House prices, consumption, and monetary policy: a financial accelerator approach

Working Paper no. 169

Kosuke Aoki, James Proudman and Gertjan Vlieghe

The Bank has a long-standing interest in the role of house prices in the transmission mechanism of monetary policy. Do house prices merely reflect macroeconomic conditions, or are there important feedback effects from house prices to other economic variables? There have been structural changes in the retail financial markets in the United Kingdom since the late 1980s. Following deregulation in the mortgage market, it has become easier and cheaper for consumers to borrow against housing collateral to finance consumption. What implications do these structural changes have for monetary policy?

In this paper, we model households' consumption and housing decisions taking account of the possible importance of credit frictions. Our hypothesis is that house prices play a role because housing is used as collateral to reduce the agency costs associated with borrowing to finance housing investment and consumption. Our motivation is based on three observations for the United Kingdom: (i) house prices and housing investment are strongly cyclical, which leads to substantial variation in households' collateral position over the business cycle; (ii) the amount of secured borrowing to finance consumption is closely related to this collateral position; (iii) the spread of mortgage rates over the risk-free interest rate varies with the collateral position of each household. These stylised facts suggest credit frictions and households' use of

their housing equity as collateral may be important in understanding the relationship between interest rates, house prices, housing investment and consumption.

Our model applies a financial accelerator mechanism to the household sector. When house prices fall, households that are moving home have a smaller deposit (ie net worth) available than they otherwise would for the purchase of their next home. When they have a smaller deposit, they obtain less favourable mortgage interest rates when renegotiating their mortgage, and have less scope for extracting additional equity to finance consumption. Fluctuations in house prices significantly affect the value of houses as collateral and therefore strongly influence borrowing conditions for households.

We show, by simulation, that the financial accelerator mechanism described above amplifies and propagates the responses of the economy to various shocks. We also consider the implications of recent deregulation in the mortgage market. Our simulation shows that cheaper access to home equity means that, for a given house price rise, more additional borrowing will be devoted to consumption relative to housing investment. This has important implications for how house price movements should be interpreted, because it implies that the relationship between house prices and consumption has changed over time.

Base rate pass-through: evidence from banks' and building societies' retail rates

Working Paper no. 170

Paul Mizen and Boris Hofmann

Nearly all central banks in the industrialised countries conduct monetary policy through market-orientated instruments designed to influence short-term interest rates. They reserve the right to supply the money market shortage at a price of their own choosing (the official rate), which then feeds through to short-term money market rates and the rates set by banks and building societies on retail products, such as deposit accounts and mortgages. For this reason, the official rate can be described as a lever that operates through short rates and longer rates to influence aggregate demand.

Ideally, official rate changes should be completely 'passed through' to market and retail rates over a reasonably short horizon. In practice, official rate changes may not be fully and instantaneously passed through to retail rates, but differentials may persist for a time. This paper explores some of the reasons why banks and building societies may face incentives to make discontinuous changes to rates. Our interest in this paper is the pass-through of official rates to bank and building society retail rates.

We consider the retail rate setting process as potentially asymmetric and non-linear. Our model allows for switching according to the size of and the change in, the difference between the current retail rate and its long-run equilibrium value. We make use of detailed monthly data on retail rates set by UK banks and building societies provided by the major clearing banks' annual publications and the Building Society Commission over the period 1985–99.

Examining the relationship between the level of each retail rate by product and by type of institution we reveal complete pass-through to be the norm in the long run for deposit rates, but not for the mortgage rate. We then consider the non-linearities that exist in the dynamics, and this requires that we specify what drives the process of adjustment. We split the drivers into endogenous and exogenous categories. Drivers that were significant included the actual or expected change in the base rate, the yield spread for three to six-month horizons, and a measure of interest rate uncertainty based on option prices. Adjustment was unaffected by indicators of market competition, such as differentials between rates on similar products of banks and building societies, differentials between mortgage and deposit interest rates as a measure of margins, or activity in the housing market.

We conclude that the main driver of base rate pass-through is the change, or the expected change, to the official instrument. This creates faster adjustment when the 'gap', between the base and retail rates, is growing in absolute size. Both banks and building societies move significantly faster to close 'grouping gaps'. Although the response is quantitatively different for each retail product and for banks versus building societies, the direction of change is the same.

