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Editorial

Mainstream macroeconomics has been quite heavily criticized for failing to predict the recent financial crisis and its extremely adverse macroeconomic effects, amounting to a global economic recession. The field has also been accused of not providing proper tools and guidance to policymakers to manage the crisis and steer economies out of recession.

Such criticism is of course understandable and, at least to an extent, justified. The debate among economists has often been a politico-philosophical debate between different schools of thought about the root cause of the crisis, the best approach to modelling it and the appropriate or optimal policy response by governments and central banks.

Central banks have received a fair share of criticism from well-known academics. Ever since the global economy was hit hard after the collapse of Lehman Brothers in September 2008, central banks have been criticized for not paying due attention in either their analytical or their policy work to the possibility of a financial crisis per se, or of financial instabilities with potentially highly adverse effects on macroeconomic activity.

Policy measures taken by central banks have also been criticized, but to a lesser extent. It is well known that many of the business cycle models developed in central banks all over the world for forecasting, simulation and research purposes are deeply rooted in mainstream macroeconomics based on dynamic general equilibrium modelling.

The crisis notwithstanding, it is of course crucial to have a solid understanding of the interactions between business cycle fluctuations and financial factors, including financial crises. To this end, mainstream

business cycle research faces an interesting and challenging research agenda.

This does not, however, imply that all that has been achieved during the past 25 years should be forgotten and that business cycle research should start from a clean table. Many of the mainstream business cycle models have been developed to quantitatively account for the main time series properties of the key macroeconomic variables under normal business cycle conditions. On balance, this research on quantitative business cycle modelling has been successful. Furthermore, the modelling discipline imposed on business cycle research by dynamic general equilibrium modelling must, in the end, be viewed as a welcome element which greatly contributes to the comparability of both research and models of business cycle fluctuations.

What lies ahead, then, is to extend these models to incorporate important insights and findings from current frontline financial market research. This will clearly involve deep theorizing.

It is important for central banks to remain fully informed of the advances and breakthroughs that will potentially emerge from future research on business cycle fluctuations. The fact that central banks are active agents in using and building (mainstream) business cycle models contributes to the possibility that modelling innovations will emerge and at least partly ensures that relevant innovations generated outside central bank research will be taken aboard.

All this implies that central banks have to remain open to academic influence. High-frequency interaction between central banks and academia is important, but so is having central bank research functions

externally evaluated by the academic community on a more or less regular basis.

To this end, the Bank of Finland has been a forerunner among central banks, as in December 2009 it published its third evaluation report of its research function. This was conducted by three internationally renowned academic professors: Anil Kashyap (University of Chicago, Booth School of Business), Matti Pohjola (Helsinki School of Economics) and Volker Wieland (Goethe University of Frankfurt).

The report makes a number of useful suggestions on how to improve the Bank's research function further. It also provides valuable input for concrete measures to improve the quality of the Bank's research and for ensuring that research focus and priorities are in line with those set by the Board of the Bank of Finland. All in all, the external evaluation process is a very useful tool for the Bank to reflect upon its research function.

Jouko Vilmunen

Financial accelerator and investment in a small open economy in a currency union

It was not long ago when one had to appeal to either highly adverse systemic events like the Great Depression of the 1930s in the US and the collapse of the Nordic economies in the late 1980s and early 1990s, or to the experiences of many emerging market economies, in order to motivate research on financial factors in business fluctuations and to induce someone to write a paper for publication in a refereed international journal on this topic. Ever since the publication by Kydland and Prescott of their article in 1982¹ and all the way up until the onset of the most recent financial crisis and global recession, mainstream macroeconomic theory

that relied on dynamic general equilibrium

¹ F. Kydland – E. Prescott (1982), "Time to Build Aggregate Fluctuations", *Econometrica* vol. 50, no 6, 1345–1370.

representative agent modelling methodology saw no deeper reason to develop the approach to business cycle modelling so as to incorporate a genuine role for financial market frictions and imperfections. In fact, these models adopt the assumptions underlying the Modigliani-Miller theorem, which implies that the financial structure is both indeterminate and irrelevant to real economic outcomes. For years, existing business cycle models of the mainstream type appeared to be successful in accounting for the prime features of normal business cycle fluctuations, both qualitatively and quantitatively. Thus Occam's razor would imply that there is no need to further complicate the mainstream business cycle models.

