

Simple Methods to Assess the Credibility of the Hungarian Inflation Targeting Regime

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In our paper, we introduce simple approaches to assess the credibility of the Hungarian inflation targeting (IT) monetary policy regime in the period between July 2001 and April 2009. First, we present the findings of a non-representative survey we conducted amongst the major stakeholders of monetary policy. The results of the survey suggest that, according to financial market players, the National Bank of Hungary (MNB) lost some of its credibility between 2002 and 2007. We then apply simple methods to assess the success of the IT regime and to measure the predictability and gradualism of the decisions of the MNB's Monetary Council (MC) and the consistency of central bank communication. The results of this analysis show that the time series of the inflation measure using unchanged tax rates became stationary after the introduction of IT in 2001, while the predictability and gradualism of MNB MC's policy rate decisions and the consistency of central bank communication each displayed low levels in the observed period.

Keywords: communication, credibility, inflation targeting, predictability

1. Introduction

1.1. Credibility of the inflation targeting monetary policy regime

Since price stability became the primary objective of monetary policy authorities around the world, inflation targeting has been the most widely acclaimed central banking technique. No country that has ever introduced an IT regime abandoned it later. Blinder (2006) points out that countries which desire disinflation are more

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likely to introduce inflation targeting but its advantages for any type of economy are clear. In a wide cross-country panel study, Mishkin and Schmidt-Hebbel (2007) show that inflation targeting helps keep inflation low in the long run, improves the efficiency of monetary policy and strengthens central bank independence in various types of economies ranging from large industrial economies such as Germany, Canada or the United Kingdom to emerging economies such as Brazil, Turkey or Korea. However, their analysis also concludes that the monetary policy performance of industrial-country inflation targeters dominates that of emerging countries. That is, inflation targeting has so far been more successfully adopted by industrial economies than by emerging ones.

For an inflation targeting regime to be successful in an emerging economy – i.e. to achieve its inflation target –, it needs to be more than the simple announcement of a medium-term inflation target. According to Mishkin (2004), the strategy of an inflation targeting central bank also needs to be information inclusive, transparent and supported by good communication, with policy-makers held accountable for the success of their policy actions. All this is what, Mishkin (2004) says, it takes to make inflation targeting succeed in reducing inflation in emerging economies.

1.1.1. The role of expectations in monetary policymaking

Using Michael Woodford’s phrasing, central banking is an art of “management of expectations” (Woodford, 2005, p. 3), and central banks can consider themselves successful when they manage market expectations in a way that leads to lower inflation in the long run. A part of these expectations is formed of the evolution of market prices of financial assets and another part is formed of the policy moves of the central bank itself as reacting to changing economic and market conditions. Based on certain signals, financial investors might expect a central bank to act in a way that is in line with its strategy (e.g. reducing inflation) or they might expect otherwise. To put it differently, investors might think of a central bank as a more or a less credible one. Either way, the result of their expectations is fed back into the prices of financial assets, continuously changing the market setting in which the central bank operates. Thus, monetary policy success hinges to a great extent on the ability of the central bank to make itself look credible in the eyes of financial market investors.

1.1.2. Concepts of credibility of monetary policy

A general perception of a central bank’s credibility is a key component of success not only in itself but also because it can contribute the most to reaching the policy target. In fact, all of the points mentioned by Mishkin (2004), above, have to do with the drive on the central bank’s part to establish credibility of its actions among the investors in financial markets. This is because, if a monetary policy regime is thought to be credible, expectations of the target variable become well-anchored to the target and fewer and more gradual policy moves are required to reach this target

(Amisano-Tronzano 2005). In this context, market perceptions of the inflation aversion of an inflation targeting central bank play a crucial role in making inflation targeting operate more effectively. As Blinder (1999) points out, a more credible central bank can engineer disinflation with a lower level of employment sacrifice as changes in the key monetary policy instrument will cause smaller GDP/employment gap volatility.

In his study based on a survey among central bankers and economists, Blinder (1999) shows that central bankers mostly identify credibility with “dedication to price stability” (Blinder 1999). An important, and difficult, issue is to measure this dedication. Obviously, when an inflation targeting regime is successful in keeping inflation low, it becomes credible. In other words, a central bank becomes credible when it matches its words with its deeds, i.e. if it says that it will and, indeed, does bring inflation down. But this is a simple, *ex post* assessment of credibility, based on the track record of the inflation-targeting central bank. A more dynamic assessment of credibility, suited to real-life circumstances, comes from the measure of perceived, *ex ante* credibility as seen by investors in financial markets. In this context, an inflation targeting central bank, dedicated to price stability, is said to be credible when the perception of its pre-commitment to disinflation or, in other words, its aversion to inflation as perceived by and implied by market prices of financial assets is high.

1.1.3. Predictability of monetary policy

After Mishkin (2004), transparency is an important element of a credible inflation targeting regime, but this can generally be said of any kind of monetary policy regime. Perez-Quiros and Sicilia (2002) opine that transparency “facilitates the understanding of what the central bank does and by doing so, it helps central banks to foster their credibility” (Perez-Quiros-Sicilia 2002). The practical manifestation of the transparency of a central bank is the predictability of its policy moves. Assessing the degree of predictability of policy moves, therefore, has been given great consideration in the academic literature, lately. The degree of predictability as implied by financial market prices, according to Perez-Quiros and Sicilia (2002), shows how transparent a central bank is in the eyes of financial market participants. In other words, predictability is a measure of how well market participants understand monetary policy strategy and how precisely they anticipate future policy actions under various market conditions. In this vein, higher predictability of policy moves helps build central bank credibility. While measuring credibility itself can prove to be a difficult task, measuring predictability of both market interest rates in general and base rate decisions in specific is more straightforward. Evaluating credibility as implied by market prices gives a good proxy for a central bank’s credibility as seen by market participants.

1.1.4. Central bank communication

An issue of high importance is how credibility can be established. Still after Mishkin (2004), a key component of building credibility by making it more predictable is good communication, which has lately become a central goal in monetary policy-making (see Woodford 2005). The most important task of a central bank striving for good market perception of its credibility is to communicate well. This is because communication gives a firsthand feedback to financial investors as to whether the central bank consistently follows the monetary strategy laid out for itself. First of all, investors can test whether communication is aligned with the monetary policy strategy. In case of an inflation targeter, each act of communication has to reflect the logic of disinflation. Financial investors will then match central bank communication with policy actions and see for themselves whether communication is useful or useless in signaling policy moves. If financial investors see a central bank that “will do what it says” (Blinder 1999), they will conclude that the signals of this particular central bank are indicative and will act accordingly. This will be reflected in the prices of major financial assets, i.e. they will move in the direction in which the central bank ushers them with communication. This is the process of building credibility. In case communication is inconsistent with policy actions, however, financial investors will conclude that central bank communication is confusing and will ignore it and focus instead on the very policy actions. Investors will reach the same conclusion when communication is inconsistent within itself. It might happen e.g. when policy-makers communicate the direct opposite of what they communicated a day before or, when policy-makers communicate ambiguously. These are the processes of destroying credibility.

