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## EDITORIAL

### Bank capital and business cycle fluctuations

It is now fairly obvious that the most recent financial crisis poses major challenges to business cycle modeling, particularly to the tradition that uses dynamic stochastic general equilibrium (DSGE) models for quantitative business cycle analysis. These DSGE models have done quite well in accounting for the dynamics of the main macroeconomic variables at 'normal' business cycle frequencies. Naturally, the meaning of normal business cycle fluctuations is open to debate, but one particular feature seems to be shared by all such fluctuations: fairly regular ups and downs in the growth rate of activity (GDP) as long as there are no major adverse or disruptive effects to or from the financial sector of the economy. 'Money' seems to stay in the background, tracking growth paths that we tend to see as representing normal business cycle fluctuations.

Many, if not most, mainstream dynamic models for business cycle fluctuations build on the strong assumptions of well functioning financial markets, rational expectations and a representative agent maximizing her lifetime welfare subject to an inter-temporal budget constraint. Recent extensions introduce to the basic setup different types of financial frictions - eg liquidity or borrowing constraints, collateral constraints or credit spreads - with the aim of gaining a deeper understanding of the effects of such frictions on business cycle dynamics. On the quantitative side, these extensions have strengthened the hopes and desires of quantitative business cycle economists to better account for the effects of large shocks, particularly financial shocks, on business cycle fluctuations.

Important as these extensions are, most of them still do not effectively allow for banks' balance sheets to affect business cycle fluctuations. Hence, these models imply that bank lending is unaffected by banks' capital position. Some very recent contributions argue that abstracting from the effects of bank capital on banks' lending capacity is a limitation of the current quantitative models of financial frictions and in fact contradicts an important part of the evidence of bank-capital effects on bank lending and economic activity.

How should one go about incorporating a role for bank capital in a

DSGE model? One alternative is to first think of bank capital as emerging endogenously as a solution to an asymmetric information problem between bankers and their creditors. This implies that a bank's capital position affects its ability to attract funds from investors for the purpose of loan origination. Consequently, bank capital influences business cycle fluctuations through what the literature has come to call a bank capital channel of transmission<sup>1</sup>. Once this mechanism is incorporated into a widely used New Keynesian model for monetary policy analysis, one can provide a quantitative basis for the evaluation of the role of bank capital in the propagation of shocks in the economy. Dynamic simulations using these types of models suggest that an effective bank capital channel indeed amplifies and propagates the effects of shocks on output, investment and inflation, and that the strength of this effect depends on the nature of the shock.

These results - from some very recent literature - though still in the nature of a first pass, are very interesting and promising. Further research along these lines is clearly needed and should be encouraged, so that we can learn which modeling features are most fundamental and robust and hence worth testing, in the search for a better basis for monetary policy analysis.

*Jouko Vilmunen*

## Great depressions: How important are financial frictions?

The wave of financial globalization that commenced in earnest in the mid-1980s was spurred by liberalization of capital controls in many developed and developing countries. Underlying the measures to deregulate international capital flows was the generally shared anticipation of possibly large benefits that could ensue from cross-border financial flows, benefits in the form of more efficient global allocation of capital and improved risk sharing possibilities.

The process of deregulation generated a surge of cross-border financial flows among most of these countries, but was unfortunately accompanied by a series of currency and financial crises in the 1980s and 1990s. While many share the perception that those developing countries that opened their capital accounts were more vulnerable to such crises than developed economies, the experience of the Nordic countries, particularly Finland, in the late 1980s and early 1990s, as well as the more widely shared experience of the most recent financial crisis and global recession clearly indicate that the large adverse effects of these crises need not be confined to developing countries.