Leading indicators of balance-of-payments crises: a partial review

Working Paper no. 171

Michael Chui

During the 1990s, many countries, developed and developing alike, experienced severe financial difficulties, including balance-of-payments crises and systemic banking failures. Events such as the 1994 Mexican peso crisis and the Asian turmoil seem likely to have been a mixture of both. The scale and impact of these events have renewed interest in the existing literature and stimulated a large volume of new theoretical and empirical work to explain and/or predict crises, and to provide countries with appropriate policy advice to avert an impending crisis. While this paper gives a brief overview of the theoretical context, it concentrates on the empirical literature, with special emphasis on the search for potential leading indicators.

There are in general three different empirical approaches to analysing currency crises. The first is the 'signalling' method. In such models, the behaviour of a number of individual variables, such as the real effective exchange rate or the debt to GDP ratio, is evaluated against certain threshold levels. Once any of these indicators moves beyond its threshold, it signals a potential crisis in waiting. The 'optimal' threshold is selected on an indicator-by-indicator basis, so as to balance out the risks of failing to predict the crisis and giving a false signal of an impending crisis.

The second method borrows a technique widely used in the discrete-choice literature to analyse the probability of a currency crisis. The basic idea is first to sort different countries and time periods into two discrete episodes: a crisis and a tranquil period. Then, by mapping a set of possible indicators (chosen on the basis of *a priori* economic theory) into some known probability distribution function of these episodes, the likelihood of a currency crisis can be evaluated.

The third method is largely descriptive and often based on specific case studies. The primary concern of these studies is to establish structural relationships between particular variables and currency crises.

While most studies claimed to be successful in identifying leading indicators, the accuracy of their prediction deteriorates out of sample. The poor predictive power can be for several reasons: the difficulties in defining the dependent variable (or a crisis), changes in the structural relationships in an economy, overemphasis on some crisis-specific indicators, and other technical problems such as data quality and revision.

Nonetheless, whichever approach the research is based on, an interesting fact is that a particular set of indicators always emerges as informative in predicting an impending crisis. This includes indicators of real exchange rate overvaluation, liquidity problems, lending growth/boom and contagion. Focusing on the evolution of these indicators might usefully complement the whole set of indicators currently monitored for surveillance purposes.

Public demand for low inflation

Working Paper no. 172

Kenneth Scheve

This paper examines public opinion in advanced economies to assess the determinants of the macroeconomic priorities of individual citizens. Are views about macroeconomic policy objectives similar across different individuals or are there important divisions? Does opinion vary across countries, and, if so, what accounts for this variation? This paper uses survey data from 20 advanced economies to address these questions and presents three main empirical findings.

First, the distributive consequences of inflation and unemployment are key determinants of how individuals weigh different economic objectives. The basis of distributive conflict over macroeconomic priorities is in part grounded in the differential effect of macroeconomic performance on outcomes in the labour market. As suggested in previous research, those individuals more exposed to unemployment are less likely to place priority on low inflation. The existing literature, however, has failed to investigate empirically one of the key theoretical mechanisms through which macroeconomic performance generates distributive conflict: the ownership of nominal assets and liabilities. The analysis in this paper makes such an assessment and finds a robust connection between nominal asset ownership and macroeconomic priorities. Owners of nominal assets are more inflation averse, consistent with their exposure to unanticipated inflation.

Second, the findings also suggest that economic context has a substantial impact on the public's economic objectives in a way broadly consistent with the specification of utility/loss functions in the theoretical political economy literature. Rising and more volatile inflation is more costly, and the public places greater emphasis on low inflation as prices increase more rapidly. Similarly, as unemployment rises relative to the level consistent with stable inflation (NAIRU), reducing unemployment becomes a greater priority. These results are generally consistent with findings in the public opinion literature, though this study extends those results by relying on comparable data from 20 advanced economies.

Third, the findings in this paper suggest that there is significant cross-country variation in inflation aversion,

controlling for economic context and individual attributes, and that some of this variation can be accounted for by national-level factors that affect the aggregate costs of inflation and unemployment. The empirical estimates in this paper suggest that the demand for government revenue and the size and structure of the financial sector partially explain cross-country variation in inflation aversion, controlling for economic context and the individual characteristics of survey respondents. The negative correlation between the demand for government revenue and inflation aversion is consistent with the idea that if. for whatever reason, the inflation tax is less distortionary than alternative forms of additional taxation, individuals in countries with higher revenue needs may assess inflation to be less costly than in countries with lower revenue demands. The positive correlation between the extent of employment in the financial sector and inflation aversion is consistent with the argument that the financial sector, particularly firms engaged in traditional commercial lending with typically long-term assets and short-term liabilities, has a strong preference for price stability.