In short, besides being a dynamic endogenous variable, credibility is also an important exogenous factor in policy-making. After economic agents obtain a certain perception of the inflation aversion of a central bank – partly through its communication –, this perception of credibility then feeds back into monetary policy actions and increases (when credibility is high) or decreases (when credibility is low) their effectiveness.

1.2. *Evolving perceptions of MNB’s credibility in the IT regime*

The issue of the market perception of credibility is especially delicate in Hungary, where, in June 2001, the Monetary Council decided to switch to another monetary policy regime by introducing a converging inflation target. As it has been shown in earlier examples³, the need to establish a strong feeling of an inflation-averse author-

³ These examples include any central bank switching from one monetary policy regime to another – e.g. inflation targeting –, or, as it happened to the European Central Bank (ECB), any central bank being established from the scratch. The emphasis in the case of MNB is on the switch to another regime coupled with new legislation warranting full independence for MNB – a constellation of conditions never seen before.

ity amongst financial investors is of key importance for the central bank to operate a successful inflation targeting regime (see the case of the European Central Bank in Goldberg-Klein 2005). In other words, for a central bank switching to another regime, like the National Bank of Hungary (MNB) did in 2001, the most important, but also the most tedious and, sometimes, painful task is the establishment of a strong market perception of credibility.

Seemingly, the success of the new inflation targeting regime in Hungary was warranted by new legislation that brought major changes into the operational background of monetary policymaking⁴. But, as it eventually turned out, the MNB had to grapple with the still dual nature of the Hungarian monetary policy framework. There emerged an inherent contradiction between the IT regime and MNB's legal obligation to keep the euro-forint exchange rate within a $\pm 15\%$ floatation band around the parity rate. Raising the policy rate to bring inflation down strengthened the forint against the euro and, thus, threatened to push the exchange rate out of the floatation band. Still, the MNB had to establish the credibility of its inflation targeting regime and maintain the credibility of the floatation band of the euro-forint exchange rate at the same time. The eventual clash of these monetary policy tasks had an adverse impact on the market perception of credibility of MNB's IT regime⁵. Sadly enough, the market perception of the central bank's credibility was exacerbated by inconsistent central bank communication. Apart from that, the conspicuous lack of coordination between fiscal and monetary policy-makers – an example of which is presented in Madár (2003) – contributed to MNB's missing the inflation target in the majority of the cases and further damaged the credibility of the IT regime in the eyes of the investors.

⁴ The new legislative background of monetary policy was created in three key steps. First, on May 3, 2001, MNB MC and the government jointly decided to widen the floatation band of the euro-forint exchange rate from $\pm 2.25\%$ to $\pm 15\%$ as of May 4. The crawling devaluation of the floatation band was later abolished as of October 1, 2001. Second, MNB MC decided to introduce the IT regime on June 12, 2001. Third, the new Act LVIII on the National Bank of Hungary came into effect on July 13, 2001, providing MNB full operational and personal independence in its efforts to achieve and maintain price stability. All this information along with the latest version of the central bank act is available at www.mnb.hu.

⁵ Press evidence (see Nyíri 2003 or The Economist 2004, amongst others) supports the view that the market perception of credibility of MNB's IT regime suffered a decisive blow in the turbulent period between October 2002 and November 2003, when the central bank was continually faced with the dilemma to decide between acting in the logic of the IT regime and acting to keep the euro-forint exchange rate within the floatation band. When, due to speculative pressure, the exchange rate reached the strong limit of the band, the MNB decided that maintaining the band was more important. But, later, it decided with the government to shift the parity of the band in the weaker direction, which, then, forced it to put aside the IT logic again to defend the exchange rate of the forint. This chain of events was especially detrimental to the perception of credibility of the IT regime and, apparently, MNB later could by no means recover the substantial loss of credibility suffered in this sub period (Rozkrut et al. 2007, p. 194).

The purpose of this paper is to provide insight into the evolution of the financial market perception of the credibility of MNB's IT regime in the period between June 2001 and April 2009. We seek answers to the following basic questions related to the credibility of the IT regime, which might serve as springboards to more complex issues of central bank credibility⁶:

1. What does narrative evidence tell us about the evolution of the perceived credibility of the Hungarian monetary policy in the observed period?
2. Was the introduction of inflation targeting in Hungary successful in anchoring inflation?
3. Were MNB MC's interest rate decisions predictable in the observed period?
4. Did central bank communication signal future policy rate decisions properly?

2. Narrative consensus on the concept of credibility in Hungarian monetary policy

We conducted a short survey with the purpose of investigating the market perception of credibility of monetary policy in general and that of the monetary policy conducted by the MNB between 2002 and 2007. Between May and August 2008, we asked chief financial officers of domestic corporations, analysts of leading commercial banks and consulting firms and other economists following monetary policy events about what they think about credibility in general and about MNB's credibility in specific.

2.1. Participants of the survey

The questionnaire and the list of responding institutions are available on request, but we insert here, in table 1, the composition of the respondents according to sectors.

⁶ This paper is part of an extensive research by the authors into the evolving market perception of credibility of the Hungarian monetary policy. In this paper, we concentrate – without going into historical details – on the fundamental issues of the IT regime alone and disregard credibility issues connected with the exchange rate band and fiscal policy.

Table 1. Number of respondents by sectors

Energy, public utility	9	22%
Finance	9	22%
Manufacturing	7	17%
Commerce	5	12%
Transport, postal, info communications	5	12%
Consulting	3	7%
Construction	1	2%
Regulation	1	2%
Education	1	2%
Total	41	100%

Source: own creation

Our methods of distributing the questionnaire included mailing the questionnaire to 85 companies listed in the 2007 edition of TOP 200 – an annually printed special issue of weekly *Figyelő*, introducing the biggest Hungarian companies (*Figyelő* 2008) –, plus sending direct e-mails containing the questionnaires to some TOP 200 CFOs and 25 analysts and economists working in domestic banks, consulting firms and research institutes. We approached 7 other, middle-sized, Hungary-based companies not listed in TOP 200 by way of personal acquaintance with their managers. We also created an on-line version of the questionnaire⁷, where CFOs and analysts could answer the questions anonymously. We have e-mailed the link to this on-line version of the questionnaire to only a few CFOs but to all the 25 analysts mentioned above.

