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1 The framework and features of inflation targeting

The most important goal of economic policy is to ensure stable economic growth that is sustainable over the long term, to which central banks can contribute by keeping inflation low and pursuing a predictable, credible monetary policy. In various countries, this understanding serves as a basis for central bank legislation, in which central banks' primary objective is stipulated as the achievement and maintenance of price stability. Nearly 30 countries use an inflation targeting (IT) framework for achieving price stability. In addition to price stability, central banks' strategies also contain other goals such as ensuring financial stability and supporting the economic policy of the government, but these may only be pursued by central banks without prejudice to the primary objective.

High inflation results in inefficiency, which entails considerable costs for economic actors. Amongst other things, it leads to an increase in inflation uncertainty and makes it harder to gauge whether certain price changes reflect relative or general trends. Maintaining price stability eliminates these costs of inflation, thereby facilitating the efficient functioning of the economy. One of the advantages of price stability is that prices can effectively fulfil their role of coordinating resource allocation, and thus predictable price developments contribute to the improvement of business confidence. Price stability preserves money's purchasing power and does not lead to a potential reallocation of incomes.

As the primary objective of monetary policy, price stability usually means a low level of inflation but not zero. This is mainly necessary because of the downward nominal rigidities, the threat of deflation, the need for a positive nominal interest rate and the statistical measurement errors in the consumer price index (e.g. technological progress, improving quality of services). Another argument for positive inflation is that, in parallel with economic convergence, the price level also approaches that of developed countries, which results in excess inflation in converging countries when the nominal exchange rate remains steady (Balassa–Samuelson effect).

Box 1 The emergence of financial stability among the goals of central banks

The financial crisis that started in October 2008 showed that macroeconomic stability in itself does not guarantee systematic financial stability, i.e. in the absence of appropriate regulation, turbulences may occur on financial markets, despite price stability and a stable macroeconomic environment. The lack of financial stability can also have substantial negative effects on macroeconomic stability. This put the role of monetary policy in a new perspective, and the question arose as to whether the risks stemming from financial imbalances and seemingly unsustainable asset prices should be taken into account while pursuing the primary objective, i.e. the achievement and maintenance of price stability, and how this is possible in the context of methodological uncertainties.

Asset price bubbles and financial imbalances developing on financial markets deserve attention, not only from a financial stability perspective but also from the aspect of macroeconomic stability. Crises may occur which only affect the banking system or the macroeconomic environment, but in the case of a major, lasting problem, tensions from the financial or macroeconomic side can have an impact on the other area as well.

Technically, financial market imbalances are very similar to regular overheating that generates inflationary pressure as well, but their development is surrounded by significant uncertainty. They cause excessive macroeconomic fluctuations, and inefficient and unsustainable resource allocation. Also monetary policy should strive to mitigate these effects. In light of the above, in addition to achieving and maintaining price stability, central banks should also devote ample attention to preventing the build-up of financial imbalances, since this is not only important from the perspective of achieving financial stability. In the case of a few central banks (e.g. the Czech or the Hungarian), the financial stability mandate is also included in the central bank act.

1.1 Elements of inflation targeting strategy

Inflation targeting is a monetary policy strategy, within the framework of which the central bank attempts to achieve price stability by meeting the publicly announced inflation target using the monetary policy instruments at its disposal. According to Frederic Mishkin, an American economist and former decision-maker of the Federal Reserve, the inflation targeting framework consists of five strategic elements, and in addition to meeting the numerical target, fulfilling the other four criteria is also indispensable to make the framework successful (Mishkin, 2002):

1. The announcement of a numerical, medium-term inflation target

The most important element of the inflation targeting framework is the publicly announced, numerical medium-term inflation target. The concrete value, which is typically determined in terms of the consumer price index, provides an opportunity for making the central bank accountable, and supplies information to economic actors about the mission of monetary policy. Furthermore, the inflation target helps anchor expectations at the appropriate level.

2. Institutional commitment to price stability, to which other monetary policy goals are subordinated

Statutory stipulation of the monetary policy goals sets a clear mandate and obligations on the one hand, and provides the central bank with instruments and rights necessary for carrying them out on the other hand. In an inflation targeting framework, the price stability objective must take priority over all other monetary policy goals. The other goals should be taken into account by the central bank without prejudice to achievement of the primary objective. In order to prevent short-term political or other interests from hindering monetary policy in attaining price stability, the central bank must be independent.

3. Monetary strategy based on a broad information basis

Monetary policy decisions cannot be made solely on the basis of the developments in one variable, since economic mechanisms are highly complex; therefore, inflation is influenced by several processes, including the

expected economic outlook, tax legislation, commodity prices and labour market developments. Analysing, understanding and forecasting these is essential for monetary policy. Central bank decisions exert their effect by influencing the decisions of economic actors, and therefore they not only affect price movements but other economic developments as well. The broader the information set, the clearer picture decision-makers can obtain about the economic stance, and the more accurately they can estimate the anticipated consequences of their decisions.

4. Transparency of monetary policy (i.e. the plans, goals and decisions of the monetary authority) in the course of its communication with the markets and the public

The entire operation of the institution must be transparent, which is strongly related to the concept of credibility. The effective management of expectations is crucial from a monetary policy perspective, since price stability also means the anchoring of inflation expectations, which is key in the mechanisms of monetary policy. The predictable and consistent operation and communication of the central bank reduces the uncertainty surrounding monetary policy and also provides guidance to market participants. Transparency enhances the predictability of decisions – i.e. economic actors are not taken by surprise by them – which at the same time increases the efficiency of monetary policy.

5. Accountability of the central bank with respect to achieving the inflation target

Central bank independence, which entails an institutional commitment and the primacy of the price stability objective, enables the central bank – as the sole institution in charge of monetary policy – to be accountable to the public for its decisions and their consequences. In accordance with the central bank acts, accountability usually manifests itself in the form of annual reports and parliamentary hearings. This obligation strengthens the requirement of transparency and contributes to bolstering credibility.

1.2 The role of the nominal anchor

Not only is the publicly announced, numerical inflation target a key element of inflation targeting, it also serves as a nominal anchor. The nominal anchor is an economic variable that is able to stabilise economic actors' expectations about future inflation. If the central bank is credible and monetary policy is consistent, expectations can strengthen monetary policy measures and may contribute to decreasing the real economy costs of the decisions. By contrast, the inadequate anchoring of expectations reduces the efficiency of monetary policy, and the decisions taken by the monetary authority increase the costs that can be measured in real economy sacrifices.

The significance of the nominal anchor had been realised in the past, but the alternative strategies used instead of IT generally did not prove to be efficient enough over the past decades. In the monetary targeting system, the problem was that the link between money supply and inflation was not strong enough. In the case of an exchange rate target, the central bank imported credibility, but the pressure from the market forced the central bank to abandon its current exchange rate target several times, thereby undermining the central bank's credibility and severely damaging the real economy. Having learned from past experiences, an ever larger group of developed and emerging countries decided to introduce inflation targeting, while in certain emerging and developing countries – in which the requirements of the efficient inflation targeting strategy are not even met in some cases – various alternative monetary strategies continue to be popular.

If economic actors regard the central bank as credible and trust that the monetary authority is able to meet the announced inflation target, they form their inflation expectations in line with this. With expectations consistent with the inflation target, economic actors themselves, through their current decisions, can also help keep the growth rate of prices from accelerating. In the context of a credible monetary policy, growth sacrifices diminish, as lowering inflation entails smaller real economy costs. In the case of unanchored expectations, the real economy sacrifices brought about by the monetary

authority's decisions are coupled with the additional costs of heightened expectations about inflation.

The nominal anchor and credible monetary policy are inseparable. Anchored expectations can strengthen the base rate's effect on inflation and provide the monetary authority greater leeway for taking into account the factors linked to its other tasks.

1.3 The role of projections

The central bank can influence economic developments by changing the base rate. Typically, interest rate decisions are slow to exert their impact on the economy (they have a large so-called outside lag), and therefore the central bank must make its decisions in a forward-looking way, based on expected developments not on current ones.¹

Changing the policy rate affects the price level through various steps and channels, and therefore the relationship between the monetary policy instruments and the ultimate objective is quite complex. Accordingly, the variables that monetary policy can directly influence may need to be taken into consideration. Such variables are called intermediate targets. In IT regimes, this role is fulfilled by inflation projections, in line with which the appropriate monetary policy measures are taken. In addition to presenting the macroeconomic forecast, the publication containing the projection typically analyses the economic developments relevant from the perspective of inflation, the risks surrounding the projection and the expected monetary policy measures. A well-chosen intermediate target may forecast the developments of several factors outside the scope of the central bank, even before they markedly influence the ultimate objective; therefore, the central bank can take measures to maintain price stability before an inflationary shock occurs.

¹ The amount of time between the economic policy decision and the point at which its full effect wears off completely is called outside lag. While this can be quite substantial, the amount of time between realising the need for an economic policy decision and making the actual decision (inside lag) is relatively short in the case of monetary policy.

The report containing the macroeconomic projection is the most important channel of communication for monetary policy. At the same time, it serves as key background material in supporting decision-making. The decisionsupporting function of the analysis is bolstered if the macroeconomic projection also takes into account the monetary policy decisions in response to real economy developments and inflation outlook. Monetary policy decision-making can be influenced by the real economy outlook aside from the divergence from the inflation target, and the former is also taken into account by decision-makers indirectly, through its inflationary effects.

The projection shows the anticipated macroeconomic developments and presents the interest rate path ensuring that the medium-term inflation target is achieved (not all central banks communicate the latter to the public). The forecast of the expected inflation path includes the impact of developments in all variables which can substantially influence future inflation. The models used by central banks can only represent economic developments in a simplified form, and therefore several considerations may gain prominence during decision-making, which play significant roles in the decision, but cannot be captured by the models.