Overall, the findings in this paper suggest a number of questions for future research. A direct extension is to investigate the degree to which inflation aversion in particular countries changes over time. The results in the paper may also be useful in future investigations of the effect of monetary institutions on economic outcomes. Evaluating the effect of these institutions depends first on specifying preferences. This paper provides substantial evidence that there is sufficient variation in public macroeconomic priorities across countries that the specification of preferences may be substantially improved by understanding the relative inflation aversion of citizens. Future studies of why countries adopt the monetary institutions that they do may also be informed by the results in the paper. The role of distributive conflict among groups in society is central to the literature on this question. The findings in this paper suggest that those distributive conflicts are evident in the electorate, as well as among firms in various sectors of the economy.

Current accounts, net foreign assets and the implications of cyclical factors

Working Paper no. 173

Matthieu Bussiere, Georgios Chortareas and Rebecca L Driver

This paper examines evidence from 18 OECD economies to see whether current account behaviour is affected by a country's initial net foreign asset position. It uses as a starting point the underlying-balance approach to current accounts of the International Monetary Fund (IMF), which is based on the fact that savings minus investment in an economy must equal the current account by identity. It therefore models the current account using the determinants of savings and investment as an alternative to trade-flow models of current account movements. The emphasis of the approach is on the medium-run determinants of the current account, but at the same time, it explicitly allows for short-run, cyclical influences.

There are several explanations why initial portfolio allocations may explain current account behaviour. In an interesting paper published in 2000 in the Quarterly Journal of Economics, Aart Kraay and Jaume Ventura suggest that it is the current account response to temporary shocks that will be affected by existing portfolio allocations, assuming investment risk is high and diminishing returns are weak. Under these circumstances the marginal unit of wealth arising from a positive transitory shock will be allocated in line with existing portfolio choices rather than being invested solely in foreign assets as more traditional approaches suggest. Temporary shocks will therefore simply lead to portfolio growth, while permanent shocks will cause portfolio rebalancing. Although they provide empirical evidence that is compatible with such a 'new rule', Kraay and Ventura do not explicitly differentiate between temporary and permanent shocks. In contrast, this paper explicitly considers how existing portfolio allocations, proxied using net foreign asset positions,

may influence reactions to both shorter and longer-run factors.

The current account is modelled by looking at both the long-run determinants of savings and investment and short-run, cyclical influences. It therefore provides a framework to differentiate between permanent and temporary shocks, based on economic criteria rather than purely statistical techniques. In addition, this method provides a framework that can be used to eliminate the impact of both global shocks (which in principle cannot affect the current accounts of individual countries) and the unobservable world real interest rate. The paper presents an estimate of a baseline current account model, of a model that considers fiscal policy composition effects and of a model that modifies the previous two to take into account initial net foreign asset positions, to proxy initial portfolio allocation.

The results suggest that initial net foreign asset positions affect the current account response to cyclical, but not longer-run, factors. The results are therefore broadly compatible with the 'new rule' under which the current account response to temporary shocks is influenced by existing portfolio allocations. One caveat to interpreting these findings solely in terms of the 'new rule' is that this paper uses net rather than gross foreign asset positions to proxy portfolio allocations. An alternative explanation for these findings might therefore be that credit constraints are larger in countries with negative net foreign assets. Under these conditions any procyclical movements in the availability of credit would modify the current account's response to the output gap in a way consistent with our findings.

Money market operations and volatility of UK money market rates

Working Paper no. 174

Anne Vila Wetherilt

It is widely accepted—both in the central bank and academic communities—that a key objective of a central bank's operational policy is to minimise persistent deviations of the relevant money market rate(s) from its policy rate. First, it is argued that excessive money market volatility might give the market confusing messages about the stance of monetary policy and is therefore to be avoided. Second, it is claimed that such short-term volatility may be transferred up the yield curve, which could affect asset markets and in turn have real economic effects. An important practical question is whether the choice of policy instruments affects this objective.