## Financial globalization and growth: puzzling observations

The standard neoclassical framework sees the key benefit of financial globalization as deriving from long-term net flows from capital-rich to capital-poor countries and thus benefiting both groups of countries in

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<sup>1</sup> See eg C. Meh and K. Moran (2010), 'The role of bank capital in the propagation of shocks', *Journal of Economic Dynamics and Control* 34, 555-576.

terms of better growth performance. Eichengreen (2001), however, finds that the empirical evidence for the conventional theoretical tenet on the growth-benefits of capital account liberalization is very weak.<sup>2</sup> This is somewhat puzzling, and recent literature on the broader dimensions of financial globalization has only added to the mystery. The vast empirical literature not only seems to provide little robust evidence of a causal relationship between financial integration and growth, but also suggests that among developing countries the volatility of consumption growth relative to income growth is positively correlated with financial integration.<sup>3</sup> This finding is the direct reverse of what canonical theoretical models would predict, ie that access to international financial markets should enable countries to smooth out consumption by insuring against country-specific income risk.

Some of the existing literature provides interesting explanations for the discrepancy between the diverse benefits of financial globalization and the mixed empirical evidence.<sup>4</sup> More specifically, instead of direct growth effects from access to improved financing possibilities, financial integration generates, via capital flows, potential collateral effects. A growing literature argues that financial openness often promotes development of the domestic financial sector, imposes discipline on macroeconomic policies, generates efficiency gains among domestic firms by exposing them to competition from foreign entrants, and unleashes forces that result in better government and corporate governance.<sup>5</sup>

The above explanations suggest that global financial integration affects economic growth in indirect ways, which is of great importance, especially for empirically estimating the benefits of financial globalization. Not only does the building of institutions, enhancing of market discipline, and deepening of the financial sector take time, but so too do the derived benefits. On the other hand, it may be particularly difficult to identify a causal role for financial market integration in a typical empirical model that includes structural, institutional and macroeconomic policy variables as explanatory variables and is used in cross country regressions to explain GDP growth. Given the indirect channels of influence alluded to above, measures of financial market openness may add very little explanatory power to these regressions.

There seems to be a connection between potential collateral effects and the well known macroeconomic trilemma faced by policy-makers in open economies.<sup>6</sup> These policy-makers are often confronted with three typically desirable but contradictory objectives: stabilizing the exchange rate, enjoying free international capital mobility, and engaging in a domestically oriented monetary policy. As it takes time for the potential collateral effects from financial globalization to be

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<sup>2</sup> Eichengreen B (2001), "Capital Account Liberalization: What Do Cross-Country Studies Tell Us?" *World Bank Economic Review*, Vol. 15 (October), 341-65.

<sup>3</sup> Prasad E, Rogoff K, Wei S-J and Kose A (2003), "Effects of Financial Globalization on Developing Countries: Some New Evidence", *IMF Policy Discussion Paper* No. 220.

<sup>4</sup> See eg Kose A, Prasad E, Rogoff K and Wei S-J (2006), "Financial Globalization: A Reappraisal", *NBER WP* No. 12484 (August).

<sup>5</sup> Kose A *et al* (2006) p. 3.

<sup>6</sup> On the trilemma, see eg Obstfeld M, Shambaugh J and Taylor M (2004), "The Trilemma in History: Tradeoffs among Exchange Rates, Monetary Policies, and Capital Mobility", working paper <http://elsa.berkeley.edu/~obstfeld/>.

realized, considerable stress is imposed on an open economy, especially on its policy-making for the short run, once capital flows are liberalized. Since policy-makers often insist that monetary policy under fixed exchange rates and free capital mobility should be oriented also toward domestic goals, stability of the exchange rate must be sacrificed, typically by switching from fixed to flexible exchange rate regime or via a sizeable currency devaluation. In its most extreme form, such a switch will generally take place only after a speculative attack on the fixed exchange rate regime, often (but not always) accompanied by a banking crisis. The Finnish experience of the early 1990s is almost a perfect example of the dual crisis.

