Estimating the determinants of capital flows to emerging market economies: a maximum likelihood disequilibrium approach

Summary of Working Paper no. 354 Guillermo Felices and Bjorn-Erik Orskaug

This paper studies the determinants of capital flows (defined as gross external bond and syndicated loan issuance) to a group of emerging market economies (EMEs) since 1992. Capital flows to EMEs are of particular interest, because their rapid reversals have been responsible for various financial crises in large economies such as Brazil, Russia, Mexico and several East Asian countries in the past few decades. Understanding the determinants of capital flows is therefore important in order to avoid future financial crises and their potential spillover effects on other financial markets, including developed ones.

For emerging market economies, the cost of financing debt via international markets has traditionally been higher than for developed ones, as investors attach risks to their ability to repay their debt, either in the form of bonds or bank loans. As a result, investors require interest rates that incorporate a premium over 'safe' interest rates in order to compensate them for taking such risk. The combined observation of capital flows and the associated interest rates reflects the interaction of the supply of capital from the rest of the world to EMEs and the demand for capital from EMEs. But this interaction might not reflect an efficient competitive equilibrium resulting from conventional supply and demand analysis. The supply of flows could, for instance, be rationed if creditors are unwilling to lend to a country at a cost of capital that is acceptable for the borrower. This could occur, for example, if creditors have imperfect information about the borrowers' ability or willingness to repay their obligations. Similarly, at times and at a given cost of capital, the demand for flows by debtor countries could be dwarfed by excess supply from the rest of the world. This could occur, for example, if the supply of capital by international investors - perhaps driven by their

search for higher returns — outpaces the capital that EMEs require to cover their financing needs.

In order to account for the possibility of disequilibrium in capital flows to EMEs we follow earlier work by Ashoka Mody and Mark Taylor by estimating an explicit disequilibrium demand and supply model of capital flows, where the quantity transacted is the minimum of either demand or supply. We use the estimated supply and demand determinants to calculate time-varying probabilities of international supply-side rationing. Unlike Mody and Taylor's paper, which estimates the model on four countries individually, we estimate it for the asset class as a whole over the period 1994 to 2004. We then explore applications of the model to a few individual EMEs including Brazil, Chile, China, Colombia, Korea, Mexico, Poland and Thailand using a longer time period than Mody and Taylor (1992 to 2004 instead of 1990 to mid-2000).

For our selection of EMEs taken together, our results suggest that the supply of flows to EMEs is positively related to EME spreads (the difference between borrowing and lending rates — a measure of expected returns), sovereign credit ratings, and estimates of world GDP growth; and negatively related with US high-yield spreads. This is in line with what theory suggests. On the demand side, domestic equity indices have a positive effect on capital flows, while the ratio of reserves over imports and EME spreads (a measure of the cost of capital to borrowers) have a negative one. Again, this is in line with theoretical priors. We find similar results for most countries when using individual country data. Finally, we present the probability of a 'capital crunch' (when the supply of capital is less than demand) for EMEs taken as a whole, and for a specific application to Brazil.

The network topology of CHAPS Sterling

Summary of Working Paper no. 355 Christopher Becher, Stephen Millard and Kimmo Soramäki

One of the core purposes of modern central banks is to contribute to financial stability. This entails assessing risks across the financial system as a whole — systemic risk — that would otherwise undermine the system in general, and seeking to make the system stronger by reducing such risks. Payment systems, which facilitate transactions between individuals, businesses and financial institutions, form a crucial part of the financial system and play a vital role in ensuring the smooth implementation of monetary policy. So, it is important for central banks to understand how shocks in one institution can be propagated across payment systems if they are to seek to reduce the systemic risk in such systems.

One way of trying to do this is to characterise the structure of a payment system — its 'network topology' — using tools recently developed by physicists. Once we understand the structure of the network of banks and the payments they make to/receive from each other, we can assess the stability of this network to particular shocks. In this paper, we seek to understand the network topology of large-value interbank payment flows in the United Kingdom so as to understand better the risks associated with the system.

The UK large-value payment system — the Clearing House Automated Payment System (CHAPS) — consists of only fifteen banks. Banks that are not direct members of the system (so-called 'second-tier' banks) have to make their payments via a correspondent bank that is a member of the system. We first examine the ramifications of this tiered structure, and illustrate the broad network topology of interbank payments in the United Kingdom, using data from the 2003 CHAPS Traffic Survey. We find that, despite the fact that there are far fewer banks in the United Kingdom than in the United States, the structure of UK interbank payments is similar in certain respects to that of Fedwire (the US large-value payment system). But while the two networks are in some respects similar, the tiered structure of the UK system implies rather different risk characteristics.

