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How Reliable are Hungarian Macroeconomic Forecasts?

Summary: Since reducing the possibility of risks that can be avoided – including risks associated with the uncertainty of the future – is of great importance in the economic arena, generations of economists have struggled and are still struggling (with mixed results) to develop 'reliable' forecasting techniques. Although some Hungarian organisations publish macroeconomic forecasts on a regular basis, their margins of error are rarely taken into account. For this reason, the authors examine how well actual processes are foreseen by the numerical forecasts published by the GKI Economic Research Co. for the next year. Their analyses are based on a 17-year comparable database, and present the development over time of indicators prognosticated and then published in statistics, take account of their differences (so-called estimation errors) and standard deviations, as well as the correlations of forecasts and statistics. They find that (in Hungary at least) the trends of certain indicators, the development of inflation or the GDP for instance, can in most cases be forecasted quite accurately, while other macroeconomic indicators (financial equilibrium indexes for example) and the turning points of business cycles in general can only be foreseen with considerable margins of error. Based on the above, they consider it necessary that economic policy take the margins of error of macroeconomic forecasts into consideration at all times.

Keywords: macroeconomic forecasting, forecast margins of error
JEL codes: E17, E27, E37

As being aware of certain information and data regarding future processes could play a key role in the decision-making, in recent decades[1] the preparation of forecasts has become widespread in macroeconomic practice (as well). Today, such forecasts and projections are regularly prepared by governments, central banks, certain companies as well as major international institutions such as the OECD, the IMF or the World Bank. These documents present (and comment on) the expected development of measurable and regularly published economic data with publicly known content. During their work, the authors usually utilise factual data available, mathematical and logical models that build on regularities observed in the past, information regarding regulatory (statutory) and economic environment – presumably significantly impacting future development – as well as notions in connection with future events accumulated on their own professional experience. The expedient method of data processing, however, is debated. Though (linear) regression analysis for example is a widely used method, on occasion certain more sophisticated procedures are more efficient (Genre – Kenny – Meyler et al., 2013). In 'simpler' (microeconomic) cases, stock exchange forecasts for example, it has been determined that often even the complex integral equations of Brownian motion give projections that are more reliable than trend forecasts. In addition, a rich tool-set has also been developed for larger macro-economic models, etc.

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The main reason responsible for methodological difficulties is that predicting the future and the possible result of economic processes is burdened with uncertainties. This is why those preparing projections frequently draw attention – primarily as part of written commentaries – to positive and negative opportunities for error they consider significant. *„Because of the things we don't know [that] we don't know, the future is largely unpredictable. But some developments can be anticipated, or at least imagined on the basis of existing knowledge."* – states *M. Singer* in her much quoted article (1997, p 39). However, the risks (errors) of these (often subjective) assumptions, notions may be considerable.

With time, certain researchers made attempts to conduct empirical studies of the differences between the forecasts and the processes that actually came to pass (or to be more precise the statistics generated of this period). Experiences of this work, primarily due to unknown or erroneously assessed uncertainty factors, have always been mixed and remain so to this day. Also frequent were forecasts that subsequently proved to be right in terms of at least their main trends, but smaller-greater estimation errors still proved to be unavoidable[2]. The failures of forecasting crises have led to and continue to lead to a wealth of problems worldwide. This is why an ironic saying by *E. Solomon* has been often cited since 1985: *„The only function of economic forecasting is to make astrology look respectable."*[3]

There are many Hungarian institutions that also publish economic forecasts. In the present paper, we primarily deal with the reliability of the main numerical[4] projections featured in the annual forecasts (also presented in the summary table) prepared by the GKI on a quarterly basis. The analysis is based on the comparison of forecasts and factual data of the 1995–2011 period; the examination extended for this 17 year period was made possible by the fact that during the period in question, the main indicators prognosticated by the GKI and the projection and statistical methods applied during their calculation did not change. Examinations regarding the period before this, however, were made inexpedient by the fact that in 1995, the Hungarian Central Statistical Office established a practice of preparing statistics related to national accounts, one that was line with European practices, and during this the data content of the national accounts changed significantly.

The methods of numerical forecasts at the GKI – as in the case of most Hungarian forecasting institutions – have long been harmonised with European practice.

- The projections contain analyses on the main items of the production and utilisation side of annual GDP as well as the indicators of national economy equilibrium. The indicators on the topics featured in the summary table are for the most part identical to those qualified as the key forecast elements in other European countries as well. The greatest difference is that while international forecasts usually include projections for the unemployment rate, in the case of the GKI, this particular indicator is often only featured in the detailed analysis. The analysts felt that the changing of this particular rate – due to the high frequency of inactive persons and black employment in the Hungarian economy – does not indicate a fundamental process of the future, but rather the amendment of regulations for instance that have low impact on actual activity.
- The database utilised during the work was made up of the usual EU statistics on the one hand, and on the other hand of the GKI corporate expectation surveys (on the latter, see for instance Tóth, 2000).

The generation of prognosticated indicator values takes into account the extrapolations of the previous period, but these trends are adjusted for the expected (estimated by experts) impact of known government intentions and other externalities. In the past, econometric models were also run; however, in the case of the annual forecasts of macroeconomic indicators, the results failed to support the expediency of this effort (on this latter, see: Papanek – Petz – Povialitis et al., 2008).

At the same time, we feel that certain experiences related to the projection possibilities of macroeconomic indicators are applicable to a wider range than GKI forecasts. For this reason, our analyses strive to support this hypothesis.

METHODS OF EXAMINATION

Our experiences show[5] that the examination of the reliability of Hungarian macro-economic forecasts raises a number of methodological problems in spite of projection methods being aligned to international methods.

Moreover, it is never easy answering the question on what qualifies as a reliable or inaccurate projection. On the various difficulties of providing answers, *Clements – Hendry* wrote the following: *„A forecast might reasonably be judged 'successful' if it was close to the outcome, but that judgment depends on how 'close' is measured."* (p. 5) It also needs to be clarified for example whether the previously prognosticated level of a given indicator is close to the level actually achieved (whether the deviation is sufficiently small), and whether the trend of the foreseen change of the given indicator characterises the direction of actual processes (for example, does the given indicator promise improving or deteriorating processes for the future). In the following, we shall therefore attempt to examine both topics.

The extent of differences (so-called estimation errors) of projected indicators that are subsequently published in statistics can be characterised by presenting the data series, and the indicators summing up the qualification, such as the average rate[6] and variance (deviation[7]) of 'errors', can also be interpreted easily. As such, these are the techniques we apply in our analyses. However, the methods that would serve to examine the harmony of trends are still under development. As part of our research, we calculated in what percentage of cases forecasts for the various indicators were higher or lower than subsequent statistics. Furthermore, we also took into account the fact that in this area, international literature often publishes the correlations between the indicator series, and as such we have also determined these indicators (which numerically describe the 'closeness' of the relationship of two given time series) –, but in many cases found the results to be difficult to interpret.

Another methodological problem encountered in our study is the fact that the data we consider as 'factual' are the statistical data available at closing in November 2012. These economic data are not exact numbers arrived at the end of an accurate measurement process, but are themselves the periodical results of long estimation processes which – naturally – also contain estimation errors. Data owners publish statistics on the basis of an information base available at the given time, and the majority of these statistics are then amended at a later date, based on an information base wider than the earlier base. This process generally improves the 'quality' of published data, but at the same time may also contribute to the occurrence of forecasting errors. This way, the preparation of forecasts is based on 'factual data' that is subsequently adjusted, which means that in essence, forecasters are 'shooting at a constantly moving target'. The forecasts issued for the various indicators – as a result of adjustments – may in

the future prove to be more accurate or for that matter less accurate compared to that shown at the given time. This is why we have expanded the topic of our analysis to include the effects of this particular factor.