The past decade has witnessed a multitude of changes in the operational framework for monetary policy across developed countries. In the United Kingdom, important structural changes include the creation of the open gilt repo market in January 1996, the introduction of gilt repo in the Bank of England's daily open market operations in March 1997, and the introduction of a ceiling for overnight rates in July 1998.⁽¹⁾ The present paper examines whether these and other reforms to the Bank's money market operations have been accompanied by significant changes in money market rates and volatility. The paper also offers some guidance on how to measure the effectiveness of operational policy best.

The paper conducts an empirical study, using daily money market rates, ranging from the overnight to twelve-month maturity. We develop an empirical model that captures the key features of the data, in particular the time-varying nature of volatility. Using this framework, we analyse volatility of the key money market rates (the overnight and two-week rate). We then use this model to examine the relationship between short-term money market volatility and spreads. We also examine whether this volatility is transmitted up the money market yield curve to affect longer maturity rates. Furthermore, we assess the speed of adjustment of interest rates along the money market yield curve to changes in official rates. We also investigate whether *not* choosing the overnight rate as a policy target has significant implications for money market volatility.

The research shows some evidence of a statistical relationship between key money market spreads and volatility at the very short end of the money market curve. The evidence is weak though, and does not extend to the longer end of the curve. First, we find no evidence of transmission of two-week volatility along the money market curve. Second, we find no evidence that allowing greater variation in overnight rates undermines efforts of the central bank to keep other money market rates in alignment with its chosen operational monetary policy target. Third, we demonstrate that spreads between the two-week market rate and the official repo rate affect both money market volatility and rate dynamics at the short end of the money market curve. The effects at the longer end are much weaker. In contrast, the overnight spread has little impact on money market rate volatility or dynamics.

Our tests further indicate that volatility of rates at the very short end of the UK money market yield curve has declined significantly since the early 1990s. The introduction of the gilt repo market in January 1996 was associated with lower money market volatility, although we have evidence that volatility had started to fall as early as mid-1995. The effects of the 1997 reforms of the Bank of England's open market operations are less discernible in the data. In contrast, the creation of a ceiling for overnight rates in June 1998 was associated with a reduction in volatility in end-of-day overnight rates.

(1) The June 2001 introduction of a floor for overnight rates is outside our sample period.

Equilibrium analysis, banking, contagion and financial fragility

Working Paper no. 175

Dimitrios P Tsomocos

An analytical framework that can be used to examine financially fragile regimes and to show how financial crises develop is presented. An attempt is made to produce a rigorous yet tractable model of contagion and financial fragility. It integrates a range of well-known and widely discussed phenomena, such as bank runs, endogenous default and the liquidity trap, in a formal monetary general equilibrium model with missing financial markets.

The standard general equilibrium with incomplete markets model with money and default is extended by incorporating a competitive banking sector. Commercial banks are *heterogeneous* and are assumed to maximise expected profits subject to bank-specific state-dependent capital requirements. The non-bank private actors maximise utility of consumption subject to liquidity constraints. The model extends over two periods, and uncertainty is resolved in the second. Assets are traded in the first period and pay off in the second.

Trade in an equity market for ownership shares of commercial banks, as well as in the interbank credit market occurs in the first period. Commodity and non-bank private sector credit markets operate in both periods. Cash in advance is needed for all market transactions and both households and banks are allowed to default on their financial obligations. The government determines fiscal policy whereas the central bank sets monetary policy. Finally, a regulatory agency legislates the bankruptcy code and fixes capital requirements and time-varying risk weights.

Existence of *monetary equilibria with commercial banks and default* (MECBD) allows for positive default levels in equilibrium. Also, financially fragile regimes are compatible with the orderly functioning of markets. Existence is guaranteed provided that there are sufficient gains-from-trade in the economy. When financial markets are inactive, the rates of delivery are honoured by government via an organisation such as Federal Deposit Insurance Corporation.

A definition of financial fragility is proposed. An economic regime is financially fragile when substantial default of a 'number' of households and banks (ie a liquidity 'crisis'), without necessarily becoming bankrupt, occurs and the aggregate profitability of the banking sector decreases significantly (ie a banking 'crisis'). A version of the liquidity trap holds where banks engage in large asset trades, without changing interest rates in the non-bank private sector's credit markets, no matter how expansionary monetary policy is. Commercial banks do not channel the increased liquidity to the consumer credit markets but the asset market, and therefore increased activity is observed in asset transactions. So, commodity prices remain relatively unaffected.