The number of respondents was 41, which gives a response ratio of 35%. (Surprisingly, the addition of the on-line version of the questionnaire failed to improve this ratio significantly.) Companies operating in the energy sector and in finance both gave 22% of all respondents, and are closely followed by respondents from manufacturing (17%). These 3 groups made up 61% of the total number of respondents, while the share of these sectors in the Hungarian GDP⁸ was 29.4% in 2007. We must add, however, that distortions in the representation of individual sectors vis-à-vis their actual weights in GDP are caused partly by the fact that the biggest of our respondent companies operates in more than one sectors. Finance is over-represented in our survey – 22% as opposed to GDP-weight of 4.6% - as analysts follow monetary policy decisions the most closely and their opinions are the most relevant. Manufacturing is adequately represented, somewhat below its GDP-weight of 21.9%. The weight of respondents from commerce is 12%, which equals the sector's weight in GDP, while transport-communications is over-represented – 12% instead of 8.2%, its GDP-weight. The representation of the rest of the sectors is be-

⁷ The questionnaire is available at http://5mp.eu/fajlok/szixai/kerdoiv_www.5mp.eu_.html.

⁸ The GDP-weights of sectors are available at www.ksh.hu.

low their GDP-weights. As for the weight of the respondent companies in the corporate sector, 49% of all respondents are listed in the TOP 200. They give 24% of the total net revenue of the first 200 Hungarian companies and can, thus, be considered a sizable and representative group.

Whatever the weights, however, based on the above mentioned number of respondents one can hardly consider this survey a representative one. Its findings are, nevertheless, very informative since we get a clearer picture on the opinion of financial experts about the meaning of credibility of monetary policy and the credibility of the Hungarian central bank.

2.2. *Findings of the survey*

In the questionnaire, we asked how closely respondents followed monetary policy events between 2002 and 2007 and weighted answers accordingly. Answers of respondents who kept close track of all events (67% of total) - including both decisions and communication - were given a weight of 1. Answers of those respondents who only followed either monetary policy communication or decisions (14%) were given a weight of 2/3. And, finally, answers of those who only followed monetary policy events occasionally (19%) were given a weight of 1/3.

Two-thirds of all respondents agreed that the credibility of monetary policy is determined by the strategy of the central bank (“a coherent central bank strategy aiming to reach a set of announced monetary policy goals”). 59% of all respondents also agreed that credibility means good communication (“plausible central bank communication, capable of orienting markets”). 41% said that credibility is warranted by a good track record (“reaching the announced monetary policy goals”) and 37% said that credibility means transparency (“transparent monetary policy rules”). Only 17% agreed that credibility means accountability (“accountability of central bank decision-makers”). These results suggest that strategy and communication seem to be the core components of monetary policy credibility, according to our respondents, while accountability is hardly an issue. The track record and transparency of monetary policy are somewhere in the middle: they are of some, but not decisive importance.

As for the evaluation of monetary policy-making in Hungary between 2002 and 2007, our respondents gave the MNB the highest point for its transparency: an average of 3.12 out of 5. Strategy came second with an average of 3.07 and track record followed with an average of 2.86. Falling behind was communication and accountability with averages of 2.47 and 2.28, respectively. This suggests that respondents valued the MNB’s transparency and strategy the most, while they were more critical of its communication and accountability over the observed period. It is fair to say that they were neutral on its track record.

We also wanted to find out more about the gradual evolution of opinions on these credibility issues over the investigated period. According to the majority who answered questions related to this issue, we can say that the MNB was worse off in

all but one aspect at the end of the observed period compared to the beginning. The only exception was strategy, which they thought was more coherent at the end of the entire period than it was in 2002. The other four aspects – communication, transparency, track record and accountability – all received less points at the end of the period than in the beginning. Our respondents also indicated in their answers that their overall assessment of the MNB's credibility worsened considerably after October 19, 2002 – the beginning of the sub period of market turbulence and high volatility of the exchange rate. The setback was the most severe (-23%) in the assessment of the MNB's track record and transparency. We think that the formal was probably a direct consequence of the central bank's having missed its 2003 and 2004 inflation targets, while the latter is a manifestation of the confusion – caused by sharp course reversals of monetary policy – over the relative importance of reaching the inflation target and maintaining the floatation band of the exchange rate. Although the overall assessment of the MNB recovered somewhat after the volatility of domestic financial markets subsided, this recovery was, nevertheless, insufficient to improve the perception of the MNB's credibility back to its initial levels. This latter suggests that the MNB could not fully repair the damage done to the assessment of its credibility during the times of market turbulence.

2.3. Divergent opinions about credibility outside the survey

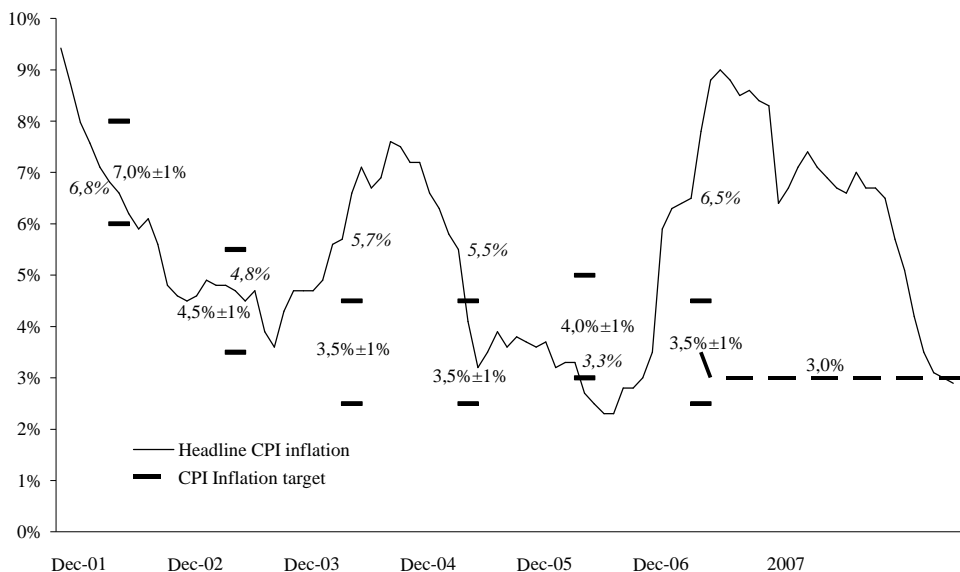
Concluding from answers to the questions of our questionnaire, economists working in the business environment identify the concept of credibility of monetary policy with different, although interrelated concepts. But, besides the results of the survey, it is also worth looking at the remarks that our questionnaire provoked our respondents to make. One analyst who declined to participate in the survey said that the questionnaire was too complex and that he did not have an opinion about the evolution of credibility in the individual sub periods. He pointed out that the only measure of credibility was that investors who are wrong in their assessment of credibility of monetary policy in a turbulent period will have to pay the price for their wrong assessment.