Finally, the extent of the possible generalisation of our results is also questionable. As far as we know,[8] however, in the past 15 years, in addition to GKI, KOPINT has also prepared macroeconomic forecasts on a regular basis in Hungary, which included several indicators and were prepared using comparable methods–. We have, however, examined the reliability of these forecasts and found them to be similar to those of the GKI. Thus, we can state (with great caution we might add) that the main findings of our research in general provide a more or less accurate picture of the Hungarian possibilities of macroeconomic forecasting. At the same time, due to the low number of international research projects[9] regarding the reliability of complex macroeconomic forecasts, we were only able to make – highly cautious –international comparisons in exceptional cases; consequently, we were unable to attempt to extend our statements to other countries.

THE ACCURACY OF FORECASTS AND FACTORS LEADING TO ERRORS

Our examinations aimed to compare annual projections and statistics.

The average rate of the estimation errors of indicators forecasted by the GKI is illustrated by the data in *Table 1* (deviations in error rate are shown in the *Appendix*).

The harmony of the forecasts examined and the (linear) trend of statistics can be characterised on the one hand using the data of positive and negative deviations as shown in Table 1, and on the other, through the correlation data in *Table 2*.

The evaluation of the data contained in the two tables is not an easy task. It can, however, be determined that the average rate of estimation 'errors' is acceptable in most key areas (it is similar to other projections we have examined, such as those prepared by foreign institutions).[10] The most significant exceptions are the forecasts related to larger changes, such as recessions, as in these cases the processes were frequently unforeseen. Accuracy, however, varies from indicator to indicator. There are certain topics where there are a great number of reliable (numerical) projections on the future level of the examined indicator, but there are some with hardly any.[11] But similar observations can also be made with respect to forecasted trends. According to the data in Table 1 regarding the frequency of positive and negative deviations, the majority of estimates (60 per cent) is typically slightly optimistic, while of the remainder some (38 per cent) are more on the pessimistic side (the remaining 2 per cent are accurate); in other words the rate of bias is for the most part rather low. For the most part, the correlation coefficients of Table 2 can also 'only' get a *relatively* favourable review (while those regarding September of the previous year cannot even get this).

Our examination also strived to review the factors that influence the reliability of forecasts. We found that among these, as we have mentioned earlier, the most important is the uncertainty of the economic cycle situation (as well as the erroneous expert assessments of this uncertainty). As reflected by *Table 3*, most forecasts examined were much more reliable at the time of the upswing of the second half of the 1990s than in the period of the 2008–2011 crisis. In recent times, forecasters have gained similar experiences worldwide despite the fact that certain authors, *N. Roubini*, or *R. Shiller*, have warned of the dangers of the financial bubble on several occasions).[12] It seems, therefore, we are forced to acknowledge that we (today still) have no efficient

Table 1

DEVIATION OF FORECASTS AND 2012 STATISTICAL DATA

Projected indicators	Average*	Relative**	Positive	Negative
	deviation		percentage of deviations	
Previous year statistics = 100 per cent***		Percentage		
GDP	1.0	44.7	59.8	38.2
Industrial GDP	3.5	78.6	47.1	52.9
Construction GDP	5.0	787.8	82.4	17.6
Agricultural GDP	10.5	260.3	47.1	52.9
Transportation, telecommunications GDP	1.8	69.2	52.9	47.1
GDP domestic use	1.6	116.0	60.8	37.3
Individual consumption	1.2	97.7	65.7	30.4
Investment	4.3	225.5	78.4	20.6
Consumer price index	0.7	6.9	42.2	45.1
	Percentage			
General government deficit/GDP	1.5	28.1	65.7	29.4
Previous year = 100 per cent***		Percentage		
Export (GDP content)	4.2	37.6	38.2	60.8
Import (GDP content)	4.3	44.8	46.1	53.9
Billion euros		Percentage		
Current account balance	1.4	43.0	61.8	38.2

* $\sum_i\sum_j \times |a_{ij}-b_i|/6\times 17$

where a_{ij} forecasts published in projection preparation period j of the year i of the projected indicator

b_i statistical data in year i of the given indicator

i respectively 1995, 1996… 2011

j forecasting period of September and December of the previous year, and March, May, September and December of the given year

6 number of projections prepared for the given year

17 number of years examined

** Percentage of absolute deviation compared to statistical data

*** percentage point

Source: own calculation

techniques to project trend turning points, and economic crises in particular.

At the same time, the accuracy of the forecast (as shown in Table 2) depends greatly on how long before the end of the year we wish to forecast the projection was prepared. As we have indicated earlier, the information base for the forecasts is made up of the monthly, quarterly and annual data published by the HCSO, the taking into account of external impacts shaping economic environment and the results of the GKI's economic cycle tests. This is supplemented by relationships with economic players (company owners, managers, entrepreneurs,

Table 2

CORRELATIONS BETWEEN FORECASTS AND STATISTICS*

	Previous year		Given year			
	3.	4.	1.	2.	3.	4.
	projections					
GDP	0.38	0.83	0.89	0.91	0.94	0.96
Industrial GDP	0.19	0.39	0.54	0.65	0.79	0.86
Construction GDP	0.52	0.57	0.73	0.78	0.87	0.82
Agricultural GDP	0.67	0.63	0.62	0.71	0.89	0.95
Transportation, telecommunications GDP	0.15	0.51	0.66	0.70	0.74	0.77
GDP domestic use	0.57	0.84	0.88	0.92	0.96	0.96
Individual consumption	0.85	0.96	0.96	0.94	0.96	0.97
Investment	0.44	0.61	0.75	0.77	0.83	0.84
Consumer price index	0.98	0.98	0.99	0.99	0.99	1.00
General government deficit /GDP	0.27	0.47	0.55	0.80	0.89	0.94
Export (GDP content)	-0.15	0.46	0.77	0.81	0.90	0.92
Import (GDP content)	0.04	0.55	0.78	0.79	0.94	0.96
Current account balance	0.81	0.81	0.86	0.85	0.93	0.95

* correlation coefficients between a_{ij} forecasts concerning year i, published in projection period j, and statistical data series b_i (where i = respectively 1995, 1996 … 2011).

Source: own calculation

trade unions, state officials and analysts), years of experience, intuition and professional acumen. Thus with the passing of time more and more information is available to us. The results of our examination indicate that – slightly in contrast with the information contained in our earlier, short time-horizon analyses used as literature for this paper – forecasters were able to utilise their knowledge, which increased with the passing of time. Forecasts are prepared six times a year on any given year's performance (in September and December of the previous year, as well as March, May, September and December of the given year), and though the forecasts published in the autumn of the previous year are still quite unreliable, accuracy improves with the passing of time, in other words, as we get nearer to the end of the given period. Estimation 'errors' become smaller, standard deviation is reduced, and as *Table 3* shows, the correlations between forecasts and subsequently published statistics are increasingly closer for all indicators. In the case of certain projected trends, beginning of year forecasts seem absolutely accurate, while in the case of others, this does not happen until May.

