for the years 2004-2006 was narrower than the bands for deviations set earlier. According to the Bank, limiting the width of the range was to contribute to curbing price volatility and enable delivering mid- and long-term price stability (BK, 2013b).

- In 2007, the Bank again brought its strategy closer to the practice of other central banks, by abandoning the target expressed in terms of core inflation in favour of the CPI index. The main argument supporting this decision was the fact that changes in core inflation indicator deviated from changes in the cost of living perceived by the public. As a consequence, monetary policy aimed at stabilising core inflation could have been inconsistent with the expectations of the public, and thus undermine the credibility of Bank's decisions (Kim, Kim, 2009). At the same time, the target for the period 2007-2009 was defined again as a point target with a fluctuation band (3% +/-0.5 percentage points). It meant that the change in the targeted inflation measure (characterised by higher volatility) was not accompanied by widening of the band for deviations. Compared to other central banks pursuing an inflation targeting strategy, the band for deviations specified by the Bank of Korea was narrow (Box 17). Setting the narrow tolerance band could have been associated with the longer target horizon, since the target was supposed to be evaluated based on comparing the 3-year average of the annual CPI inflation with the target (and not annual inflation levels; BK, 2007). Therefore, the impact of short-term inflation fluctuations on meeting the inflation target was substantially limited. Simultaneously, the departure from setting the target range and maintaining the narrow band for deviations were intended to facilitate anchoring of inflation expectations and, consequently, curb inflation volatility (BK, 2006). However, the decision of the Bank turned out ineffective, since the volatility of CPI inflation in a 3-year horizon (2004-2006)

was higher in Korea than in countries applying a broader band for deviations (Sweden, Canada, New Zealand, the Czech Republic or Mexico).

- High inflation volatility in the years 2007-2009 resulted in inflation rate remaining outside the band for a large part of that period (30 of 36 months). This prompted the Bank to modify the inflation target again. While maintaining the target level (at 3%) for the years 2010-2012, the Bank extended the tolerance band to +/- 1 percentage point. The argument for this decision was that amid elevated inflation volatility, setting a narrow fluctuations band could restrict the scope for the Bank's policy decisions (BK, 2010). The extension was supposed to ensure greater flexibility of monetary policy response to transitional changes in the price level and allow monetary authorities to focus on inflation developments in mid- and long-term horizons (BK, 2010). The widening of the band was also justified by the change in the process of evaluating the Bank's policy, which since 2010 has been performed on an annual basis. The BK stressed, however, that it would still be focused on maintaining inflation at a level close to 3% (BK after Wall Street Journal, 2009)[125].
- When setting the target for the years 2013-2015, the Bank once again switched to the quite narrow target band. This step was supposed to help anchoring inflation expectations. It was also associated with the expected decline in inflation volatility, and the efforts to increase democratic accountability of the Bank of Korea (BK, 2013a). Reintroducing the target range (of 2.5-3.5%) was motivated by the uncertainty regarding the rate of inflation consistent with fundamentals. Moreover, according to the Bank, such definition of the target provided greater flexibility of monetary authorities in response to shocks (BK, 2013a).

[125] However, part of financial institutions assessed that the extension of the band would lengthen the period of keeping Bank's interest rates at historically low levels and force their subsequent fast increases in order to reduce inflation expectations and curb the growth in prices of financial assets (Nomura, 2009).

- In 2016 the Bank lowered the target (to 2%) and decided to use a simple point target, without any tolerance bands.

Box 18: Point *vs.* band targets

Central banks implementing an inflation targeting regime differ from each other, in particular, in the way they define the target. Inflation targeters may express their inflation targets either as a point – with or without a band for deviations – or as a range.

The conducted review shows that slightly more than half of the inflation targeting central banks opted for a point target with fluctuation band (23 out of 41 banks), 13 banks for a point target with no band for deviations, and 5 banks for a target range. Such a distribution of choices stems from the fact that although the point target allows for a precise indication of the desired inflation level – the lack of the full control of monetary policy over inflation developments, and the resulting inability to permanently maintain the inflation rate at the target level – suggests that the point target with fluctuation band seems to be the most appropriate option (Hammond, 2012).

In the case of the point target with fluctuation band, the width of this band is a significant parameter. On the one hand, the use of a narrower band may be perceived by economic agents as a stronger commitment to ensure price stability, which should facilitate the anchoring of inflation expectations (Schaechter *et al.*, 2000). However, on the other hand, a narrow band may result in more frequent deviations of inflation from the target that would be outside the band, which – in turn – may negatively affect the anchoring of inflation expectations[126]. Moreover, a narrow band may incline the central bank to react even to short-term fluctuations in prices, which would increase interest rates volatility and have a destabilising impact on the economy and financial markets (Debelle, 1997).

According to Schaechter *et al.* (2000), the optimum width of the band should be therefore determined by the frequency and strength of price shocks hitting the given economy and the credibility of the central bank. The analysis by Horvath and Mateju (2011) confirms that the width of the band is positively correlated with inflation volatility. In particular, central banks of emerging market countries – characterised by greater volatility of macroeconomic conditions and probably

[126] Adverse effects of inflation remaining outside the band may be, however, limited in the case of banks with the established credibility.

lower credibility of central banks – tend to adopt wider bands than central banks in advanced countries.

As of 2018, in the majority of inflation targeters using point targets with fluctuation bands, the width of the band was +/- 1 percentage point. This is the case in 13 inflation targeters, while the others are using somewhat wider bands (of either +/- 1.5 percentage points, or +/- 2 percentage points).[127]

3.7.2. Frequent changes of the target and inflation developments in Korea

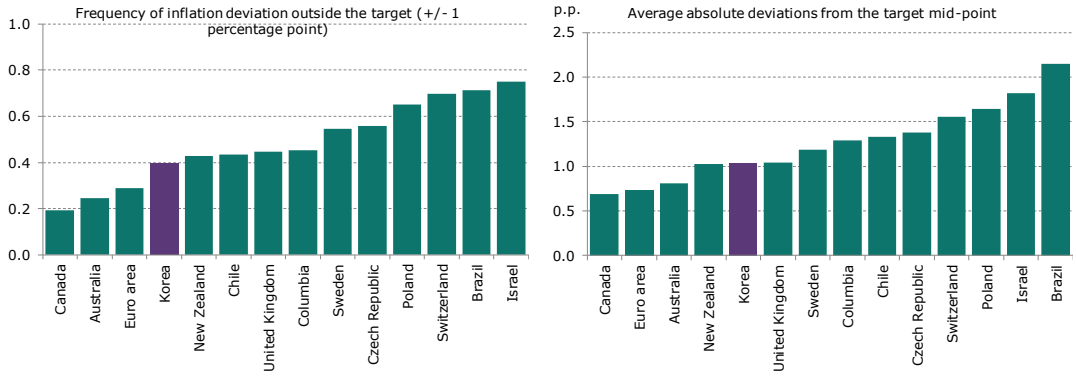
In the years 1999-2018, the CPI index and core inflation displayed similar average values (2.5% and 2.2%, respectively), whereas volatility of the two measures was higher for headline inflation (standard deviation amounted to 1.2 and 0.9, respectively). As a consequence, if the inflation target would refer to the CPI index throughout the whole period, the frequency of inflation deviations from the target would be higher than compared with a situation when the target would be expressed in terms of core inflation measure. If a standard +/- 1 percentage point width of the fluctuation band would be applied, inflation would remain outside the band in 40% of cases for the headline measure, while for core inflation this share would amount to 33%.

Overall, however, the numerous modifications of the inflation target introduced by the Bank of Korea did not significantly affect inflation developments in Korea. In particular, in the years 2004-2009, when the target was quite narrow (in 2004-2006 a target range of the width of 1 percentage point was used, and in 2007-2009 a point target with tolerance bands of +/- 0.5 percentage points), inflation remained outside the target for most of the time (in 65% of months in that period). Interestingly, in some countries declaring a target with tolerance bands of +/- 1 percentage points, inflation remained outside the band for similar or even higher number of months than was the case in Korea with a narrowly defined target (examples include Sweden,

[127] 5 banks using a point target with a band for deviations are apply a band of +/- 1.5 percentage points, and 5 are using a band of +/- 2 percentage points.

Iceland, Israel, Mexico, Philippines, Turkey).[128] It means that 2004-2009 was characterised by quite frequent inflation deviations from central banks' targets in a number of economies. Against this background, Korea – despite adopting a narrower band for deviations – did not diverge from other countries.[129]

Figure 35. Inflation outturns *vs.* inflation target in Korea and other inflation targeters

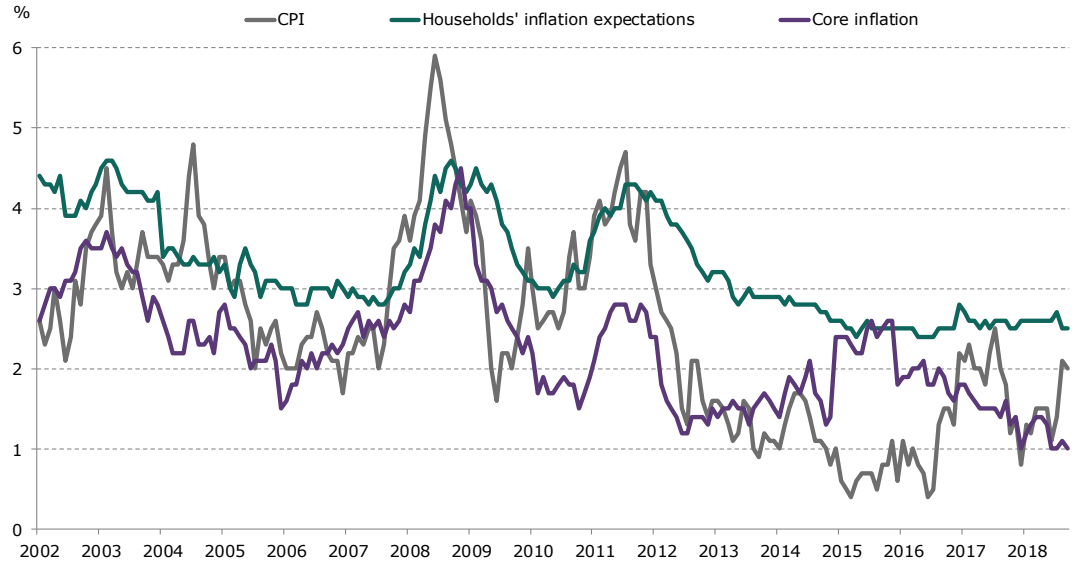


Source: Own calculations based on central banks' and Bloomberg data.
Notes: The period covered in the charts begins in 2004 and ends in mid-2018. The target is understood as a mid-point of the target.

Since 1999, despite a relatively high inflation volatility in Korea, the frequency of inflation deviations from the target has been close to average values for other inflation targeting countries.[130] At the same time, Korea demonstrated relatively low average absolute deviations of the inflation rate from the target (Figure 35).

[128] For other inflation targeters (except of Korea), the width of the bands was adopted as +/- 1 percentage point.
[129] If a standard width of the fluctuation bands would be applied (of +/- 1 percentage points), the frequency of deviations outside the target in Korea would drop to only 19% in that period.
[130] The comparison covers countries which officially started to implement an inflation targeting framework in 1999 or earlier and countries pursuing a regime similar to inflation targeting.

Figure 36. Inflation expectations of households and CPI inflation



Source: Own compilation based on data of the Bank of Korea.

In addition, the changes in the inflation target definition introduced by Korea did not significantly affect inflation expectations (Figure 36). The inflation expectations of households in Korea throughout the entire analysed period remained adaptive and showed downward rigidity, staying at a level close to the target (2.5-3%) even in periods of strong declines in the inflation rate.

Box 19: Macroprudential policy applied in Korea

The Bank of Korea is one of the central banks that for already some time before the global financial crisis placed great emphasis on financial stability issues. As a result of the Asian crisis of 1997, the need to introduce regulations directed towards limiting imbalances in the financial system was identified in Korea exceptionally early. Instruments used to accomplish this objective are currently considered as macroprudential policy tools.

Initially, actions undertaken by the Korean authorities were mainly aimed at enhancing the banking sector stability. On the one hand, a domestic currency liquidity ratio was introduced. On the other hand, in view of the sharp growth in banks' short-term debt in foreign currency in years preceding the recent crisis, the emphasis was put on regulations related to banks' operations in foreign currency. This led, among others, to introducing FX liquidity ratio (Lee, 2013).