Now, the things have changed quite a bit. It is no longer necessary to make references to old ghosts to motivate research on the interaction of financial factors and business cycle fluctuations. Over the past few years, the US and much of the industrialized world have experienced the worst financial crisis of the post WWII period. The global recession that followed the financial crisis also appears to have been the most severe of this era. Currently we getting optimistic signals that the financial sector has stabilized and the real economy has stopped contracting. However, the signals, in particular on the real economy, still appear to be relatively weak, and the path to recovery remains highly uncertain. By arguing that things have changed and that the macroeconomic profession currently yearns for models of aggregate economic activity incorporating credit market frictions, we are not denying the existence of a robust literature in this area, which has been developing over the last several decades. In fact Bernanke, Gertler and Gilchrist (BGG, 1999)² provided an excellent survey of much of the earlier work a decade ago, and the literature has continued to expand since that

² B. Bernanke – M. Gertler – S. Gilchrist (1999), "The Financial Accelerator in a Quantitative Business Cycle Framework", kirjassa *Handbook of Macroeconomics vol 1*, tekijät J. Taylor – M. Woodford.

survey. Much of this work continues to be relevant also to the current situation. But this literature obviously did not – and could not – anticipate all the key phenomena that have been observed during the most recent crisis. A literature that builds on and extends the earlier work in addressing these issues is cropping up with surprising speed. Although most of this new literature is in preliminary working paper form, it will not take long before the contributions start to appear in refereed journals.

There is more than one way to incorporate financial frictions into a standard business cycle model of the New Keynesian variety. Borrowing and collateral constraints are two possibilities that have been used quite frequently. The financial accelerator mechanism of BGG provides yet another approach to modelling financial frictions in a model of business cycle fluctuations. BGG develop a dynamic general equilibrium model that is intended to help clarify the role of credit market frictions in business fluctuations, in both qualitative and quantitative terms. The financial accelerator in their framework derives from endogenous developments in credit markets that work to amplify and propagate shocks to the macroeconomy. More specifically, the key mechanism involves the link between the external finance premium (difference between cost of funds raised externally and the opportunity cost of the firm's internal funds) and the net worth of potential borrowers (defined as borrowers' liquid assets plus collateral value of illiquid assets less outstanding obligations).³ On the other hand, to endogenously motivate the existence of an external finance premium, BGG postulate a simple agency problem that introduces a conflict of interest between a borrower and his respective lenders. The financial contract is then designed to minimize the expected agency costs.

Although the financial accelerator mechanism introduced by BGG is

³ See BGG (1999), p. 1345.

theoretically simple and very interesting, including in particular a linear relationship between the demand for capital goods and entrepreneurial net worth that facilitates aggregation, much empirical work is needed to establish and quantify the strength of this mechanism. In particular, as the procyclicality of entrepreneurial net worth, and hence countercyclicality, of the external finance premium lies at the core of the mechanism amplifying the effects of business cycle shocks, hard evidence is needed to establish the importance of this core to business cycle fluctuations and to quantify its strength. In her forthcoming paper *Financial market disturbances as sources of business cycle fluctuations in Finland* Hanna Freystätter presents an analysis with the aim of providing empirical evidence of the strength of the financial accelerator mechanism and the role of financial market shocks for business cycle fluctuations in the small open economy of Finland. The latter extension is highly relevant, since, as she also notes, the 2007–2008 financial crises has also shown the need for new sources of shocks stemming from the financial market itself and for assessing both the qualitative and quantitative importance of financial market disturbances in understanding macroeconomic dynamics.