In addition to depicting inflationary and macroeconomic developments, it is also necessary to illustrate the uncertainty arising from various sources. The fan chart shows the technical uncertainty of the projection. The further we go forward in time, the less certain the projection becomes around the outcome deemed to be most probable. Fan charts can be made not only for the underlying inflationary trends but also for several economic variables (e.g. GDP growth, unemployment rate, policy rate, exchange rate). The risks associated with the assumptions used in the projection can be represented using alternative scenarios. The risk paths linked to the individual scenarios show events, in the case of which a deviation from the monetary conditions assumed in the baseline scenario may be warranted. There are central banks that do not prepare alternative scenarios for the potential risks but consider such in their decision-making.

1.4 The requirements of transparency and accountability

In addition to the previously mentioned inflation projection, central banks employ several other means of communication to inform economic actors and the public. There are basically two reasons for this: to ensure the accountability of monetary policy and to increase the efficiency of the transmission mechanism.

The need for accountability is closely linked to the birth of modern central banks. Nowadays, it is accepted and desirable that central banks should be independent from short-term, often political interests, so that they can perform their duties focusing on longer-term goals. At the same time, it is important to monitor whether this institution, which enjoys independence but also exerts a substantial influence over the economy, truly operates in accordance with the laws. The large degree of independence of the central banks is counterbalanced by the requirement of transparent operation. Central bank decision-makers can present their arguments and the justification of central bank decisions both in a verbal or in a written way, and they are also required to give an annual account of the financial management of the central bank. In addition to the publications, central bank leaders regularly report to the legislature on the activities of the central bank and on economic developments. Various bodies (supervisory board, financial committee, audit office) continuously monitor the operation of central banks, but may not voice their views on monetary policy issues. Assessing the performance of central banks contributes to greater accountability.

The goal of transparent operation is not only to ensure accountability, but also to increase the efficiency of monetary policy. Decisions on the main policy instrument are taken based on a predetermined schedule. Whereas in the past central bank operation was characterised by isolation from the public, nowadays even the justifications of interest rate decisions are published (statement, minutes, transcript of the press conference), and a large portion of the projections and analyses serving as the basis for the decisions are public as well. Studies presenting research results indirectly support monetary policy communication. If economic actors understand and accept the central bank's goal and the steps necessary for achieving it, it can boost trust in the central bank, increase the credibility of the inflation target and help anchor inflation expectations around the target. If market participants consider the change in the policy rate to be persistent, it can influence the price of financial instruments even over the longer term. The efficiency can also be increased by financial market analysts who, when they have the appropriate information, can forecast central bank decisions more effectively, which can bolster the smooth operation of financial markets. Transparency can also have a positive effect on the internal processes of central banks. Intensive external and internal communication may result in higher-quality central bank analyses and decision-making.

Owing in part to the above, central banks that – out of the various frameworks – employ an inflation targeting system, are characterised by the most transparent operation (Geraats, 2009). Central banks publish a large amount of information pertaining to their operation. From the perspective of the efficiency of central bank communication, it is vital that this happens in a structured form, and that the different channels complement each other.

2 The theory of inflation targeting

2.1 Time inconsistency and the anchoring of expectations

After economic actors establish their expectations, the central bank may have an incentive to deviate from the monetary policy announced earlier, and to give priority to other goals (e.g. mitigating a decline in output) over the short term. Expansive monetary policy can boost the growth rate of the economy and reduce the unemployment rate over the short run, and as a result, decision-makers may feel an inclination to exploit this opportunity, despite the fact that the impact of monetary policy on real variables fades away over the longer term. The equilibrium level of these variables is basically determined by supply-side developments such as the available technology, demographics or the preferences of economic actors. Over time, economic actors also realise that the central bank will deviate from the rules it had set, which appears in their expectations.²

Box 2

The long-term neutrality of monetary policy

In normal economic cycles, central banks' decisions take into account the output gap, which shows the difference between potential output – the maximum that is sustainable if price stability is preserved – and actual output, i.e. the cyclical position of the economy. Potential output does not directly affect decision-making, since monetary policy cannot influence the trend of potential growth, but can smooth out cyclical fluctuations in aggregate demand. In the case of a larger economic downturn, the output trend is not necessarily independent of monetary policy measures. In cases when a persistent drop in demand curtails the supply potential as well, boosting aggregate demand through monetary policy may mitigate the long-term decline of the supply side. In view of this, estimating the output gap and the expected path of potential output is key for central banks for maintaining price stability and supporting recovery from a crisis (Gábriel–Motyovszki, 2013).

² For example in the case of an expansive monetary policy, economic actors adjust their expectations about wages and prices upwards.

Due to time inconsistency, monetary policy measures will have a more subdued effect, and as a result achieving price stability may entail significantly higher costs in the future. Also, the inflation rate rises even over the longer term, which has negative consequences for the economy. This was the economic rationale behind entrusting independent central banks with monetary policy, thereby improving the credibility of monetary policy.

Today, solving the problem of time inconsistency and anchoring expectations are vital for all central banks. The latter is essential from the perspective of a successful monetary policy, since the inflation target provides economic actors information about future price levels and is able to support the achievement of the price stability objective by helping to appropriately anchor inflation expectations on the target. In more general terms, discretionary monetary policy is constrained, and therefore the problems caused by time inconsistency, which would otherwise jeopardise the chances of meeting the price stability objective over the long term, can be avoided. Instead of following strict operational rules, most central banks publish the details of their monetary strategy, the target variables, the decisions and the main arguments underpinning them, as well as their assessment about expected economic developments, which provide guidance about the systemic behaviour of monetary policy (its "reaction function"). The commitment to the target function is strengthened by institutional guarantees and by establishing credibility. These help to guide expectations, as the interest rate anticipated by market participants is determined by the central bank base rate path thought to ensure achievement of the inflation target. In addition to effectively managing expectations, the nominal anchor can also curb pressure from politics.

2.2 Describing central bank behaviour with a loss function

In both the theory and practice of monetary policy, it is generally accepted that central banks can best contribute to the long-term welfare of society by creating a stable economic environment. This is the aim of price stability, in addition to which central banks take into account other factors when conducting monetary policy. According to the widespread view, flexible inflation targeting can be best described as the central bank seeking to mitigate the fluctuations of inflation around the inflation target and those of output around its potential level (the reasons behind flexibility and its forms are detailed in Chapter 3). In line with the above, central banks are faced with a trade-off between inflation and real economy factors, as shown in Chart 1, capturing the rationale behind flexible IT in a simple form. The points along the Taylor frontier show where inflation volatility is the lowest with a given volatility of output. Thus, on the frontier, neither variable's variance can be reduced without making the other one's increase. The central bank's response to various economic shocks is formulated based on the optimal point deriving from the central bank's preferences.



The trade-off between inflation and real economy aspects can be formalised mathematically – with some simplification – in the form of a loss function, which is used as a basis for modelling central bank behaviour (Tóth, 2007). Overall, it provides a relatively good approximation of monetary policy measures if the central bank chooses an interest rate path along which it can

minimise all the discounted losses of future periods, i.e. if it wishes to stabilise both inflation and output along their long-term equilibrium path:

$$L = E_0 \left(\sum_{0}^{\infty} \beta^t L_t \right),$$

where L_t is the expected one-period loss, β is the discount factor, and E_0 denotes the expectations formed at the beginning of the period.

The one-period loss function can be stated as:

$$L_t = (\pi_t - \pi^*)^2 + \lambda (y_t - y_t^*)^2, \qquad \lambda \ge 0$$

where the first component shows the deviation of inflation from the target, while the second component shows the deviation from potential output (output gap). The deviation from the equilibrium values (the targets) means a loss for the society, and therefore the central bank seeks to minimise the sum of their squares.³ The quadratic function form penalises substantial deviations from the target, i.e. large divergences mean significantly more losses than smaller fluctuations, and it behaves symmetrically, i.e. it gives equal weight to positive and negative shifts. The central bank can choose the inflation target but not the long-term level of potential output. The trade-off between inflation and the real economy is captured by the λ parameter, and a positive value reflects a flexible IT. In practice, this is always the case, as "strict" IT, which only takes into account inflation, can be regarded as a theoretical construct. The higher value of the parameter indicates that the relative weight of inflation's stabilisation is lower in the loss function.

In practice, no central bank directly uses such a loss function, but it serves well to illustrate the underlying economic thinking. There are several difficulties with respect to choosing the variables. The natural level of capacity utilisation cannot be observed, and its estimation involves substantial uncertainty. In the case of the inflation measure, several alternative indicators can be mentioned

³ The formula can include additional components such as interest rate smoothing, according to which large deviations in the base rate as compared to the rate in the previous period are undesirable, since sudden and large-scale interest rate moves may cause extra volatility in the economy, and therefore a gradual interest rate policy should be pursued. Furthermore, according to studies, in addition to the volatility of inflation and output, the loss function should be complemented with a variable that captures financial stability (Woodford, 2012).

(adjusted for indirect tax changes or core inflation index). Moreover, monetary policy is influenced by several other factors that may temporarily warrant a different interest rate level (inflation expectations, asset prices). In reality, due to the complexity of the economy, it would be difficult to find the appropriate target function.

During the global financial crisis, central banks implemented monetary easing of an unprecedented magnitude, using several new central bank instruments, in order to cushion the effects of the economic downturn. Loose monetary conditions lingered even after the recovery started, but as inflation increases, tensions may rise between stimulating the economy and ensuring price stability. Despite the active communication in many areas, it is difficult to gauge whether this situation will lead to a substantial change in central banks' practices, and how it will appear in modelling central bank behaviour.

2.3 The role of interest rate rules in pursuing an optimal monetary policy

IT central banks wish to ensure the sustainable and predictable growth of the economy and thereby maximise social welfare by meeting the inflation target. Inflation targeting central banks typically use a short-term interest rate as their policy instrument, and accordingly, they apply interest rate rules during the technical determination of the interest rate paths linked to the projections they prepare – which also fulfil the role of an intermediate target – while pursuing their monetary policy.