It is similarly important that we have determined that the adjustment of 'statistics' can also widely affect the reliability of forecasts. According to the data, the rate of subsequent adjustments is at times quite significant *(see Table 4).* The only exception in this respect is the consumer price index, which is quickly available (with a 2 week "delay") and which for this reason is never adjusted.

Forbes also calls attention to the fact that the reliability of projections prepared by various institutions varies, and the justification of accuracy is not simple either. *„One surprise is that*

Table 3

FORECASTS AND STATISTICS PUBLISHED IN 2012

	Average deviation		
	1995–2000	2001–2006	2007–2011
	Percentage point, previous year = 100 per cent		
GDP	0.7	0.8	1.5
Industrial GDP	3.1	2.8	4.5
Construction GDP	3.8	3.7	7.2
Agricultural GDP	4.8	13.8	13.4
Transportation, telecommunications GDP	1.9	1.1	2.3
GDP domestic use	0.9	1.8	2.2
Individual consumption	1.4	1.0	1.4
Investment	2.8	3.4	6.7
Consumer price index	0.9	0.4	0.7
Export (GDP content)	4.9	2.5	4.9
Import (GDP content)	4.7	3.6	4.5
	Percentage		
General government deficit /GDP	1.1	2.3	1.3
	Billion euros		
Current account balance	1.0	1.2	1.8

Source: own calculation

less-renowned forecasters have been the top performers. For example, Northern Trust ... and Wachovia/First Union Bank ... trounced widely quoted prognosticators such as the Conference Board. The study observed the same phenomenon worldwide, including citing the International Monetary Fund as one of the worst performers." (Simons, 2002). This is the reason why earlier we were only able to anticipate that our main findings could also be observable in the case of other Hungarian forecasts as well.

Finally we should mention that according to certain opinions, the projections published by forecasting workshops that are widely recognised and hold great prestige in the given economy are integrated into the expectations of economic players; in other words, they themselves shape the future they are forecasting.[13] Others, however, feel that this is mistaken as the players of the economy react to events and phenomena they observe in their own business environment, and do not take the various macroeconomic forecasts into consideration. We cannot take sides in this debate, but we can assume that the 'truth' lies somewhere between the two positions presented.

THE ACCURACY OF FORECASTING NATIONAL ECONOMY PERFORMANCE

As it is well-known from economic theory, information required to calculate GDP (an indicator of domestic product[14]) can be obtained from a number of sources. The preparation of

Table 4

AVERAGE ABSOLUTE DEVIATIONS OF INITIAL HCSO STATISTICS AND THOSE PUBLISHED IN 2012

	Average absolute deviation Percentage, previous year = 100 per cent
GDP	0.6
Industrial GDP	1.9
ConstructionGDP	3.0
Agricultural GDP	4.0
Transportation, telecommunications GDP	2.1
GDP domestic use	0.9
Individual consumption	0.6
Investment	2.0
Consumer price index	0.0
Export (GDP content)	1.4
Import (GDP content)	1.1
Percentage	
General government deficit /GDP	no data
Billion euros	
Current account balance	no data

Source: own calculation

GKI-forecasts starts off by analysing possible GDP growth trends. Within this, as part of an iteration process, a projection is first made on the expected development of demand (domestic use and export), then supply (GDP-production of of the main sectors and import), and finally, juxtaposing the two factors, the equilibrium of the national economy is analysed. The result of this is a harmonised cluster of forecasts regarding GDP dynamics and certain elements of the production and final expenditure side.

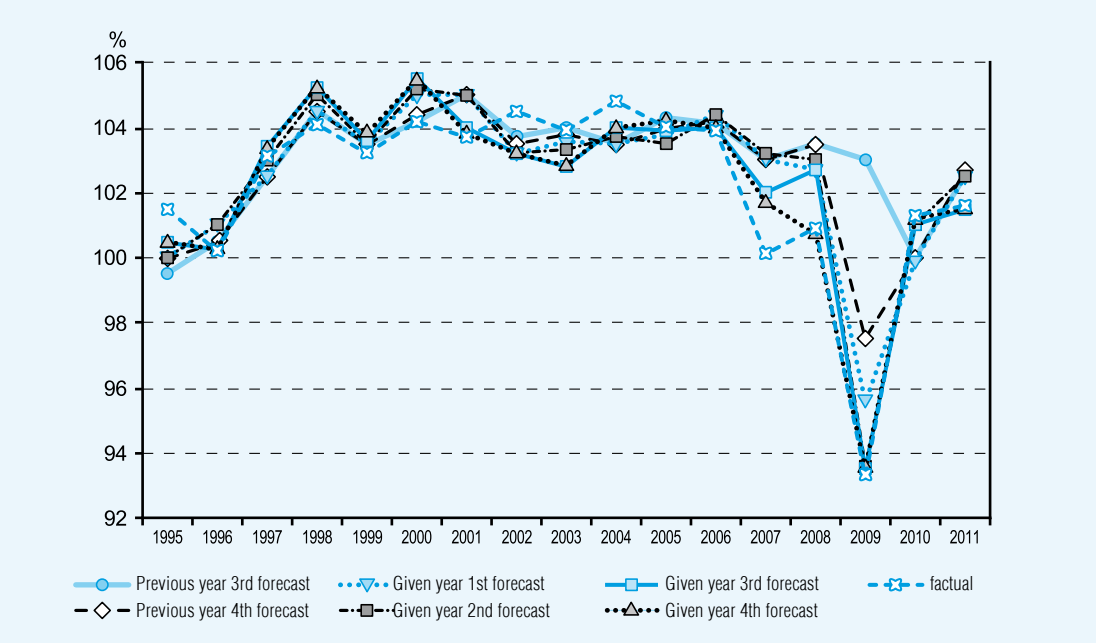
As Tables 1–3 as well as *Chart 1* below show (in line with experiences of earlier examinations), the mutual verification of estimates in most cases provides relatively good forecasts – which, after initial errors[15], improve quickly with the passing of time – on all expected performances, i.e. the technique is quite efficient. The most important information in Table 1 is that the average rate of 'errors' committed in forecasting annual GDP dynamics (the indicator that best characterises the performance of the Hungarian economy) is 1 percentage point; barely more than the 0.6 percentage point average difference between domestic GDP statistics that were first projected then published in later years. According to the table presented in the *Appendix*, the standard deviation of error rate is not catastrophic to begin with and decreases rapidly.

But the reliability of GKI forecasts in the 2006-2011 period also barely deviated from the average of the opinions of experts polled by *Reuters (see Table 5).*

The errors committed in forecasting expected *direction* of development were not great either (the correlations between projections and statistics are relatively favourable as well). The GKI slightly overestimated growth possibili-

Chart 1

FORECASTS AND STATISTICS OF GDP DYNAMICS AND STATISTICS (PREVIOUS YEAR = 100)



Source: HCSO, GKI-forecasts

Table 5

AVERAGE ABSOLUTE DEVIATION* OF GDP FORECASTS AND FACTUAL DATA, 2006–2011 (PERCENTAGE POINTS)

Date of forecast	Reuters	GKI
Previous year 1	2.5	3.0
Previous year 2	1.9	2.1
Given year 1	1.5	1.6
Given year 2	1.3	1.2
Given year 3	0.7	0.7
Average	1.6	1.7

* Mathematical average of the absolute values of differences between forecasts and factual data published in 2012. In the given year, Reuters did not publish the fourth forecast for every single year, and as such we will not do so either.

