Institution: Queen Mary University of London (QMUL)

Unit of Assessment: C18 Economics and Econometrics

Title of case study: Macroeconomic Modelling and Monetary Policy in the UK

1. Summary of the impact (indicative maximum 100 words)

George Kapetanios's research on macroeconomic modelling and forecasting has influenced both the operational practices of the Bank of England and its conduct of UK monetary policy. His work has:

1. led to the creation of novel forecasting tools that have been adopted by the Bank to inform the Monetary Policy Committee on macroeconomic trends,
2. enabled the Bank to extract information from ONS macroeconomic data more effectively by producing estimates that correct for deficiencies in early ONS releases,
3. informed the Bank's decision to adopt quantitative easing by estimating the effects of this policy on GDP growth and inflation, and provided the main source of scientific support for the effectiveness of the QE policy in the UK during the Great Recession.

2. Underpinning research (indicative maximum 500 words)

A central bank will be able to target inflation effectively only if it can produce accurate macroeconomic forecasts based on high-frequency data and extract useful information from uncertain signals. These capabilities are all the more necessary when the monetary authority resorts to unconventional measures, such as the quantitative easing policy (asset purchases financed by central bank money) adopted in the UK in the aftermath of the Great Recession.

Kapetanios's research on macroeconomic modelling and forecasting has made important contributions to the above aspects of monetary policy, including:

1. development of a suite of statistical models, based directly on published research (see reference #3 in Section 3 below), that has improved the Bank of England's ability to forecast macroeconomic variables;
2. introduction of methods to deal with uncertainty in data releases by the Office of National Statistics (ONS), allowing more useful information to be extracted. The underlying research (see reference #1 in Section 3 below) employs a state space approach that quantifies the uncertainty in ONS data releases resulting from measurement errors and estimates the true values of the economic variables of interest; and
3. analysis of the effects of quantitative easing (QE) on the UK economy using vector autoregression models (see reference #6 in Section 3 below). These models quantify the macroeconomic impact (in particular the effects on GDP growth and CPI inflation) of the drop in government bond spreads associated with QE asset purchases.

3. References to the research (indicative maximum of six references)

1. A state space approach to extracting the signal from uncertain data. (With A. Cunningham, J. Eklund, C. Jeffery, and V. Labhard.) *Journal of Business and Economic Statistics* 30(2):173–180, 2012.
2. Estimating time variation in measurement error from data revisions: an application to backcasting and forecasting in dynamic models. (With T. Yates.) *Journal of Applied Econometrics* 25(5):869–893, August 2010.
3. Forecasting using Bayesian and information-theoretic model averaging: an application to UK inflation. (With V. Labhard and S. Price.) *Journal of Business and Economic Statistics* 26(1):33–41, 2008.
4. A real time evaluation of Bank of England forecasts of inflation and growth. (With J.

Groen and S. Price.) *International Journal of Forecasting* 25(1):74–80, January–March 2009.
5. Forecasting with measurement errors in dynamic models. (With R. Harrison and T. Yates.) *International Journal of Forecasting* 21(3):595–607, July–September 2005.
6. Assessing the economy-wide effects of quantitative easing. (With H. Mumtaz, I. Stevens, and K. Theodoridis.) *Economic Journal* 122(564):F316–F347, November 2012.

4. Details of the impact (indicative maximum 750 words)

The Bank of England engages with academia in order to explain current policy issues and learn about tools and models that may be useful for addressing them. This engagement process often leads to research projects involving both Bank staff and external academics, the results of which are described in internal publications such as the Quarterly Bulletin. These publications, in turn, inform decisions by policymakers at the Bank.

Kapetanios was employed by the Bank prior to joining QMUL, and continues to spend one day a week there on a permanent basis, so he is well placed to participate in the interchange of ideas between academics and policymakers. His research in collaboration with staff at the Bank has continued to influence both its operational practices and its conduct of monetary policy. The examples of collaborative research described below demonstrate this impact: in all three cases, Kapetanios was personally involved in the production of briefing notes presented to the Monetary Policy Committee (MPC) to inform and support its decision-making.

1. *Macroeconomic forecasting.*

Since monetary policy is forward looking, a critical factor for its effectiveness is the availability of accurate macroeconomic forecasts. This is especially so, as in recent years, in the aftermath of a severe recession.

Kapetanios's research has led to the development of a suite of novel statistical models that are routinely used by the Bank to construct forecasts of key indicators such as GDP growth and inflation for the Monetary Policy Committee. These models exploit data and methods not previously included in the Bank of England Quarterly Model, the institution's primary framework for producing official economic projections. For example, the suite contains linear and non-linear univariate models whose performance Kapetanios has compared with official forecasts (see reference #4 in Section 3 above).

2. *Uncertainty in data releases.*

Most macroeconomic data are uncertain; that is, they are estimates rather than perfect measures of the economic variables of interest. Quantifying and correcting for this uncertainty is of great importance for the conduct of monetary policy.

In 2005 Kapetanios was asked by the Bank of England to serve as the lead econometrician on a team assigned to study biases and other deficiencies in early ONS releases, and to propose methods for addressing these issues. This research collaboration has produced innovative tools for understanding and using uncertain macroeconomic data, including a behavioural model of government statistical agencies and an analysis of the trade-off between accuracy and recentness of information (see references #2 and #5 in Section 3 above). Bank staff who brief the Monetary Policy Committee regularly use this data-uncertainty toolkit to improve their forecasts of macroeconomic trends.

3. *Effects of quantitative easing.*

After the financial crisis intensified in late 2008, the Bank of England and other central banks loosened monetary policy by both conventional and unconventional means. In the UK, the principal unconventional policy measure has been the so-called “quantitative easing” programme, which has made large-scale asset purchases financed by central bank money.

Kapetanios has recently coordinated a Bank project aiming to quantify the macroeconomic effects of the QE programme. A variety of vector autoregression models indicate that the first round of asset purchases had peak effects of approximately +1.5% on real GDP and +1.25% on CPI inflation. These findings have provided the main source of scientific support for the effectiveness of the QE policy in the UK during the Great Recession.

5. Sources to corroborate the impact (indicative maximum of 10 references)

The following Bank of England staff members can address the impact of different aspects of Kapetanios’s research:

1. Senior Research Advisor – on the suite of statistical models.
2. Agent, East Midlands – on the work relating to data uncertainty.
3. Research Adviser – on the work relating to quantitative easing.
4. MPC Member – on the suite of statistical models.

The following documentary evidence also demonstrates the impact of the research:

1. “Extracting a better signal from uncertain data” (by Alastair Cunningham and Christopher Jeffery). Bank of England Quarterly Bulletin, 2007 Q3; on the work relating to ONS macroeconomic data and its use by the Bank.
2. “The United Kingdom's quantitative easing policy: design, operation and impact” (by Michael Joyce, Matthew Tong, and Robert Woods). Bank of England Quarterly Bulletin, 2011 Q3; on the work relating to quantitative easing and its use by the Bank.