The goal of the interest rate rule – or in other words, monetary policy reaction function – built into forecasting models is to show monetary policy's response considered optimal as different relevant macroeconomic variables develop. Accordingly, it contains variables the stabilisation of which is deemed important by the central bank.

The simple form of the interest rate rule can be stated as:

$$\mathbf{r}_{t} = \delta_{1}\mathbf{r}_{t-1} + (1 - \delta_{1})\left[\overline{\mathbf{r}_{t}} + \delta_{2}\hat{\pi}_{t+x}\right] + \delta_{3}\hat{\mathbf{y}}_{t}$$

The interest rate rule includes the interest rate from the previous period (r_{t-1}) , the neutral real interest rate (\bar{r}_t) , the divergence of inflation expected after a certain (x) period from the target $(\hat{\pi}_{t+x})$ and the difference in output as compared to the long-term value $(\hat{y}_t, \text{ output gap})$. Based on the variables shown here, it can be seen that the monetary authority not only considers price stability factors but also real economy aspects when making monetary policy decisions. In addition to the above, the interest rate rule may contain variables reflecting further aspects such as financial stability considerations. This allows for the representation of the fact that central banks form their monetary strategy taking into account the adequate functioning of the financial system (Krusper–Szilágyi, 2013).

Within the framework of the inflation targeting regime, the goal of the central bank is to achieve and maintain price stability over monetary policy's decision-making horizon (usually 6–8 quarters). The central bank takes into account expectations through forward-looking inflation, i.e. the current interest rate is determined in view of the anticipated inflationary environment. By taking into account real economy aspects, the central bank may also smooth fluctuations in output, without jeopardising its primary objective. In the interest rate rule, this aspect is directly represented by the output gap and indirectly by the expected level of forward-looking inflation. The different variables are weighted in the interest rate rule ($\delta_{i'}$ ($1-\delta_{i}$), δ_{2} , δ_{3}), reflecting the preferences of decision-makers. This ensures that certain variables can be assigned greater weight by monetary policy decision-makers. Interest rate rules cannot be applied as simple rules of thumb. When making their decisions, decision-makers are helped by interest rate paths derived from the interest rate rule, but their individual perception of the economic environment is indispensable.

The interest rate rule may contain the interest rate of the previous period, and in such case monetary policy determines the current rate in view of that. Taking into account the decisions of the previous period (path dependence) means somewhat of a commitment to the interest rate path. In such a scenario, decision-makers – taking into account the substantial uncertainty of economic developments – avoid changing the policy rate to a large extent and instead strive for a gradual approach when adjusting it. The behaviour aimed at

reducing the volatility of the interest rate is called interest rate smoothing, which plays a central role in successfully shaping and anchoring expectations. Central banks contribute to this by their role played in establishing their credibility: a gradual change in the interest rate is a signal suggesting the realisation of the interest rate path communicated and emphasised in the forward guidance.

The use of interest rate rules in the forecasting models of monetary policy simplifies and facilitates optimal decision-making, since it highlights the relationship between the development of the target variables and the interest rate path consistent with such variables. Due to the greater comprehensibility and enhanced transparency of monetary policy goals and decisions, this provides economic actors with a broad information base, which contributes to the transparency of monetary policy and to maintaining central bank credibility. Simple rules may have the advantage of providing a relatively good approximation of monetary policy measures, even across different models. This does not mean, however, that in practice monetary policy follows an always applicable, predetermined interest rate rule. The commitment to price stability is not manifested in an interest rate rule but in the form of the inflation target.

3 The flexibility of inflation targeting

One of the important elements of the inflation targeting framework is an institutional commitment to price stability. This, however, is not to say that the central bank only takes inflation considerations into account when conducting monetary policy. Having an inflation target does not mean that inflation constantly remains at that value: in the case of all inflation targeting central banks, there are shorter or longer periods when inflation deviates substantially from the target.

In practice, inflation targeting is always flexible (Svensson, 2008). Within the flexible framework of IT, central banks take into account other factors besides inflation when shaping monetary policy, for example they strive to stabilise the real economy. The latter means that monetary policy, although it cannot influence its level over the long term, can mitigate fluctuations and stabilise capacity utilisation around its natural level. The flexible approach is warranted by several factors.

- The lengthy process of transmission. One of the main factors is that monetary transmission takes considerable time, since a change in the base rate typically exerts its macroeconomic impact after several quarters. Compared to medium-term monetary policy, offsetting inflation shocks in the short term would require a substantially greater monetary policy response. Due to the delayed impact, monetary policy is typically forward-looking, meaning that decision-makers do not react directly to currently incoming data, but rather to expected future developments.
- *Supply shocks*. The monetary policy response also depends on the nature of the shock affecting inflation. Usually, two types of shocks are distinguished. In the case of a demand shock (e.g. rise in consumption), output and inflation move in the same direction, and require the same monetary policy response. By contrast, in the case of a supply (or cost) shock, output and inflation move in opposite directions, as a result of which a trade-off emerges between the stabilisation of inflation and output. In such a case, the central bank may decide to move inflation to the target more rapidly, at the expense of greater

real economy volatility, or to induce a slower reaction in inflation, which leads to a more subdued volatility in output.

• *Minimising social losses*. Since real economy volatility also incurs costs for the economy, the endeavour to minimise social losses also warrants the central bank taking into account aspects other than inflation. Partly as a result of this, all the banks using inflation targeting employ a flexible framework, and all of them have experienced episodes when the inflation target was temporarily not met due to real economy or financial stability considerations. (These were typically periods when inflation was affected by a one-off price level shock not jeopardising the anchoring of expectations, and decision-makers did not deem it necessary to offset this.) A substantial shock (crisis) may also alter the perception about the loss function.

In practice, flexibility may be manifested in several forms. Specific examples for some of the forms below can be found in all inflation-targeting central banks, which shows that central banks do not determine their policy based solely on inflation developments.

- There are several factors monetary policy should not react to in the short run, despite their inflationary effect. Therefore, the point target can be coupled with a tolerance band, indicating that inflation may fluctuate around the target. Due to the shocks to the economy, inflation deviates from the target, sometimes even departing from the band, but even in such cases central banks primarily strive to meet the point target.
- Inflation targeting central banks typically seek to keep inflation in line with the target over the medium term. In the spirit of flexibility, the usual horizon, over which the central bank attempts to achieve the inflation target, can be changed. Depending on the nature and persistence of the specific shock, the horizon can become shorter or longer, and as a result inflation may deviate from the target in the short run, but from a macrostability perspective, the longer-term result may be more favourable. Accordingly, in the case of an unusually large deviation, the central bank may decide to offset the effects of the shock over a longer horizon than previously used. This is because rapid inflation or disinflation would cause unwanted real economy fluctuations,

and therefore decision-makers can temporarily tolerate inflation deviating from the target. The extent of the specific change depends on the weight the central bank assigns to the real economy factors, as well as on the magnitude of the shock. Nevertheless, must be taken into account that if inflation returning to the target takes too long a time, the risk rises that economic actors start to doubt the central bank's commitment to the inflation target and its ability to meet the inflation target even over the long term, altering their expectations accordingly.

- Another sign of flexibility is if the central bank does not react to certain volatile elements of inflation and avoids causing real economy fluctuations by reacting to short-term effects. In this case too, the central bank takes into account real economy considerations.
- In various "exemption/escape clauses", central banks can describe circumstances under which a temporary deviation from the inflation target is acceptable. These include severe shocks considered external from a monetary policy perspective (e.g. VAT increase or a considerable change in global commodity prices), the direct effect of which exerted on the price level central banks do not react to, but devote special attention to the indirect, second-round effects that emerge through expectations and wage setting. Recognising that the divergence from the target may be sometimes due to factors the influencing of which falls outside the purview of the central bank, the central bank accepts that the inflation target is temporarily not met. In such a scenario, the central bank shows how one of the above factors led to missing the target, and over what horizon inflation can achieve the level that is in line with the target.
- Finally, decision-makers may also directly react to developments in some real economy variable, taking into account the considerations with respect to the economy's capacity utilisation or reducing the risk of a build-up of financial imbalances. Hence, if the economy experiences inflationary pressure due to overheating (demand shocks), the central bank reacts more strongly, but if the inflationary pressure emerges due to a weak economy (supply or cost shocks), the central bank response may be much more cautious.

The central bank's ability to reduce short-term fluctuations in output depends on the credibility of its commitment to price stability. The more credible the central bank is and the longer it has maintained an inflationary environment close to the target, the greater the chance that it can look through the inflationary impact of a one-off price level shock while ensuring that inflation expectations remain anchored. If missing the inflation target called the commitment of the central bank into guestion, it would be more costly to keep inflation around the target later. In view of this, flexibility cannot be arbitrary, and it requires a clear and transparent communication, from the perspective of both the efficiency and the accountability of monetary policy. This includes providing detailed explanations about the reasons behind the deviations. The United Kingdom can serve as an example, where inflation has been steadily above the 2 per cent target in the years after the crisis. Compared to the extremely high inflation of the 1970s, the main difference in today's situation is that now, due to the central bank's commitment to low and stable inflation, inflation expectations were anchored when price shocks (increasing global energy prices, growing import prices due to the weakening exchange rate, rising administered prices, VAT increase) affected the economy (McCafferty, 2013). This credibility provided the necessary flexibility to decision-makers who tolerated the overshooting of the target for a longer period than before, in order to avoid further real economy sacrifices. Together with a drop in credibility, the central bank's flexibility would also diminish, and that is why the anchoring of inflation expectations remains an important aspect.

As a result of the global financial crisis, inflation targeting shifted towards a more flexible approach than before, and macroprudential policy also gained ground. The experiences of the crisis showed that although price stability is important, it is not sufficient to maintain macroeconomic stability in itself. Due to the steadily sluggish economic growth – and having taken into account the low inflation and inflation expectations – central banks turned to supporting the recovery and stabilising financial markets. Central banks' experiences show that the inflation targeting strategy, when applied with the necessary flexibility, is an effective tool for ensuring price stability over the medium term and also bolsters macroeconomic stability.