### Financial factors and boom-bust cycles: Finland in the late 1980s and early 1990s

Under the then-prevailing fixed exchange rate (more accurately, a narrow exchange rate target zone), Finland experienced a boom-bust cycle in the latter half of the 1980s and early 1990s. The deep recession that followed the boom of the late 1980s resulted in a large and protracted decline in aggregate output and investment. Real GDP growth peaked at six percentage points above trend at the turn of the decade, and then dove to five percentage points below trend in the three-year period ending in 1993. The corresponding figures for aggregate private investment growth paint an even more dramatic picture of the decline in aggregate activity: a boom of 20 percentage points above trend in 1989 was followed by a bust of 15 percentage points below trend in the four years ending in 1993 and resulted in an overall contraction of investment activity in Finland of 35 percent in four years. These figures place Finland among the "Big Five" postwar large scale financial crises in rich countries identified by Reinhart and Rogoff (2008).<sup>7</sup>

Such boom-bust cycles present huge challenges to quantitative business cycle modelling. So what are the available options, if we want to quantitatively account for such large movements in observed aggregate activity in Finland? Perhaps more importantly, what role should we assign to financial factors in explaining the behaviour of the macroeconomy during the boom-bust period in Finland? One interesting alternative is provided by Gorodnichenko *et al* (2010),<sup>8</sup> who construct a dynamic general equilibrium model with labour frictions and argue that the reason for the deep recession in Finland in 1991-93 was the costly restructuring of the manufacturing sector and sharp increase in energy costs caused by the collapse of trade with the USSR. They further argue that two shocks - the surge in energy prices and the sudden redundancy of the Soviet-oriented manufacturing industry - successfully explain most of the observed decline in aggregate output. Downward rigidity of real wages and the collapse of demand for nontraded goods amplified the initial shocks into a depression. Hence,

<sup>7</sup> Reinhart C. and Rogoff K (2008), "Is the US sub-prime financial crises so different? An international historical comparison", *American Economic Review: Papers & Proceedings*, Vol. 98, No. 2, 339-344.

<sup>8</sup> Gorodnichenko Y, Mendoza E and Tesar L (2010), "The Finnish Great Depression: From Russia with Love", working paper <http://www.econ.berkeley.edu/~ygorodni/index.htm>.

the authors assign no role to financial factors in accounting for the observed decline in aggregate activity.

A second alternative borrows from Kehoe and Ruhl (2007),<sup>9</sup> who use growth accounting and a simple dynamic general equilibrium model - a two sector neoclassical growth model with distortionary taxes and government consumption, as well as investment-specific technological change - to study the depression in Finland. The authors find that the sharp decrease in real GDP over the period 1990-93 was driven by a combination of a drop in total factor productivity in 1990-92 and increases in taxes on labour and consumption, as well as increases in government consumption in 1989-94, which had the effect of reducing hours worked in Finland. Kehoe and Ruhl also try to endogenize the drop in total factor productivity in variants of the model with an investment sector and a terms-of-trade shock. But these extensions fail to provide a quantitative account of the drop. Kehoe and Ruhl go on to abstract from financial market factors in constructing their model for quantitatively analysing the Great Depression in Finland.



Hanna Freystätter

In her forthcoming Bank of Finland discussion paper, Hanna Freystätter takes a different approach to the quantitative analysis of the Finnish boom-bust cycle in the late 1980s and early 1990s in that she explicitly incorporates financial markets shocks and a financial accelerator mechanism in her dynamic stochastic general equilibrium model of the Finnish economy. She motivates her modelling choices by citing three factors that were key to the Finnish boom-bust episode: financial market deregulation in 1980s, collapse of the Soviet trade in 1991, and the collapse of the fixed exchange rate regime in 1992. One of the contributions of her work is in formalizing and calibrating these three events as shocks in her model, in order to assess their role in generating a boom-bust cycle that matches both qualitatively and quantitatively the one observed in Finland.