The Diamond-Dybvig result is a special case of MECBD in which banks are *homogeneous* and *financial contagion* due to default is maximal. But if, on the other hand, loans are financed entirely by capital, there should be no spill-over effects. There is a trade-off between financial stability and efficiency, since stricter capital requirements generate higher interest rates and thus reduce efficient trade and limit banks' risk-taking behaviour.

It is also shown that under certain restrictions and binding capital requirements, equilibria are constrained inefficient. Therefore, if the government or the regulator intervened in period 0 through transfers, taxation or by modifying the capital requirements of the economy, it could achieve a Pareto improvement on the original equilibrium. Consequently, *optimal* regulatory policy exists, and it depends on the particular parameters of the economy.

Finally, the quantity theory of money proposition, in which both prices and quantities adjust in response to policy changes, holds. The term structure of interest rates is specified and accommodates both the expectations and liquidity preference hypotheses. Default influences the shape of the yield curve. Also, monetary, fiscal and regulatory policy changes are non-neutral only when interest rates are positive and the policy variables change disproportionately.

Within this framework, which displays several crucial characteristics of the financial system in its current form, it has been possible to show how financial fragility manifests itself *in the continuum*, and may not precipitate a financial crisis if the appropriate measures are adopted. Active regulatory policy may be used to improve welfare and alter the distributional effects of financial fragility.

Rational expectations and fixed-event forecasts: an application to UK inflation

Working Paper no. 176

Hasan Bakhshi, George Kapetanios and Anthony Yates

This paper tests a version of the rational expectations hypothesis using 'fixed-event' inflation forecasts. These forecasts can best be explained by describing the data we use. The forecasts are the prediction of fund managers surveyed by Merrill Lynch. Respondents are asked to forecast inflation, say, two years ahead. The following month they are asked for the forecast of inflation for that same date, now one year and eleven months ahead; the next month they are asked for their one year and ten month ahead forecast, and so on. Each month they are asked to forecast the annual inflation rate for the same date. The forecast event is fixed throughout, and the horizon of the forecast shrinks as the time line approaches the event. In the final month, respondents are asked to forecast the annual inflation rate one month ahead. This is what we term a forecast 'event', and we have 7 such events, and typically 23 forecasts, made every month over two years, for each event.

Our fixed-event forecasts allow us to test for whether expectations are unbiased in a similar fashion to the rest of the literature. But they also permit us to conduct particular tests of forecast efficiency—whether the forecasts make best use of available information—that are not possible with rolling event data. We present three efficiency tests. The first test is whether the forecast errors are uncorrelated with past forecast revisions: the intuition here is that under the rational expectations hypothesis (REH) current forecast errors should not be predicted by any past information, which includes past forecast revisions. The second test is whether this period's forecast revision is uncorrelated with last period's. This prediction follows when we note that the current forecast error comprises all future revisions, and combine it with our first test of the REH (that the forecast error is unpredictable). Under the REH, forecast revisions should only reflect news, not past revisions, nor in fact past data on anything at all. This test is particularly interesting since, unlike the first, and unlike tests with rolling event forecasts, it is not complicated by moving average error problems. Third, we test to see if the variance of the forecast errors declines as we get closer to the inflation outturn. Intuitively, it ought to be easier to forecast annual inflation six months ahead, when you already have half the data you need published, than forecasting inflation two years ahead. These tests also follow from our first: the forecasts and forecast errors can be re-written in terms of sums of future forecast revisions, which, if independent of each other, yield expressions for the variance of forecasts and forecast errors in terms of the variance of forecast revisions.

We find evidence of a positive bias in inflation expectations. But the evidence for inefficiency is much less clear cut: in particular, tests on forecast revisions that are robust to the serial correlation structure implied by rational expectations in our dataset do not show significant evidence for inefficiency.

The provisioning experience of the major UK banks: a small panel investigation

Working Paper no. 177

Darren Pain

Ideally, banks' provisions should capture expected losses. In practice, accounting conventions in the United Kingdom mean that provisions are set in a backward rather than forward-looking manner—specific provisions can only be made once the debt is shown to have genuinely become impaired and general provisions should cover losses that exist in the current loan portfolio but have yet to be identified. Provisions therefore correspond largely to realised loan losses.