Box 3 The practice of the Norwegian central bank

In representing the flexibility of inflation targeting, the Norwegian central bank is among the most transparent institutions. In order to increase awareness and transparency, they have already formulated the requirements that need to be fulfilled by the individual interest rate paths in the projections. This openness may be partly explained by the fact that the Norwegian central bank has published a numerical projection about the interest rate since 2005, which draws considerable attention to the interest rate path. The logic behind their approach illustrates the above well.



In addition to the endogenous interest rate path used in the projection, the way the individual aspects appear in the interest rate path is also published, as well as their impact on the projected variables. The published loss function shows the expected interest rate path under three conditions. The first condition gives an interest rate path where monetary policy focuses exclusively on meeting the inflation target (Criterion 1). Then real economy considerations are added to the central bank's response (Criteria 1, 2), as it seeks to smooth out the fluctuations in capacity utilisation. Thus, flexible inflation targeting connects the longer-term goal of monetary policy (nominal anchor) with the shorter-term considerations (stabilising the economy). Finally, in addition to the above, monetary policy also strives to mitigate the risk of financial imbalances (Criteria 1, 2, 3). The baseline projection takes into account all three aspects. Necessarily, this hampers the attainment of the inflation target to some extent, but it transparently represents the additional aspects that were taken into account.

4 International experiences

In the second half of the 20th century, several developed and emerging countries experienced high and volatile inflation. During this period, output and unemployment in developed economies fluctuated substantially, while productivity and the pace of potential output growth decelerated. Although not all problems were attributed to inflation, most economists concluded that high inflation had an adverse impact on the functioning of economies.

According to the considerations underpinning the inflation targeting frameworks established in the 1990s, price stability - i.e. a low-inflation environment – is not an end in itself for economic policy but the prerequisite for sustainable prosperity. A predictable inflationary environment provides greater profitability to companies, since they do not need to devote additional resources to project the expected inflation and to adjust their prices accordingly in a continuous manner, and they can assign more weight to their unique supply and demand characteristics when it comes to making their pricing and wage setting decisions. Steadily low inflation stimulates investments and reduces uncertainty in the business environment, which encourages economic actors to enter into long-term agreements. Based on experiences in several countries, it can be stated that in an environment of low inflation and sustainable fiscal policy, longer-term interest rates also decline, which is favourable from the perspective of financing government debt. Companies' and especially households' borrowing decisions may be channelled towards the domestic currency by low long-term interest rates, thereby reducing the risk of a build-up of unhedged FX credit. Having made a commitment to keep inflation low, several developed and emerging countries have introduced the inflation targeting system over the past two decades.

4.1 The spread of inflation targeting

Inflation targeting has become a widely accepted and applied strategic framework, but in the early 1990s it was still considered revolutionary. The lack of success of exchange rate and monetary targeting highlighted the need

for new alternatives, but knowledge about inflation targeting was limited, and in fact, most studies were written after its first introduction.

The first central bank to use an inflation targeting strategy was the central bank of New Zealand, which introduced the framework in late 1989. The country was followed by Canada in February 1991. In Europe, the first central bank to employ an inflation targeting framework was the Bank of England in the United Kingdom, directly after it was forced to leave the European exchange rate mechanism on 16 September 1992.⁴ The Swedish central bank (Sveriges Riksbank), considered the oldest national bank in the world, was the second to announce the introduction of inflation targeting in Europe in 1993, which it has pursued since 1995. Similar to the United Kingdom, directly preceding the decision, on 12 November 1992, the Riksbank had to stop protecting the exchange rate of the Swedish krona pegged to the ECU.⁵ The turbulence experienced by European currencies was also problematic for Finland, and therefore it switched to a floating exchange rate regime in September 1992, then six months later it introduced the IT framework. After that, inflation targeting replaced the fixed exchange rate as a monetary policy objective. The pioneering central banks were later followed by the central banks of other developed countries, including Australia, Spain, Norway and Iceland.

After the Asian crisis (1997–1998), many Asian countries (Indonesia, South Korea, Thailand) also adopted the system. In Central and Eastern Europe, the inflation targeting framework was first used by the Czech Republic and Poland after the political transition; they were followed by Hungary, Slovakia and Romania. In addition to the European and Asian countries, a growing number

⁴ The European Exchange Rate Mechanism (ERM) was established by the European Community (the forerunner to the European Union) in March 1979 as part of the European Monetary System (EMS). In the spirit of preparing for the Economic and Monetary Union and the introduction of the euro, the goal of the system is to reduce exchange rate fluctuations and facilitate financial stability in the European Union Member States. The British central bank was forced to leave the system due to exchange rate speculation. The day of the crash has become known as Black Wednesday.

⁵ The European Currency Unit (ECU) was the common unit of account in the European Community and later in the European Union from 1979 to 1999, until the introduction of the euro. The exchange rate of the ECU was determined by the weighted average of Member States' currencies. The goal of the system was to mitigate the fluctuations between Member States' currencies, and to enable economic transactions in the Community to be settled in a common currency unit.

of South American and African countries have announced inflation targeting in recent years. The spread of IT is shown on Chart 2, where the vertical lines indicate the month of introduction by the individual central banks.

Currently, the central banks of 28 countries pursue a monetary policy based on inflation targeting. These countries span 6 continents and form a quite heterogeneous group from the perspective of economic development.



Note: The vertical lines indicate the month of introduction by the individual central banks (of developed and emerging countries). Periods characterised by extreme inflation (for annual inflation in excess of 50 per cent in the given month) are excluded from the time series. Source: IMF International Financial Statistics

As low, stable inflation gained prominence, the monetary policy of notable central banks that formally do not use an inflation targeting strategy can also be best characterised by the features of flexible inflation targeting. Most recently, both the Federal Reserve and the Bank of Japan took significant steps towards inflation targeting by announcing a 2-per cent inflation target (Felcser–Lehmann, 2012). Having an explicit inflation target may have several advantages even if it does not enjoy the priority as in the framework

of inflation targeting, and this may have contributed to the overhaul of existing strategies. Perhaps the most important advantage is that it can help monetary policy in anchoring inflation expectations, which plays a key role in maintaining price stability.

4.2 The inflation targets used

Inflation targeting central banks typically determine the inflation target in terms of the change in the consumer price index.⁶ Central banks in developed countries have adopted a low inflation target of around 2 per cent (Chart 3). In emerging countries, the target is usually higher, which – in addition to the convergence of the economy – might reflect the lower credibility of monetary policy and the higher volatility of the exchange rate. The broad tolerance band may also serve the purpose of managing the high volatility of food prices, such as in the case of Turkey (the price of unprocessed food is very unstable, yet such products account for 15 per cent of the Turkish consumer basket). In the Central and Eastern European region, the targets are around 2–3 per cent.

Certain central banks publish detailed explanations, while others only announce the numerical value of the target. When setting the inflation target, the factors that probably play a part include past inflation, the measurement error of the consumer price index, the zero lower bound (ZLB) of the base rate, wage and price rigidities, the external inflationary environment and economic growth (Horváth–Matějů, 2011). Estimates support the view that, in addition to macroeconomic fundamentals (level and volatility of inflation, economic growth), institutional characteristics (credibility) are also important. The credibility of the inflation target plays an important role in anchoring inflation expectations in periods characterised by inflation which is substantially offtarget. According to the results, higher targets are typically coupled with higher and more volatile inflation.

In recent years, several central banks (e.g. in Romania, Serbia, Indonesia and the Philippines) have lowered their inflation targets. This is partly due to the

⁶ Earlier, the only central bank targeting core inflation was in Thailand. In early 2015, the central bank adopted a 2.5-per cent CPI inflation target with a ±1.5-per cent tolerance band, instead of the 0.5–3 per cent target determined in terms of core inflation.

fact that in certain cases inflation targeting, with gradually lower inflation targets, is part of the disinflation strategy. Earlier, the Turkish central bank significantly raised its target: in 2008 the target was increased from 4 per cent to 7.5 per cent, which was justified by the claim that the rise in food and energy prices could not be deemed solely a temporary, cyclical effect, as it was probably also the result of structural factors. Although at first the monetary policy horizon was extended to 3 years, in the end it was decided to raise the target, since according to the decision-makers, it would only have been possible to meet the original target if monetary policy had responded to the first-round effects of supply shocks, causing undesirable fluctuations in the economy. Financial markets responded to the announced target adjustment unfavourably, viewing the move as a weakening of the commitment to curb inflation.



Note: In the case of Canada and New Zealand, the midpoint of the band is emphasised, which is thus marked with a grey circle. In the United Kingdom, if inflation is off target by more than 1 percentage point, the Bank of England writes a letter to the Chancellor of the Exchequer explaining the reasons behind the deviation. This, however, is part of central bank accountability, and therefore it is not considered a tolerance band. There is a similar procedure in Iceland. Source: Central bank websites

Point targets (even with a tolerance band) provide a clear signal to economic actors about the target of the central bank. The symmetrical nature helps highlight that deflation should be avoided just as much as inflation substantially above target. Furthermore, a point target underscores the medium-term nature of targeting, as inflation cannot be expected to be right on target each month, and it is also more suitable for managing severe volatility than a tight band. The target range also underlines that the central bank does not have complete control over inflation developments. In the absence of a clear target value, however, its guidance role may be weaker, leading to elevated inflation uncertainty. Examining the practice of central banks, it can be stated that more than half of inflation targeting central banks use a point target with a tolerance band, while a smaller group (Albania, Iceland, Norway, Sweden and the United Kingdom) have only announced a point target. By contrast, 6 central banks have set a target range.