As she notes, the greater part the financial deregulation in Finland took place in the latter half of the 1980s. Deregulation was followed by unexceptionally rapid growth of bank lending. Freystätter introduces domestic financial market shocks in the form of a credit supply shock and a financial wealth shock, to capture the deregulation of financial markets in Finland. On the other hand, she incorporates a capital obsolescence shock as the model counterpart of the collapse of the Soviet trade. The more conventional route would have been to model the trade collapse as a terms-of-trade shock. The underlying reason for her choice draws on Gertler and Karadi (2009),<sup>10</sup> who introduce a capital obsolescence shock in their model, to capture the subprime crisis that partly wiped out the value of intermediaries' balance sheets in the US in the aftermath of the collapse of subprime-related asset values. Finally, Freystätter chooses a shock from the international financial markets - a shock to Finland's interest rate premium on its borrowing from international markets - to represent the collapse of the fixed exchange rate regime in 1992. Here the argument is that

<sup>9</sup> Kehoe T and Ruhl K (2007), "Modeling Great Depressions: The Depression in Finland in 1990s", in *Great Depressions of the Twentieth Century*, Kehoe J and Prescott E (eds) Federal Reserve Bank of Minneapolis, 2007, 427–75.

<sup>10</sup> Gertler M and Karadi P (2009), "A Model of Unconventional Monetary Policy", working paper <http://www.econ.nyu.edu/user/gertlerm/papers.html>.

indebtedness of the entrepreneurial sector, in conjunction with that fact that some of the entrepreneurial loans were denominated in foreign currency, resulted in a persistent decline in investment and a slow recovery of the economy despite increases in net exports due to improved international price competitiveness.

Freystätter conducts simulations that show that the financial accelerator mechanism is critical for the amplification of initial shocks and for the model to generate a boom-bust cycle. As is well known, firms' balance sheet condition is related to real activity through the financial accelerator mechanism. A firm pays a premium on its loans, the size of which depends inversely on its net worth, ie on the strength of its balance sheet. Freystätter argues that initially the credit-supply and financial-wealth shocks generated a boom in which the real-economy effects were amplified by the financial accelerator mechanism, as entrepreneurial net wealth increased because of the positive effects of these shocks. Later entrepreneurial net worth was hit hard by the collapse of the Soviet trade, which rendered most of the capital stock serving that trade obsolete and useless for exports to western markets. As a consequence, the firms' balance sheets weakened and the premium on entrepreneurial loans increased considerably. The implied increase in firms' financing costs forced them to curtail their investment activity, which adversely affected aggregate economic activity. Finally, in the model, Finland's borrowing premium increased sharply as the exchange rate regime collapsed in 1992, with the financial accelerator once again amplifying the real effects of the initial shock.

Freystätter forcefully argues that the key to understanding the boom-bust episode in Finland is the financial accelerator or the behaviour of entrepreneurs' balance sheets. She rightly notes that the procyclical variation in firms' balance sheets constitutes a potential amplification mechanism in all three of the events alluded to above and that, in addition to the amplification mechanism, initial shocks are needed that directly impact entrepreneurs' balance sheets and cost of external finance. Based on a model exercise that she performs, it appears that both financial shocks and financial amplification are needed. This is because, absent a link between entrepreneurial net worth and premia on firms' loans, shocks to firms' balance sheets or to the cost of external capital would only have a limited effect on real activity. Furthermore, Freystätter shows via simulations that, interestingly, the financial accelerator mechanism generates a decline in investment activity after a shock to the quality of capital, ie after a capital-obsolescence shock, in contrast to the case without the financial accelerator, where investment activity increases immediately after a small initial decline.

The quantitative exercise Freystätter performs, as well as the interpretation she offers for the Finnish boom-bust cycle in the late 1980s and early 1990s, are clearly interesting and solidly substantiated. The fact that she finds such large roles for financial shocks and for the financial accelerator mechanism increases the plausibility of her findings, particularly compared to the analyses mentioned above, which rely totally on real shocks. Her analysis also demonstrates how dynamic stochastic general equilibrium models with sticky prices and financial imperfections can usefully complement existing great depression methodologies in explaining large and persistent movements in aggregate activity and in allotting a large (possibly leading) role to financial variables in accounting for these

movements in quantitative terms. More research along these lines remains to be done, particularly in specifying and interpreting the shocks, and also in clarifying the role of banks' capital structure and leverage, before we can obtain a balanced view of the importance of financial factors for large business-cycle fluctuations. This analysis by Freystätter will be highly useful in this undertaking.