Furthermore, three respondents called our attention to the fact that we should also deal with the contribution of fiscal policy to the deterioration of perceived credibility of monetary policy and it was partial on our side to only examine the credibility of monetary policy. They said that it was probably fiscal rather than monetary policy mistakes that caused most of the turbulence in financial markets and monetary policy alone could not help avoid it. Another respondent opined that changes in the volatility of the euro-forint exchange rate should not be considered as the basis of differentiation between the perceptions of credibility within the individual sub periods. We understood this as saying that changes in exchange rate volatility had little or nothing to do with changes in the perception of credibility.

3. Statistical analysis of the success of MNB's IT regime

The first, *ex post*, approach to the concept of credibility, as we put forward in the introduction, is judging the track record, that is, the success of the central bank in meeting its target. The findings of our survey also suggest that this analysis is an important element of assessing credibility. In case of the Hungarian IT regime, it is plain to see from chart 1 that the inflation target – which is set together by MNB and the Ministry of Finance – was missed 5 out of 9 years (2003, 2004, 2006, 2007 and 2008).

Chart 1. The inflation target and actual inflation rates

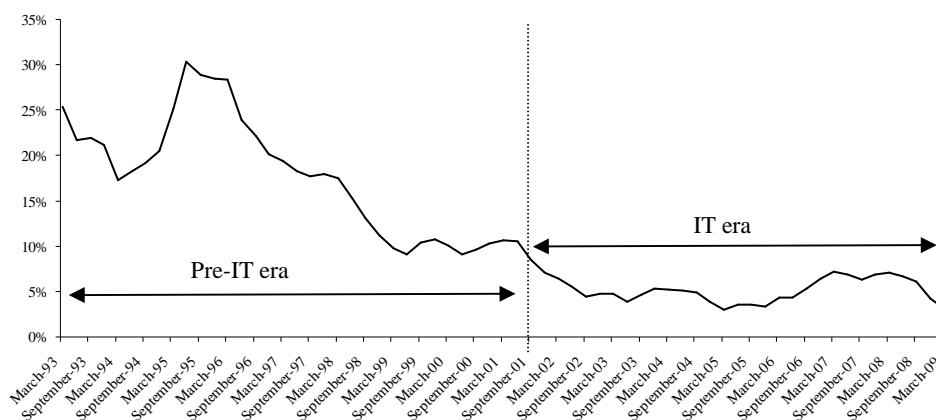


Source: own collection from www.ksh.hu and www.mnb.hu

Since the Hungarian headline CPI inflation target is a common nominal target of the monetary and fiscal policy, and the target can only be attained through the coordination of the monetary and fiscal sides, the simple fact that the target was missed in a majority of the cases so far tells little about the credibility of the IT regime. To investigate MNB's responsibility in this issue, it is necessary to narrow our analysis. We will first look at a simple comparative statistical overview of the period before and after the introduction of IT in June 2001 using a seasonally adjusted inflation measure, which filters out the impact of tax rate changes (VAICPI computed by the Central Statistical Office (KSH)). Clearly, it was most often the exogenous changes in VAT, excise and other tax rates by fiscal policy that deterred the headline CPI

inflation rate from the target. Filtering out tax rate changes from the headline CPI inflation measure better shows just how much MNB contributed to lowering and/or stabilizing the inflation rate. It can be seen from a look at chart 2 that VAICPI became lower and less volatile in the IT era compared with the pre-IT era.

Chart 2. Seasonally adjusted quarterly average change of year-on-year VAICPI



Source: own collection from www.ksh.hu, www.mnb.hu and MNB staff

For a detailed comparison of the two periods of similar length, table 2 presents the fundamental statistics.

Table 2. VAICPI dynamics in the pre-IT and the IT eras

	Q1 1993-Q2 2001	Q3 2001-Q1 2009
Number of Observations	34	31
Average	17.75%	5.24%
Standard Deviation	6.46%	1.40%
Coefficient of Variation	36.37%	26.64%
Persistence	84.64%	85.53%
Range	21.23%	5.55%
Minimum	9.10%	2.98%
Maximum	30.33%	8.54%

Source: own calculations based on data from www.ksh.hu and www.mnb.hu

Apparently, all relevant statistics point to an amelioration of inflation dynamics after the introduction of IT, as attested by the VAICPI measure. The volatility and average of inflation subsided, along with their ratio, the coefficient of variation. The range, maximum and minimum all decreased substantially. The only exception is the

persistence of inflation, which is the extent to which the average inflation rate of the previous quarter determines the average inflation rate of the following quarter. The fact is that slightly higher inflation persistence is even desirable in a generally lower inflation environment, which characterizes the IT period vis-à-vis the pre-IT era. Therefore, it does not alter the overall perception that, from a static point of view, inflation was harnessed in following the introduction of IT.

3.1. Inflation stationarity before and after the introduction of IT

It should be noted, however, that inflation is a dynamic phenomenon, so this simple statistical comparison should be complemented by a more advanced test that accounts for the dynamic nature of inflation. We apply the augmented Dickey-Fuller test with drift to see if the above time series of the seasonally adjusted quarterly average change of year-on-year VAICPI has a unit root. The equation we use in this test is as follows:

$$\Delta y_t = a_0 + \sigma y_{t-1} + \sum_{j=1}^k \theta_j \Delta y_{t-j} + u_t,$$

where y_t is the logarithm of the inflation measure and k , the lag order of the autoregressive process, is initially set to equal 5.

The results of the test are unsurprising given the precedents. In the pre-IT period, we cannot conclude to reject the null hypothesis of $\sigma=0$, meaning that VAICPI inflation was a non-stationary process until June 2001. Regardless of the lag length, the test statistics show that, in the pre-IT era, the inflation rate of previous periods failed to significantly determine the inflation rate of the following period. On the other hand, the test statistic for the IT-era was significant at 5% level, with a p-value of 0.0223 and a Durbin-Watson statistic of 2.0683. The test statistic was significant using shorter or longer lag operators, as well. Based on this result, one can conclude that VAICPI inflation became mean-reverting or, in other words, anchored, after the introduction of IT. Although the cause-effect link is unclear, one can reasonably assume that this was at least partly owing to the anti-inflation measures taken by MNB according to the logic of the IT regime.

4. Comparative analysis of MNB MC's predictability

We will now go on to discuss the simple *ex ante* aspects of credibility. We begin with the concept of predictability, which, as we stated in the introduction, is the manifestation of a central bank's transparency and, as such, is a prerequisite for building credibility. Here, we follow the methodology first introduced by Gaspar, Perez-Quiros and Sicilia (2001) and later used by Ross (2002) and Perez-Quiros and Sicilia (2002) to assess the predictability of the European Central Bank. Pintér and

Wenhardt (2004) applied this methodology first on the Hungarian experience. This simple methodology can be used in a relative context to compare the predictability of the decisions of MNB MC with those of the decision-making bodies of other central banks.