Source: own calculation

ties in the 1998–2001 period, at times strongly overestimated them in the 2007–2008 period, but slightly underestimated between 2002 and 2004. These errors are similar to those found in forecasts prepared by other institutions. In the 2006-2011 period for instance, the GKI over- and underestimated the rate of economic growth in 80 and 20 per cent of the cases respectively, while this same rate in the case of projections published by Reuters was 77 and

20 per cent (with the remaining 3 per cent accurate). The given relative optimism (in essence the underestimation of equilibrium adjustment and the impacts of the global financial crisis) was therefore typical of the entire Hungarian analyst community in the given period.

> The improvement of forecasts over time is also considerable. Between 1995 and 2011, in the case of June projections (which already made use of the estimate published for Q1 GDP), the absolute deviation of forecasts from subsequent factual data was only 65 per cent of values from September the previous year. Forecasting error dropped by close to 60 per cent between the first and last projection. The average 'quality' of the forecast published in December of the year under review is, therefore, not worse than the first data released by the HCSO one quarter later (both deviation values are 0.6 per cent). This is not surprising. The information base available in September of the year before the year under review is quite modest. The results of economic cycle tests provide some points of reference for the given year, but not the year after. At this point, the country has no approved budget for the year after, and the tax laws that would determine the near future are only outlines. The majority of major institutions (the European Commission for instance) only publish their forecasts at a later date. At this point, those preparing forecasts have only poor information available to them. However, many things are cleared up by December: the statutory and budgetary environment usually stabilises (in some cases only temporarily of course), and the picture of the economic processes of the given year – the year before the year under review – is also clearer and more accurate. The reason for the improvement observed in the year under review is also clear. At this point, quarterly data for the beginning of the year under review, and for certain areas monthly data as well, are already available.

Another, relatively widely-used tool for verifying the reliability of projections is the comparison of projection results with the results of the simple (so-called 'dummy') forecasting technique, according to which the forecast for the next (t+1) year is actually the factual figure for the given year t. In developed countries, these simple GDP projections are fulfilled with errors of around 1 percentage point (Kash, 2006), while in the Hungarian economy, in the period under review the average error value of GDP forecasts prepared with a similar method is almost 2 percentage points. The accuracy of GDP forecasts examined is, therefore, much greater than the simple projections above.[16]

At the same time, we were also forced to determine that the projections for national economy GDP production examined were considerably more accurate than the forecasts for the items of either the supply (production) side, or the demand (final expenditure) side. This development comes as no surprise whatsoever, as in the 1995-2011 period, the appropriate statistics also fluctuated more strongly; both the sector performance indicators that show a lower aggregation level on the production side and the items of the final expenditure side exhibited greater swing than the entire GDP itself. The standard deviation of the GDP volume index in the period under review is 2.8, 5.3 for transportation and storage, 6.2 for industry, 7.3 for the construction industry and 21.1 for agriculture. On the final expenditure side, these same data were 4.8 for consumption, 6.6 for investment, 7.5 for export and 8.8 for import. The preparation of projections for the items of the production and final expenditure side was logically a far greater challenge for forecasters than preparing projections for national economy GDP. This difference could also have been increased by the fact that errors committed with respect to sector forecasts could – in fortunate cases – also have 'neutralised' one another.

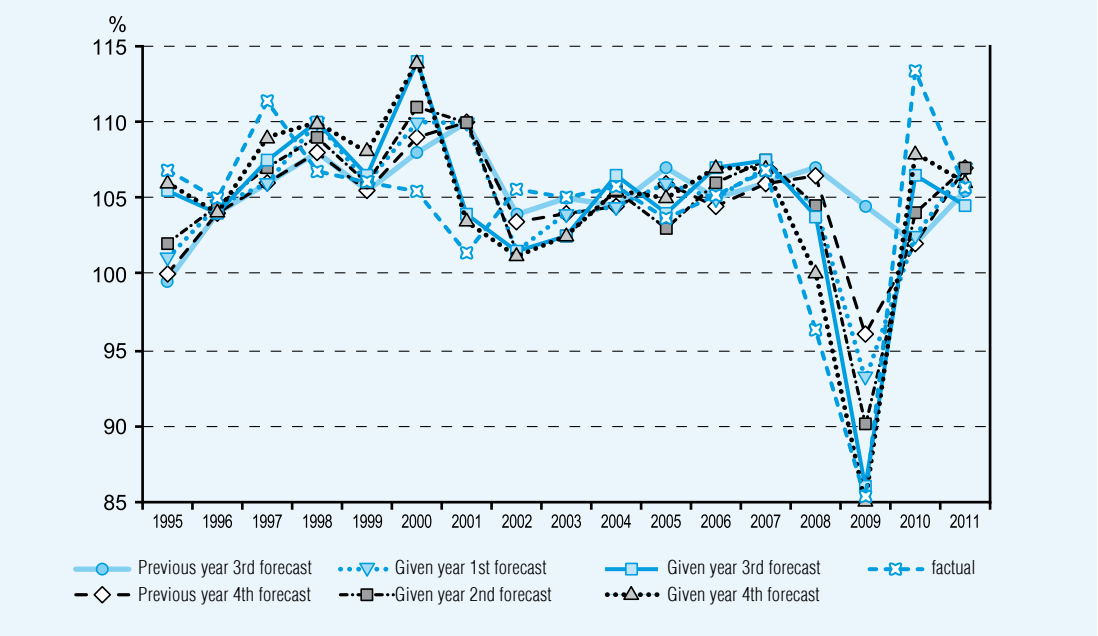
The average error level of GKI projections for INDUSTRIAL PRODUCTION is around 3.5 percentage points, which is much greater than the approximately 1 percentage point error level observed in the case of total GDP (at the same time, though, it is lower than the average error of the above mentioned 'dummy' forecasting technique, which is above 5 percentage points). Standard deviation of error rate is relatively significant (though decreasing over time). Furthermore, in spite of the fact that the ratio of over- and underestimations is roughly equal, 47 and 53 per cent *(see Chart 2),* the correlation indexes are quite weak.

Experience shows that the difficulties of judging export demand are primarily responsible for the indicated errors of industrial projections. Nevertheless, statistical data supply also follows industrial production with lower efficiency than it does GDP production. On average, the data first published by the HCSO deviate from the 'final' data published in 2012 by 2 percentage points.

The average error level of forecasts examined in the CONSTRUCTION is around 5 percentage points, the standard deviation of error rate is also high, i.e. it considerably exceeds that of industrial projections. The sector's projections – particularly in the period after 2004 – in general proved to be overly optimistic: the sector's potential for development was overestimated in 82 per cent of cases and underestimated in 18 per cent. The problems of construction forecasts are to be found primarily in the extreme volatility of the demand for industry products, and particularly in the 'tug-of-war' nature of the state's investment policy. After our accession to the European Union, however, not just GKI forecasters, but other analyst institutions and industry organisations also expected an upturn in investments relying on EU funds. Incoming grants, however – due to the bursting

Chart 2

FORECASTS AND STATISTICS OF INDUSTRIAL GDP CHANGE (PREVIOUS YEAR = 100)



Source: HCSO, GKI-forecasts

of the real estate market bubble and financial crisis-related austerity measures among other things – generated significantly lower than expected construction demand. In 2009, the assessment of applications practically came to a standstill and the new government also failed to accelerate the process. In recent years, the admission of this fact generated a level of optimism in forecasters that was much lower than before *(see Chart 3)*.