*Jouko Vilmunen*

## Economic crisis and exchange rate fluctuations



Ilkka Korhonen

The economic crisis has had an impact on the exchange rates of many of the developing countries. For example, many of the raw materials-producing countries saw their currencies weaken substantially around the start of 2009, as commodity prices declined. But in the second half of the year, the same currencies appreciated. China's currency, on the other hand, has been subjected to substantial upward pressure because China – as the only truly significant emerging economy – has continued to grow during the crisis. BOFIT researchers are currently pursuing a number of studies on exchange rates and related policies in the developing economies.

The Russian rouble weakened by about 30% during in latter part of 2008 and early part of 2009. The depreciation was however kept under control by the Russian central bank, which was a notable challenge for monetary policy. BOFIT Discussion Paper 7/2010 (Vladimir Sokolov: Bi-currency versus single-currency targeting: Lessons from the Russian experience) examines the interactions between Russia's monetary and exchange rate policies. In 2005 Russia switched the focus of its exchange rate policy from individual rates to a two-currency index. The change led to an untying of domestic interest rates from the US dollar, and domestic rates began to track more closely a synthetic interest rate comprised of the Libors of the basket currencies (dollar and euro). The paper also looks at how Russia's index-based exchange rate policy helped protect its economy during the recent worldwide liquidity crisis. It was found that the Russian mosibor rate was negatively related to the US dollar Libor and positively related to the synthetic dollar-euro rate at the time when the two economies seemed to be moving in different directions. Although US monetary policy was then marked by a sizable quantitative easing, Russia's financial markets were more closely attuned to euro area monetary policy. A key finding of this paper is that, in an environment of managed-float exchange-rate regime and free movement of capital, the relationship between domestic and foreign interest rates depends on the true operating target of the domestic central bank, whether that is a single exchange rate or an index of exchange rates.

The connection between exchange rate and monetary policies in the Chinese context has also been the subject of extensive study in recent times. While it is true that China continues to restrict capital flows to a relatively large extent, its exchange rate could have some impact on its monetary policy settings. BOFIT Discussion Paper 10/2010 (Aaron Mehrotra and José R. Sánchez-Fung: China's

monetary policy and the exchange rate) models Chinese monetary policy using an empirical hybrid McCallum-Taylor reaction function. According to the resulting rule, monetary policy reacts to inflation and the output gap as well as to movements in the trade-weighted exchange rate index. The paper finds that China's monetary policy has on average been adjusted for changes in the inflation rate. In contrast, exchange rate shocks have not greatly influenced monetary policy, nor was there a structural change in the estimated reaction function when the tight link to the dollar was terminated in July 2005. The absence of a tight link between the trade-weighted exchange rate index and domestic monetary policy may have played a role in protecting the Chinese economy in the last few years from the effects of the worldwide economic crisis.

***Ilkka Korhonen***



### Conferences and seminars

In October, the Bank of Finland (Research Unit and BOFIT) and the CEPR ([Centre for Economic Policy Research](#), London) jointly hosted a scientific conference, 'Banking in emerging economies', co-organized by Rensselaer Polytechnic Institute, [Lally School of Management & Technology](#) (New York). The papers and presentations given at the conference are now available at the [conference site](#).



#### Bank of Finland Research Seminars

Thu 4 Nov 2010

Prof. [Markku Kaustia](#)

Aalto University School of Economics

What drives the heterogeneity in portfolio choice? The role of traditional, institutional, and behavioral factors.

Thu 2 Dec 2010

Dr. Tianxi Wang

University of Essex

[Risk Sharing, \(Over\) Leverage, and Regulation](#)

Research seminars organized by the Bank of Finland's research unit are held on the first Thursday of the month at 13.30–15 in Rauhankatu 19, 3<sup>rd</sup> floor big meeting room (unless indicated otherwise). Research seminars are open to all interested parties. Please register in advance at [seminars@bof.fi](mailto:seminars@bof.fi) by noon of the preceding day. For further information please visit the [seminar site](#).

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### BOFIT Discussion Papers

16/10

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