Broadly speaking, the major UK banks' provisions ratios have moved quite closely together in the past. Most banks experienced a significant increase in provisions in the early 1990s—coinciding with a period of economic recession in the United Kingdom-while the provisions ratio fell back in the mid-1990s. Some important differences in movement are apparent. In particular, some of the major UK commercial banks experienced significant defaults on their Latin-American debts in the late 1980s. However, stripping out these problem country effects, provision ratios tended to vary more across time than across banks. This would seem to suggest that, over this period, the major UK banks' provisions arose more often from shocks hitting the banking sector as a whole than from idiosyncratic risks.

Banks' own behaviour may contribute to their vulnerability to such disturbances. In particular, banks may be prone to underestimate future losses in periods of economic expansion as lending criteria are relaxed or because concentrations of loan exposures increase. During subsequent economic downturns, this 'overlending' gives rise to a sharp increase in bad debts. As this may occur when bank income is itself weaker due to slower loan demand growth, such losses can actually reduce banks' existing capital. Further, during such recession periods banks may themselves be less able to raise new capital.

This paper investigates the possible influences on UK banks' loan-loss provisions (as a proxy for realised losses). Specifically, based on a small (unbalanced) panel dataset covering the period 1978–2000, regression analysis is used to examine the influence of macroeconomic variables and bank-specific factors on reported bad debt provisions. The main findings are that real GDP growth, real interest rates and lagged aggregate lending can indeed inform about banks' provisions. But bank behaviour is also important. In particular, increased lending to riskier sectors, such as commercial property companies, has generally been associated with higher provisions.

The impact of price competitiveness on UK producer price behaviour

Working Paper no. 178

Colin Ellis and Simon Price

There are relatively few papers analysing the price mark-up equation. This is despite the fact that the role of price-setting in macroeconomics has come strongly to the fore recently. The 'new' Phillips curve is interpreted as a dynamic pricing equation, where marginal costs are proxied by the output gap, or, perhaps more satisfactorily, by unit labour costs. Within the literature, it has usually been taken as given that there should be a role for competitors' (import) prices. Yet there is theoretical ambiguity, and identification is a neglected issue. This is important for policy, as 'competitor' is synonymous with 'foreign' in this literature, and we know from the New Open-Economy Macro literature that pricing behaviour of importers is important when we consider the monetary transmission mechanism. Evidence from the existing literature using single-equation estimates does suggest such a relationship exists, and if this is the case, there are implications for the monetary transmission mechanism.

To help better understand the economic processes at work, we examine UK producer prices. This sector is a natural one to examine, because most output is tradable and the relevant economic model is likely to be appropriate. We relax the customary assumption of Cobb-Douglas production technology. There is a potential identification problem, as in principle there may be two long-run relationships—one that we will call a long-run price relationship (LRP: not necessarily purchasing power parity in the sense it is normally understood), and the other the optimal mark-up. Cointegrating techniques are used in an attempt to resolve this identification problem. We also have a proxy for competitiveness, which is intended to match comparable import and domestic prices. Some evidence is found for the existence of two separately identifiable long-run relationships. The first of these is interpretable as the price mark-up (or, equivalently, factor demand) relationship, and competitors' prices can be excluded from it. The second equation can be interpreted as a long-run equilibrium price relationship equating domestic and foreign prices.

This raises the possibility that single-equation estimates indicating a role for foreign prices in domestic price determination may unintentionally mislead. The results are for producer prices and may not necessarily be extended to other indices. But they suggest the possibility that the structural price mark-up equation for UK manufacturing does not depend upon foreign prices. This relationship appears to equilibrate via labour demand or, in terms of our modelled variables, productivity. However, there is evidence for a separate link between import and domestic producer prices, which might be thought of as the general equilibrium long-run relationship, which equilibrates through all three variables in our system. Thus, there is a suggestion that the reason why single-equation estimates find significant effects in price equations is that they conflate the structural and general equilibrium relationships.

A Kalman filter approach to estimating the UK NAIRU

Working Paper no. 179

Jennifer V Greenslade, Richard G Pierse and Jumana Saleheen

In the second half of the 1990s, a period that was characterised generally by buoyant economic activity, unemployment in the United Kingdom fell continuously and reached its lowest level in over 20 years. In 2000, Labour Force Survey (LFS) unemployment stood at just over 5% of the labour force, which was nearly 2 percentage points below the lowest rate seen during the previous recovery. A key question then is at what level of unemployment will wage and price inflation begin to rise? This critical level of unemployment is usually referred to as the non-accelerating inflation rate of unemployment or NAIRU. If the unemployment rate falls below this level, it will put upward pressure on inflation and inflation will tend to rise (though effects from other variables may offset this pressure).