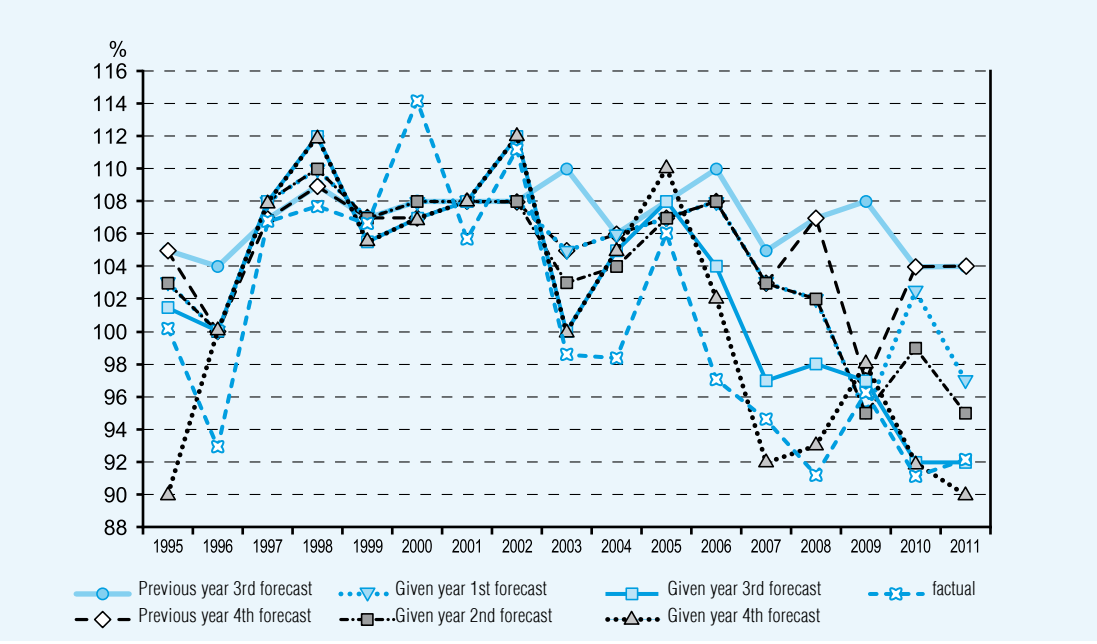
According to the data of Table 1, the average error level and error rate deviation of AGRICULTURAL FORECASTING – in part due to reasons found in nature – are far greater than in industrial or construction industry forecasting. In the period under review, forecasters practically equally over- and underestimated the performance of agriculture (47 and 53 per cent). The rate of errors only drops substantially as of the fourth forecast, as this is when the weather peculiarities for the given year are for the most part known.

The performance of the TRANSPORTATION AND TELECOMMUNICATIONS SECTOR was forecasted by the GKI in the period between 1995 and 2011 with an average error of about 2 percentage points (and a relatively small error rate standard deviation). Of all the sectors of the national economy, this was the one where performance was most efficiently prognosticated in the recent period.

The largest item of the final expenditure side of GDP is *private consumption*. The forecasts provided for consumption are relatively reliable, average error rate in the period under review barely exceeds 1 percentage point, standard deviation of error rate is not particularly strong either, while the correlation of projections and statistics is especially good; in other words, the reliability of forecasts is just slightly weaker than that of the GDP. Nevertheless, we have overestimated possibilities in 66 per cent of the cases and underestimated in 30 per cent (the remaining 4 per cent are accurate) (*see Chart 4)*.

Chart 3

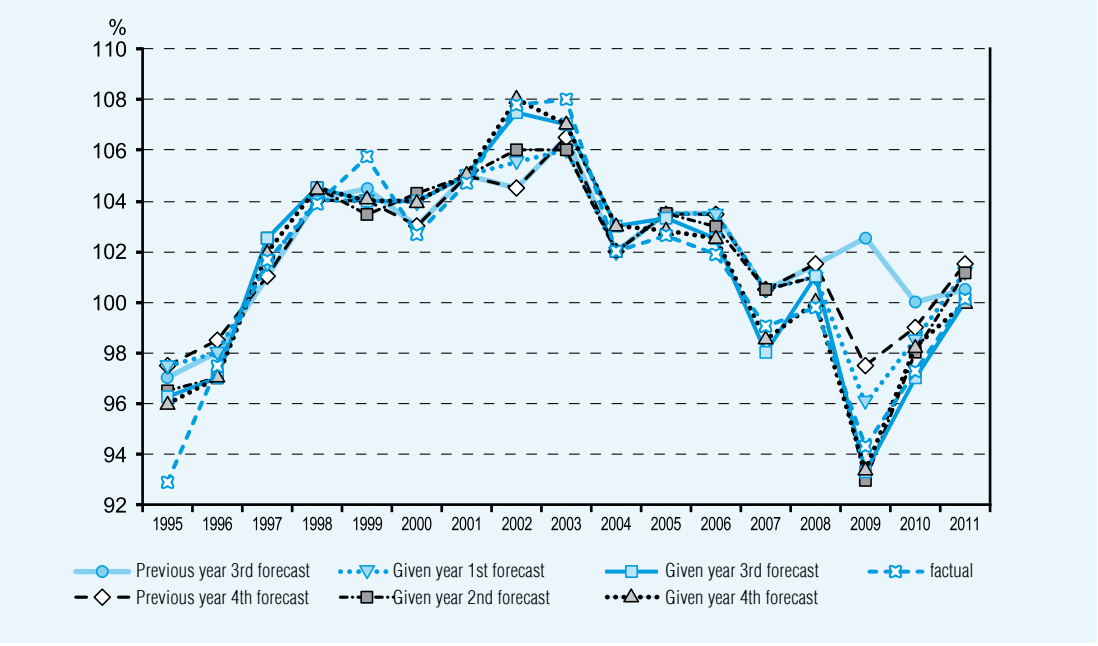
FORECASTS AND FACTUAL DATA OF CONSTRUCTION INDUSTRY GDP DYNAMICS (PREVIOUS YEAR = 100)



Source: HCSO, GKI-forecasts

Chart 4

FORECASTS AND STATISTICS OF INDIVIDUAL CONSUMPTION DYNAMICS (PREVIOUS YEAR = 100)