This model compares the actual short-term market interest rate after the interest rate decision with expectations as reflected in short-term market interest rates before the decision. The model assumes that interest rate decisions can have two possible outcomes: one is when the MC decide to change the base rate (the interest rate paid on the two-week MNB bond, which is the key policy-making tool of the central bank) by either 25 or 50 basis points and another is when the base rate is left unchanged. That is

$$E_t(i_{t+1}) = 25\beta + i_t, \text{ or} \quad [1]$$

$$E_t(i_{t+1}) = 50\beta + i_t, \quad [2]$$

where $E_t(i_{t+1})$ is the base rate expected for time $t+1$ at time t as implied by the short-term market interest rate (2-week Bubor in the Hungarian case) ahead of the rate decision, and i_t is the base rate before the decision, both measured in basis points. β is the probability of an interest rate change – positive when a rate hike is expected and negative otherwise. When β is more than or equal to 50% (or 0.5), we judge that the market expects a rate change ahead of the rate decision. Models [1] and [2] only differ in the presumption that interest rate changes usually amount to either 25 or 50 basis points in the monetary policy routine. In MNB's case, model [2] seems a more suitable choice.

We have created three plus one different categories to evaluate the predictability of base rate decisions based on how well these decisions were anticipated by the short-term market interest rate. Based on this, a decision is precisely anticipated, imprecisely anticipated, or unanticipated and there is also the possibility that the market expects a change in vain. We consider a decision precisely anticipated when the difference between $E_t(i_{t+1})$ and i_{t+1} is less than 12.5 basis points in model [1] or less than 25 basis points in model [2]. A decision is considered imprecisely anticipated when the market expects the direction of the change well but misses its extent by 12.5 basis points or more in model [1] or by 25 basis points or more in model [2]. A decision is deemed unanticipated if the market misses the direction of the change or if it expects a change when there is none or if it expects no-change when there is change. The fourth (plus one) category includes instances when interest rate changes are anticipated in vain, that is, when either a rate cut or a rate hike is expected but does not happen.

The predictability of MNB MC's base rate decisions is worse in most aspects than that of the central banks of 4 developed and 4 emerging countries – or region in

the case of the Euro zone – in our sample⁹. According to model [1], MNB ranks 5th (2nd in the emerging peer group) in the overall hit rate that quantifies the share of all – precisely or imprecisely – anticipated decisions. It has the worst record (9th) in the anticipation of interest rate changes, and has the 3rd highest record in the anticipation of interest rate no-changes. As for the reliability of the indication of interest rate changes expected by the market, MNB’s record is only better than that of the NBP (8th).

According to model [2], respective ranks are 6th, 8th, 5th and 7th. Using this model, the relative forecasting ability of market interest rates is slightly lower because model [2] shows deterioration in the predictability of interest rate no-changes compared to model [1]. On the other hand, the relative reliability of anticipations of interest rate change is higher than in model [1]¹⁰. Model [2] predictability statistics are presented in table 3.

Table 3. Predictability of central bank rate decisions by model [2]

	MNB	ECB	Fed	Riks- bank	BoE	SARB	CBRT	CNB	NBP	Average
Overall										
Hit Rate	67%	89%	75%	82%	76%	61%	63%	70%	56%	73%
Rate										
Changes	22%	63%	70%	34%	31%	62%	68%	19%	38%	43%
No-										
changes	91%	94%	78%	95%	96%	60%	58%	97%	67%	86%
Reliabil-										
ity of										
Changes	58%	70%	63%	73%	70%	58%	54%	75%	38%	64%
Number										
of Meet-										
ings	139	157	130	72	144	54	43	138	100	-

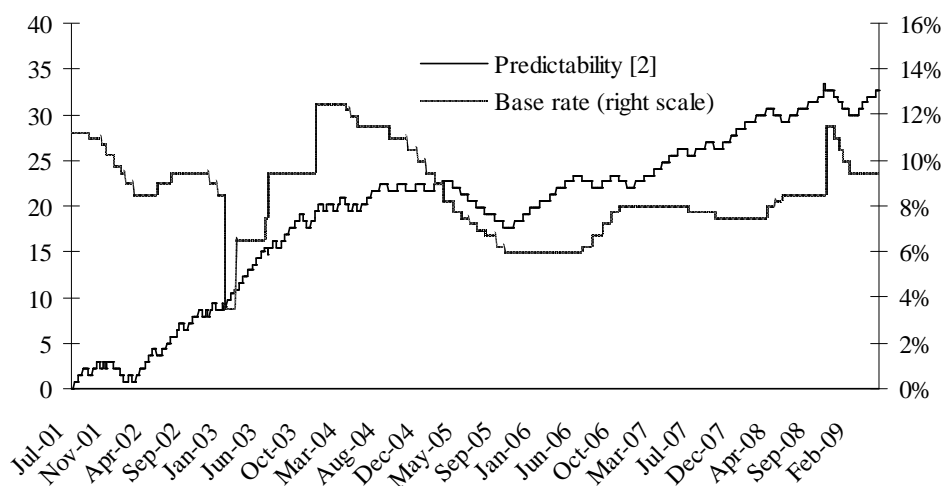
Source: own calculations based on data available on central bank websites

In assessing the predictability of MNB MC’s decisions in itself, it should be noted that the predictability of their interest rate changes is made low by the poor predictability of their decisions to lower the policy rate. To illustrate this fact, we sketched in chart 3 the cumulated predictability as of model [2] on a scale of ± 100 points together with the policy rate in the period stretching from July 2001 to April 2009.

⁹ Developed peers in the sample are the ones with the world’s oldest, most established monetary systems: the United States (Fed), the Euro zone (ECB), the United Kingdom (BoE) and Sweden (Riksbank). Emerging peers are taken from the so called Europe, Middle East, Africa (EMEA) region: the Czech Republic (CNB), Poland (NBP), Turkey (CBRT) and South Africa (SARB). In the entire sample, the Fed is the only central bank that does not operate a formal IT regime, but is also responsible for maintaining price stability as a central task.

¹⁰ This has to do with the specifications of the model, since surprises caused by rate decisions according to model [1] are not necessarily surprises in model [2]. Therefore, model [2] tends to improve the anticipation ratio of policy rate no-changes, while it reduces the anticipation ratio of rate changes.