To address the issue in her research agenda, Freystätter constructs a New Keynesian DSGE model that incorporates the financial accelerator mechanism of BGG as well as a rich set of stochastic shocks hitting the economy. Two of the most interesting shocks are domestic credit market shocks reflecting exogenous sources of entrepreneurial wealth destruction and exogenous shocks to finance premiums that capture exogenous changes in domestic financial intermediation. Here Freystätter follows Gilchrist, Ortiz and Zakrajsek (2009)⁴ and calls this latter shock a credit supply shock. The model is then subjected to the data

⁴ See S. Gilchrist – A. Ortiz – E. Zakrajsek (2009), *Credit Risk and the Macroeconomy: Evidence from an Estimated DSGE Model*, wp <http://people.bu.edu/aortizb/research.htm>.

(quarterly over the period 1995–2008) and estimated using Bayesian Maximum Likelihood methods. As she notes, from the point of view of investigating the potential role of financial markets for aggregate fluctuations, the estimation period is particularly interesting and relevant. Around the turn of the century, the Finnish economy, along with many others, experienced a stock market boom, and the estimation period also covers the start of the financial market turmoil in 2007. Furthermore, her analysis takes into account an important feature of the small open economy of Finland: as part of the euro area, the Finnish economy cannot rely on the two important channels that help a standard small open economy to adjust to economic shocks, namely the nominal exchange rate and the policy rate set independently by the central bank.

In contrast to much of the existing literature, Freystätter studies a small open economy where shocks originating in international markets play an important role. By extending existing model, she is able to evaluate, via her estimation and simulation exercise, the relative importance of domestic and international shocks to the aggregate fluctuations of the domestic economy. According to her results, domestic financial market shocks emerge as key drivers of recent business cycle fluctuations in Finland, even after allowing for several sources of domestic and international shocks. Freystätter also notes that the results are obtained without using any financial market data in the estimation, in contrast to Gilchrist, Ortiz and Zakrajsek (2009), who construct and use a highly sophisticated measure of credit spread in their model estimation. This makes it possible for Freystätter to assess the performance of the model by investigating the match between the relevant part of the model outcome and financial market data. One further important aspect of her exercise is the exclusion of investment-technology-specific shocks from the analysis. That this is

important is revealed in the empirical DSGE literature, which has often argued that investment-specific shocks are among the most important driving forces of economic fluctuations. However, as argued in the background literature,⁵ investment-technology-specific shocks can actually hide unmodelled frictions in the capital accumulation process.

The evidence presented by Freystätter suggests that there is an operative financial accelerator mechanism in Finland. The estimate of the parameter governing the strength of the financial accelerator mechanism is of the right sign and close to values obtained in the relevant international reference literature using estimated DSGE models to study the quantitative significance of the financial accelerator for the aggregate economy. Hence, she concludes that the financial accelerator mechanism acts as an amplifying mechanism for many disturbances hitting the Finnish economy. Furthermore, according to her main results, disturbances stemming from the financial market itself contributed significantly to the cyclical fluctuations of the Finnish economy between 1995 and 2008. On the basis of her results, Freystätter is able to argue that domestic financial market shocks impinging upon the creation of entrepreneurial wealth and the demand for capital are key drivers behind aggregate investment dynamics in Finland. These shocks consequently explain particular business cycle episodes in Finland, such as the boom and bust of the stock market late 1990s and early 2000s, the subsequent early millennium slowdown and, more recently, the sudden reversal of investment activities in 2008 due to the global financial crises.

Freystätter's analysis is most welcome and is precisely of the kind that we need currently. It is quantitative business cycle analysis that takes credit market imperfections seriously and incorporates credit frictions in a quantitative DSGE framework. Moreover, it

⁵ See eg Justiniano, Primiceri and Tambalotti (2008), *Investment shocks and business cycles*. Federal Reserve Bank of New York, Staff report no. 322.

includes important financial market shocks that have intuitive and plausible interpretations. The most recent crisis presents a golden opportunity with interesting challenges and huge returns for mainstream models of aggregate fluctuations to extend the existing models of business cycle fluctuations to incorporate a genuine role for financial frictions. The profession should seize this opportunity. Freystätter's work and other similar research projects at the Bank of Finland show that the Bank is shifting its research focus accordingly. Significant challenges and difficult problems lie ahead, but additional research effort will be highly rewarding.