In the subsequent years, the focus of regulators shifted towards the real estate market and mortgage loans. After the collapse of the real estate market in 1997-1998, house prices – amid sharply rising mortgage loans – were again growing rapidly.[131] In order to curb the rise in house prices, in 2002 the authorities introduced the requirements for the LTV ratio. This measure, as well as a number of other steps aimed at limiting housing demand (higher tax related to purchases of dwelling, more stringent administrative procedures) were, however, insufficient to hamper price growth in the real estate market (Lee, 2013). As a consequence, in 2005 the set of macroprudential regulations had to be expanded. At that time they referred to DTI ratio requirements.

In view of the dynamic growth of mortgage loans which was not accompanied by an equally fast increase in deposits, banks increasingly relied on short-term financing acquired in foreign currency (Bruno, Shin, 2013). In this way, the boom in the housing market contributed to the building-up of imbalances in the banking sector. However, the major factor boosting those imbalances was a sharp increase in the volume of forward FX transactions used by banks since 2005. The growth of banks' exposure to this type of instruments was associated with a strong demand from exporters and investment funds, who expected the Korean won to strengthen further. As a consequence, banks took the long position in foreign currency, while hedging their FX exposures by short-term FX loans (IMF, 2013b). The result was a significant mismatch of the FX and term structure of banks' assets and liabilities.

The risk involved in such a mismatch materialised during the global financial crisis in 2008. Since international markets became illiquid, banks found it difficult to roll over their debt. Their situation was additionally aggravated by the sharp depreciation of the Korean won which was raising the value of debt expressed in domestic currency. In response to considerable disturbances in financial markets, the authorities introduced a number of extraordinary measures: they provided financial institutions with liquidity in foreign currency, as well as granted guarantees for repayment of banks liabilities in foreign currency (Lee, 2013).

Simultaneously, the experience of the crisis encouraged the authorities to undertake measures striving to reduce the reliance of the banking system on wholesale funding in foreign currency. Restrictions were introduced on banks' exposures to FX derivatives, and additional fees were applied on banks' liabilities incurred in foreign currencies (Kim, 2013). The measures contributed to limiting

[131] The growth in mortgage loans was associated with the change in the strategy of banks which, after the 1997 crisis, increased the availability of loans for households at the expense of corporate loans (Kim, 2013).

the level of the banking sector debt in foreign currency (IMF, 2013b). Moreover, available research shows that these macroprudential policy instruments resulted in a lower sensitivity of capital flows to Korea to global factors (Bruno, Shin, 2013).

Following from those experiences, significant institutional changes were introduced in Korea in 2011. While price stability remained the main objective of the Bank of Korea, ensuring the financial stability was indicated as the second objective of the Bank.

3.7.3. Conclusions from the experiences of the Bank of Korea

The Bank of Korea modified the parameters of its inflation target multiple times. These changes related to the level of the target, the width of the fluctuation band, target type, target horizon, as well as the targeted inflation measure. However, these experiments seem not to have had a significant impact on inflation developments and the anchoring of inflation expectations in this country. The case of Korea may indicate that the way the target is defined may have a limited significance for the inflation outturns and inflation expectations.

In Korea, the need to undertake measures addressed at ensuring the financial stability with the use of macroprudential policy tools was recognised relatively early. Although the instruments introduced were relatively effective in mitigating a certain type of risks (e.g. they enabled gradual normalisation of the situation in the real estate market), they did not inhibit the growth of other imbalances in the financial system (e.g. the mismatch of the FX and term structure of assets and liabilities). The experience of Korea suggests that the macroeconomic policy should use an extensive set of instruments counteracting materialisation of various risks to the financial stability of the country.

3.8. United Kingdom – stimulating nominal GDP growth

The Bank of England (BoE) adopted an inflation targeting framework at the end of 1992. Since 2003, when the target of 2% was introduced, until late 2018, the average CPI inflation in the United Kingdom has been running at 2.3%, i.e. slightly above the target. Importantly, the BoE accepted long periods of elevated inflation. In particular, since December 2009 inflation remained persistently above the target for over 4 years. Although the BoE was emphasising its determination to achieve the target, it seemed that during the crisis the principal goal of monetary policy in the UK was to stabilise the financial system and stimulate nominal GDP growth amid recession or weak real GDP growth.

3.8.1. Inflation targeting in the United Kingdom

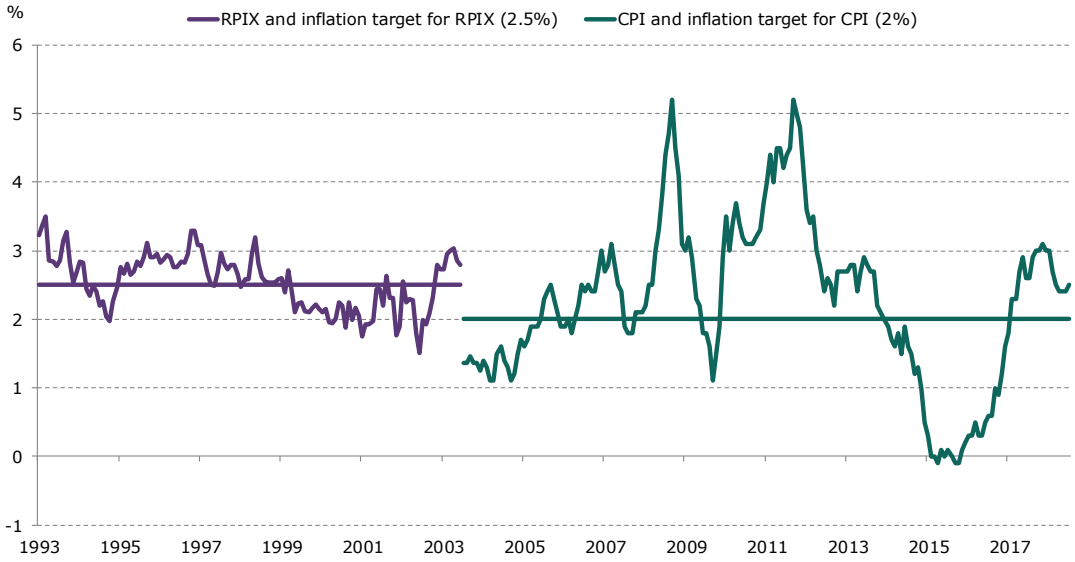
When announcing the adoption of inflation targeting in 1992, the BoE set the target at 2.5% in terms of the RPIX (Retail Prices Index), which excluded mortgage interest payments (Figure 37). In mid-2003, the BoE changed the target measure into the CPI index. It also lowered somewhat the level of the target, arguing that the 2% target in terms of CPI inflation was equivalent to the 2.8% RPIX inflation target (i.e. a lower CPI inflation target would correspond to a slightly higher RPIX target).[132]

Since December 2009, inflation remained permanently above the target for over 4 years (and, disregarding several months in mid-2009,[133] when the CPI temporarily declined below 2%, thus counting also a period of elevated inflation starting in mid-2008, inflation stayed above the target for about 6 years). Nevertheless, at that time, the Bank of England pursued highly expansionary monetary policy, keeping interest rates close to zero. Elevated inflation in those years resulted largely from a significant depreciation of the British pound in 2007-2008, as well as (in some sub-periods) from

[132] In the case of the United Kingdom, the CPI is equivalent to the HICP.
[133] The decrease in inflation in 2009 was associated with temporal reduction in VAT rates, weaker domestic demand and a decline in commodity prices in the world markets.

growing commodity prices in global markets and increases of taxes and administered prices.[134]

Figure 37. Inflation against the inflation target in the UK

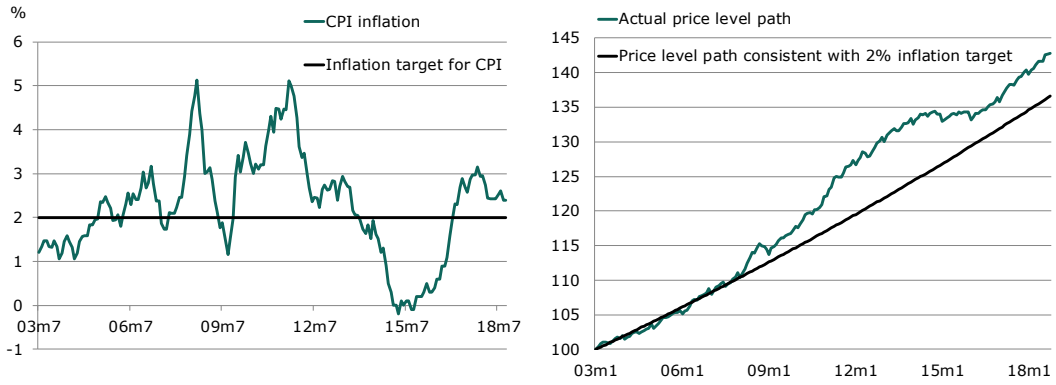


Source: Own compilation based on EcoWin data.

When analysing price developments in the United Kingdom, it can be seen that significant and – in most cases – upward deviations of inflation from the target led to a considerable upward shift of the price level path from the path determined by the 2% inflation target (Figure 38). An essential element of inflation targeting framework is to ignore past deviations of inflation from the target unless they trigger a permanent rise in inflation expectations. The UK example clearly shows that such an approach, in a situation when shocks affecting a given economy are all translating into higher inflation, may lead to a significant and persistent rise in the price level (which may be problematic in terms of curbing debt).

[134] Factors increasing inflation rate comprised: growing energy and food prices in the world markets and the depreciation of the British pound (2008-2009); increasing oil prices, the rise of VAT rates, the effect of earlier weakening of the exchange rate and a rise in administered prices (2010-2011).

Figure 38. Inflation and price level paths in the United Kingdom since the introduction of the CPI inflation target



Source: Own compilation based on data of the Bank of England.

The BoE was emphasising that its actions were aimed at meeting the inflation target in the medium term. However, given concerns regarding the stability of the financial system, the extended period of severe economic downturn and the high level of public sector debt, it seems that – at least temporarily in the aftermath of the global financial crisis – stimulating economic growth became the principal task of the Bank.

3.8.2. Banking crisis in the United Kingdom

Prior to the global financial crisis, basic macroeconomic indicators, including inflation, were conducive to keeping low nominal interest rates in the British economy. At the same time, global imbalances were building up. The environment of low interest rates contributed to investors' search for yield. This translated into a significant inflow of capital – mainly from emerging Asian economies – to the largest advanced countries, including the United Kingdom. It led to developing dependence of the UK banking system on wholesale financing and a high leverage of financial institutions. Those factors, combined with an increased complexity of financial instruments, hindering evaluation of banks' standing, led to a banking crisis (House of Commons Treasury Committee, 2009). In 2008-2009, many financial institutions in the United Kingdom faced the threat of bankruptcy.

At that time, assets of the British banks amounted to approximately 400% of Britain's GDP, while the financial sector generated about 10% of GDP and provided employment to approximately one million people (Carney, 2013). Thus, the threat to financial stability prompted the British government to launch a rescue package. As a part of this package, short-term loans and guarantees were granted and insolvent banks were partially nationalised[135] (Chancellor of the Exchequer, 2008d; 2008e; Wearden, 2008). The value of the package announced in October 2008 was approximately GBP 500 billion, i.e. about 35% of UK's GDP (of which GBP 50 billion – in two tranches – was spent for banks' recapitalisation by the government, GBP 250 billion – was used for State guarantees for interbank loans, whereas GBP 200 billion was offered as short-term loans from the BoE to banks under the Special Liquidity Scheme, SLS).

