Institution: University of Leicester

Unit of Assessment: Department of Economics

Title of case study: Forecasting of inflation and timing of monetary policy decisions for the National Bank of Poland.

1. Summary of the impact

The making of monetary policy requires accurate forecasts of key monetary variables, and in particular of the inflation rate. Research conducted by **Charemza** has led to the development of new methods of forecasting inflation. The relevant information is summarised in a Monetary Policy Indicator (MPI) that can be used to identify the optimal timing of active monetary policy. Since June 2006, the MPI has been applied by the Monetary Policy Council (MPC) of Poland in the process of deciding on the levels of monetary instruments (interest rates and reserve levels). The use of these methods has contributed to Poland's economic stability and helped to ensure unprecedented growth of the Polish economy in the last decade.

2. Underpinning research

Research on the MPI by Wojciech **Charemza**, Professor of Economics at the Department of Economics in Leicester since 1987, began in 2003 while he was visiting the European University at St. Petersburg (EUSP), Russia. The research was conducted in collaboration with Svetlana Makarova (EUSP then, now University College London).

The MPI is an index that allows the decomposition of real and monetary shocks which have been econometrically identified in the past. This decomposition enables to identify the exact moment in time when a possible shock induced by a monetary policy move (in most cases, a change in the monetary interest rate) would be most effective. That is to say, when the monetary policy move would minimise the output loss in case of a contractionary decision, and maximise the output gain in case of an expansionary decision.

In 2003, **Charemza** described the idea of an MPI at a seminar at the National Bank of Poland (NBP) – i.e., the central bank of Poland, which is responsible for conducting monetary policy. This led to his appointment as a visiting advisor to the Governor of the National Bank of Poland the following year, on secondment from the University of Leicester. (In this period, he continued to work at Leicester at 0.75FTE.) The principal aim of the appointment was to develop the MPI further and to implement it as a working tool for the Monetary Policy Council.

In 2005, Charemza's co-author, Makarova, joined NBP, on secondment from EUSP. They jointly developed a complex forecasting program. Apart from the MPI, the forecasting program computes the probabilities with which monetary policy targets will be achieved, the probabilities of turning points in inflation dynamics, and other indicators.

The results of the first stage of the research were presented in [Ref 1] and [Ref 2]. These papers provide the general derivation of the MPI, some simulation results, and preliminary empirical results. A more complete presentation of the results was hampered and delayed by security clauses of NBP, which prevented disclosure of the technical details. This has long been an obstacle towards publication in more highly ranked academic journals, which typically impose fuller disclosure requirements.

In 2005 **Charemza** and Makarova, in collaboration with Lifshits (St Petersburg State University, Russia) published [Ref 3], which can be regarded as a complement to [Ref 1] and [Ref 2]. Although it could not deal with the MPI explicitly for the reasons explained above, it presented a novel method of modelling time series without the explicit assumption of normality, which was instrumental to develop the MPI. This method was implemented by **Charemza** and Makarova and incorporated into the NBP's programming suite for identification of inflationary and real shocks, which were further utilised for computing MPI.

Research on the MPI has continued even after **Charemza** and Makarova left the National Bank of Poland in 2008: see, in particular, [Ref 4], which provides a more detailed analysis of the MPI.

3. References to the research

1. Charemza, W. and S. Makarova (2005), 'Ex-ante dynamics of real effects of monetary policy', BOFIT Discussion Papers No. 20. The final version of this paper is:

2. Charemza, W. and S. Makarova (2006), 'Ex-ante dynamics of real effects of monetary policy: theory and evidence for Russia and Poland, 2001-2003', *Comparative Economic Studies* **48**, pp. 458-479, doi:10.1057/palgrave.ces.8100180.

   Due to the popularity of the series, the BOFIT Discussion paper is more highly quoted than many journal publications. It also contains more technical details than the published version.

3. Charemza, W., M. Lifshits and S. Makarova (2005), 'Conditional testing for unit-root bilinearity in financial time series: some theoretical and empirical results', *Journal of Economic Dynamics and Control* **29**, pp. 63-96, doi:10.1016/j.jedc.2003.07.001.

4. Charemza, W., S. Makarova and I.H. Shah (2013), 'Making the most of high inflation', University of Leicester, Department of Economics Working Paper No. 13/01, submitted for publication.

4. Details of the impact

How the research led to the impact

The National Bank of Poland (NBP) began its interest in the forecasting methodology developed by **Charemza** and Makarova after the research seminar held in 2003 mentioned above, where **Charemza** presented their initial results. The seminar was followed by meetings with the Governor of NBP and the Deputy Governor. As a result of these meetings, **Charemza** (and later Makarova) continued the development of the MPI working part-time at NBP.