Jouko Vilmunen

Dynamic stochastic general equilibrium model for China

The Bank of Finland's Institute for Economics in Transition (BOFIT) is currently developing a dynamic stochastic general equilibrium (DSGE) model for the Chinese economy. The purpose of the project is to create a model capable of replicating certain stylized facts of the Chinese economy. Such a model can be useful in evaluating issues of policy relevance and for deepening our general understanding of China's economy and its dynamics.

The model under construction is close to the closed economy model formulated by Jordi Galí (2008, Chapter 3). The model is of the New-Keynesian variety, with three types of agents: households, firms and a policymaker. Each agent maximizes its utility (for firms, profits), subject to an intertemporal budget constraint. As in other similar models, all markets must clear, and equilibrium is reached after shocks to monetary policy and technology. Nominal rigidities stem from staggered price setting of firms, in line with the now-conventional Calvo-pricing (Calvo, 1983). The goods market is characterized by

monopolistic competition, with each firm setting prices in accord with its objective function. The labour market is fully competitive, however, which is easily justifiable, especially in the export-oriented Chinese industrial sector. The equations characterizing equilibrium are a New-Keynesian Phillips Curve, a dynamic IS curve, and a monetary policy reaction function.

The monetary policy reaction function for China differs from the widely-used Taylor rule for advanced economies, in which nominal interest rates are the central bank's policy instrument. In the Chinese model, the central bank uses base money as its instrument, and it supplies base money as a function of the output and inflation gaps. The difference in the rule specification versus advanced economies stems from China's institutions: interest rates have not historically played a major role in its monetary transmission mechanism.

China's level of development entails several challenges for modelling. Data problems set limits to the choice of parameters used to calibrate the model. It is partly the choice of these parameters that makes the model China-specific. The chosen parameters impact the economy's responses to various shocks. On the other hand, the ongoing structural change in the Chinese economy may prevent the economy from reaching an equilibrium in the way described by the DSGE model.

References

- Calvo, G., 1983. Staggered Prices in a Utility Maximizing Framework. *Journal of Monetary Economics* 12(3), 383–398.
- Galí, J., 2008. *Monetary policy, inflation, and the business cycle*. Princeton: Princeton University Press.

Aaron Mehrotra

Events

The 6th annual DYNARE Conference will be held in Helsinki on June 3–4, 2010. The conference is organised by the Bank of Finland together with DSGE-net and the Dynare project at the CEPREMAP. The DYNARE conference will feature the work of the leading scholars in dynamic macroeconomic modelling and provide an excellent opportunity to present your own research results. The plenary speakers will be Fabio Canova (Pompeu Fabra University) and Tom Sargent (New York University). Deadline for submissions is February 15, 2010.

Seminars

Bank of Finland Research Seminars

Friday, 5 Feb 2010, 13.30–15.00.

Rauhankatu 19, Auditorium. Prof. Jaume Ventura. Universitat Pompeu Fabra
Theoretical Notes on Bubbles and the Current Crisis.

Thursday, 4 Mar 2010, 13.30–15.00.

Ph.D. Student Qinwei Wang. University of Cambridge, Heterogeneous Expectations, Learning and Monetary Policy Rules in a Two-Country Model.

Thursday, 8 Apr 2010, 13.30–15.00.

Ph.D. Samuel Reynard, Swiss National Bank
Modelling Monetary Policy.

Please register in advance via Marjut Salovuori at seminars@bof.fi. For further information visit the seminar site at <http://www.bof.fi/en/tutkimus/konferenssit/tutkimusseminaarit/>.

BOFIT seminars

Tuesday, 3 Feb 2009. 10.30.

Linlin Niu. Wang Yanan Institute for Studies in Economics and BOFIT. An Affine Term Structure Model with Auxiliary Stochastic Volatility-Covolatility for banking services: What determines the fees?

Tuesday, 18 Feb 2010, 14.00.