Source: HCSO, GKI-forecasts

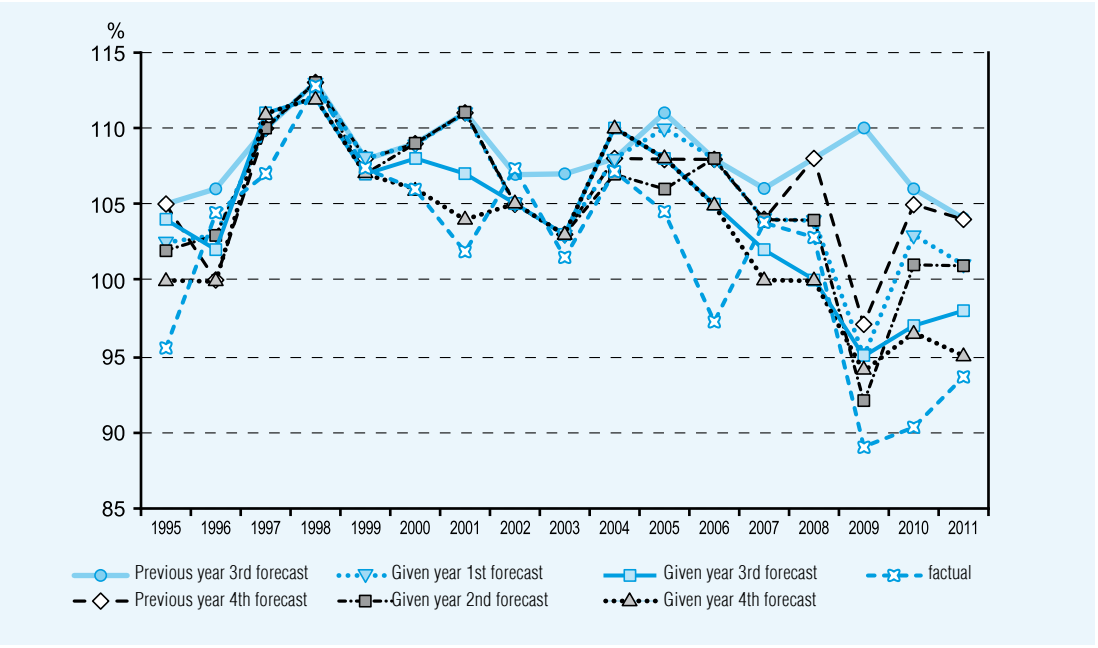
The average error level of INVESTMENT projections examined exceeds 4 percentage points, standard deviation of error rate is high, and correlation indexes are low; in other words, the reliability of forecasts is significantly weaker than that of consumption. Consumption is inelastic, and reacts to changes – be they fast and significant – of income processes with delay and in a subdued manner. Investments, however, are strongly influenced by the changes of profit outlooks and the broader economic environment. In many cases, the state's investment decisions follow no rationality whatsoever in an economic sense, they are purely political in nature, and as such, forecasting them falls outside of the 'range of vision' of economic forecasters. Even so, in the period under review, it was the overestimation of the economy boosting role of EU funds that was responsible for forecasters overestimating investment performance in 78 per cent of cases and underestimating it in 22 per cent of cases. *(See Chart 5)*

The average error level of projections regarding EXPORT AND IMPORT volume indexes is similar to that of investments, 4 percentage points, and standard deviation of error rate is also high. The main difficulty when forecasting these is that not only must forecasters have a realistic vision of the conditions and possibilities of the Hungarian economy, but must (should) also know the expected development of the demand of partner countries which is often an impossible requirement to meet. Of course, Hungarian forecasters are not the only ones to encounter difficulties in the field of international trade forecasting; it is a well-known fact that major forecasting institutions are also regularly forced to substantially adjust their world trade projections.

In light of our findings with respect to the forecasting difficulties of demand-supply structure, it is perhaps no coincidence that the publication of projections for these factors – and examination

Chart 5

FORECASTS AND STATISTICS OF INVESTMENT DYNAMICS (PREVIOUS YEAR = 100)



Source: HCSO, GKI-forecasts

of their reliability – is far rarer in international practice than it is in the case of GDP.

THE RELIABILITY OF ECONOMIC EQUILIBRIUM FORECASTS

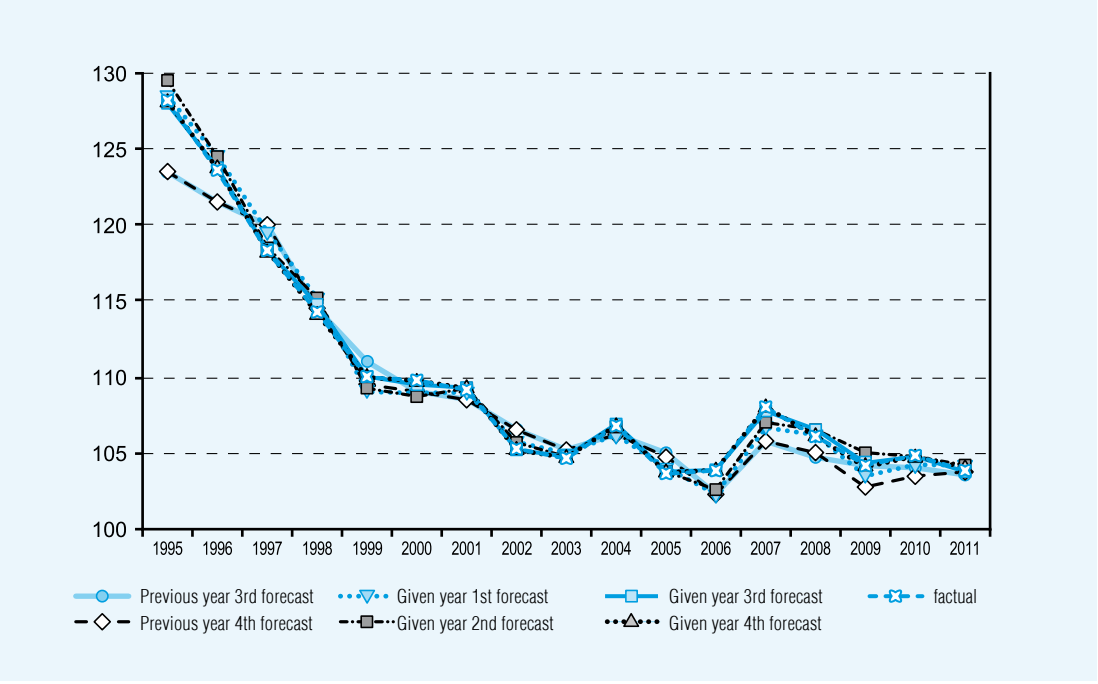
Experience shows that the various factors of domestic market equilibrium can be prognosticated with various degrees of accuracy.

In the case reviewed for instance, the forecasting of the CONSUMER PRICE INDEX is again the most accurate, while inflation forecasting, as we will see, is usually a 'success-story'. The average absolute deviation of GKI forecasts and factual numbers between 1995 and 2011 is 0.7, which – in comparison to the above – is a distinctly low value. Error rate standard deviation is small. In addition, the standard deviation of errors and error rate quickly drop with the passing of time, correlation indexes are excellent, and there is no bias in terms of the directions of estimation errors as expected inflation was overestimated in 42 per cent of cases and underestimated in 45 per cent (the remaining 13 per cent represents accurate results).

There are a number of underlying factors behind relatively accurate forecasts. On the one hand, it is well-known that the inflation index is an annual average, the average of the price changes of the 12 months of the given year. The statistical data published provide excellent reference points for forecasters (as they can be easily integrated into the forecasting model). On the other hand, the inflation data measured in a given month against the similar period of the preceding year is the result of impacts that are in part 'carried over' (i.e. already known in an earlier period). Thirdly, it is a major advantage that inflation data are not amended subsequently by the HCSO; therefore, the earlier mentioned problem arising from the adjustment of statistics does not apply here *(see Chart 6)*.

Chart 6

INFLATION FORECASTS AND STATISTICS (PREVIOUS YEAR = 100)



Source: HCSO, GKI-forecasts

Another widely stated opinion on the accuracy of inflation forecasts is that the self-fulfilling effect of such projections is particularly strong as corporate pricing relies heavily on these. According to the authors of the present paper, however, in most cases it is the price index published by the HCSO for the preceding year, and not the forecast, that is built into corporate expectations or the agreements concluded between economic players – on the basis of the logic of the aforementioned 'dummy' forecasting technique.