In the case of target ranges, central bank practices may vary, and the targets used by central banks may change over time as well. In a less stable macroeconomic environment, the target range is usually broader. The renewed agreement in autumn 2012 between the central bank of New Zealand and the government reaffirmed the 1–3 per cent inflation range of the central bank, but, in contrast to the past, it added that on average inflation should be kept close to the middle of the range (2 per cent). By contrast, the Korean central bank replaced the earlier point target and the tolerance band (3±1 per cent) with a 2.5–3.5 per cent target range. The elimination of the centre point was justified by the uncertainty surrounding the appropriate level of inflation, since with the new target, expectations can become anchored even around a level below 3 per cent.

The use of a point target is more widespread than a target range, and in most cases it is coupled with a tolerance band. Inflation can temporarily depart from the tolerance band, but central banks strive to maintain price stability over the medium term. The difference between this and a target range is that in this case, central banks explicitly seek to achieve the point target. For example, in Poland the 2.5-per cent target is coupled with a ± 1 -per cent tolerance band, but based on the 2014 monetary policy guidelines, the central bank endeavours to keep inflation as close to 2.5 per cent as possible

over the medium term, and not only to keep it within the tolerance band (NBP, 2013). There are central banks that do not set a tolerance band, while others abandoned it, as it became unnecessary. An example for the latter is Sweden, where in 2010 the central bank assessed that even if inflation departs from the band, it does not jeopardise the credibility gained by the point target. The tolerance band principally serves communication purposes in assessing the achievement of the target, thereby facilitating transparency and accountability.

4.3 IT's macroeconomic success

One of the favourable effects attributed to inflation targeting is that the level, the volatility and the persistence of inflation become more subdued, inflation expectations become more anchored on the target, and real economy fluctuations are reduced (Gosselin, 2007). According to Mishkin–Schmidt-Hebbel (2007), in the case of IT central banks, inflation drops both over the short term and the long term. Studies measuring the credibility of inflation targeting central banks and the anchoring of expectations usually draw positive conclusions with respect to the stronger credibility of inflation targeting (see, for example, Gürkaynak et al., 2006). The introduction of IT has a positive impact on the operation of a central bank as well, rendering decision-making consistent, communication transparent and enhancing the accountability of the central bank.

Nonetheless, inflation targeting has been criticised because, according to some, it puts an overly narrow focus on inflation, thereby marginalising the support for the real economy. In the case of the large FX debts that tend to be accumulated in emerging economies, the flexible exchange rate coupled with IT may have a destabilising effect through the macroeconomic-financial impact of the revaluation of FX debt. Having examined the experiences of inflation targeting central banks from seven OECD countries, Ball–Sheridan (2005) have not found conclusive evidence on IT being a successful strategy.

Most empirical results suggest that the concern that, after the introduction of IT, attention is almost exclusively focused on inflation, and thus the growth rate of the real economy decelerates and its volatility rises, is unfounded.

Lower inflation also supports economic activity through the more predictable economic environment. Based on data for 50 developing countries, IT is successful in containing inflation, while its effect on growth varies from region to region (Ayres et al., 2014). Examining the developments in inflation and GDP growth, IT offers advantages to both developed and emerging countries (Abo-Zaid–Tuzemen, 2012). In emerging countries that use IT, inflation rates are substantially lower and more stable. The growth rate of the economy is higher in both developed and emerging IT countries as compared to the period before IT, while non-IT countries are characterised by more moderate change. Furthermore, in developed IT countries, fiscal policy is more disciplined and more in line with monetary policy. Based on the results, if a country wishes to curb its high inflation without hampering economic growth, announcing an inflation target may prove to be a good strategy.

Table 1 Inflation and	GDP gro	wth						
		Inflati	on (%)			GDP gro	wth (%)	
	Le	vel	Vola	tility	Le	vel	Vola	tility
	Before IT	After IT						
Developed (IT)	6.7	2.6	3.4	1.5	3.4	3.3	2.0	2.0
Emerging (IT)	15.3	6.0	8.9	2.3	3.2	4.6	4.3	2.0
Whole sample (IT)	12.8	5.0	7.3	2.1	3.3	4.2	3.7	2.0
Developed (NT)	3.1	1.9	1.5	0.8	2.8	2.1	1.8	1.4
Emerging (NT)	11.4	7.1	7.2	4.1	3.8	5.3	4.0	2.9

Note: IT denotes inflation targeting, NT denotes non-inflation targeting central banks. In line with similar studies, in the NT groups, the hypothetical date for IT's introduction is derived from the corresponding IT group's average date of introduction (in the case of developed countries it is February 1996, while in the case of emerging economies it is March 2002). The period after IT's introduction lasts until October 2008, thereby eliminating the distorting effect of the global financial crisis. Inflation values were calculated without taking into account the periods characterised by extreme inflation (with annual inflation in excess of 50 per cent in the given month).

Developed IT: Australia, Canada, Iceland, New Zealand, Norway, South Korea, Sweden, United Kingdom. Emerging IT: Albania, Armenia, Brazil, Chile, Colombia, Czech Republic, Ghana, Guatemala, Hungary, Indonesia, Israel, Mexico, Peru, Philippines, Poland, Romania, Serbia, South Africa, Thailand, Turkey.

Developed non-IT: Austria, Belgium, Denmark, France, Germany, Italy, Japan, Netherlands, Portugal, United States.

Emerging non-IT: Argentina, Bolivia, Bulgaria, China, Costa Rica, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, India, Malaysia, Morocco, Panama, Tunisia, Uruguay, Venezuela. Source: IMF International Financial Statistics Table 1 summarises the statistical results on inflation and GDP growth using a sample slightly different from the above. The decline in inflation was a general trend in the period of several decades under review (1985-2008), and in inflation targeting (IT) countries a decrease of larger proportion could be seen, albeit from a higher level. The volatility of inflation dropped in all groups, with the strongest reduction seen in emerging IT countries, where it stands at around a quarter of its value compared to the period before IT. After the introduction of IT, the average growth rate increased in emerging countries, just as in other emerging countries. Furthermore, the volatility of GDP growth exhibited an outstanding decline in the emerging IT countries.

The fluctuation of inflation around the target is substantial both in a crosssection and over time. This can be partly explained by exchange rate developments (small, open economies), budget deficits and the different levels of development in the financial sector (Gosselin, 2007). Based on data on deviations from the target in 21 IT countries, the inflation performance of developed countries is favourable, while emerging countries are more heterogeneous. When a higher inflation target or a broader target range are used, inflation shows larger fluctuations around the target, and the lower volatility of output does not offset the losses incurred due to the higher volatility of inflation.

With respect to economic activity, the countries that use IT (and a flexible exchange rate regime) performed better in the two years following the global financial crisis (Carvalho Filho, 2011). This remains valid even if we take into account other factors that are important from the perspective of growth (growth in foreign trading partners, changes in the terms of trade, the level of short-term external debt before the crisis, capital inflows, openness, flexibility of the exchange rate, etc.). It may have contributed to the success of IT countries that the credible inflation target helped avoid the liquidity trap, and that the central bank could engage in a more active monetary policy easing without jeopardising the inflation outlook. Higher pre-crisis interest rates may have limited excessive lending – which turned out to be an aggravating factor during the crisis – and the allure of risky foreign assets on the one hand, and offered more room for manoeuvre for lowering interest rates on

the other hand. The shock-absorbing feature of the flexible exchange rate regime may have also helped. Owing to the above, nominal and real central bank interest rates dropped more, and deflationary worries cropped up less due to the better anchoring of inflation expectations, and real depreciation did not undermine risk perception.

Based on the analyses, inflation targeting countries performed better compared to their own earlier achievements. However, results differ as to whether these countries performed well compared to other countries. The comparison of small, open IT countries and larger, more closed non-IT countries is a general problem. Moreover, the strategies of several central banks resemble IT in many important aspects, despite officially being noninflation targeting central banks (European Central Bank, Federal Reserve, Bank of Japan). Exploring cause and effect is also a challenge, as inflation may have dropped due to the IT strategy, but the reverse may be also true, i.e. that central banks adopted IT while decreasing inflation. Furthermore, several other, non-monetary policy factors may explain the decline in inflation (globalisation, fiscal policy).

5 Impact of the crisis on the inflation targeting framework

According to the consensus before the crisis, flexible inflation targeting provided monetary policy with an appropriate framework for achieving price stability and thus also sustainable economic growth. However, based on the experiences of the crisis, the new consensus seems to be that inflation targeting in its past form was unable to keep economies on a sustainable growth path and to prevent the financial crisis. After the crisis erupted, it became obvious that the instruments used until then were unsuitable for managing the severe fallout from the financial crisis.⁷

5.1 Challenges posed by the zero lower bound: renewing the instruments

After the onset of the financial crisis, it became obvious that suddenly reining in lending and reducing the unsustainable debt accumulated earlier would have substantial, negative real economy consequences. Therefore, central banks in developed countries undertook intensive monetary easing (Chart 4). The conventional instrument used by central banks, i.e. the reduction of short-term nominal interest rates, quickly reached its limits: the negative shock affecting the economy was so large that its impact could not be offset by lowering the central bank base rate to even around zero. The zero lower bound (ZLB) on nominal interest rates hindered further monetary easing using the conventional instruments employed previously, although further easing would have been necessary for the economy.

⁷ The theoretical and practical opportunities that arose in connection with the changes and overhaul of inflation targeting in the wake of the global crisis are surveyed in Ábel et al. (2014).



Thus reaching the ZLB is a challenge for monetary policy, since, having exhausted its conventional tools, it must continue to stimulate the economy with other, unconventional instruments. Closely related to the zero lower bound, the so-called liquidity trap involves risks in addition to the central bank not being able to sufficiently support the economic recovery. In a liquidity trap, the economy suffers such a negative shock that the (negative) real interest rate necessary for stabilising the economy cannot be achieved in the context of the prevailing inflation expectations, even if the central bank base rate is reduced to zero. Insufficient monetary easing cannot reverse the real economic downturn, which exerts downward pressure on both prices and inflation. As economic actors see the inefficiency of the central bank's monetary policy, they may include lower inflation in their expectations, and in fact, in the case of shocks above a certain magnitude, deflationary expectations may even emerge. As soon as inflation expectations are detached from the inflation target of the central bank and start to decline, real interest rates begin to rise, moving even further away from the level necessary to

stabilise the economy, and exacerbating the real economic downturn even more. This exerts additional downward pressure on prices, which can plunge the economy into a deepening deflationary spiral when this spills over into inflation expectations.