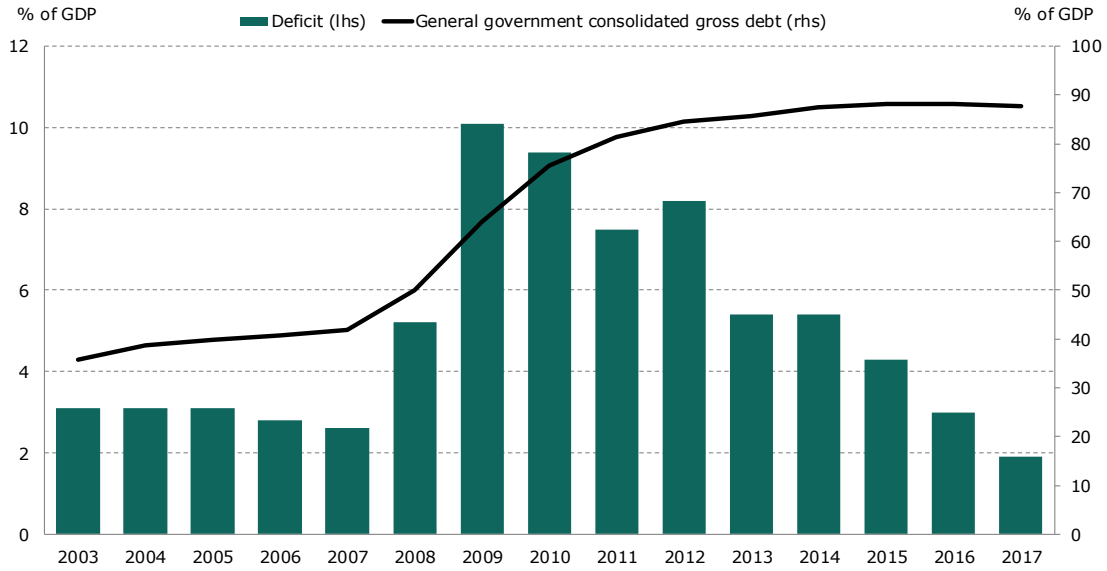
The announcement of the rescue package was aimed at restoring confidence in the banking system.[136] However, it also led to a significant increase in fiscal deficit and public debt in the United Kingdom (Figure 39). The central bank balance sheet also started to expand.

The United Kingdom is characterised by a high debt-to-GDP ratio. The financial sector accounts for a large part of the total debt in this economy owing to the role of the UK as the world's financial centre (Figure 40). Since the start of the banking crisis, public debt increased significantly, currently being close to 100% of GDP. Debt of households and non-financial corporations, in turn, initially declined and has been rather stable in recent years.

[135] The British government bought out, in whole or in part, the following banks: Bradford & Bingley, HBOS, Lloyds TSB, Northern Rock and Royal Bank of Scotland (House of Commons Treasury Committee, 2009).

[136] Simultaneously, as already noted, the collapse of Lehman Brothers encouraged major central banks worldwide to lower interest rates in a coordinated move. On 8 October 2008, interest rates were decreased by the ECB, the Fed, the Bank of England, the Swiss National Bank, the Bank of Canada and the Bank of Sweden (BoE, 2008). The monetary policy easing was also supported by the Bank of Japan.

Figure 39. Public finance sector deficit and debt in the United Kingdom



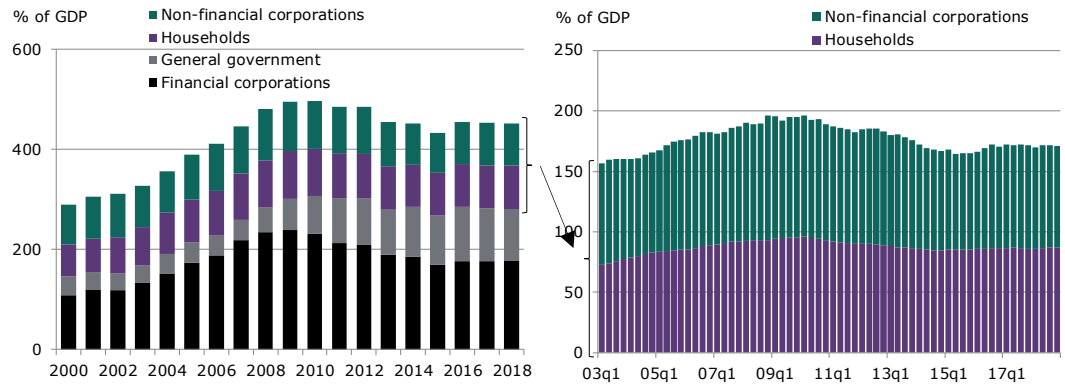
Source: Own compilation based on Ameco data.

In 2012, the European Commission identified imbalances in the British economy (EC, 2012b)[137] indicating that the level of household debt was too high, which, in conjunction with high real estate prices, might pose a threat to financial stability.[138] The Commission also highlighted the high and rising level of the public debt, while signalling that it positively evaluated the efforts of the government to reduce the debt and the public finance sector deficit.

Private sector deleveraging amid economic downturn involves high costs. When economic activity is weak, reducing the fiscal imbalance is also difficult. In this context, it seems that the British authorities in recent years have prioritised supporting economic recovery (particularly as the elevated inflation has had a mitigating effect on the burden of debt repayment).

[137] The main conclusions were repeated in subsequent EC reports, for example of 2013 (EC, 2013b).
[138] The EC also raised concerns about the loss of the competitiveness of the United Kingdom's exports.

Figure 40. Liabilities (debt securities and loans) of major sectors of the UK economy



Source: Own compilation based on Eurostat data.

3.8.3. The Bank of England response to the financial crisis

The global financial crisis contributed to an economic downturn and major strains in financial markets in the United Kingdom. This encouraged the BoE – whose mandate as of 2009 comprises ensuring both price and financial stability – to take a number of steps to provide liquidity to the banking sector.[139] Already at the end of 2007, operations providing longer term liquidity were launched[140], and in April 2008, a temporary liquidity programme was initiated, i.e. the Special Liquidity Scheme, which enabled a temporary exchange of illiquid high value securities for Treasury bills and was subsequently included in the rescue package (BoE, 2009a).[141] According to the BoE announcement, these measures were aimed at stabilising the situation in the banking sector and were not to affect monetary conditions.

[139] Pursuant to the *Bank of England Act* of 1998, amended in 2009, the Bank of England has two equivalent objectives: ensuring price stability and financial stability.
[140] Extended Collateral Term Repo Facility was to serve that purpose.
[141] The use of SLS was possible until 30 January 2009. The value of Treasury bonds borrowed under the SLS amounted to approximately GBP 185 billion. Starting from October 2008, the operating system of the Bank's monetary policy was extended by the Discount Window Facility (DWF) aimed at providing short-term liquidity in the case of idiosyncratic or systemic liquidity shock. As in the case of SLS, DWF allows to increase the liquidity of the asset portfolio through exchanging low liquidity securities to Treasury bills (Fisher, 2012).

In the initial phase of the crisis, the Bank restricted itself to conventional monetary policy measures. In response to a strong deterioration of economic outlook and heightened probability of inflation falling below the target in the medium term, it cut interest rates from 4.5% in October 2008 to 0.5% in March 2009. At the same time, the BoE expressed its concerns that given the observed and expected weak demand growth, the scale of monetary policy easing might be insufficient to meet the inflation target in the medium term. In view of the prevailing views that further lowering of interest rates might lead to undesirable economic effects,[142] the Bank decided to introduce an additional monetary policy tools – quantitative and credit easing. Under this approach, the Asset Purchase Facility was launched in 2009 (APF), the Funding for Lending Scheme in 2012 (FLS), and Corporate Bond Purchase Scheme in 2016 (CBPS). The BoE has stressed that those additional measures were a natural extension of its regular instruments, aimed at the accomplishment of its main objective, i.e. ensuring price stability (BoE, 2009b; Benford, 2009). Under the quantitative easing programmes, the BoE purchased assets equivalent to approximately 22% of GDP, predominantly in the form of the UK Treasury bonds.

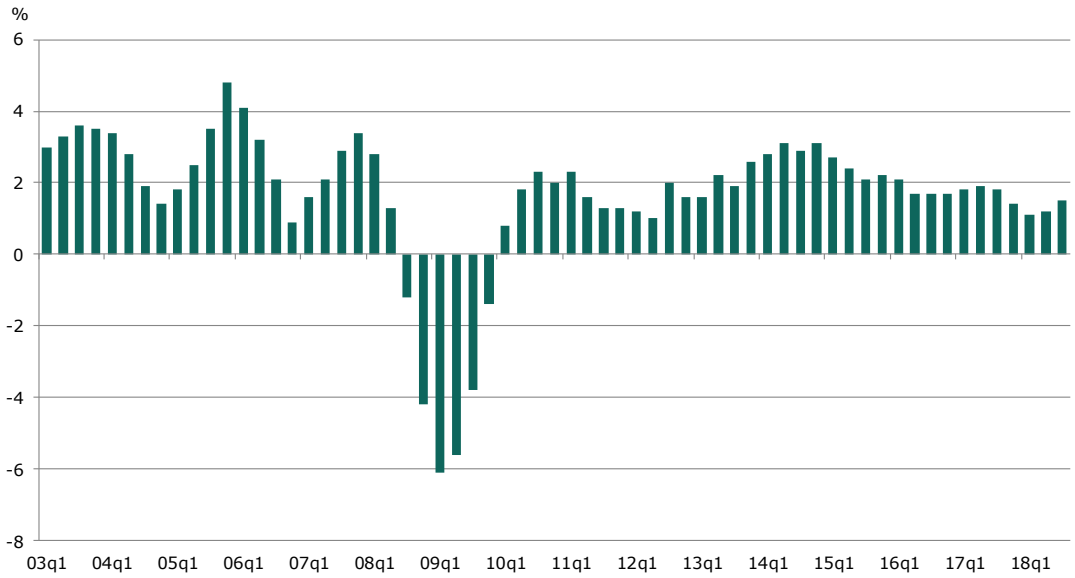
Also in the area of communication, the BoE has flexibly selected tools, while implementing inflation targeting. In particular in August 2013, the Bank introduced conditional forward guidance, announcing that it would keep interest rates at a level close to zero until a significant improvement in the labour market situation has taken place, unless such a policy should pose a risk to the stability of prices or the financial system. However, already in February 2014, in view of the unemployment rate approaching the threshold value, the Bank was forced to change its communication, and launched the next stage forward guidance, where decisions concerning monetary policy were be based on the analysis of a broad set of macroeconomic indicators (Box 4).

[142] Concerns were related to the adverse impact of too low interest rates on the banks' margins, which could translate into lower credit supply. In addition, a long period of negative interest rates could disrupt money market functioning (BoE, 2009b).

3.8.4. Communication of the Bank of England in the period of elevated inflation

In the aftermath of the global financial crisis, the United Kingdom experienced a deep recession (in the years 2008-2009; Figure 42), followed by a moderate recovery, which was supported by highly accommodative monetary policy (Figure 43). At the same time, until mid-2012 persistently elevated inflation posed a threat to the credibility of the BoE inflation target.

Figure 42. GDP growth



Source: Own compilation based on Eurostat data.

In open letters explaining the causes of inflation exceeding 3% in 2008, the BoE Governor – on behalf of the Monetary Policy Council (MPC) – indicated that increased inflation in that period resulted from temporary factors. Therefore, monetary policy that should remain focused on a medium term outlook for inflation, should not respond to them (BoE, 2008a; 2008b; 2008c; 2009; 2010a; 2010b; 2010c; 2010d).[143] In turn, when – following a temporary drop – the CPI started to rise sharply

[143] The Governor of the Bank of England is obliged to present causes of inflation deviating from the target in the letter to the Chancellor of the Exchequer, in cases when such deviation exceeds 1 percentage point.

again in 2011, after it had anyway stayed above the target for over a year, the Bank stressed that efforts to bring inflation back to the target quickly would entail an increase in output volatility (BoE, 2011a; 2011b; 2011c; 2011d; 2012). At the end of 2011 and at the beginning of 2012, when the inflation rate was close to 5%, the BoE Governor stated directly that "*the best contribution that monetary policy can make to high and stable levels of growth and employment is to respond flexibly and transparently to bring inflation back to target in the medium term*." (BoE, 2011d; 2012).