The method of (and potential benefits from) making monetary policy decision according to the indications given by the MPI were presented and discussed in a series of internal workshops at NBP. In June 2006, the first pilot application of the index was published in an internal bulletin of NBP under the title of 'Krotkookresowa prognoza inflacji i ocena klimatu decyzyjnego' (Short-term inflation forecast and the evaluation of the monetary policy climate).

Since then, the bulletin has been regularly produced on a monthly basis. It is delivered to the members of the Monetary Policy Council one week before their monthly meetings. A typical issue of the bulletin would report both systematic forecasts (updated every month) and occasional information relevant for the special circumstances of each period.

An important feature of the Bulletin is its timeliness. The most relevant information used for updating the forecast is the consumers' price index (CPI). This is published by the Polish Central Statistical Office three or four days before the so-called working meeting of the Monetary Policy Council. When **Charemza** was at NBP, the preliminary version of the forecast was usually produced within 2-3 hours after the CPI figure was released. The preliminary version of the bulletin was available about 6 hours after the release for scrutiny by the Director of the Macroeconomic Research Bureau of NBP. The final version of the bulletin was usually ready for delivery to the Council less than 24 hours after the release of the CPI figure. In other words, its cut-off date (i.e. the moment after which new statistical data could not be included in the forecast) was just 24 hours prior to its publication date. By comparison, the usual cut-off date for other forecasts produced at NBP, based on quarterly rather than monthly data (ECMOD forecast), was three weeks.

In March 2008, Charemza's and Makarova's secondments ended and they left NBP. However, they retained control over the bulletin until September 2009. Overall they produced 37 regular issues of the bulletin. Before leaving the NBP, they provided training and consultation to the team of NBP researchers which took over the bulletin in September 2009. The bulletin is still delivered to the Monetary Policy Board on a monthly basis.

Evidence of the impact

Due to the confidential nature of the bulletin (and of the computer program used to calculate the

MPI), it is difficult to provide written evidence of the computational details. However, permission to release a sample bulletin for the purpose of REF evaluation has been granted ([Source 1]).

The former Deputy Governor of National Bank of Poland is the person who actually engaged **Charemza** in the project. He participated in the Monetary Policy Council meetings in his capacity of the Deputy Governor. He said: "One of the main duties of Prof Charemza was to prepare a monthly forecasting bulletin, containing probabilistic forecast of inflation and evaluation of index of monetary policy climate, which identifies appropriate timing for undertaking policy decisions. The methodology of this index as well as concepts used for the probabilistic forecasting had been developed by Professor Charemza in collaboration with Dr Svetlana Makarova, also employed by the NBP at that time. It is my understanding that the methodology was original and described in academic paper authored by Charemza and Makarova. (…) **the bulletin was considered as one of the main auxiliary information used by the members of the Monetary Policy Council, who often commented favourably on its quality and original content**.'' See [Source 2].

A former member of the Monetary Policy Council of Poland and currently Director of the Institute of Economics at the National Bank of Poland was one of the final recipients of the bulletin, as the voting member of the Monetary Policy Council. He said: "In the period from 2004 - 2010 I was a member of the Monetary Policy Council of the National Bank of Poland, responsible for conducting monetary policy… **Information given in the bulletin helped me (and most likely my colleagues in the Council as well) in undertaking monetary policy decisions.** Since 2010 I have been acting as the Director of the Economic Institute of the National Bank of Poland. **I can confirm that some methods developed by Wojciech Charemza are still in use and contribute to the forecasting analysis made by the Institute for the benefit of the Monetary Policy Council.** Most notably the indicator of monetary policy climate has been re-programmed and is now included in the currently produced bulletins.'' See [Source 3].

The former Director of the Research Department of the National Bank of Poland is currently Deputy Director of the Institute of Economics of the National Bank of Poland. He was responsible for the scrutinising the bulletin, supervising its production and delivering it to the Monetary Policy Board. He said: "The monetary policy conducted by the National Bank of Poland in the period of 2005-2008 is generally regarded as being successful. In particular Poland was the only country in European Union which avoided negative growth in 2009 and maintained positive growth record throughout. Also its inflation, albeit occasionally breaching the target bands, was never greater than 5% in this period. This is, to a large extent, attributed to the effective monetary policy. **Overall, I can conclude that the forecasting methodology developed by Professor Charemza and his collaborators contributed significantly to the enhancement of the analytical and forecasting tools used at the National Bank of Poland**.'' See [Source 4].

5. Sources to corroborate the impact

1. A sample bulletin is available for inspection.
2. Letter from the former Deputy Governor of National Bank of Poland
3. Letter from the former member of the Monetary Policy Council of Poland and currently Director of the Institute of Economics at the National Bank of Poland.
4. Letter from the former Director of the Research Department of the National Bank of Poland, currently Deputy Director of the Institute of Economics of the National Bank of Poland