Inflation forecasting is always given considerable emphasis in both various domestic projections and long-standing international forecasting.[17] Thus, we can determine that in the 2006–2011 period, the GKI's inflation projections were just as reliable as for example the average of the opinions of the experts polled by Reuters *(see Table 6)*.

Though in recent years the forecasting of PUBLIC FINANCE POSITIONS have become equally, and in certain cases even more important worldwide as the forecasting of GDP and inflation, the errors of these projections were at times quite grave all over the world, and in Hungary's case this was accompanied by tense domestic and EU debates, while in other cases (Greece for example) severe economic consequences.

The majority of Hungarian forecasters – among them the GKI – usually based their relevant projections on the highly detailed analysis of budgets. In many cases, however, these calculations were upset by unpredictable 'state' behaviour. On many occasions, the government hoped to book expenditure items (such as motorway construction for instance) outside of public finances, which in the end it did not receive authorisation to do or in many cases, at the end of the year it booked certain state con-

Table 6

AVERAGE ABSOLUTE DEVIATION* OF CONSUMER PRICE INDEX PROJECTIONS AND FACTUAL DATA, 2006–2011 (PERCENTAGE POINTS)

	Reuters	GKI
Previous year 1	1.3	1.1
Previous year 2	1.2	1.2
Given year 1	0.7	0.8
Given year 2	0.6	0.7
Given year 3	0.2	0.2
Given year 4	0.1	0.1
Average	0.8	0.8

* Mathematical average of the absolute values of differences between forecasts and factual data published in 2012.

Source: own calculation

solidation expenditures without prior notice. These increased the deficit of the given years. Due to these chaotic situations, GKI forecasters often published forecast variants containing a number of options, which, however, could not be taken into account by the present calculation examining the reliability of forecasts. As a result, the GDP-proportionate average error level of the forecasting of general government deficit came to approximately 1.5 percentage points – i.e. nominally HUF 400-500 billion per year. Error rate standard deviation is significant, and correlation indexes are unfavourable for a longer period. The size of the deficit was underestimated in 66 per cent of the cases, and overestimated in 29 per cent (the remaining 5 per cent were accurate). The projections of the period between 2001 and 2006, a period burdened with the above matters, were the ones that were overly optimistic *(see Chart 7)*.[18]

The estimation of FOREIGN TRADE EQUILIBRIUM is also highly uncertain. The on-average EUR 1.4 billion underestimation of the current account balance is arrived at as the difficult to foresee balance of highly volatile and significant earning movements, and in this case, the factual figures are available even later than usual and only as estimates, a fact that is emphasised *(see Chart 8)*.

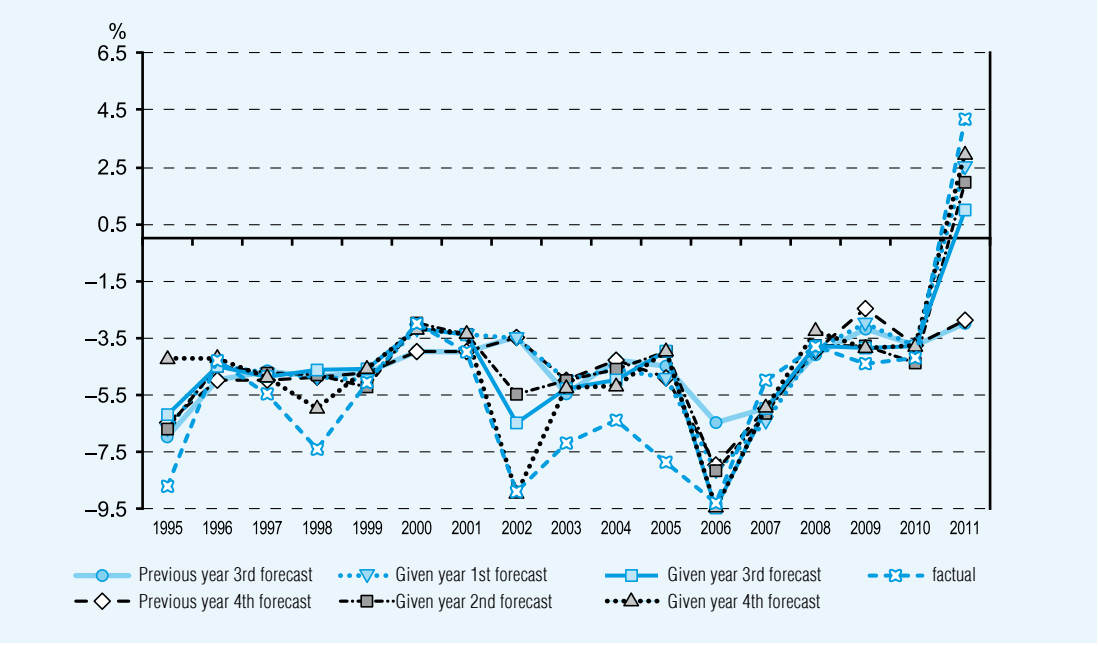
All these of course are not unique Hungarian features. In the recent period, it was quite frequent to encounter erroneous assessments regarding the equilibrium outlooks of Southern European EU Member States.

CONCLUSIONS

When someone manages to provide a forecast on the future that turns out to be correct, it is most of the time pure coincidence. It is always expedient to strive to prepare a reliable forecast, but to hope to do this on a regular basis is nothing but an illusion. This also goes for economic forecasts. Analysts and forecasters try to arm themselves with information on the past as well as tools (statistical data, logical, mathematical-statistical and econometric models) verifying the reliability of such information in order to make their projections as sound as possible. The information technology revolution has expanded the boundaries of opportunities (in terms of both data access and processing) which is an obvious helping hand for forecasters.