The Chancellor of the Exchequer accepted those explanations, stressing the support to the MPC forward looking monetary policy, as well as recognising that the adopted inflation targeting regime enabled disregarding temporary deviations of inflation from the target in current decision-making.[144] Starting from mid-2010, and particularly in 2011, the letters also indicated that the announced consolidation of fiscal policy would leave more room for expansionary monetary policy aimed at supporting economic activity (Chancellor of the Exchequer, 2010b; 2011a; 2011b; 2011c; 2011d). In mid-2011, i.e. when the inflation rate exceeded 5%, the Chancellor of the Exchequer additionally emphasised that he appreciated the MPC flexibility in response to the changing economic outlook.[145]

Thus, taking into account the stance of the Chancellor of the Exchequer on the issue, the BoE could put significant weight in its decisions on the need to support economic recovery, although in its communication it continued to stress the commitment to bring inflation back to the target over the medium term (BoE, 2009b; Benford *et al.*, 2009; Dale, 2010; Fisher, 2010; Bean, 2011). The reaffirmation of the Bank's commitment to delivering price stability was to prevent inflation expectations from

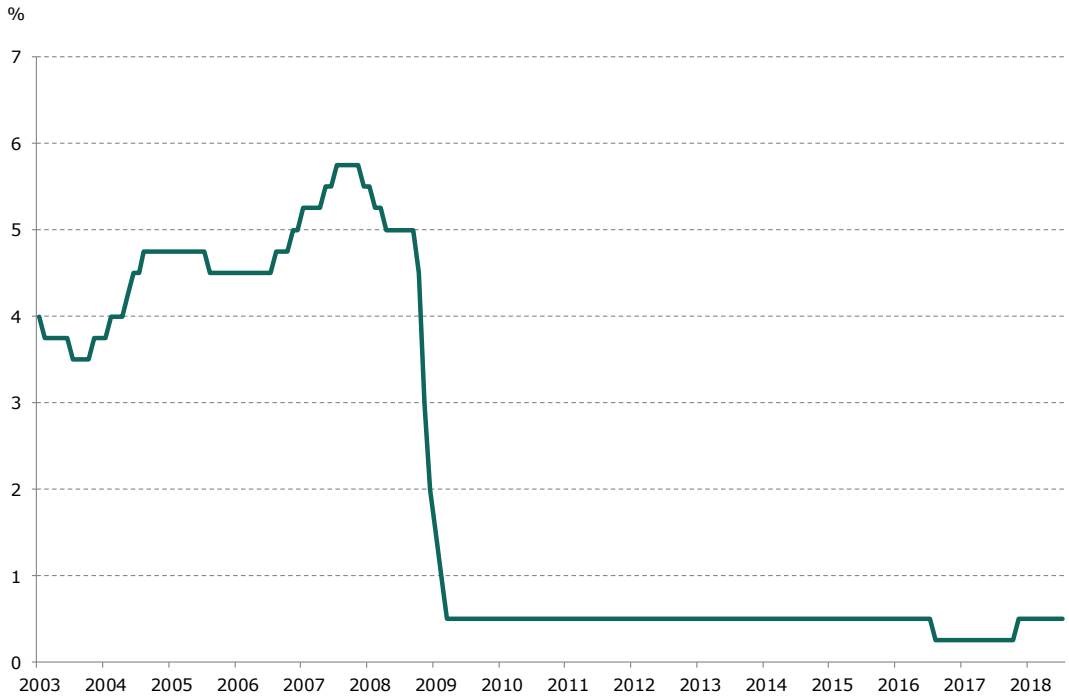
[144] „*I welcome the MPC's intention – as set out in your letter – to look through the temporary effects on inflation and focus on ensuring that inflation remains on track to meet the 2% target (…)*", Chancellor of the Exchequer (2008c). „*The MPC's remit allows it to look through short-term movements in inflation*", Chancellor of the Exchequer (2010a).

[145] "I *welcome the MPC's continued commitment to respond flexibly to the economic outlook and to set policy to balance the upside and downside risks in order to meet the inflation target in the medium term.*", Chancellor of the Exchequer (2011b).

de-anchoring, particularly since after the interest rates had been reduced to nearly zero, the BoE took recourse to quantitative easing with its hard to predict impact on inflation and a possible effect on inflation expectations.

The BoE measures aimed at anchoring inflation expectations proved relatively effective. Taking into account the duration and the scale of inflation deviating from the target for most of the time between 2008 and 2012, the rise in expectations observed in those years seems moderate. In the November 2013 *Inflation Report* it was assessed that the MPC recognised these expectations as remaining sufficiently well anchored at the target level (BoE, 2013d).[146]

Figure 43. Bank of England's policy interest rates



Source: Own compilation based on data of the Bank of England.

[146] According to the analysis presented in the August 2013 *Inflation Report*, inflation expectations of households and professional forecasters remained consistent with the inflation target. In the case of inflation expectations derived from financial instrument prices, a certain growth in their sensitivity to published inflation readings was observed, which may have indicated their somewhat weaker anchoring at the target.

3.8.5. Conclusions from the experiences of the Bank of England

The financial crisis and the continuously weak economic activity in the United Kingdom over the past subsequent years inclined the BoE to maintain highly accommodative monetary policy stance. It should be noted that the flexible response to price shocks (exchange rate depreciation, tax rises) and, in particular, the possibility to set the horizon within which inflation should return to the target, is fully compliant with an inflation targeting framework in its flexible form. However, the exceptionally long upward deviation of inflation from the target in the United Kingdom posed a threat to the anchoring of inflation expectations. For this reason, the Bank emphasised its commitment to bring inflation back to the target in the medium term, simultaneously indicating the exceptional circumstances due to which it tolerated inflation above the target for many years. The effects of the BoE's operations turned out rather effective. Taking into account the duration and the scale of inflation deviation from the target, the rise in inflation expectations observed in 2008-2012 period seemed moderate.

Although the BoE stresses that it strives for achieving inflation target in the medium term, it can be judged that the financial system stability and stimulating economic growth have become its equally important goals.

Under the quantitative easing, the BoE launched the APF programme in 2009 and the FLS in 2012. At the same time, the Bank emphasised that unconventional instruments is decided to employ were a natural extension of its standard measures, aimed at delivering its objectives. However, it is difficult to ignore that quantitative easing also lowered servicing costs of the public sector debt, which had risen sharply as a result of the public sector taking over a part of the banking sector losses amid the recession of 2008-2009.

3.9. Iceland – *leaning against the wind* and stabilisation of exchange rate

In 2008, Iceland experienced a collapse of the financial system, whose earlier growth turned out to be excessive. Its example shows that the effectiveness of the leaning against the wind approach – used by the Bank of Iceland (BoI) before the crisis – may be limited in counteracting the accumulation of imbalances in the banking system in a small open economy, particularly under open capital flows.

Both in the period preceding the crisis and in the subsequent years, the Bank of Iceland pursued monetary policy under an inflation targeting framework, although for some time following the collapse of the banking system the stabilisation of the exchange rate of the Icelandic krona became its principal objective.

3.9.1. Inflation targeting in Iceland

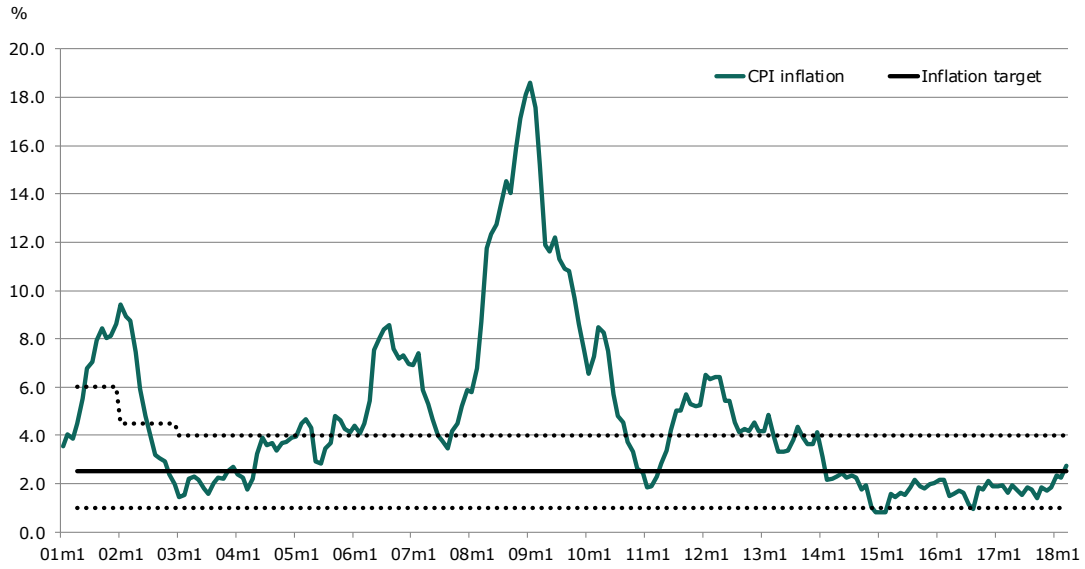
For a long time, the monetary policy of the Bank of Iceland focused on stabilising the exchange rate.[147] However, in 2001 the Bank decided to adopt an inflation targeting strategy. Since then, the target of the BoI has been to keep inflation as close as possible to 2.5%, whereas, should it deviate from the target by more than 1.5 percentage point, the Bank is required to submit a report to the government explaining the causes of such a deviation and describing its monetary policy response.

Initially, the range of deviations from the inflation target was asymmetrical. This meant that in view of accelerating price growth, temporarily slightly higher inflation was accepted in order not to put in question the credibility of the target (Figure 44). In 2001, the upper limit of deviations was set at 6%, in 2002 it was lowered to 4.5%, and in 2003 it decreased to 4%. At the same time, the lower limit for deviations was,

[147] The exchange rate regime was changed several times (with was associated, in particular, with a gradually developing market – the interbank FX market started to operate in Iceland only in 1993). The flexibility of the exchange rate regime was increased in several steps. At the beginning, the band of possible deviations from the central parity had the width of +/-2.25%, in 1995 (after de-regulation of capital flows) it was extended to +/-6%, and in 2000 to +/-9%. In March 2001 the band of deviations was abandoned.

from the very beginning, set at 1%, and continues to be at that level also currently. Thus, since 2003, the band of deviations from the inflation target has been symmetrical of +/1.5 percentage points.

Figure 44. Inflation against the target



Source: Own compilation based on data of the Bank of Iceland.

The reason of setting a transitionally higher upper limit for deviations from the target was the fact that, upon introducing the new strategy, inflation was rising and – in accordance with the Bank's forecasts – it was to stay at an elevated level in the subsequent year. The announcement of an asymmetrical band of deviations, was to signal that bringing inflation back to 2.5% would not be possible immediately.

Since the introduction of the inflation target until the end of 2013, inflation in Iceland remained above 2.5% for most of the time, and in 2008 it even temporarily rose to over 18% (due to a sudden depreciation of the Icelandic krona). However, from the beginning of 2012, a gradual decrease of inflation was observed and since 2014 inflation in Iceland has been running close to the target. The Bank of Iceland emphasises its commitment to preserve price stability, however, for a few years following the collapse of the financial system the priority was clearly given to the exchange rate stabilisation (CBI, 2013a; 2013b; 2013c).

3.9.2. The financial crisis of 2008 and stabilisation measures applied in Iceland

After a period of a slowdown in 2002, an investment boom started in Iceland, driven by large infrastructural projects and thriving real estate market (Thorgeirsson and Noord, 2013). It was accompanied by a very sharp increase in private sector debt (Figure 45), which, until the collapse of the banking system in 2008, had reached the level of around 230% of GDP in the case of companies and of around 120% of the GDP in the case of households. The sharp increase in lending translated into a 9-fold growth in equity prices and 3-fold growth in housing prices.

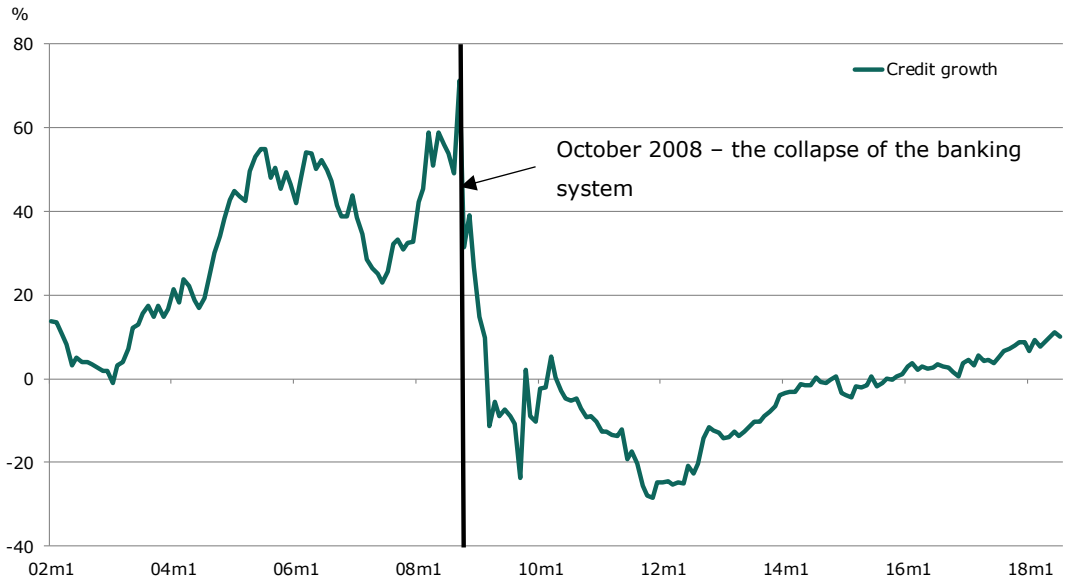
At the same time, Icelandic banks, after their privatisation had been completed in 2003, started a broad expansion into EU countries, as a result of which the value of their assets increased from 101.7% of GDP in 2003 to over 1000% of GDP in 2008 (CBI, 2011). As a consequence, the share of liabilities denominated in foreign currencies in the balance sheets of Icelandic banks increased considerably, which was conducive to an increase in the availability of foreign exchange-linked loans they offered.[148] At the same time, significant differences in the interest rate levels and the gradual appreciation of the Icelandic krona encouraged the private sector to take out this type of loans.[149] In 2008, approximately 75% of corporate debt and approximately 20% of household debt was associated with foreign exchange-linked loans. The expansion of the banking system was also related to transactions with SPVs of Icelandic banks.