Tania De Renzis. Rensselaer Polytechnic Institute and BOFIT. Performance Pricing

Provisions in Bank Loans in Transition Economies.

For further information please visit the seminar site http://www.bof.fi/bofit_en/tutkimus/seminaarit/tiistai. Please register in advance via Liisa Mannila (firstname.lastname@bof.fi, + 358 10 8312268).

Recent Bank of Finland research publications

Bank of Finland Discussion Papers

Hanna Freystätter: Financial market disturbances as sources of business cycle fluctuations in Finland, BOF DP 5/2010.

Sungho Choi – Bill B Francis – Iftekhar Hasan: Cross-border bank M&As and risk: evidence from the bond market, BOF DP 4/2010.

Iftekhar Hasan – Heiko Schmiedel – Liang Song: Return from retail banking and payments, BOF DP 3/2010.

Iftekhar Hasan – Heiko Schmiedel – Liang Song: Growth strategies and value creation: what works best for stock exchanges? BOF DP 2/2010.

Timo Korkeamäki – Elina Rainio – Tuomas Takalo: Law and stock markets: evidence from an emerging market, BOF DP 1/2010.

Annalisa Castelli – Gerald P Dwyer – Iftekhar Hasan: Bank relationships and firms' financial performance: the Italian experience, BOF DP 36/2009.

Yuliya Demyanyk – Iftekhar Hasan: Financial crises and bank failures: a review of prediction methods, BOF DP 35/2009.

Leonardo Becchetti – Andrea Carpentieri – Iftekhar Hasan: The determinants of option-adjusted delta credit spreads: a comparative analysis of the United States, the United Kingdom and the euro area, BOF DP 34/2009.

Patrick M Crowley – Tony Schildt: An analysis of the embedded frequency content of macroeconomic indicators and their counterparts using the Hilbert-Huang transform, BOF DP 33/2009.

Patrick M Crowley: How do you make a time series sing like a choir? Using the Hilbert-Huang transform to extract embedded frequencies from economic or financial time series, BOF DP 32/2009.

Martin T Bohl – David G Mayes – Pierre L Siklos: The quality of monetary policy and inflation performance: globalization and its aftermath, BOF DP 31/2009.

Efrem Castelnuovo – Paolo Surico: Monetary policy, inflation expectations and the price puzzle, BOF DP 30/2009.

Jukka Vauhkonen: Bank safety under Basel II capital requirements, BOF DP 29/2009.

Juha Tervala: Export pricing and the cross-country correlation of stock prices, BOF DP 28/2009.

BOFIT Discussion Papers

Andrei Vernikov: Russian banking: The state makes a comeback?, BOFIT DP 24/2009.

Aaron Mehrotra – José R. Sánchez-Fung: Assessing McCallum and Taylor rules in a cross-section of emerging market economies, BOFIT DP 23/2009.

Zuzana Fungáčová – Tigran Poghosyan: Determinants of bank interest margins in Russia: Does bank ownership matter? BOFIT DP 22/2009.

Yu-Fu Chen – Michael Funke – Nicole Glanemann: A soft edge target zone model: Theory and application to Hong Kong, BOFIT DP 21/2009.

Martin T. Bohl – Michael Schuppli – Pierre L. Siklos : Stock return seasonalities and investor structure: Evidence from China's B-share markets, BOFIT DP 20/2009.

Forthcoming publications

Bank of Finland Discussion Papers

Patrick M Crowley: Long cycles in growth: explorations with new frequency domain techniques using US data.

Juha-Pekka Niinimäki: Moral hazard in the credit market when the collateral value is stochastic.

BOFIT Discussion Papers

A. Peresetsky: Bank cost efficiency in Kazakhstan and Russia.

Laurent Weill: Do Islamic Banks Have Greater Market Power?

Zuzana Fungáčová – Laura Solanko – Laurent Weill: Market Power in the Russian Banking Industry.

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RePec (Research Papers in Economics; NEP, new economics papers on central banking)

<http://lists.repec.org/mailman/listinfo/nep-cba>