Faced with the above challenges, further monetary easing must be performed not only using conventional tools, i.e. lowering short-term nominal interest rates, but also using other measures to ensure that the inflation target is met and that the real economy receives the appropriate stimulus. As the problem is mainly rooted in the fact that the central bank is unable to lower real interest rates to the necessary extent, the solutions suggested are essentially attempts to remedy this. The central bank instruments aimed at solving the ZLB problem can be divided into two major groups: asset purchases or quantitative easing programmes (QE), and forward guidance (FWG). With these instruments, the central bank can influence financing conditions by increasing the central bank's balance sheet and adjusting its composition, and orienting expectations about future interest rates.

Quantitative easing programmes

Quantitative easing instruments can be basically divided into two larger groups: the first includes direct credit market interventions, while the second comprises government securities purchases.

Direct credit market interventions include central banks purchasing corporate securities or covered bonds, or, in rare cases, directly extending loans to financial enterprises. In this manner, the central bank becomes directly involved in the private sector, and thus the credit risk of the sector is partly borne by the central bank. The goal of direct credit market interventions is to help the functioning of credit markets, reduce the risk and liquidity premiums on credit markets and ultimately improve the credit conditions of the private sector. Direct credit market interventions are only undertaken by the central banks of some developed countries that have sufficient credibility, as there are few countries with a developed securities market through which private sector credit conditions can be influenced efficiently and substantially.

The other group of guantitative easing programmes comprises large-scale government securities purchases on the secondary markets. Government securities purchases may have two purposes. In the first case, central banks constrained by the lower bound of the interest rate may use this instrument in order to further expand liquidity, improve longer-term risk-free yields and thus indirectly credit conditions, and stimulate aggregate demand. However, making government securities purchases can be justified even in the context of interest rates above but close to zero: during the European debt crisis, the European Central Bank's (ECB) use of the instrument could be explained by the desire to mitigate liquidity strains on the government securities markets, restore monetary transmission and avoid a self-fulfilling sovereign debt crisis. From a central bank credibility perspective, government securities purchases can be considered a rather risky unconventional instrument, since this is where the consistency with inflation targeting and independent central bank operation, the primary purpose of which is price stability, is most likely to be called into question. This is because the dividing line between improving the liquidity situation or the transmission mechanism, and monetary financing is blurred. To make sure that the market does not interpret the measure as debt financing, central banks exclusively perform secondary market interventions.

By and large, the unconventional instruments can be regarded as successful, and they proved especially effective during the most severe financial turbulences, as they restored the operation of the markets and significantly reduced systemic risks. The instruments cut long-term bond yields and in certain cases even credit spreads. Justification for the future use of unconventional instruments depends on several factors. Experiences show that these instruments proved to be the most effective at the peak of the crisis, when financial strains led to segmentation on the markets. In addition, the instruments can also be considered successful in boosting aggregate demand when the zero lower bound is reached, although as markets return to normal, this can have an increasingly mild impact. With the onset of the economic recovery and the easing of financial market tensions, the zero lower bound constraint is increasingly less significant, which undermines the justification for using unconventional instruments. In such circumstances, the greatest challenge for monetary policy is the appropriate phase-out of the unconventional instruments. Since in many cases this would involve unprecedented unconventional instruments that have been used for a relatively long time, the appropriate communication about the phase-out vis-à-vis economic actors, markets, financial institutions and other central banks is of crucial importance.

Forward guidance

The other central bank instrument for tackling the ZLB problem is forward guidance, which can influence the monetary policy stance by orienting inflation expectations. Although the role of forward-looking communication has gained in importance due to the policy rate hitting the zero lower bound, the desire for transparency in central bank operation and communications has become increasingly widespread. Hence, it has become common practice for central banks to publish the details of their monetary strategy, the target variables, the decisions and the main arguments underpinning them, as well as their assessment about the expected economic developments. Nevertheless, when uncertainty about the economic outlook grows, as for example during the financial crisis, the communication about the future monetary policy stance becomes more important, since economic actors face unprecedented situations on the one hand, and due to the ZLB, the room for monetary policy manoeuvre is more limited on the other hand, which makes forming expectations about monetary conditions more difficult (Csortos et al., 2014).

In the case of best-practice inflation targeting central banks, a common form of forward guidance is forecast-based guidance, which gives an indication of the most likely monetary policy response in view of the given information base. In a favourable case, even the longer end of the yield curve shifts in line with the central bank's intentions. The forecast-based guidance may be a simple verbal indication of the expected interest rate path (e.g. direction of further steps or the expected slope of the interest rate path), but it can also include the publication of an interest rate path consistent with the central bank's macroeconomic forecast. In certain special cases, it may be necessary to complement forward guidance with some degree of commitment. Such a special scenario is when the given economic conditions and the previously used reaction function would warrant further monetary easing, but the base rate has reached or come close to its zero lower bound, and the policy rate cannot be cut further. Under such circumstances, low inflation may be coupled with a high real interest rate, which can lead to a further fall in aggregate demand. This can be mitigated by the central bank by providing commitment-based guidance, i.e. for example announcing that it will keep the policy rate low, even at the expense of temporarily missing the inflation target, which increases inflation expectations and thereby reduces the real interest rate. The lower real interest rate supports the economy by bringing consumption spending forward and stimulating investments.

Compared to the above, other contrasting views have also been formulated about the exact goal of forward guidance and its mechanism. According to these interpretations, the main aim of forward guidance is to mitigate the bond market uncertainty surrounding the onset of the tightening cycle and to prevent a stampede to sell bonds (Csortos et al., 2014). This interpretation maintains that monetary policy decision-makers do not wish to raise inflation expectations and thus lower real yields by providing forward guidance, instead they want to keep long-term nominal yields low and thereby prevent a rise in real interest rates and overreaction by the bond markets to any interest rate increases.

The main difference between forecast-based and commitment-based guidance is that while during the former the central bank provides information on the expected consequences of its usual strategy, the latter wishes to exert an impact through the temporary suspension of the prevailing strategy. Commitment-based guidance typically contains some kind of condition, as no central bank wants to make a long-term commitment to a strategy that it would not normally consider to be optimal. Central banks employing commitment-based guidance usually formulate conditions about the time horizon or the state of the economy (state-contingent commitment).

The success of forward guidance depends on numerous factors.⁸ First, in order to make the instrument effective, the central bank must make a credible commitment, since the guidance can only then exert the intended effect on expectations. Second, the central bank's communication about its goal and its response to economic developments must be clear. Nonetheless, the guidance cannot be too complicated or complex, because this can have a negative effect on the comprehensibility of the monetary policy intention. In addition, central bank decision-makers' differing views about economic developments and their contradictory communication can also reduce the straightforward and credible nature of the guidance, and thus its effectiveness.

5.2 Challenges posed by the zero lower bound: adjusting the targets

Taking into account unemployment and other real economy factors

In the years after the crisis, an rising number of banks started mentioning unemployment in their regular communication. The state-contingent forward guidance on monetary policy was adopted by the Federal Reserve in December 2012 and by the Bank of England in August 2013, linking it to a threshold in the unemployment rate. As earlier central banks had typically refrained from linking their monetary policy explicitly to labour market variables, these developments have brought about a substantial change in central bank communication, presenting new challenges to decision-makers. Later, both central banks removed the unemployment threshold from their guidance, as the unemployment rate quickly approached the threshold in both countries. After this, the Bank of England linked its forward guidance to the unused capacities in the economy instead of labour market developments, while the Federal Reserve started to emphasise in its communication that the lift-off of the interest rate will be decided based on several factors.

Targeting the unemployment rate in itself and using it during forward guidance may entail risks if the natural or structural unemployment rate – an

⁸ In the March 2014 BIS Quarterly Review, Filardo–Hofmann (2014) examined the efficiency of the forward guidance used by the ECB, the Bank of England, the Bank of Japan and the Federal Reserve.

unobservable variable corresponding to the long-run equilibrium value – is not known. This is determined by supply-side characteristics of the economy that monetary policy cannot influence. Therefore, targeting an unemployment rate lower than the natural rate would result in aggregate demand constantly hitting the supply capacity constraints of the economy, which would cause increasingly rapid inflation. This is not only problematic because of the uncertain value of the natural rate, but also because this rate may change over time. Targeting a fixed unemployment rate is thus a risky strategy, since in the long run this variable is independent from monetary policy, and an incorrect estimate of the natural rate of unemployment might jeopardise price stability.

It should be emphasised, however, that the unemployment rate thresholds used by the Federal Reserve and the Bank of England in their forward guidance did not mean that the banks' inflation target or the price stability mandate had changed. They were responses to a special situation in which the central banks, having already taken real economy aspects into consideration, sought to perform further easing in the form of forward guidance, and after having reached the zero lower bound, precisely in order to meet the inflation target. However, both central banks realised that the chosen macroeconomic variable did not provide an adequate forecast of capacity utilisation in the economy, and therefore, as they approached the threshold, they decided to adjust their forward guidance.

Rethinking the inflation target

We have seen in the crisis that the economy can be affected by considerable shocks, the most recent of which came from the financial sector, but in the future a shock of similar magnitude may come from others sources. Seeing such huge shocks, the central bank may take raising its inflation target into consideration, which would create more room for manoeuvre to meet the target in the case of potential new shocks. Furthermore, the emergence of a liquidity trap would be less likely, and the associated costs would drop. Others argue that by increasing the 2-per cent target currently aimed at by several central banks, mostly in developed countries, i.e. by unexpectedly raising inflation, the real debt of households, the government and the financial sector indebted during the crisis could be reduced. Blanchard et al. (2010)

suggested that the inflation target should be increased to 4 per cent, which was criticised by central bankers for several reasons.