[148] In the case of Iceland, it is important to distinguish loans denominated in a foreign currency (where the value of instalments – including principal and interest payments – are expressed in foreign currency) and loans linked to the foreign currency exchange rate (e.g. through FX indexation of only interest payments). Granting foreign currency denominated loans was allowed, whereas granting loans linked to the foreign currency exchange rate was found not to be in line with the existing regulations. It was confirmed by the Supreme Court in 2010, having recognised loans linked to the foreign currency exchange rate as illegal, and imposing their conversion to the Icelandic krona.

[149] Economies of Central and Eastern Europe, including mainly the Baltic States and Hungary, had a similar experience related to FX loans.

The systemic risk of the banking sector in Iceland was additionally increased by granting big loans to affiliated entities (Benediktsdottir *et al.*, 2010).

Figure 45. Growth in lending to the private sector in Iceland

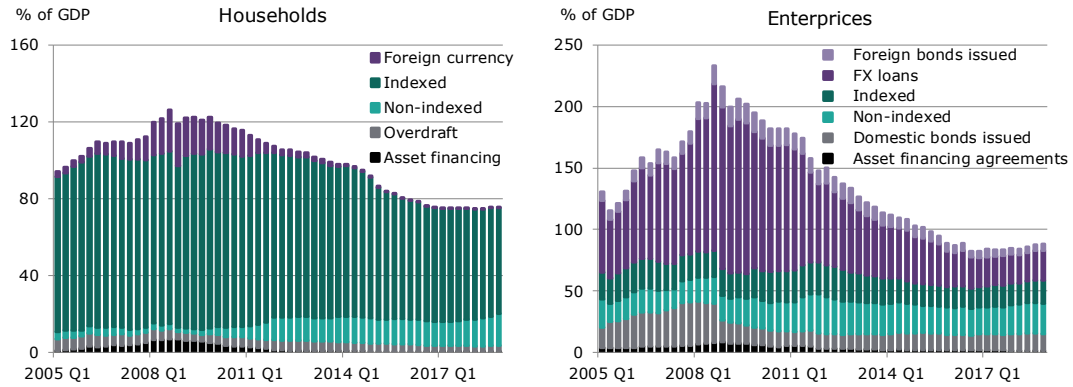


Source: Own compilation based on data of the Bank of Iceland.

In turn, the situation of the public finance sector was gradually improving – the deficit was decreasing, and beginning from 2005, Iceland started to report budget surpluses. Public debt also decreased significantly (partly due to revenues from privatisation). Those developments translated into higher ratings and rising attractiveness of Iceland as a place to invest capital. The inflow of capital was also fostered by the fact that in order to curb the credit boom, the Bank of Iceland tightened its monetary policy conditions, raising interest rates by approximately 10 percentage points between mid-2004 and mid-2008 (Figure 48).[150]

[150] The basic interest rate of the Bank of Iceland was raised from 5.3% in May 2004 to 15.5% in April 2008. However, inflation in this period increased which, to a large extent, followed from high growth of housing prices which are included in the inflation measure in Iceland. Simultaneously, unit labour costs also increased, pushing up prices of services.

Figure 46. Debt relative to GDP by type



Source: Own compilation based on data of the Bank of Iceland.

Those factors (i.e. increasing the scale of foreign operations of Icelandic banks, improvement of public finance standing and a tightening of monetary policy) strengthened the appreciation pressure on the Icelandic krona (Figure 47). The appreciation, in turn, translated into a sharp growth of imports, which resulted in a rapid increase of the current account deficit which amounted to over 20% of GDP in 2006.

Figure 47. Exchange rate of Icelandic krona

Source: Own compilation based on data of the Bank of Iceland.

In 2006 – taking into account the excessive growth of the banking system in relation to the size of the domestic economy – serious concerns emerged related to the stability of the Icelandic financial sector. However, at that time, the Icelandic banks still managed to acquire financing abroad. The outbreak of the crisis in the United States in 2008 resulted in a shortage of liquidity on the global markets and significantly worsened the situation of the Icelandic banks, which were forced to request the Bank of Iceland for assistance. This was accompanied by a run on those banks, both at home and abroad. The needs regarding banks' refinancing in foreign currency exceeded the capacity of the Icelandic central bank (the Bank was unable to ensure its access to a sufficient quantity of FX funds so that it could act as the lender of last resort effectively). Consequently, a series of bankruptcies of the biggest financial institutions took place.[151] At the same time, an attempt to withdraw funds by investors led to a rapid depreciation of the Icelandic krona – in the span of a week, the exchange rate depreciated by 70% and listed companies lost approximately 90% of their value. The depreciation contributed to the rise in inflation that exceeded 18%. At the same time, real estate prices dropped by approximately 30% (Kristinsson, 2012).

A specific feature of the Icelandic credit market was that the interest rate on most loans was indexed to CPI, and – as already mentioned – that there was also a significant share of loans linked to foreign currencies (Figure 46). This meant that with the rapid depreciation of the Icelandic krona, the burden of loan repayment increased dramatically (in the case of CPI-indexed loans, this effect stemmed, in the first instance, from higher import prices). Therefore, the main objective of

[151] Glitnir was the first to request assistance (25 September 2008). Subsequently (7-9 October 2008) it was joined by Landsbanki and Kaupthing Bank. Those were the biggest banks in Iceland. The next wave of bankruptcies of financial institutions occurred in March and June 2009.

stabilisation policies undertaken at that time – apart from ensuring access to banking services – was to stop the depreciation of the exchange rate.

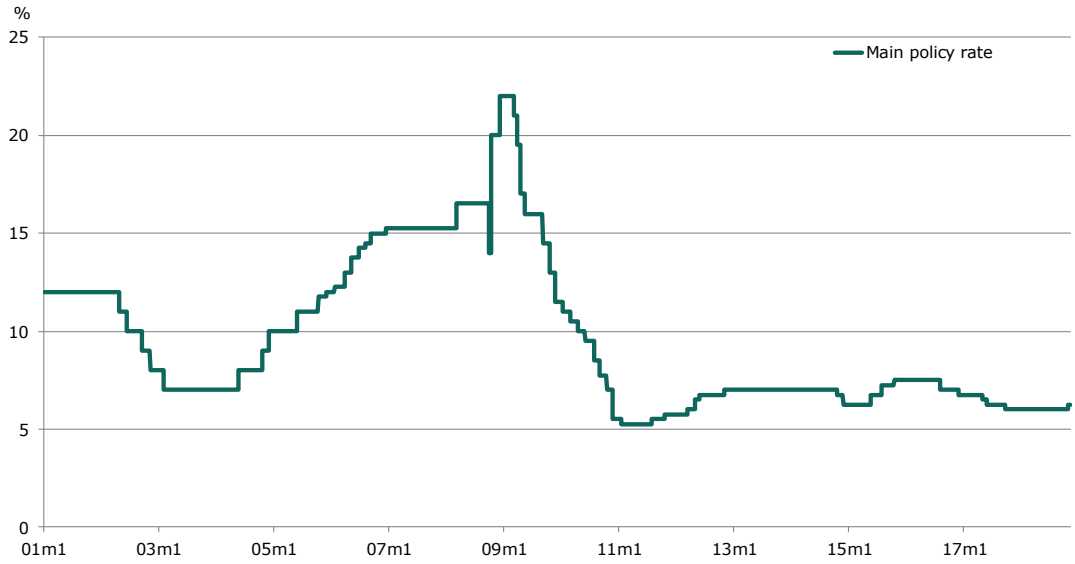
The stabilisation measures, supported by the IMF programme (IMF, 2013), included[152]:

- The break-up of banks by the Financial Supervision Authority into "old" and "new" parts and a temporary capital injection to the "new" banks, as well as governmental guarantees for domestic deposits held in the "new" banks (the "new" banks were to provide access of the domestic economy to banking services and took over the majority of assets and liabilities of the bankrupt banks, whereas the "old" banks were required to resolve the issue of foreign liabilities of the Icelandic banks and came under administrative receivership[153]).
- Imposing controls on capital flows (initially the official exchange of the Icelandic krona to foreign currencies was totally suspended, but later – while the restrictions related to capital flows within the financial account were kept – the restrictions to the capital flows within the current account were relaxed) and using monetary policy to stop the depreciation of the Icelandic krona (in October 2008 the BoI rates were raised by 8 percentage points).
- Debt restructuring, among others, through extending the period of loan repayment, writing down part of household debt (the value of debt was reduced to 110% of the collateral value), and conversion of mortgage and car loans linked to foreign currencies to the Icelandic krona.[154]

[152] A formal agreement was signed with the IMF on 21 November 2008. Under the agreement, Iceland received funds in the amount of USD 5.1 billion, originating from the IMF, Denmark, Finland, Norway, Sweden, Poland, Russia and the Faroe Islands.
[153] The valuation of assets taken over by the "old" banks included, among others, the risk of borrower's insolvency and the level of related losses. As a result, the value of assets was measured as 46% of their nominal value.
[154] Conversion of loans linked to the foreign currency exchange rate (and recalculation of all related payments from the moment of concluding the agreement) was a consequence of the verdict of the Supreme Court which recognised loans linked to the foreign currency exchange rate as illegal.

The government of Iceland had also entered into negotiations with governments of the United Kingdom and the Netherlands, since prior to the crisis the Icelandic banks had been collecting deposits in those countries (via the internet investment fund – Icesave), that could not be withdrawn after the collapse of the Icelandic banking system. Those negotiations did not result in signing a binding agreement. Ultimately, the case was brought to the EFTA Court which recognised that Iceland had the right to refuse disbursements of deposits to foreigners (EFTA, 2013). The government of Iceland had to repay claims only to the level of minimum guaranteed contributions.

Figure 48. Interest rates of the Bank of Iceland



Source: Own compilation based on data of the Bank of Iceland.

As a result of the banking system crisis, monetary policy of the Bank of Iceland was subordinated to the objective of stabilising the exchange rate (with the Bank's declarations of maintaining the inflation target as a long-term objective of the monetary policy, CBI, 2009a; 2009b; 2009c; Figure 48). However, amid elevated inflation, counteracting weakening of the Icelandic krona was consistent with the efforts to reduce the pace of price growth.

The restructuring of the Icelandic banking sector led to the decrease of its size – the total value of banks assets fell from 1000% of GDP in 2008 to approximately 200% of GDP in 2013. The financing structure of banks' lending activity also changed – its prevailing part currently comes from the domestic deposit base.

The restructuring of private sector debt has been proceeding gradually and it has been significantly faster in the segment of corporate loans than in the segment of household loans. Corporate debt amounted to around 90% of GDP in 2018 (which means it declined strongly from its highest level exceeding 200% in 2008), and household debt – to 75% of GDP (a decline from the level of around 120% of GDP in 2008). However, the share of non-performing loans remains rather high.

In 2008, Iceland – that previously had been a country with budgetary surpluses – turned into a country recording deficits of the public finance sector, which was mainly associated with the significant role of the State in stabilising the situation of the banking sector (public debt increased from approximately 30% of GDP prior to the crisis, to close to 100% of GDP in 2010). However, from that moment on, the fiscal balance was gradually improving – the primary deficit of the sector reached the level close to -13% of GDP in 2008, and by 2014 it became almost zero, and turned positive in 2016). The rating of the country has been also improving. In 2011, Iceland regained access to global financial markets by selling bonds denominated in US dollars.