Table 7

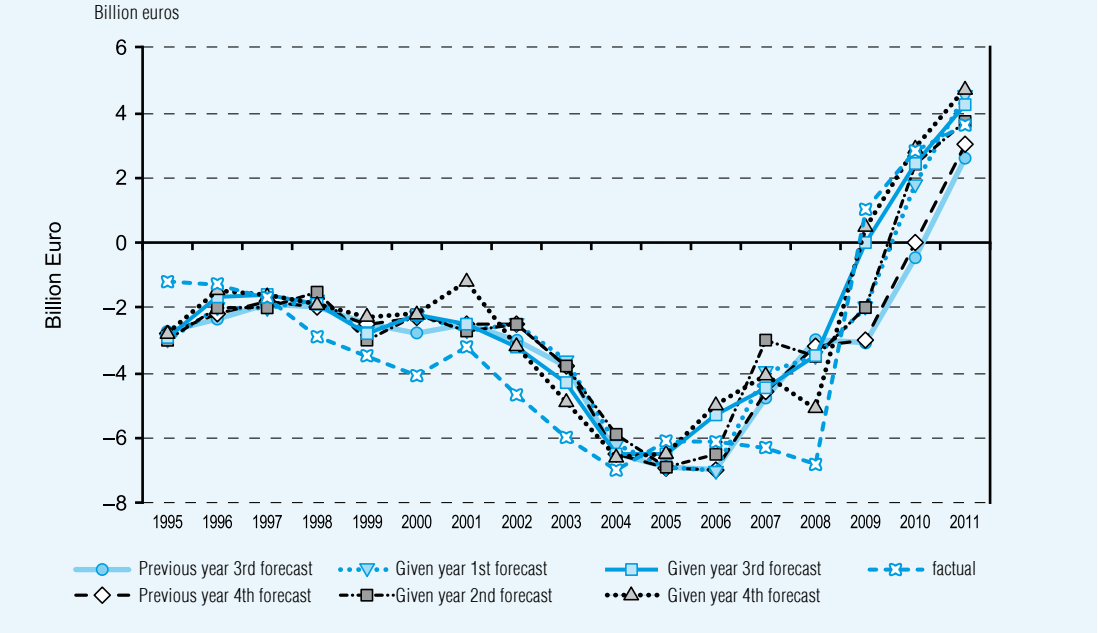
FORECASTS AND STATISTICS OF GDP-PROPORTIONATE GENERAL GOVERNMENT DEFICIT



Source: own calculations

Table 8

FORECASTS AND STATISTICS OF THE BALANCE OF PAYMENTS



Source: own calculations

Today, analyses are even published on the forecasting accuracy as well. The fundamental lesson of the above, however, is that although in more 'peaceful' times, when development trends are primarily shaped by the internal movements of the economy, forecasts are for the most part reliable; in more eventful times – scattered with trend turns – however, when external effects become stronger and the nervousness of markets and governments adds up, the reliability of forecasts deteriorates drastically. This is also true for Hungary and the GKI. Thus, it is an outstandingly important lesson of our analysis that we must accept: at the moment, we still do not have efficient techniques to foresee trend turns of economic development, and in particular, to foresee crises. It is an even more important finding, however, that in many cases and topics, it is indeed possible to prepare relatively reliable projections that can indeed be taken into account in economic policy practice.

At the same time, it is desirable that the regular preparation of forecasts be a learning process. The evaluation of earlier mistakes, the conclusions drawn from these and the integration of experiences gained into the forecasting process can improve the efficiency of both projections and the utilisation of their results.

Appendix

Table 7

STANDARD DEVIATIONS OF THE DIFFERENCES BETWEEN FORECASTS AND STATISTICS

	Previous year		Given year			
	3.	4.	1.	2.	3.	4.
	projections					
	Percentage of dynamics					
GDP	2.7	1.6	1.3	1.2	0.9	0.8
Industrial GDP	6.9	5.6	5.1	4.6	3.8	3.2
Construction GDP	8.9	7.6	6.3	5.7	4.1	4.5
Agricultural GDP	18.1	17.9	17.8	17.1	13.0	8.9
Transportation, telecommunications GDP	3.3	2.5	2.1	2.1	2.0	1.9
GDP domestic use	3.8	2.7	2.3	1.8	1.3	1.1
Individual consumption	2.6	1.9	1.7	1.5	1.2	1.1
Investment	8.4	6.7	5.7	5.1	4.3	3.7
Consumer price index	1.6	1.7	0.8	0.7	0.2	0.1
	Percentage					
General government deficit /GDP	2.7	2.6	2.0	1.8	1.8	1.6
	Percentage of dynamics					
Export (GDP content)	8.5	6.8	5.0	4.8	3.6	2.9
Import (GDP content)	9.4	7.2	5.4	5.3	3.1	2.4
	Billion euros					
Current account balance	1.9	1.9	1.7	1.8	1.3	1.3

Source: own calculation

Notes

[1] „Serious economic forecasting got under way only in the early 1960s in many OECD countries." (http://www.oecd.org/eco/economicoutlookanalysisandforecasts/2502379.pdf). Granger – Newbold (1973) already published certain comments regarding the assessment of economic forecasts.

[2] Estimation error is the term used for the difference between forecasts and subsequent statistical data. As these difference may be the consequence of a lot of reasons (they may have come about as a result of unexpected effects 'imported' from the external environment, as a result of government measures that were not communicated in advance, or even due to preemptive measures taken in light of projections warning of future dangers), the use of the term does not reflect on the forecast.

[3] The saying is often (wrongly) attributed to J. K. Galbraith (Popik, 2009).

[4] Therefore, we shall not assess the verbal conclusions drawn from the data and published in the documents examined. We wish to avoid the dangers of subjectivity that might arise at this latter assessment, the rate of which is well reflected by the vast differences between the government and opposition views regarding the future of the modest GDP growth recorded at the beginning of 2013. See for instance: Lentner (2013), and Jankovics (?).

[5] See: Némethné – Papanek − Sulok, 2001; Papanek − Sulok, 2003; Papanek − Bíró − Munkácsy et al., 2008; Papanek, 2009

[6] Average deviation: the average size of the difference between all forecasts examined and the statistics (taken at absolute value). Relative deviation: average deviation divided by the average size of the projected indicator. Percentage of positive (negative) deviation: the number of positive (negative) deviations divided by the total number of forecasts (if the percentage of positive and negative deviations is lower than 100, the missing amount is the ratio of accurate forecasts).

[7] In the case of many smaller 'errors' deviation is low, but increases considerably if there are also large 'errors' among these.

[8] We acquired information on the matter from several Hungarian institutions that have published forcasts in the recent period. Most institutions surveyed, however, only provided information on forecasting practice that was relatively short or which dealt with forecasts that were prepared at irregular intervals or regarding variable indicators, and none of the organisations indicated that they have the long-term databases required to analyse projection reliability at their disposal.

[9] The data in the present study cannot be compared with findings on the reliability of projections of given indicators because these latter forecasts do not take the, at times, very close correlations of macroeconomic processes (such as demand and inflation for example) into account.

[10] The reliability of the GDP and inflation forecasts prepared by GKI for the years between 2006 and 2011 for example, as we will see, is approximately the same as the projections published by Reuters, which reflect the average of the expectations of 25-30 experts.

[11] Of course, the frequent numerical errors still do not make projections unnecessary as verbal analyses (as referred to the above-quoted saying by M. Singer) can still point out crucial correlations in the future.

[12] Gonzales Cabanillas, – Terzi (2012); http://en.wikipedia.org/wiki/Economic_forecasting etc. The subject is discussed in more detail in Hungarian by Magas (2009) for example.

[13] In this aspect, government forecasts fall into a separate category as the shapers of economic policy have tools at their disposal to shape processes, while independent institutions are but mere observers of events.

[14] See: Samuelson – Nordhaus (1993), Vol. III, p. 1114; Porter (1990)

[15] In 2012, other research projects also gained similar experiences on the existence of initial errors. As Domokos (2012) writes for example, "the spring projections for the GDP growth rate given by most forecasting institutions, but especially the government, Századvég and the MNB, significantly exceeded the actual growth figures."

[16] In spite of the above, economic policy makers still have to take GDP forecast margins of error into consideration. It is hardly disputable that the uncritical acceptance of the gravely erroneous Greek GDP projections provided by the EU and illustrated as such by Frederic (2012) caused considerable damage.

[17] According to M. Weale, member of the Monetary Council of the Bank of England, in 1979 the BoE was probably the first, at least in England, to publish estimates on potential forecastingerrors, and as of 1993, the BoE also illustrated the probability of its inflation forecasts using (funnel) diagrams (http://www.thefiscaltimes.com/Articles/2011/12/27/8-Outrageously-Flawed-Economic-Predictions.aspx#page1).

[18] The indicated margins of error of public finance position projections can obviously cause great problems for example in the case of Parliament decision making regarding considerably smaller items. With respect to this particular topic, we recommend extreme caution to economic policy makers.

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