We then look at the CHAPS system as a network containing only the settlement banks. We find that payment flows in CHAPS form a well-connected network — every bank is connected to every other bank by some set of payment flows - and that its properties change little day to day. A consequence of this network structure is that liquidity is able to flow efficiently around the network. We also find that the network develops only gradually in the early hours of opening. The explanation for this pattern lies in the purposes of payments being made at this time, and in particular the tendency to withhold payments until time-critical payments have been settled. We also saw slight peaks in the number of pairs of banks involved in payments before noon and late afternoon, indicating that the network is particularly busy at these times. This variation indicates that the impact of an operational disruption may vary according to the time of day at which it strikes.

Finally, we examine the effects of a particular incident where one of the banks was unable to make payments for a large proportion of the day — on the properties of the CHAPS network. The network appears to be highly resilient to this type of shock. In the particular instance of an operational outage examined here, the effective removal of a node for much of the day had little impact on the ability of other banks to make payments between one another. The fact that the network is 'well-connected' will have contributed to this resilience. However, we cannot discount the possibility that operational disruptions at one or more large banks, especially if they are net suppliers of liquidity to the system, would have a more severe impact on the payment network than was evident from this case study.

Measuring monetary policy expectations from financial market instruments

Summary of Working Paper no. 356 Michael Joyce, Jonathan Relleen and Steffen Sorensen

The Bank of England's Monetary Policy Committee (MPC) is interested in financial market participants' expectations of future monetary policy rates for a variety of reasons. Most obviously, the market's interest rate expectations affect the lending and borrowing rates facing firms and consumers and so play an important role in the transmission mechanism of monetary policy to the real economy. Monetary policy makers therefore want to know how their decisions and communications are affecting these expectations. In addition, these expectations may themselves contain useful information about the market's perceptions of current and future economic developments, which policymakers might also want to incorporate into their own view of the outlook.

There are a variety of possible financial market instruments that can be examined for the purpose of measuring the market's policy rate expectations. But none are self-evidently suited for the task, in that none are directly linked to the UK policy rate, Bank Rate. Moreover, different instruments vary in terms of their credit quality (default risk) and liquidity (the extent to which there is an active market for the particular instrument), which may be reflected in their associated interest rates, driving them away from genuine Bank Rate expectations. In addition, interest rates, particularly those relating to more distant future periods, may also reflect term premia (the compensation investors require for the risk of future interest rate changes), which will complicate their relationship with policy rate expectations.

Market expectations cannot, of course, be directly observed, making it difficult to assess which financial market instruments measure them best. In order to evaluate different financial market instruments, the paper makes the underlying assumption that more reliance should be placed on those instruments that have more accurately predicted Bank Rate in the past since, other things being equal, instruments that have predicted relatively well are less likely to have been affected by other factors.

The first part of the paper attempts to evaluate the interest rates derived from various financial instruments in terms of their ability to forecast UK policy rates over the period from October 1992 to March 2007. The sample therefore covers a period during which the United Kingdom followed an explicit inflation target, but excludes the period of turbulence in international money and credit markets that began in Summer 2007. The main finding is that interest rates derived from instruments or yield curves that are less likely to embody material credit or liquidity risk premia have done better in forecasting Bank Rate. But beyond this finding, it proves difficult to discriminate. This may not be that surprising if financial markets work efficiently, so that expectations are consistently reflected in different instruments. We do, however, find some evidence that is consistent with term premia being important at horizons of a year and beyond, which potentially obscures the information in market interest rates about future policy rate expectations.

The paper then examines several ways of estimating term premia, in order to calculate term premia-adjusted market interest rates. One method of doing this suggested by other work is to regress the difference between Bank Rate outturns and implied interest rates onto macroeconomic and financial information. Under certain conditions, the fitted values from these sorts of regression provide a measure of term premia. We construct such measures but in general find them to be sensitive to the precise specification, forward horizon and sample period being examined. We also compare these regression-based term premia estimates with other common ways of measuring term premia using survey expectations and interest rate models. Different approaches are sometimes found to provide quite different term premia estimates.

Finally, we examine how important it is to adjust for term premia in inferring interest rate expectations from market rates. When we compare various methods of forecasting Bank Rate out of sample (that is, using no information that would not have been available to forecasters in real time), we find no consistent pattern. Sometimes, using a regression-based method to adjust market rates for term premia produces Bank Rate forecasts inferior to those generated by unadjusted market interest rates, or by simply assuming that Bank Rate will remain constant.

The main message of this paper is that it does not seem prudent to rely on any one particular method for measuring monetary policy rate expectations from financial market instruments. The best approach seems to be to take an inclusive approach, using a variety of methods and information. This provides some support for the convention of conditioning the Bank of England *Inflation Report* forecast projections on a profile of market interest rates that has not been explicitly adjusted for term premia. But this remains an active area of research at the Bank and elsewhere and it is conceivable that further research may change this conclusion.