At present, monetary policy of the BoI has continued to be conducted in such a way as to affect the exchange rate of the Icelandic krona, although in its communication the Bank does not stress this issue so strongly as in 2009. At the same time, the capital controls have largely been removed.

3.9.3. Conclusions from the experiences of the Bank of Iceland

The experience of Iceland shows that interest rate policy is not a sufficient tool to curb growing imbalances in the financial system. In particular, under the conditions of free movement of capital, raising interest rates in the domestic currency in

response to excessive lending growth or growth in real estate prices may lead to heavy foreign capital inflows. These capital flows combined with a strengthening of the domestic currency may, in turn, boost loans linked to foreign currencies. Besides typical problems related to excessive indebtedness, this creates additional risks to the stability of the financial system, mainly due to the foreign exchange risk and dependence on external sources of financing.

The interest rate rises by the Bank of Iceland in the years 2004-2008 did not translate into a tangible slowdown in lending, but increased the pressure on an appreciation of the Icelandic krona. Consequently, the private sector found loans indexed to foreign currencies significantly cheaper, especially amid low perception of foreign exchange risk. Thus, the measures taken by the Bank did not enable it to ensure the overall stability of the economy.

The financial crisis forced the Bank of Iceland to subordinate its monetary policy to targets associated with recovering the stability of the banking system. Due to the level of private sector debt in foreign currency, the strive to stop the depreciation of the Icelandic krona turned out most important. However, the Bank maintained an inflation targeting strategy, emphasising that the stabilisation of inflation remains its long-term monetary policy objective. Importantly, counteracting further weakening of the Icelandic krona exchange in the aftermath of the crisis was consistent with the efforts to hamper price growth. Over the recent years, inflation in Iceland has, indeed, considerably fallen and has become less volatile. Also inflation expectations have gradually subsided to the Banks' target. Overall, deviations from the inflation target are currently comparable to those reported in other advanced economies.

4. Evolution of an inflation targeting framework in Poland

Witold Grostal, Joanna Niedźwiedzińska

The NBP adopted an inflation targeting regime in 1998, and since 2004 it has pursued a continuous inflation target of 2.5% +/- 1 percentage point. Over the years, the NBP Monetary Policy Council (MPC) has introduced some modifications in interpretation and implementation of its monetary policy strategy, while preserving its key elements (i.e. the inflation target itself and the floating exchange rate regime). Before the global financial crisis, those modifications were mainly related to expanding the scope of monetary policy communication, whereas after the crisis they involved signalling a possibility of leaning against the wind in the case of growing risks of asset price bubbles and recognising macroprudential policy as an important tool of domestic stabilisation policy. Moreover, they also included increasing the Bank's readiness to conduct exchange rate interventions if required for ensuring the macroeconomic and financial stability of the country, and emphasising the role of flexibility in pursuing monetary policy. It is worth indicating that a significant part of those changes had been introduced quite early, i.e. before most other central banks accounted for them in their inflation targeting frameworks. As a result, the current NBP monetary policy regime does not deviate from the standards applied by central banks of advanced economies.

4.1. Introduction of inflation targeting in Poland

In 1998, the NBP Monetary Policy Council made the decision to adopt inflation targeting. It was meant to replace the regime used previously, which could be referred to as an eclectic strategy, since it comprised not only the inflation target, but also intermediate targets set for monetary aggregates and the exchange rate.

The decision on adopting inflation targeting was motivated by the need to increase the effectiveness of monetary policy. Amid growing integration of the Polish financial market with the global market, the applied eclectic regime was marked by increasing inconsistencies between the intermediate targets and the price stability goal.[155] The adoption of inflation targeting was mainly aimed at anchoring inflation expectations at a low level, which was considered as crucial for finalising the disinflation process.[156]

The *Medium-Term Strategy of Monetary Policy 1999–2003,* that was adopted by the MPC in 1998, indicated the completion of the disinflation process as the main task of the Bank (NBP, 1998). The medium-term target was to reduce inflation below 4% by 2003.[157] At the same time, annual targets for end-year inflation in subsequent years were also announced, in order to set a disinflation path that was supposed to help reaching the medium-term target. While annual end-year targets were largely missed[158], in 2003, inflation was already very low. Therefore, in the *Monetary Policy Strategy beyond 2003,* the Council formulated its principal task as stabilising inflation at a low level, and adopted a continuous inflation target which, since then, has amounted to 2.5% +/- 1 percentage point (NBP, 2003).

[155] Additional arguments that spoke in favour of changing the NBP monetary policy regime included the desire to increase transparency of the conducted monetary policy, the need to take account of developing money and FX markets, as well as facilitating the adjustment of the Polish economy to the standards of the EU, and subsequently the EMU.

[156] An important factor that influenced the formulation of the NBP monetary policy regime was the adoption in 1997 of the new *Constitution of the Republic of Poland* and the *Act on Narodowy Bank Polski*, which ensured the independence of the central bank and defined its principal goal as protecting the value of the Polish currency. Those legal acts also changed the NBP institutional set-up by establishing the Monetary Policy Council.

[157] At the same time, the process of floating the zloty exchange rate was continued. Although the official floating took place in April 2000, interventions in the FX market had been ceased already in 1999, i.e. when inflation targeting started to be implemented.

[158] It turned out in practice that the annual targets were difficult to meet, in particular, due to supply shocks triggering sharp changes in prices of food and fuel, as well as lags in the monetary policy transmission mechanism. However, the disinflation process was continued.

It is worth noting that Poland was one of the first countries undergoing systemic transformation which decided to adopt inflation targeting, when this new monetary policy regime was only gaining popularity (Figure 1).[159] Some economists claimed that Poland was not prepared for becoming an inflation targeter, since the transmission mechanism of interest rate changes to prices was not yet sufficiently stable (Christoffersen and Wescott, 1999). It was also indicated that the Bank did not have adequate forecasting models in place at that time. However, in the NBP assessment, the key prerequisites for the effectiveness of the new regime were fulfilled, since the Bank was given instrument independence, open market operations system was functioning well, and financial system was adequately developed. Some of the elements increasing the effectiveness of inflation targeting in the area of communication and forecasting capabilities were successfully introduced already in the course of pursuing the new regime.

4.2. Main modifications to the NBP inflation targeting framework

In the initial period of implementing inflation targeting, the changes introduced to the NBP monetary policy framework were mainly aimed at ensuring the fulfilment of all requirements set for fully-fledged inflation targetters. Importantly, already when announcing the adoption of the regime in 1998, the Council emphasised that along with the periodical evaluation of its validity, some of its elements may be subject to adjustments. In accordance with this announcement, while maintaining the key elements of inflation targeting, in the *Monetary Policy Guidelines for the Year 2005* the Council presented the detailed description of principles it would apply in the conduct of its monetary policy (NBP, 2004).

[159] The Czech Republic was the first systemic transition country which decided to adopt inflation targeting. In December 1997, the Czech National Bank announced launching the new regime starting in 1999. It is worth stressing that the decision on abandoning the monetary policy framework used previously in the Czech Republic was enforced by the currency crisis which affected this economy.

In subsequent years, the Council introduced some further modifications to interpretation and implementation of the framework, preserving however the unchanged inflation target and the floating exchange rate regime. It is worth indicating that some of the changes – especially those related to taking account of financial stability considerations in monetary policy – had been introduced before the majority of other central banks incorporated them in their monetary policy frameworks.

4.2.1. Increasing the range of publications related to monetary policy

When an inflation targeting regime was introduced, the basic communication tools of the Bank included the MPC press releases, the *Monetary Policy Guidelines* and the *Report on Monetary Policy Implementation* – of which the latter two were required pursuant to the *Constitution of the Republic of Poland*. Over the years, these documents were subject to some evolution, but their scope, objective and general construction remained mainly unchanged. In contrast, significant changes were introduced to the *Inflation report*. Until mid-2001, the *Report* did not contain voting records of the Council, and until mid-2004 – nor the NBP projection.

- Voting records of the Council were first included in the *Report* in June 2001. This was all the more important as the *Report* also presented information on the Council's voting on motions which did not receive the majority vote (the publication of voting records on the adopted resolutions, i.e. motions which received the majority vote, had already been regulated by the *Act on the NBP* of 1997). It significantly increased the transparency of the Council's activities.
- Results of inflation and GDP projections were first published in August 2004. At that time, the projections were developed with the use of NSA and MSMI models, which were replaced by the ECMOD model in 2005, and by the currently used NECMOD model in 2008. Descriptions of official forecasting models (and the development of the Bank's forecasting tools) have been described on the NBP website.

The next significant step in increasing the transparency of the Council's activities was the publication of the *Minutes of the Monetary Policy Council decision-making meetings* which was initiated in April 2017. When the decision on the publication was taken, *Minutes* of the decision-making meetings were already published by half of the central banks pursuing inflation targeting. Since the very beginning, the rule was adopted that the arguments used by the Council members would be presented without attributing names. The aim of such an approach was to reduce the risk of limiting free exchange of views during the discussions.

Moreover, in some periods, the Council used communication involving some forward guidance, i.e. the MPC indicated to the public what kind of interest rate policy it intended to pursue within the horizon longer than the nearest decision-making meeting.

- In the period from February 2000 to December 2005, the Council directly communicated its current monetary policy stance (as accommodative/neutral/restrictive bias).
- In the period from April 2007 to May 2010, the Council continued to indicate to the public its assessment of the future inflation developments, which – albeit in a different way – also signalled the monetary policy stance.
- Another example of the forward looking communication was the Council's declaration, used in the period from September 2013 to June 2014, regarding the likely time horizon of maintaining unchanged interest rates.

4.2.2. Drawing attention to financial stability issues in monetary policy

As already mentioned, before 2009, a discussion about the role of asset prices in monetary policy was conducted between the proponents of the *mop up after* and the *leaning against the wind* approach, with most of the major central banks opting for the *mop up after* strategy. However, the global financial crisis fully exposed a weakness

of this approach. The recent experiences resulted in a significant shift in central banks' attitude to asset prices and financial stability.

In the case of the NBP, the MPC views on those issues were first presented in 2006 in the *Monetary Policy Guidelines for 2007*, i.e. even before the outbreak of the global financial crisis.[160] In this document, the Council opted for some *leaning against the wind* (NBP, 2005).[161]

The issue of taking financial stability into account in the monetary policy decisions and putting some weight on developments in monetary aggregates were reiterated in the *Guidelines* for subsequent years. Special emphasis was placed on those elements in 2009 in the *Guidelines* for 2010, i.e. after the onset of the global financial crisis (NBP, 2009). A year later, in the *Guidelines* for 2011, it was added that combining the efforts to keep inflation at the target level and support financial system stability may require allowing a longer time horizon for meeting the inflation target (NBP, 2010). Indicating the possibility to extend horizon for bringing inflation back to the

[160] Before the global financial crisis, activities aimed at curbing imbalances in the financial system were also undertaken in Poland. In particular, in 2006 the Polish Financial Supervision Authority introduced Recommendation S related to good practices in the area of mortgage-backed credit exposures, which limited the growth of housing loans denominated in foreign currency.

[161] In the *Guidelines* for 2007, the Council indicated that "*while assessing the inflation outlook, especially when inflation is low, central banks allow for considering also the prices of assets, because of the need of ensuring financial stability. In the conditions of liberalised financial markets and amid favourable developments on the supply side of the economy, which are supporting low inflation, it is becoming ever more essential for monetary authorities to allow for the financial stability in their decisions. If in response to low inflation central banks reduce interest rates too much, this may lead to a rapid asset price growth. This growth is accompanied with the risk of the so-called unstable boom, where higher inflation surfaces with a considerable lag. Such a rapid growth in asset prices is also accompanied with the rising risk of their violent and considerable slump, which poses the threat to the stability of the financial system and the real economy. Financial system stability ensures effective operation of the transmission mechanism, which is crucial for appropriate monetary policy implementation. In assessing the risk of the emergence of disruptions in the asset market and the inflation outlook, it may be useful in the longer run to account for the paths of monetary aggregates.*" (NBP, 2006).

target once it deviates from it was closely linked to another important element of an inflation targeting regime, namely its flexibility, that became increasingly stressed.