Chart 3. Cumulated market predictability of MNB MC's base rate decisions



Source: own calculations based on data from www.mnb.hu

Chart 3 shows that MNB MC's cumulated predictability as of model [2] is +33 points (+13 points in model [1]) and there were both ups and downs in the path of the curve. Most of the downward spirals were triggered by serial rate cut decisions (e.g. the series of rate cuts in early 2002, 2005 or late 2008). According to model [2], financial investors anticipated only 12% of MNB MC's rate cuts (24% in model [1]), while they anticipated 44% of the rate hikes (88% in model [1]) in the observed IT period. It seems that, for some reason, financial investors find it harder to predict MNB MC's rate cut decisions, which weighs considerably on the relative assessment of MNB's credibility.

On a whole, there is no significant difference for MNB between the results of model [1] or [2]. In both models, MNB's average rank is between 6th and 7th in the overall sample, and MNB's scores exceed the sample average only in the case of anticipation of interest rate no-changes. It means that the relative predictability of MNB MC's interest rate changes is low. Table 4 summarizes the rankings of central banks by the aspects of the two predictability models.

Table 4. Relative predictability of MNB MC decisions

Rank-ings	Model [1] – 25-basis-point Changes				Model [2] – 50-basis-point Changes			
	Overall Hit Rate	Rate Changes	No-changes	Reliability of Changes	Overall Hit Rate	Rate Changes	No-changes	Reliability of Changes
1.	ECB	ECB	CNB	CNB	ECB	Fed	CNB	CNB
2.	CNB	Fed	ECB	Fed	Riks-bank	CBRT	BoE	Riksbank
3.	Fed	SARB	<i>MNB</i>	CBRT	BoE	ECB	Riks-bank	ECB
4.	BoE	CBRT	Fed	SARB	Fed	SARB	ECB	BoE
5.	<i>MNB</i>	BoE	BoE	BoE	CNB	NBP	<i>MNB</i>	Fed
6.	CBRT	Riksbank	Riks-bank	ECB	<i>MNB</i>	Riksbank	Fed	SARB
7.	Riks-bank	CNB	CBRT	Riksbank	CBRT	BoE	NBP	<i>MNB</i>
8.	SARB	NBP	NBP	<i>MNB</i>	SARB	<i>MNB</i>	SARB	CBRT
9.	NBP	<i>MNB</i>	SARB	NBP	NBP	CNB	CBRT	NBP

Source: own calculations based on data available on central bank websites

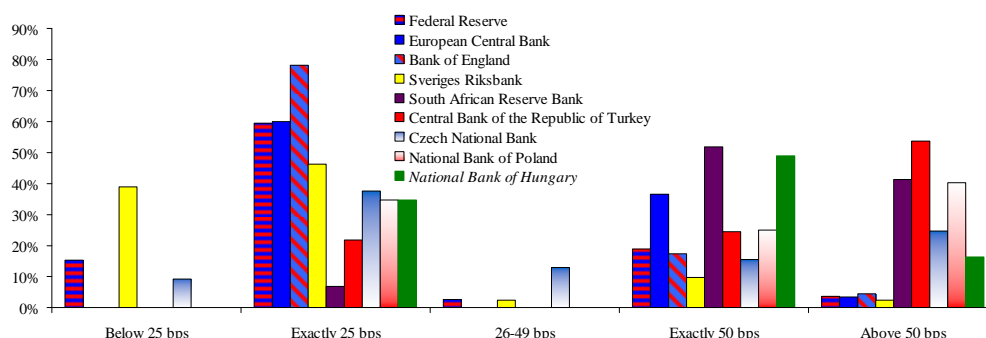
4.1. Gradualism of MNB MC's interest rate decisions

As suggested by Blinder (2006), an important element in the predictability of central bank decisions is the frequency distribution of interest rate changes, which shows how gradual these changes are. In MNB's case, a comparison with the average of the rest of the central banks in the sample seems useful¹¹.

The frequency distribution chart, presented in chart 4, reveals that MNB MC displayed a tendency to make less gradual interest rate decisions than the average of the sample. Comparing the frequency distribution of MNB MC's rate decisions to that of the average of all 8 other central bank in the sample, we can conclude that MNB has operated with changes of 25 basis points or lower less often than the average (35% vs. 56%), while it has more 50-basis-point changes on record than the average of the sample (49% vs. 24%).

¹¹ When computing the averages we weight by the actual number of interest rate decisions.

Chart 4. Gradualism of central bank rate decisions



Source: own calculations based on data available on central bank websites

Comparing MNB routine to that of the central banks of developed countries in the sample, the contrast is even starker as 77% of all interest rate changes in the developed countries' peer group have been changes of 25 basis points or lower, and only 18% have been changes of 50 basis points. In comparison with the average of the emerging peer group – which excludes Hungary, of course –, the ratio of small changes (0.25% or lower) is almost equal (35% for MNB MC vs. 33% for the peer group). On the other hand, the ratio of MNB MC's 50-basis-point changes has been almost double that of the emerging peer group (49% vs. 25%), while the ratio of changes of more than 50 basis points is lower (16% vs. 37%). Clearly, MNB MC relied significantly more on 50-basis-point rate changes and less on changes of more than 50 basis points in the observed period than the average of the emerging peer group¹².

When we restrict the timeframe of observation to a shorter period, in which all the central banks in the sample were given independence in changing the policy rate according to the logic of the IT regime – expect, of course, for the Fed, which does not operate such a regime –, MNB MC's gradualism appears to have fallen behind even the average of the emerging peer group. In conclusion, MNB MC have made less gradual policy rate decisions than the average of the peer group in both observed periods, and their decisions become less gradual when we only take into account the more recent years.

¹² Especially, the SARB and the CBRT tend to have frequently changed policy rates by more than 0,5%. As we show in the next subsection, it has to do with the fact that the level of interest rates in these two countries was mostly above 10% throughout the period. This later argument is bolstered by the fact that the Polish Monetary Policy Council abandoned the practice of changing the policy rate by more than 0.5% after its policy rate fell below 10%.

4.2. The correlation of ranks by predictability, gradualism and the average level of policy rates

This can, of course, be explained partly by the lower level of interest rates in developed economies: the lower the level of interest rates, the smaller the extent of interest rate changes necessary to reach a certain monetary policy goal. It can be said that 50-basis-point changes become scarce under interest rate levels of 5-6%. For instance, the Hungarian policy rate was only below 6% temporarily – for 5 weeks – in the entire examined period¹³, which is one explanation for MNB’s lower rank in gradualism.

Table 5 shows the rankings of central banks according to predictability, gradualism, maximum and minimum levels of policy rates in the respective IT periods¹⁴, all ending in April 2009. Apparently, there is a clear gap between the groups of central banks of developed and emerging countries. In the developed group and in the Czech Republic, the average level of the policy rate was below 5%, and these central banks proved to be more gradual and predictable in their decisions than the rest of the sample.