The most important argument against raising the inflation target can be illustrated by the shifts in the Phillips curve. According to the theory, the short-term Phillips curve (PC₁ and PC₂ on the chart; LRPC denotes the long-run Phillips curve) captures the negative relationship between inflation and unemployment (Chart 5). The initial equilibrium is at Point A (U* represents the natural rate of unemployment). If economic policy wishes to lower unemployment, it can be achieved at the expense of higher inflation (Point B), which means a shift along the short-term Phillips curve (PC₁). In practice, nominal wages do not change (due to wage stickiness caused by the currently effective contracts) during this process, but prices rise more rapidly, therefore companies have an incentive to hire relatively cheap labour in order to increase production. However, the process does not stop here, as workers demand higher wages on account of the price increases. As wages start to adjust,



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companies lose their incentive to hire further labour, and unemployment returns to its natural rate, while inflation stabilises at a higher level (Point C).

From a practical perspective, several arguments can be listed against raising the inflation target. In addition to the erosion of real debts due to higher inflation, real interest rates, real wages and real property prices would also decline, which would necessitate another macroeconomic adjustment. Moreover, higher inflation entails several other costs. Perhaps one of the major problems is that, on account of the higher inflation, a wide range of changes can occur in the economy (e.g. the spread of wage indexation), inflation shocks can intensify and monetary policy can lose some of its efficiency. Even if the inflation target is only raised temporarily, the fact that the central bank's credibility is called into question poses a great risk, which may cause substantial difficulties in central bank decision-making going forward.

5.3 Solutions beyond the framework of inflation targeting

In the literature on optimal monetary policy, the target function maximising social benefits usually results in a so-called history-dependent monetary policy (Clarida et al., 1999, Eggertsson–Woodford, 2003), which is particularly true near the zero lower bound and in the case of a liquidity trap. In contrast to inflation targeting, history-dependent monetary policy rules are not forwardlooking, as in the latter case the interest rate policy is also affected by the past developments in the target variable, which impacts the influencing of inflation expectations. History dependence can be usually achieved by choosing the level of a nominal variable as monetary policy's intermediate target (nominal anchor) instead of its growth rate. In such a scenario, all deviations from the target path accumulated in the past must be offset in the future. In other words, in the case of undershooting the target, it is not enough to return to the previous growth rate (as in the case of forward-looking rules, e.g. inflation targeting), since monetary policy must be backward-looking and compensate for missing the target in the past by attaining a growth rate temporarily and intentionally higher than the average in order to guide back the economy onto the predetermined target path. Thus, the central bank can make a credible commitment to remain loose even after the onset of the recovery, which automatically entails a more expansive monetary policy and therefore higher inflation expectations.

Price level targeting

Price level targeting (PLT) satisfies the requirements of the history-dependent monetary policy rules detailed above, since it focuses on the level of a nominal variable, the consumer price index, instead of its change (inflation). Alternatively, we can think of PLT as an inflation targeting framework that also takes the past into account, and in which the inflation target is met on average over a longer period. Thus, the target path for the price level is determined in line with the desirable inflation target. Should inflation diverge from this implicit target, it is not enough to bring it back to this value (as a forwardlooking inflation targeting regime would do), because the deviation has to be compensated for in the other direction to nudge back prices onto the predetermined target path (Chart 6).





In the case of price level targeting, several drawbacks should be mentioned. The problems with this approach include that – although it stabilises the price level and meets the inflation target on average over a long period of time – in the short run it entails more volatile inflation. Another disadvantage of PLT is that it cannot look through the one-off price level shocks that only deflect inflation temporarily from its long-term target (e.g. indirect tax increase, reduction of administered prices). Under the PLT, these misses must also be compensated for. Finally, a price level targeting monetary policy regime would probably put the central bank in a more difficult position from a communication perspective as well. In light of this, currently no central bank uses this framework.

Nominal GDP targeting

Targeting a level of nominal GDP (nGDP) also exhibits the characteristics of history-dependent monetary policy rules, but in this case the role of the nominal anchor (the intermediate target of monetary policy) is played by nominal GDP instead of the price level. Nominal GDP is calculated by multiplying real output by the price level measured with the GDP deflator, i.e. it basically expresses the value of the goods and services produced in the economy at current prices. Currently, nominal GDP targeting is merely a theoretical suggestion, and it has been applied nowhere in practice, but several economists (Woodford, 2012) and the governor of the Bank of England (Carney, 2012) have mentioned this possibility.

According to the proponents of nominal GDP targeting, this framework would enable monetary policy to focus more on stabilising the real economy over the short term without the economy losing its long-term nominal anchor and without jeopardising price stability. The temporary toleration of missing the inflation target is not necessarily harmful, if this can prevent excessive real economy volatility.

However, the problem is that due to the history-dependent nature of the rule, the central bank must compensate for past deviations from the target in the future, which may cause greater volatility in inflation. Second, the optimal point where the target path of nominal GDP should start is not obvious. The target path would run on an optimal course if it started from the equilibrium state of the economy when the output gap is zero and inflation is on target. Estimating the equilibrium state of the economy in real time is quite uncertain, and in the absence of a confident estimate, the target path can result in a looser or tighter monetary policy than necessary for an extended period of time.

Moreover, targeting nominal GDP makes it essential to address the problems associated with measuring the level and growth rate of long-term potential output. The other practical problem arises from measuring nominal GDP. Whereas inflation indicators are available on a monthly basis, the data for nominal GDP is only published in every quarter, typically with a delay of several months. In contrast to the inflation indicator, GDP is revised often, i.e. the whole time series might have to be modified retroactively as more accurate information is received. Finally, if nominal GDP is to be used as the monetary policy objective, it should be considered that it is harder to communicate, therefore it is more difficult for the public to grasp the concept, which would be especially important in the case of a framework heavily based on influencing expectations.

5.4 The change in the relationship between price stability and financial stability

The current financial crisis shed new light on the long-running debate whether central banks should take into account seemingly unsustainable asset prices and financial imbalances (or, in other words, financial overheating) while performing their primary function, i.e. achieving and maintaining price stability, and if so, how. The period before the crisis is called the Great Moderation, which is an allusion to the fact that before the crisis rapid and enduring growth could be observed coupled with near price stability. Compared to earlier times, both inflation and GDP growth exhibited much less volatility. The experiences of the crisis showed that macroeconomic stability did not ensure macro-level financial stability: the number of instabilities steadily increased, even in developed countries, although this time, surprisingly, against the backdrop of price stability and a generally stable macroeconomy. The other observation was that the lack of financial stability could also exert substantially negative effects on macroeconomic stability. Therefore, it can be stated that asset price bubbles and financial imbalances caused problems simultaneously from the perspective of macroeconomic stability and financial stability. Consequently, a central bank with the primary objective of price stability must devote its attention to financial strains even before a crisis situation, in the build-up phase of financial imbalances, since this is important to the central bank, and not only from the perspective of achieving financial stability.

According to the pre-crisis consensus, in order to achieve macroeconomic stability, monetary policy only had to concentrate on attaining price stability, which could be influenced by a single instrument, i.e. changing the policy rate. Similarly, in the field of prudential policy, tasked with regulating credit institutions, it was widely held that in the context of an efficient microprudential policy, i.e. when individual financial institutions operate reliably and are regulated adequately, no financial stability problem can arise. The crisis showed that monetary policy should not only focus on price stability if it wishes to achieve macroeconomic stability: it should also take into account financial variables and the developments of the financial system when making decisions. In addition, while prudential policy before the crisis did not take into account price stability considerations, and solely focused on ensuring the adequate functioning of the individual institutions, after the crisis it became clear that no macroeconomic stability can be achieved in times of financial instability, and that the stability of individual institutions is not a sufficient condition of financial stability. System-wide macroprudential regulation is necessary to ensure the stability of the financial system.

At the same time, when the financial crisis made it clear that financial stability was a necessary but not sufficient condition for price stability, the view became increasingly widespread that the instruments of monetary and macroprudential policy should not be treated separately since there are important interactions between the two areas. Despite all of this, there is no clear stance on how explicitly monetary policy should formulate financial stability goals.

Fully incorporating financial considerations into monetary strategy requires a fundamental change in attitudes and new modelling approaches. Due to the different periodicity of financial cycles, the varying length of cyclical phases and their interactions, the methods used should be suitable for adequately adjusting for these cycles. Furthermore, the variables identifying these cycles (credit aggregates, financial asset prices, external balance indicators) should be examined. Taking into account such financial and other, non-financial imbalance indicators when estimating the cyclical position of the economy might have the advantage of making the real time estimate of the output gap more reliable, and providing help in making well-founded decisions.

The ultimate goal of monetary policy is to maximise social welfare, the best approximation of which is the endeavour to smooth out the fluctuations in inflation and GDP. If we accept that the build-up of financial imbalances entails the risks of large fluctuations in economic growth, then, especially in light of the crisis, to many analysts and economic policymakers this includes the mitigation of welfare losses caused by financial imbalances. The crisis did not call into question the primary objective of central banks, but it has become obvious that keeping inflation steadily low is not enough: central banks have further tasks with respect to achieving macroeconomic stability.

The ideal solution would be if the instruments providing the most input in central bank decision-making could be enhanced to gain a clearer picture of the risks threatening macroeconomic stability. This could be achieved by representing financial variables and the financial sector in central bank projection and analysis models more realistically. In recent years, more and more attempts have been made to incorporate the financial sector into macroeconomic models, and simplifying assumptions are eliminated constantly (allowing non-linearities, introducing heterogeneous actors, weakening rationality assumptions).⁹

The solution that would currently work in practice could be to complement the already used monetary policy analyses with combinations of indicators reliably signalling the build-up of financial overheating and instability (e.g. Borio–Lowe, 2002, Csortos–Szalai, 2014).¹⁰ In addition, signalling the overheating in the economy may be improved further by taking into account financial variables as well as inflation developments while determining the cyclical position of the economy.