4.2.3. Emphasising the readiness to conduct foreign exchange interventions

Since the adoption of an inflation targeting regime until 2010, the NBP did not intervene in the FX market. At the same time, in the *Strategy for 1999-2003* the Council indicated that the NBP had the right to intervene by buying or selling foreign currencies, should it recognise a need to do so for monetary policy reasons. Subsequently, in the *Guidelines* for 2003-2009, the MPC specified that FX interventions were possible should they turn out necessary for meeting the inflation target.

In view of severe turmoil in the financial markets following the Lehman Brothers bankruptcy, the Council recognised that specifying such motivations for FX intervention might prove too narrow. Therefore, in 2009, in the *Guidelines* for 2010, the NBP broader readiness to conduct foreign exchange interventions was emphasised through indicating that they might be undertaken if required for ensuring the macroeconomic and financial stability of the country. In the subsequent years this provision has been maintained.

In April 2010, NBP conducted the first one-off FX intervention after 1998. Since then, the NBP occasionally intervenes in the market.

4.2.4. Highlighting the role of flexibility in monetary policy

The issue of flexibility in monetary policy response to shocks – a constituting element of an inflation targeting regime – was already stressed in the *Strategy for 1999-2003*, and subsequently indicated as one of the key elements of the *Strategy after 2003*. Also the annual *Guidelines* underlined the medium-term nature of the inflation target, together with the fact that the monetary policy reaction to shocks depended on the strength, origins and character of shocks, as well as the assessment of their persistence and of the anchoring of inflation expectations.

During the global financial crisis central banks were criticised for placing too much weight on ensuring price stability, while neglecting other important issues, including, in particular, financial stability discussed above. For this reason, in 2012, in the *Guidelines* for 2013, the Council decided to point out that flexibility is one of the basic characteristics of an inflation targeting regime (NBP, 2012).[162] Moreover, the MPC directly indicated that flexibility refers to defining the horizon of bringing inflation back to the target.[163] Flexibility was also broadly discussed in the *Guidelines* for 2014, adopted in 2013 (NBP, 2013).

4.2.5. Seeing macroprudential policy as a new instrument of stabilisation policy

The first explicit reference to macroprudential policy as an area of the Banks' interest was made in 2012, in the *Guidelines* for 2013 (NBP, 2012). It was pointed out that macroprudential policy might be treated as "*an additional instrument of the central bank's stabilisation policy*". It was also indicated that the Bank should play a leading role in pursuing this policy. This postulate, extended by its justification, was repeated in 2013, in the *Guidelines* for 2014 (NBP, 2013).[164] Moreover, in the *Guidelines* for 2014

[162] In the *Guidelines* for 2013, the Council underlined that "*Both before the crisis and over the course of the most severe crisis-driven tensions in the global economy, the NBP's monetary policy – in line with the adopted IT strategy – responded flexibly to shocks affecting the Polish economy, adjusting the level of interest rates to changing macroeconomic conditions*." (NBP. 2012).

[163] In the *Guidelines* for 2013, the Council stated that "*As far as response to shocks is concerned, it is of particular importance that the central bank may specify the time horizon of inflation returning to the target flexibly, i.e. conditional on the nature of the shock.*" (NBP, 2012).

[164] In the *Guidelines* for 2014 it was indicated that "*The experience of the past few years also speaks in favour of acknowledging macroprudential policy as another, besides monetary policy, instrument of the central bank's countercyclical policy. The application of this instrument rests on the conviction that besides the classical business cycles – usually addressed with monetary policy instruments – we see longer financial cycles occurring in the economy which should be tackled with macroprudential policy measures. (…) Arguments in support of central banks' key role in macroprudential policy include their expertise in analysing economic developments from the macroeconomic point of view and independence allowing them to make decisions which, while potentially weighing down short-term economic activity, are necessary to maintain economic balance in longer term.*" (NBP, 2013).

it was argued that macroprudential policy might support or – in certain cases – replace monetary policy (NBP, 2013).[165]

Box 20: Effectiveness of the inflation targeting regime in different countries

The implementation of an inflation targeting regime by the NBP enabled to ensure price stability in Poland over the recent decades. Since the introduction of the inflation target at 2.5% +/- 1 percentage points in 2004, the average level of CPI inflation in Poland amounted to 2%[166], thus, it was compliant with the target.

Below some data allowing for a more comprehensive assessment of the effectiveness of inflation targeting in Poland and in other countries over the past 20 years are presented.[167] Besides statistics referring directly to meeting the inflation target (e.g. levels of inflation relative to the target), the comparison also comprises other variables important for analysing the monetary policy effectiveness (e.g. output gap, volatility of interest rates). As already indicated, since IT central banks generally conduct flexible inflation targeting, they focus not only on inflation developments, but additionally pay attention to economic activity and overall macroeconomic stability.

Inflation in Poland – as compared to other countries – has been deviating from the target fairly frequently. However, the scale of the reported deviations has been relatively small. Also looking at the volatility of inflation it should be assessed as moderate. It may be an indication that monetary policy in Poland – as the Council has been stressing in its communication – has been, indeed, pursued in a flexible way, allowing for extending the time horizon for bringing inflation back to the target if the nature of shocks occurring in the economy justifies such an approach.

[165] In the *Guidelines* for 2014 it was written that "*Monetary policy, supported by macroprudential policy, should strive to prevent unsustainable booms in the mortgage markets, as their collapse can trigger a sharp and prolonged economic slowdown.*", and that "*(…) in order to preserve financial stability and curb the risk of imbalances building up in the economy, macroprudential policy is of particular importance, which, through selective impact on certain credit aggregates and asset prices may be a more adequate tool in limiting macroeconomic imbalances than monetary policy, as it involves less cost to the real economy.*" (NBP, 2013).

[166] The average level of inflation in the period 2004 – 2018.

[167] The comparison includes between 18 and 22 countries (depending on data availability), in order to allow for comparing countries with a similarly rich experience with pursuing inflation targeting, thus only economies that had adopted an inflation targeting framework by 2002 are considered. The period analysed covers 2004 – 2018.

At the same time, the flexibility of monetary policy has been contributing to the moderate volatility of the output gap and of interest rates, which by no means can be assessed as excessive among the analysed inflation targeters.

Figure 49. Effectiveness of inflation targeting in various countries

Source: Own calculations based on data from the analysed central banks, statistical offices, Eurostat, OECD, and Bloomberg.

The frequency of deviations of inflation from the target is calculated as the number of months in which inflation deviated from the target midpoint by more than 1 percentage point in relation to the total number of months in the analysed period (in the case of Australia and New Zealand quarters are used instead of months, due to the quarterly availability of inflation data for those countries). Output gaps are estimated with the use of the Hodrick-Prescott filter.

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Annex

Key aspects of inflation targeting strategy (1)

	Albania	Armenia	Australia	Brazil	Canada	Chile
Start date of the strategy	2009	2006	1993	1999	1991	1991
Authority setting inflation target	central bank	central bank + government	central bank + government	central bank + government	central bank + government	central bank
Inflation target level	3%	4% +/– 1.5 pp.	2–3%	2018: 4.5% +/– 1.5 pp. 2019: 4.25% +/– 1.5 pp. 2020: 4% +/– 1.5 pp. 2021: 3.75% +/– 1.5 pp.	midpoint 2% with control range 1–3%	3% +/– 1 pp.
Targeted inflation measure	CPI	CPI	CPI	CPI	CPI	CPI
Inflation target time dimension	continuous	continuous	continuous	continuous	continuous	continuous
Exchange rate arrangement (*de jure*) [168]	free floating	free floating	free floating	floating	free floating	floating
Exchange rate arrangement (*de facto*) [169]	floating	floating	free floating	floating	free floating	free floating

[168] Classification according to the IMF *The Annual Report on Exchange Arrangements and Exchange Restrictions 2017.*

[169] Classification according to the IMF *The Annual Report on Exchange Arrangements and Exchange Restrictions 2017.*

Key aspects of inflation targeting strategy (2)

	Colombia	Czech Republic	Dominican Republic	Euro area	Georgia	Ghana
Start date of the strategy	1999	1998	2012	1998 (not official inflation targeter)	2009	2007
Authority setting inflation target	central bank	central bank + government	central bank	central bank	government	central bank + government
Inflation target level	3% +/– 1 pp.	2% +/– 1 pp.	4% +/– 1 pp.	below, but close to, 2%	3%	8% +/– 2 pp.
Targeted inflation measure	CPI	CPI	CPI	HICP	CPI	CPI
Inflation target time dimension	continuous	continuous	continuous	continuous	continuous	year–end
Exchange rate arrangement (*de jure*)	free floating	floating	managed floating	free floating	floating	floating
Exchange rate arrangement (*de facto*)	floating	stabilised arrangement[170]	crawl–like arrangement	free floating	floating	floating

[170] On 6th of April 2017 Czech Republic decided to discontinue its asymmetric exchange rate commitment against euro.

Key aspects of inflation targeting strategy (3)

	Guatemala	Hungary	Iceland	India	Indonesia	Israel
Start date of the strategy	2005	2001	2001	2016	2005	1992
Authority setting inflation target	central bank + government	central bank + government	central bank + government	central bank + government	government	central bank + government
Inflation target level	4% +/– 1 pp.	3% +/– 1 pp.	2.5%	4% +/– 2 pp.	3.5% +/– 1 pp.	1–3%
Targeted inflation measure	CPI	CPI	CPI	CPI	CPI	CPI
Inflation target time dimension	continuous	continuous	continuous	continuous	continuous	continuous
Exchange rate arrangement (*de jure*)	floating	free floating	free floating	floating	free floating	free floating
Exchange rate arrangement (*de facto*)	floating	floating	floating	floating	floating	floating

Key aspects of inflation targeting strategy (4)

	Japan	Kazakhstan	Korea	Mexico	Moldova	New Zealand
Start date of the strategy	2012 (not official inflation targeter)	2015	1998	2001	2010	1990
Authority setting inflation target	central bank	central bank + government	central bank + government	central bank	central bank	central bank + government
Inflation target level	2%	2018: 5–7%, 2019: 4–6%, 2020 and thereafter: below but close to 4%	2%	3% +/– 1 pp.	5% +/– 1.5 pp.	1–3% with midpoint 2%
Targeted inflation measure	CPI	CPI	CPI	CPI	CPI	CPI
Inflation target time dimension	continuous	continuous	continuous	continuous	continuous	continuous
Exchange rate arrangement (*de jure*)	free floating	managed float	free floating	free floating	floating	free floating
Exchange rate arrangement (*de facto*)	free floating	floating	floating	free floating	floating	floating

Key aspects of inflation targeting strategy (5)

	Norway	Paraguay	Peru	Philippines	Poland	Romania
Start date of the strategy	2001	2011	2002	2002	1999	2005
Authority setting inflation target	government	central bank	central bank	central bank + government	central bank	central bank + government
Inflation target level	2%	4% +/– 2 pp.	2% +/– 1 pp.	3% +/– 1 pp.	2.5% +/– 1 pp.	2.5% +/– 1 pp.
Targeted inflation measure	CPI	CPI	CPI	CPI	CPI	CPI
Inflation target time dimension	continuous	continuous	continuous	continuous	continuous	continuous
Exchange rate arrangement (*de jure*)	free floating	floating	floating	free floating	free floating	managed float
Exchange rate arrangement (*de facto*)	free floating	floating	floating	floating	free floating	floating

Key aspects of inflation targeting strategy (6)

	Russia	Serbia	South Africa	Sweden	Switzerland	Thailand
Start date of the strategy	2015	2009	2000	1995	2000 (not official inflation targeter)	2000
Authority setting inflation target	central bank	central bank + government	government	central bank	central bank	central bank + government
Inflation target level	4%	3% +/– 1.5 pp.	3–6%	2% +/– 1 pp.	below 2%	2.5% +/– 1.5 pp.
Targeted inflation measure	CPI	CPI	CPI	CPIF (CPI with fixed interest rate)	CPI	CPI
Inflation target time dimension	continuous	continuous	continuous	continuous	continuous	continuous
Exchange rate arrangement (*de jure*)	floating	floating	free floating	free floating	free floating	floating
Exchange rate arrangement (*de facto*)	free floating	stabilised arrangement	floating	free floating	floating	floating

Key aspects of inflation targeting strategy (7)