Table 5. Central bank rankings in the IT period

Central Bank	Average ranking	Predictability ¹⁵ [1]	Predictability [2]	Gradualism ¹⁶	Average Level of Policy Rate	Average Level of Policy Rate	Observed Period
ECB	2.25	3.	1.	4.	1.	3.06%	01.1999-
Fed	3.25	2.	5.	3.	3.	3.94%	01.1995-
CNB	3.25	1.	3.	5.	4.	4.44%	01.1998-
BoE	3.5	4.	4.	1.	5.	4.99%	06.1997-
Riksbank	3.5	8.	2.	2.	2.	3.12%	01.2000-
MNB	6.75	7.	6.	7.	7.	8.62%	07.2001-
NBP	7.5	9.	9.	6.	6.	6.75%	01.2001-
CBRT	7.5	5.	8.	8.	9.	15.84%	01.2006-
SARB	7.5	6.	7.	9.	8.	9.81%	01.2001-

Source: own calculations based on data available on central bank websites

¹³ From January 17 until February 24, the policy rate was 3.5%, the rate of interest MNB paid on overnight deposits placed by commercial banks with the central bank. The availability of the 2-week deposit was restricted throughout this period.

¹⁴ This applies for all except for the cases of Poland and Sweden. For Poland, we could only find market interest rates from January 2001 to calculate predictability, although the NBP has been operating IT since 1999. For Sweden, we applied January 2000 instead of January 1993 – the formal start of the IT regime – as the beginning of the period of observation since the Riksbank were granted full independence in their interest rate decisions at that point of time.

¹⁵ Ranks are calculated as the average of ranks by the overall hit rate and the reliability of changes.

¹⁶ Ranks are set in order of the share of interest rate changes of 25 basis points or lower.

Calculating the Spearman rank correlation¹⁷ for the correlation of the different rankings in the IT periods, we conclude the followings. The link is very strong (0.85) between the ranking by predictability as of model [2] and the ranking by the average level of policy rates throughout the period. The ranking by gradualism and by the average level of policy rates also show strong correlation with each other (0.77). (The ranking by the first predictability model does not show significant correlation with any other rankings.)

Table 6. Spearman rank correlations in the IT period

	Predictability [1]	Predictability [2]	Gradual- ism	Average Level of Policy Rate
Predictability [1]	-	0.47	0.25	0.33
Predictability [2]	-	-	0.67	0.85
Gradualism	-	-	-	0.77

Source: own calculations based on the rankings in Table 5

In table 7, we present rankings based on a broader period of observation, which is the longest period that we found relevant for measuring the gradualism of policy rate decisions and the average level of policy rates for the respective central banks. MNB's rank improves one notch as it takes 6th place in gradualism and the average level of interest rate from NBP. However, this improvement is, in fact, deterioration as it indicates that NBP started off in a less favorable interest rate environment and could still lower its policy rate and improve the gradualism of its decisions more successfully than MNB.

¹⁷ The Spearman rank correlation is $\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$, where d_i is the difference between the individual country ranks by two different aspects and n is the total number of ranks in the sample. *Italic* figures in the tables show significance at the 5% level of significance ($\rho > 0.683$), **bold** at 2% ($\rho > 0.783$) and **bold and italic** at the same time at 1% ($\rho > 0.833$).

Table 7. Central bank rankings in the broader period

Central Bank	Gradualism ¹⁸	Average Level of Policy Rate	Average Level of Policy Rate	Maximum Level of Policy Rate	Minimum Level of Policy Rate	Observed Period
Riks-bank	1.	2.	3.98%	8.91%	0.5%	06.1994-
BoE	2.	4.	4.99%	7.5%	0.5%	06.1997-
Fed	3.	3.	4.60%	9.625%	0 - 0.25%	08.1987-
ECB	4.	1.	3.06%	4.75%	1.25%	01.1999-
CNB	5.	5.	5.80%	39%	1.75%	12.1995-
MNB	6.	6.	8.62%	12.5%	3.5% ¹³	07.2001-
NBP	7.	7.	9.55%	24%	3.75%	01.1998-
CBRT	8.	9.	23.42%	57%	9.75%	02.2002-
SARB	9.	8.	10.05%	13.5%	7%	11.1999-

Source: own calculations based on data available on central bank websites

The Spearman rank correlations based on the broader period show an even closer correlation between the ranking by predictability as of model [2] based on data from the previously observed IT period, and the ranking by gradualism and by the average level of policy rates, as seen in table 8.

Table 8. Spearman rank correlations in the broader period

	Predictability [2]*	Gradualism	Average Level of Policy Rate
Predictability [2]*	-	0.78	0.78
Gradualism	-	-	0.87

*Based on the shorter, IT period.

Source: own calculations based on the rankings in Table 7

These results suggest that the rankings of central banks by gradualism and predictability are closely correlated with their ranking by the average levels of interest rates, which is a way of saying that central banks appear to be more predictable in their decisions in an international comparison if the average level of their policy interest rate is lower and they take a more gradual approach in their decisions. The reverse of this argument partly explains why MNB ranks behind central banks of developed countries and the Czech Republic in predictability. MNB could neither lower interest rates to the critical level nor take a gradual enough approach in its decision-making to make its decisions become significantly more predictable by financial investors.

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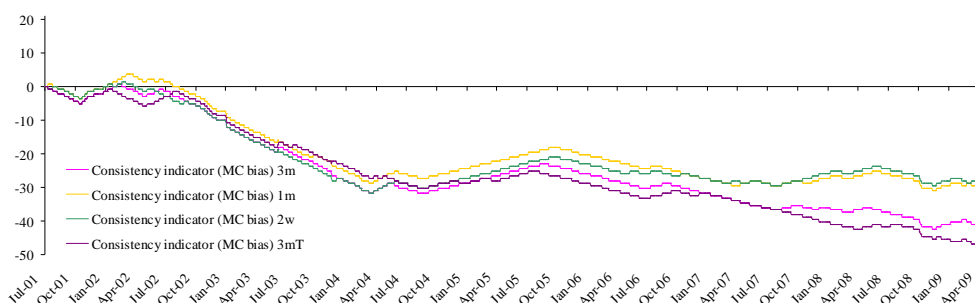
Ranks are set in order of the ratio of interest rate changes of 25 basis points or lower.

5. Consistency of communication

Communication, as shown by the literature review as well as the results of the survey, is a seminal component of successful monetary policy-making. Much has been said about MNB's communication with financial markets but little actual analysis has been carried out to see whether the communication of MNB's governor and the Monetary Council helped build the credibility of the IT regime or not. An exception is Rozkrut et al. (2007), who, amongst others, introduce a new measure, the so called consistency indicator, to appraise the consistency of central bank communication. The consistency indicator can be applied to measure the consistency of the communication of the Monetary Council or that of the central bank governor ahead of each interest rate decision. Similarly to cumulated predictability, it is calculated as a cumulative measure building in the values given for each rate decision. We give a value of 1 if the sign of the difference between the geometric mean of the base rate in the three months following the rate decision and a market (e.g. 2-week, 1-month, 3-month Bubor, 3-month T-bill) interest rate on the day before the decision coincides with the sign of communication¹⁹ by the MC or the governor in the period leading up to the rate decision. This is because if the two signs coincide then it can be said that the central banks oriented investors in the right direction. Taking the cumulated value of this indicator and plotting it on a ± 100 -point scale, we get chart 5, which can be viewed as a track record of communication.