⁹ Cecchetti et al. (2009) suggested some necessary changes.

¹⁰ During its Macroeconomic Imbalance Procedure (MIP), the European Commission aspires to point out emerging imbalances with the help of its early-warning system. The Commission examines the various indicators for each Member State annually, and based on those, it calls Member States' attention to risks.

5.5 Inflation targeting in emerging economies during and after the crisis

The new directions and experiences linked to inflation targeting and described above mostly appeared in developed-country central banks. Nevertheless, it is worth exploring the same problems in the context of emerging economies, and how the monetary policy of their inflation targeting central banks was affected by the financial crisis.

As a result of the substantial monetary easing in the developed world, yields on developed markets shrank considerably, which also impacted emerging markets. On account of the higher yields, investors reallocated their savings to emerging countries from developed markets, with the former thus experiencing huge capital inflows. This put appreciation pressure on the exchange rates of emerging economy currencies and reduced their financing costs. In some countries, however, as a result of the significant capital inflows, financial stability was threatened by the heightened risk of macroeconomic imbalances and the build-up of financial bubbles, which in many countries was sought to be offset by introducing capital controls. Meanwhile, in other countries, monetary policy could be looser owing to the increased global liquidity and risk appetite, which provided better support to the recovery. In the majority of emerging economies, central banks did not hit the zero lower bound of the nominal interest rate, and therefore they did not need to face the challenges posed by this. Yet, the responses given by the developed world to the ZLB problem affected these countries too, and influenced the room for monetary policy manoeuvre.

In many emerging economies, the financial stability issues described above are coupled with a unique aspect, typical of these countries. Due to the so-called "original sin" phenomenon, these countries cannot satisfy their financing requirement solely from their own currency, therefore they obtain a large portion of financing in foreign currency, which may lead to a significant FX debt. In the case of a large FX exposure of the household and corporate sectors, exchange rate developments may be a very important factor in financial stability. Should depreciation occur, the repayment burden on actors indebted in foreign currency increases, which may threaten the stability of the banking system. This constrains the room for manoeuvre of an inflation targeting central bank that takes into account financial stability considerations as well, since it not only needs to consider the impact of the exchange rate on inflation when conducting monetary policy, but also the effects emerging in the wake of FX debt revaluation. After a shock similar to the present crisis, when real economy output plummets and inflation is below target, macroeconomic stability considerations would warrant looser monetary policy, but if there is a huge amount of FX debt, the exchange rate depreciation in the wake of the shock can potentially cause risks in the banking system that constrain the room for monetary policy manoeuvre. Therefore, financial stability considerations in emerging economies may conflict with the price stability objective.

For the majority of emerging countries, it can be stated that they shifted towards the inflation targeting framework and towards making it more credible (e.g. Russia, India), without seeking alternative solutions. Nevertheless, the inflation targeting framework has become more flexible during the crisis from several respects, and its set of instruments has expanded. Flexibility was not manifested, however, in the targets but mainly in the use of the new instruments. In the case of most emerging countries, the central bank did not hit the zero lower bound of the base rate, and therefore unconventional instruments such as quantitative easing were seldom used. The Czech, Israeli and, to a smaller extent, the Chilean central bank constitute an exception to this. At the zero lower bound, the Czech national bank started using the exchange rate as an instrument for further monetary easing (by introducing an exchange rate commitment), the Israeli central bank performed quantitative easing while the base rate stood at 0.5 per cent, and in Chile the floor of the rate-cutting cycle was 0.5 per cent, and temporarily unconventional instruments were used here as well (longer-term repo transactions), although they have since been phased-out. The Magyar Nemzeti Bank used targeted measures to improve monetary transmission, launching the Funding for Growth Scheme (FGS) in April 2013, then deciding to introduce a similar but separate construction, the FGS+ in February 2015. In addition, the so-called

Self-Financing Programme launched by the Magyar Nemzeti Bank and the forint conversion of FX-based household mortgage loans had a favourable effect on the efficiency of the transmission mechanism.

Forward guidance was employed by several central banks that had not hit the ZLB, but its form and the strength of the commitment varied widely. For example the Czech central bank publishes its interest rate path projection in the form of a fan chart, and it also specifically communicates the earliest expected date for the phase-out of the exchange rate threshold. In Poland and Chile the central banks have indicated the expected time horizon over which the base rate will be kept unchanged, which is more like a forecast-based guidance with a looser commitment. During the 2012–2014 rate-cutting cycle, the Magyar Nemzeti Bank provided a signal for a shorter horizon, and then, after the interest rate cycle ended, it started using conditional forward guidance. During the interest rate cycle which was restarted in March 2015, the central bank indicated its expected measures through short-term guidance once again, and then, after reaching the bottom of the cycle, it formulated a longer-term forward-looking message.

With respect to the target value, Turkey shifted towards a higher inflation target in 2008. The central bank justified this by claiming that inflation expectations had risen considerably due to shocks outside the scope of monetary policy. Later, however, the central bank reduced its inflation target to support the process of disinflation and to anchor expectations at a lower level. In most countries (Romania, Russia, India), inflation targets were typically gradually lowered, and in New Zealand the central bank clarified the point target that monetary policy wishes to attain within the target range. In order to make its inflation targeting system more flexible, the Magyar Nemzeti Bank introduced a \pm 1-percentage point ex ante tolerance band around the 3-per cent inflation target.

The most considerable common element in the countries under review is that among the lessons of the crisis, central banks attribute special significance to the changed relationship between monetary policy and financial stability. Several central banks' mandate and instruments have been expanded with macroprudential regulation, and in many cases microprudential supervision has also been absorbed by central banks. In addition to the primary objective of price stability, financial stability is increasingly regarded as the other major goal of monetary policy that should be taken into account while conducting interest rate policy.

	Date IT adopted	Target type	Decision- making process	Published fan charts	Forecast owned by	Parliamentary hearings	Minutes
Albania	2000	Point with tolerance band	Vote		n.a.	n.a.	No
Armenia	January 2006	Point with tolerance band	Vote	Inflation, GDP	Central bank	Yes, annual	Yes, after 10 days
Australia	June 1993	Range	Consensus	Inflation, GDP	Central bank	Yes, twice a year	Yes, after 2 weeks
Brazil	June 1999	Point with tolerance band	Vote	Inflation, GDP	MPC	Yes, six times a year	Yes, after 2 weeks
Canada	February 1991	Range with midpoint	Consensus	Inflation, core inflation	Governing Council	Yes, twice a year	No
Chile	September 1999	Point with tolerance band	Vote	Inflation and alternative indicator*, GDP	Board	Yes, four times a year	Yes, after 2 weeks
Colombia	October 1999	Point with tolerance band	Vote	Inflation and alternative indicators, GDP, output gap	Staff	Yes, twice a year	Yes, after 2 weeks
Czech Republic	December 1997	Point with tolerance band	Vote	Inflation and alternative indicator*, GDP, interes rate	Central bank	No (Report)	Yes, after 8 days
Ghana	May 2007	Point with tolerance band	Consensus	Inflation	MPC	No	No
Guatemala	2005	Point with tolerance band	Vote	Inflation	Staff	Yes, twice a year	Yes, after 4 weeks
Hungary	June 2001	Point with tolerance band	Vote	Inflation, GDP	Staff	Yes, once a year	Yes, after 2 weeks
Iceland	March 2001	Point	Vote	Inflation	Staff	Yes, twice a year	Yes, after 2 weeks
Indonesia	July 2005	Point with tolerance band	Consensus		Board	No	No
Israel	June 1997	Range	Vote	Inflation, key policy rate	Staff	Yes, twice a year	Yes, after 2 weeks
Mexico	2001	Point with tolerance band	Consensus	Inflation, core inflation, GDP, output gap	Staff	Yes, not regular	Yes, after 2 weeks

Annex: Overview table about the individual features of inflation targeting

	Date IT	Target type	Decision-	Published fan charts	Forecast	Parliamentary	Minutes
	adopted		making process		owned by	hearings	
New Zealand	December 1989	Range with midpoint	Governor decides		MPC	Yes, four times a year	No
Norway	March 2001	Pont	Consensus	Inflation, core inflation, output gap, key policy rate	Governor	Yes, annual	No
Peru	January 2002	Point with tolerance band	Vote	Inflation, GDP, output gap	Central bank	Yes, once a year	No
Philippines	January 2002	Point with tolerance band	Vote	Inflation	Central bank	No	Yes, after 4 weeks
Poland	1998	Point with tolerance band	Vote	Inflation, GDP	Staff	No	Yes, after 2 weeks
Romania	August 2005	Point with tolerance band	Vote	Inflation	Board	No	No
Serbia	January 2009	Point with tolerance band	Vote	Inflation, GDP	Executive Board	No	No
South Africa	February 2000	Range	Consensus	Inflation, GDP	MPC	Yes, at least three a year	No
South Korea	April 1998	Range	Vote	Inflation, GDP, current account	Central bank	Yes	Yes, after 6 weeks
Sweden	1995	Pont	Vote	Inflation and alternative indicator*, GDP, report	Board	Yes, twice a year	Yes, after 2 weeks
Thailand	May 2000	Point with tolerance band	Vote	Inflation, core inflation, GDP	MPC	No	Yes, after 2 weeks
Turkey	January 2006	Point with tolerance band	Vote	Inflation, output gap	MPC	Yes, twice a year	Yes, within 7 days
United Kingdom	October 1992	Point	Vote	Inflation, GDP, unemployment rate	MPC	Yes, three times a year	Yes, after 2 weeks
* Alternative net of food pi Source: Hami	inflation indicat rices inflation ra mond, G. (2012):	ors: in Chile net te, in Sweden CF State of the art u	of food and ene ^o l with fixed inteı of inflation targe	rgy prices inflation rate, in Czech Republic n rest rate (CPIF). eting, CCBS Handbook No. 29, Bank of Engla	10netary policy- nd, central bank	relevant inflatio : websites	n, in Colombia

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