	Turkey	Uganda	Ukraine	United Kingdom	United States
Start date of the strategy	2006	2011	2017	1992	2012 (not official inflation targeter)
Authority setting inflation target	central bank + government	central bank	central bank + government	government	central bank
Inflation target level	5% +/– 2 pp.	5%	2018: 6% +/– 2 pp. 2019: 5% +/– 1 pp.	2%	2%
Targeted inflation measure	CPI	core inflation (inflation excl. food crop prices)	CPI	CPI	PCE deflator (*Personal Consumption Expenditures* – PCE)
Inflation target time dimension	year–end	continuous	end-year	continuous	continuous
Exchange rate arrangement (*de jure*)	free floating	free floating	floating	free floating	free floating
Exchange rate arrangement (*de facto*)	floating	floating	floating	free floating	free floating

Decision–making process (1)

	Albania	Armenia	Australia	Brazil	Canada	Chile
Decision–making body of a central bank	Supervisory Council – 9 members, including 6 external members	Board – 7 members, including 5 external members	Reserve Bank Board – 9 members, including 7 external members	COPOM (Monetary Policy Committee) – 9 members	Governing Council – 6 members	Board – 5 members
Decision–making process	voting	voting	voting	voting	consensus	voting
Frequency of decision–making meetings	8 meetings a year	12 meetings a year	11 meetings a year	8 meetings a year	8 meetings a year	8 meetings a year

Decision–making process (2)

	Colombia	Czech Republic	Dominican Republic	Euro area	Georgia	Ghana
Decision–making body of a central bank	Board of Directors – 7 members, including 1 external member	Bank Board – 7 members	Monetary Board – 9 members, including 7 external members	Governing Council – 25 members, including 19 governors of national central banks	Governor	Monetary Policy Committee – 7 members, including 2 external members
Decision–making process	voting	voting	voting	consensus	governor	consensus
Frequency of decision–making meetings	8 meetings a year	8 meetings a year	12 meetings a year	8 meetings a year	8 meetings a year	6 meetings a year

Decision–making process (3)

	Guatemala	Hungary	Iceland	India	Indonesia	Israel
Decision–making body of a central bank	Monetary Board – 8 members, including 7 external members	Monetary Council – 5-9 members, including 4-6 external members	Monetary Policy Committee – 5 members, including 2 external members	Monetary Policy Committee – 6 members, including 3 external members	Board of Governors – 6-9 members	Monetary Committee – 6 members, including 3 external members
Decision–making process	voting	voting	voting	voting	consensus	voting
Frequency of decision–making meetings	12 meetings a year	12 meetings a year	8 meetings a year	6 meetings a year	12 meetings a year	8 meetings a year

Decision–making process (4)

	Japan	Kazakhstan	Korea	Mexico	Moldova	New Zealand
Decision–making body of a central bank	Policy Board – 9 members, including 6 external members	Board – 9 members, including 3 external members	Monetary Policy Board – 7 members, including 5 external members	Board of Governors – 5 members	Executive Board – 5 members	Governor
Decision–making process	voting	voting	voting	voting	voting	governor
Frequency of decision–making meetings	8 meetings a year	8 meetings a year	8 meetings a year	8 meetings a year	8 meetings a year	8 meetings a year

Decision–making process (5)

	Norway	Paraguay	Peru	Philippines	Poland	Romania
Decision–making body of a central bank	Executive Board – 8 members, including 5 external members	CEOMA (Open Market Operations Executive Committee) – 10 members	Board of Directors – 7 members	Monetary Board – 7 members, including 6 external members	Monetary Policy Council – 10 members, including 9 external members	Board of Directors – 9 members, including 5 external members
Decision–making process	voting	no information	voting	voting	voting	voting
Frequency of decision–making meetings	8 meetings a year	12 meetings a year	12 meetings a year	8 meetings a year	11 meetings a year	8 meetings a year

Decision–making process (6)

	Russia	Serbia	South Africa	Sweden	Switzerland	Thailand
Decision–making body of a central bank	Board of Directors – 15 members	Executive Board – 6 members	Monetary Policy Committee – 8 members	Executive Board – 6 members	Governing Board – 3 members	Monetary Policy Committee – 7 members, including 4 external members
Decision–making process	voting	voting	voting	voting	no information	voting
Frequency of decision–making meetings	8 meetings a year	12 meetings a year	6 meetings a year	6 meetings a year	4 meetings a year	8 meetings a year

Decision–making process (7)

	Turkey	Uganda	Ukraine	United Kingdom	United States
Decision–making body of a central bank	Monetary Policy Committee – 7 members, including 1 external member	Board of Directors – 7-9 members, including 1 external member	Board – 6 members	Monetary Policy Committee – 9 members, including 4 external members	Federal Open Market Committee – 12 members
Decision–making process	voting	voting	voting	voting	voting
Frequency of decision–making meetings	8 meetings a year	6 meetings a year	9 meetings a year	8 meetings a year	8 meetings a year

Communication activities (1)

	Albania	Armenia	Australia	Brazil	Canada	Chile
Communicating monetary policy decisions	press release and press conference	press release	press release	press release	press release and press conference (with *Inflation reports*)	press release and press conference (with *Inflation reports*)
Publication of *Minutes*	no *Minutes*	around 2 weeks after the meeting	around 2 weeks after the meeting	around 1 week after the meeting	no *Minutes*	around 2 weeks after the meeting
Voting records	no voting records	no voting records	no voting records	full voting records	n/a (consensus)	full voting records
Publication of *Inflation report*	4 times a year	4 times a year	4 times a year	4 times a year	4 times a year	4 times a year
Inflation forecast presentation	no charts/data	fan charts	fan charts	fan charts	point forecast and line charts	fan charts
Publication of open letters	no open letters	no open letters	no open letters	if inflation breaches the target	no open letters	no open letters
Reporting to the Parliament	parliamentary reports	parliamentary hearings	parliamentary hearings	parliamentary hearings	parliamentary hearings	parliamentary hearings

Communication activities (2)

	Colombia	Czech Republic	Dominican Republic	Euro area	Georgia	Ghana
Communicating monetary policy decisions	press release and press conference	press release and press conference	press release	press release and press conference	press release and press conference (with *Inflation reports*)	press release and press conference
Publication of *Minutes*	around 2 weeks after the meeting	around 1 week after the meeting	no *Minutes*	around 4 weeks after the meeting	no *Minutes*	no *Minutes*
Voting records	ratio of votes	full voting records	no voting records	n/a (consensus)	n/a (governor)	n/a (consensus)
Publication of *Inflation report*	4 times a year	4 times a year	2 times a year	4 times a year	4 times a year	2 times a year
Inflation forecast presentation	fan charts	fan charts	fan charts	fan charts	fan charts	fan charts
Publication of open letters	no open letters	no open letters	no open letters	no open letters	no open letters	no open letters
Reporting to the Parliament	parliamentary reports and hearings	parliamentary reports and hearings	parliamentary reports	parliamentary reports and hearings	parliamentary reports and hearings	parliamentary hearings if the target is not achieved

Communication activities (3)

	Guatemala	Hungary	Iceland	India	Indonesia	Israel
Communicating monetary policy decisions	press release and press conference	press release and press conference	press release and press conference	press release and press conference	press release	press release and press conference (with *Inflation reports*)
Publication of *Minutes*	around 4 weeks after the meeting	around 2 weeks after the meeting	around 2 weeks after the meeting	around 2 weeks after the meeting	no *Minutes*	around 2 weeks after the meeting
Voting records	no voting records	full voting records	full voting records	full voting records	n/a (consensus)	ratio of votes
Publication of *Inflation report*	3 times a year	4 times a year	4 times a year	2 times a year	4 times a year	2 times a year
Inflation forecast presentation	fan charts	fan charts	fan charts	fan charts	no charts	fan charts
Publication of open letters	no open letters	no open letters	if inflation exceeds 4% or falls below 1%	if the average inflation remains outside tolerance bands for any three consecutive quarters	if the inflation target is not achieved in any given year	no open letters
Reporting to the Parliament	parliamentary reports and hearings	parliamentary reports and hearings	parliamentary reports and hearings	no information	parliamentary reports and hearings	parliamentary reports and hearings

Communication activities (4)

	Japan	Kazakhstan	Korea	Mexico	Moldova	New Zealand
Communicating monetary policy decisions	press release and press conference	press release	press release and press conference	press release and press conference	press release and press conference	press release and press conference
Publication of *Minutes*	around 7 weeks after the meeting	no *Minutes*	around 2 weeks after the meeting	around 2 weeks after the meeting	as a part of *Inflation reports*	no *Minutes*
Voting records	full voting records	no voting records	full voting record	no voting records	ratio of votes	n/a (governor)
Publication of *Inflation report*	4 times a year	2 times a year	4 times a year	4 times a year	4 times a year	4 times a year
Inflation forecast presentation	point forecast and line charts	fan charts	fan charts	fan charts	fan charts	point forecast and line charts
Publication of open letters	no open letters	no open letters	if inflation deviates from the target by more than 0.5 pp. in either direction for six consecutive months	no open letters	if there is a deviation of the inflation rate exceeding the variation interval	if inflation is outside the medium-term target range, or if such occasions are projected
Reporting to the Parliament	parliamentary reports and hearings	parliamentary reports and hearings	parliamentary reports and hearings	parliamentary reports and hearings	parliamentary reports and hearings	parliamentary reports and hearings

Communication activities (5)

	Norway	Paraguay	Peru	Philippines	Poland	Romania
Communicating monetary policy decisions	press release and press conference	press release	press release and press conference	press release and press conference (with *Inflation reports*)	press release and press conference	press release and press conference
Publication of *Minutes*	irregularly	around 1 week after the meeting	no *Minutes*	around 4 weeks after the meeting	around 2 weeks after the meeting	around 1 week after the meeting
Voting records	ratio of votes	n/a (no information on decision-making process)	no voting records	no voting records	full voting records	ratio of votes
Publication of *Inflation report*	4 times a year	4 times a year	4 times a year	4 times a year	3 times a year	4 times a year
Inflation forecast presentation	fan charts	fan charts	no charts/data	fan charts	fan charts	fan charts
Publication of open letters	if there are significant deviations between actual inflation and the target	no open letters	no open letters	if the bank fails to achieve the inflation target	no open letters	no open letters
Reporting to the Parliament	parliamentary reports and hearings	no information	parliamentary hearings	parliamentary reports	parliamentary reports and hearings	parliamentary reports

Communication activities (6)

	Russia	Serbia	South Africa	Sweden	Switzerland	Thailand
Communicating monetary policy decisions	press release and press conference (with *Inflation reports*)	press release and press conference	press release and press conference	press release and press conference	press release and press conference	press release and press conference
Publication of *Minutes*	no *Minutes*	no *Minutes*	no *Minutes*	around 2 weeks after the meeting	no *Minutes*	around 2 weeks after the meeting
Voting records	no voting records	no voting records	ratio of votes	full voting record	n/a (no information on decision-making process)	no voting records
Publication of *Inflation report*	4 times a year	4 times a year	2 times a year	6 times a year	4 times a year	4 times a year
Inflation forecast presentation	fan charts	fan charts	fan charts	fan charts	point forecast and line charts	fan charts
Publication of open letters	no open letters	if the departure of inflation from the target lasts for more than six consecutive months	no open letters	no open letters	no open letters	if headline inflation breaches the announced target
Reporting to the Parliament	parliamentary reports and hearings	parliamentary reports and hearings	parliamentary reports and hearings	parliamentary reports and hearings	parliamentary reports	parliamentary reports

Communication activities (7)

	Turkey	Uganda	Ukraine	United Kingdom	United States
Communicating monetary policy decisions	press release and press conference (with *Inflation reports*)	press release	press release and press conference	press release and press conference (with *Inflation reports*)	press release and press conference (with *Inflation reports*)
Publication of *Minutes*	around 1 week after the meeting	no *Minutes*	no *Minutes*	simultaneously with interest rate decision	around 3 weeks after the meeting
Voting records	no voting records	no voting records	no voting records	full voting records	full voting records
Publication of *Inflation report*	4 times a year	6 times a year[171]	4 times a year	4 times a year	2 times a year[172]
Inflation forecast presentation	fan charts	fan charts	fan charts	fan charts	fan charts
Publication of open letters	in case of a breach or a probable breach of the inflation target	no open letters	no open letters	if the inflation target is missed by more than 1 pp. either side	no open letters
Reporting to the Parliament	parliamentary reports and hearings	parliamentary reports	parliamentary reports and hearings	parliamentary reports and hearings	parliamentary reports and hearings

[171] Projections are not included in every report.
[172] Projections are prepared and published 4 times a year.

List of boxes

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