There are many possible methods that could be used to estimate the NAIRU. This paper adopts a statistical approach by applying Kalman filter techniques that allow the joint estimation of the Phillips curve and a time-varying measure of the NAIRU. We have used a variety of models (based on either price or wage inflation) and calculated time-varying NAIRU estimates from 1973 to 2000. According to these estimates, the NAIRU reached a peak in the mid-1980s and tended to decline thereafter. Such profiles are broadly in line with other UK estimates, often obtained from different approaches. Of course, the estimates presented in this paper should be regarded as illustrative and not interpreted as MPC estimates. In practice there are a range of labour market indicators that may be relevant for analysing inflationary pressures.

It is widely acknowledged that there is a great deal of uncertainty around NAIRU estimates, whichever approach is used. We illustrate this through the large standard error bands around our Kalman filter estimates. As a consequence, we would not place weight on any particular point estimate for the NAIRU. But even though there may be uncertainty about the level of the NAIRU, a range of specifications and assumptions tend to suggest that the NAIRU was falling through the 1990s (though we do not analyse the reasons for any fall in the NAIRU). Further, according to our models, it appears likely that unemployment at the end of the decade was below the NAIRU, suggesting some upward pressure on inflation from this source. Had the NAIRU estimates not fallen over this period, there would have been greater upward pressure on inflation from the labour market. So structural changes appear to have had a beneficial effect on UK inflation during this period.

However, the story does not end there. Our results suggest that temporary supply factors (captured by real import prices or real oil prices) are also likely to have played an important role in holding inflation down, especially in the 1997–99 period. Developments in import prices or oil prices, as well as movements in the unemployment gap, may therefore be important in assessing future inflationary pressures.

This paper has not touched on changes to the UK monetary policy regime, such as the move to inflation targeting at the end of 1992 or the granting of independence to the Bank of England in 1997, which may have had an impact on the formation of inflation expectations. It is possible that our NAIRU estimates are indirectly picking up any such changes, thus casting doubt on our estimates. But separate work including inflation expectations does not provide any strong evidence that this was a key factor for the United Kingdom.

The role of expectations in estimates of the NAIRU in the United States and the United Kingdom

Working Paper no. 180

Rebecca L Driver, Jennifer V Greenslade and Richard G Pierse

During the second half of the 1990s there were similarities in the performance of the US and UK economies. In particular relative to their recent past, both economies were characterised by stronger growth, falling unemployment and both low and more stable inflation. This combination led commentators to label the United States (where these developments were more pronounced) as the Goldilocks economy: one which was neither too hot, nor too cold, but just right. This paper examines the evidence for a change in the relationship between inflation and unemployment in the United States and United Kingdom between the 1990s and earlier periods. The paper contains a potentially important innovation by incorporating an explicit role for inflation expectations derived from survey measures.

All the results for the United States suggest that the non-accelerating inflation rate of unemployment (NAIRU) was steadily declining during the second half of the 1990s. However, inflation expectations are found to play a particularly important role in the United States and when expectations are included our results show that a declining NAIRU is not found solely in the 1990s. On the same basis, our results suggest that the timing of any change in the United Kingdom occurs somewhat later than in the United States. As our modelling strategy uses a reduced-form estimate of the NAIRU, we cannot identify exactly which factors trigger any changes. In addition, one important caveat is that there is typically a high degree of uncertainty surrounding NAIRU estimates. For this reason our results should be seen as illustrative rather than precise point estimates. Furthermore, these estimates should not be interpreted as MPC estimates.

There are two types of explanation for the combination of low inflation and stronger growth witnessed in the United States and the United Kingdom in the second half of the 1990s: favourable shocks or structural shifts. If it was the result of favourable external supply-side shocks, such as falling energy prices, supply potential as well as the relationship between inflation and excess demand factors will be unchanged. The alternative involves a lasting change in the relationship between inflation and excess demand, now known by the collective label of new paradigm economics. Here, such manifestations can take two main forms. The first involves changes in an economy's supply potential, such as an increase in potential growth or a fall in the NAIRU, which alters the level of excess demand for a given level of actual demand. Alternatively, it could imply a change in the relationship between inflation and a given level of excess demand, for example due to changes in the behaviour of margins resulting from competition. Of course, the true explanation may well be a combination of both favourable supply shocks and structural changes; the paper allows a role for both.