¹⁹ Naturally, a positive value in communication is an early indication of tightening and a negative is an early indication of easing. In case of the MC, we discern the monetary policy bias from the communiqué published after the most recent rate decision and consider it as indication of future monetary policy ahead of the upcoming rate decision. MC communication is given a value of 1 when it is deemed to be hawkish – hinting a rate hike in the future –, -1 when it is thought to be dovish – hinting a rate cut in the future – and 0 when it is considered to be neutral in its predictions of the path future monetary policy will take. In the case of the governor we take the average of his comments in the period between two consecutive rate decisions and use it as indication of the direction of the next rate decision. Similarly to the MC case, values of the individual comments made by the governor are given 1, -1 or 0 depending on their monetary policy bias. The only difference is that, in the case of the governor, there can be more than one comment in the interim periods. Thus, the sum of the values attached to the individual comments is divided by the total number of comments made in the interim period.

Chart 5. Consistency indicator of MNB MC’s monetary policy bias

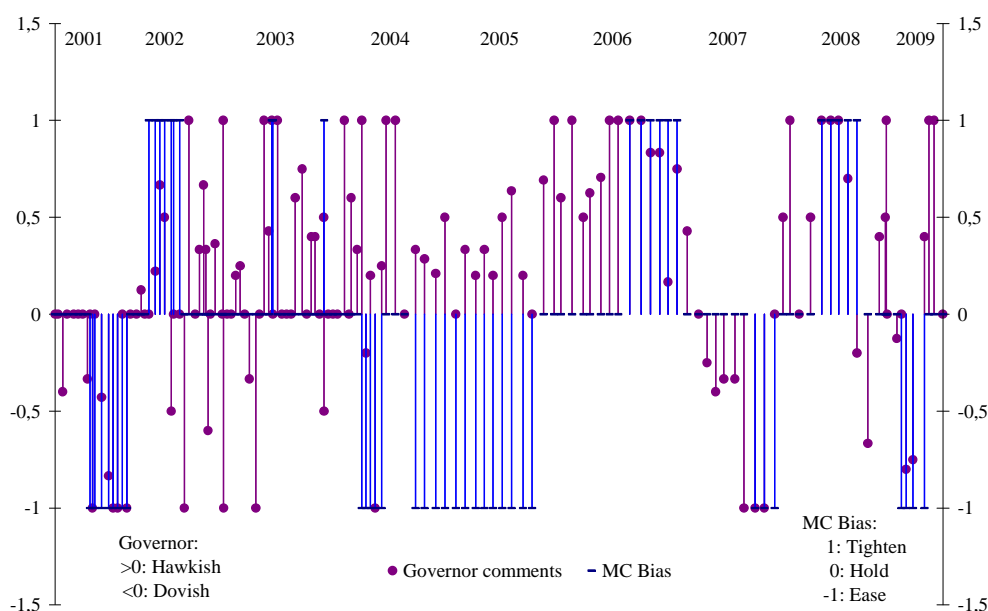


Source: own calculations based on data from www.akk.hu and www.mnb.hu

The values of this consistency indicator for MNB MC range from -29 to -47 depending on which market interest rate we use in our calculation. We get similar figures (-32 to -49) when we plot the consistency indicator of the governor’s communication ahead of rate decisions²⁰. These figures send a strong message to policy-makers: they suggest that neither the bias statements included in the MC’s post-decision communiqués nor the statements made by the central bank governor in the interim period served as good predictors of subsequent policy changes. To put it in a starker form, the central bank’s MC and its governor more often misled financial investors speculating over the future path of policy rates than guided them in the right direction. And not only did they fail to indicate the future path of policy rates, the messages conveyed by the two sources of communication were more often contradictory than unequivocal. In chart 6, we plotted the direction of indications of the future path of policy rates as implied by MNB MC communiqués and comments by the governor in between rate decisions in the period from July 2001 until April 2009. Times when the indications point to different directions – e.g. in 2004 and 2005, the governor continuously communicated tightening, while the MC communiqués signaled easing or maintaining monetary conditions – are when central bank talk is simply counterproductive and destroying credibility.

²⁰ To calculate these latter figures we collected all comments made by the governor in the observed period. Our sources included www.budacash.hu, www.ebroker.hu, www.fn.hu, www.hirtv.net, www.index.hu, www.mno.hu, www.napi.hu, www.nol.hu, www.otpbank.hu, www.portfolio.hu, www.raiffeisen.hu, www.reuters.hu, www.tozsdeforum.hu, www.vg.hu. Our database is available on request.

Chart 6. Communication on future policy by MNB MC and the governor



Source: own calculations based on data from www.mnb.hu and own press collection

6. Conclusions

The above analysis is only a preliminary investigation into the complex concept of evolving credibility of the Hungarian IT regime. It avoids a number of delicate issues – such as the inherent conflict between the IT regime and the exchange rate band or the (lack of) coordination with fiscal policy – in order to simplify the analysis. It presents the results of the observations mostly without explaining the facts. This analysis should be complemented by a thorough account of the historical conditions in which MNB had to operate in the observed period, as some of these conditions played a decisive role in central bank decisions. We plan to elaborate on these aspects in another paper.

Nevertheless, we can draw a few conclusions from the results by answering the questions posed in the introduction:

1. Narrative evidence tells us that the credibility of the Hungarian monetary policy as perceived by the stakeholders of monetary policy deteriorated between 2002 and 2007. The respondents of our short survey confirmed that

- central bank communication, which most of them deemed an integral component of credibility, became worse by the end of the period.
2. The introduction of inflation targeting in Hungary brought about the anchoring of inflation dynamics. Although the headline CPI inflation targets were missed in the majority of years between 2001 and 2009, the analysis of the VAICPI time series shows that this measure of inflation – which ignores the price shocks caused by tax changes – became stationary after the introduction of IT in June 2001.
 3. The predictability and gradualism of MNB MC's interest rate decisions were relatively low in the observed period compared to other central banks in the developed peer group and mediocre compared to other central banks in the emerging peer group.
 4. Central bank communication failed to signal future policy rate decisions properly in the observed period. The consistency of communication by both MNB MC and the central bank governor were low and their indications of future policy moves were sometimes contradictory.

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