The framework used here relates inflation to a combination of inflation inertia, demand-side factors (provided by the gap between unemployment and the NAIRU) and external exogenous supply shocks (provided by real oil prices and real import prices). Most of the underlying models for this framework assume that price-setters are forward looking, so expectations will be an important determinant of behaviour. However, explicit measures of expectations are not normally included in estimation. When the regime is stable, agents' inflation expectations can be modelled using the actual and lagged values of the variables in their information set, so including an explicit measure of expectations should not matter. However, when the regime has changed (either because of a policy shift or change in the competitive environment), it will be important to include inflation expectations explicitly. This channel has been largely ignored and we try to assess how important this omission may have been.

The evidence is obtained using Kalman filter techniques, which allow the joint estimation of the Phillips curve and a time-varying measure of the NAIRU. As well as representing one of the tools in the policy-makers' tool kit, the use of the Kalman filter has the advantage of providing some direct evidence on whether the NAIRU had in fact fallen in the second half of the 1990s. Such statistical estimates are independent of the correct identification and estimation of the structural factors underlying a fall. The latter are important for pinning down exactly how a fall may differ from past observed falls in the NAIRU. Of course, time-varying NAIRUs are one of several indicators that can be used to interpret movements in the labour market.

Procyclicality and the new Basel Accord—banks' choice of loan rating system

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The Basel Committee on Banking Supervision is proposing to introduce, in 2006, new risk-based requirements for internationally active (and other significant) banks. Under this regime capital requirements for many banks will be based on their own assessments of the probability of default of individual borrowers. These will replace the relatively risk-invariant requirements in the current Accord which are based on the broad type of lending. This paper examines the implications of this new risk-based regime for the cyclicality of capital requirements-in particular whether the choice of particular loan rating systems by the banks would make sharp increases in capital requirements in recessions more likely. This is an important policy question because substantial changes in capital requirements would increase the likelihood of 'credit crunches'.

All regimes with minimum capital requirements have the potential to generate procyclical effects because capital available to meet the requirements becomes more scarce in recessions as banks make provisions and write off defaulted loans. The new element under the proposed revised Basel Accord is the potential for capital requirements on non-defaulted assets to rise in recessions if banks downgrade loans. The paper finds that the extent of this additional procyclicality depends on the nature of the rating systems used by the banks.

A number of banks have carried out careful mapping exercises to ensure that their rating approaches are very close to those of the main rating agencies which are designed to be relatively stable over the cycle. Many other banks have adopted an approach based on a Merton-type model which uses information on the current share price and liabilities. Because this approach uses current liabilities, it is in some respects akin to a rating that is conditioned on the point in the cycle. We estimate the likely increase in capital requirements in a recession, depending on whether a bank is using one or other of these two rating approaches. Portfolios of corporate exposures are constructed using information on the actual quality distribution of corporate loans made by some large banks. The extent to which banks would downgrade loans in their rating bands in a recession is estimated using transition matrices (for 1990–92) calculated from Moody's ratings and from ratings produced by a Merton-type model. We find that ratings based on Moody's approach lead to little, if any, increase in capital requirements for non-defaulted assets, whereas ratings based on a Merton-type model lead to a 40% to 50% increase.

This makes the question of which rating schemes banks will use very important. We use a general equilibrium model of the financial system to explore whether banks would choose to use a countercyclical, procyclical or neutral rating scheme. The model consists of three sectors (the household, corporate and banking sectors), two time periods with two possible future scenarios, and a financial market with one default-free asset and loans. Default is endogenous in the model. Capital requirements depend on the credit rating set by the bank, which is in turn based on the expected default rate of corporates. Expected default is also the key variable that affects the banks' decisions on how to allocate their portfolios between loans and other assets. This affects credit expansion in the economy. Demand for loans depends on the default rate and supply of loans on the bank rating and capital weight.

The results indicate that banks would not choose a stable rating approach. Bank profits would be higher if they adopted a system that produced ratings that varied over the economic cycle, because such a system would enable them to transfer the cost of recessions to the rest of the economy. Procyclical ratings could have macroeconomic consequences by encouraging overlending relative to risk in booms and reduction in lending in recessions. This underlines the need for banks to be given incentives to adopt more stable rating regimes to underpin their capital requirements. This consideration has been reflected in the current design of the Accord.