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# Assessing the impact of monetary tightening: a sectoral analysis of the UK and Scottish economies

Julia Darby and Heather Phillips, University of Strathclyde and Centre for Public Policy for Regions

The Bank of England has increased interest rates by one quarter of a percentage point on three occasions since last summer, in August and November of 2006 and in January of 2007. January's increase in the base rate to 5.25% surprised many analysts, most of whom had expected the decision to be delayed until February. Although rates were kept on hold in February and March, most commentators are expecting a further increase in April or May.

The Monetary Policy Committee take great pains both to understand, and to then explain, how changes in the official interest rate are propagated through the economy. A decade ago the Bank of England published a study of differential industry estimates of the impact of interest rate hikes (Ganley and Salmon, 1997). Unfortunately, the absence of adequate data make it infeasible to provide a full analysis of industry impacts by region within the UK, and to date, no similar study of potential differential regional impacts of monetary policy exists for the UK.

Some might argue that such analysis is irrelevant or unnecessary, not least because the Bank sets UK wide monetary policy. Most would agree that credible monetary policy can do no more than set the appropriate interest rate to meet the UK wide inflation target. However, it is reasonable to ask if it is really possible to understand the impacts of policy changes without this kind of disaggregated analysis. Furthermore, the UK government has emphasised the importance of the regional dimension to its central economic objectives, and has set targets for regional convergence (HM Treasury 2001, 2004 and Department of Trade and Industry, 2004), but has been silent on the possibility that monetary policy changes might propagate divergent responses of activity in different regions. This begs further questions. To quote Alf Young, "if the only hammer (the MPC) have in their hand to combat inflation smashes some regional nuts into smaller pieces than elsewhere, how effective are the other policies the government has in place to deal with the consequences?" (Young, 1999).

In this article we summarise the key findings of a forthcoming CPPR discussion paper (Darby and Phillips,

2007). We begin by updating Ganley and Salmon's industry estimates of the impact of interest rate hikes then we extend the analysis to similarly disaggregated Scottish data made available by the Scottish Executive. Ideally it would be interesting to look at other regions of the UK as well as Scotland, but lack of suitable data currently makes this infeasible.

The existing literature offers various arguments that lead us to expect differential sector responses to a given policy change. The construction sector, industries linked to construction and capital intensive industries, as well as producers of consumer durables are the kinds of sectors we should expect to suffer from the most significant and pronounced contractions in activity following a rate hike. It follows too that regions of the UK with activity relatively more concentrated in these sectors are likely to be more exposed.

Unanticipated interest rate changes will also cause fluctuations in the exchange rate, and this opens another channel for differential effects across sectors and regions. An unexpected rise in the UK interest rates will generally lead to appreciation of sterling, hence causing both a loss of competitiveness and a real income gain from terms of trade improvements. These effects may be differentially distributed, in part because openness to trade differs significantly across sectors and regions. We also draw attention to openness as it affects imported intermediates and hence production costs, as distinct from trade in final goods.

Balance sheets matter too. Tighter monetary policy hurts companies with large debts far more than those with more moderate debt levels and healthy balance sheets. The vulnerability of debtor companies is clear, and they too may be more concentrated in some sectors than in others.

## Approach and key results

The most common approach to identifying the effects of monetary policy on activity is to employ Vector Autoregressions or VARs. It is generally agreed that the VAR framework offers an efficient means of drawing out 'stylised facts' in the response of the economy to policy shocks. We follow Ganley and Salmon (1997) in estimating separate VARs for each sector's Gross Value Added (GVA), using data on the London Clearing Bank's base rate, the retail price index, the real effective exchange rate, and UK aggregate GVA<sup>1</sup>.

This section gives an overview of our results on the responsiveness of GVA to an unexpected monetary tightening, where the monetary tightening in question is a 1 standard deviation increase in the official interest rate (equivalent to an increase of around 1.1 percentage points). We are particularly interested in assessing the size, significance and speed with which any contraction in economic activity occurs following an increase in the official interest rate.

Figure 1: Example – the % response of sectoral GVA to a 1 standard deviation increase in the official interest rate

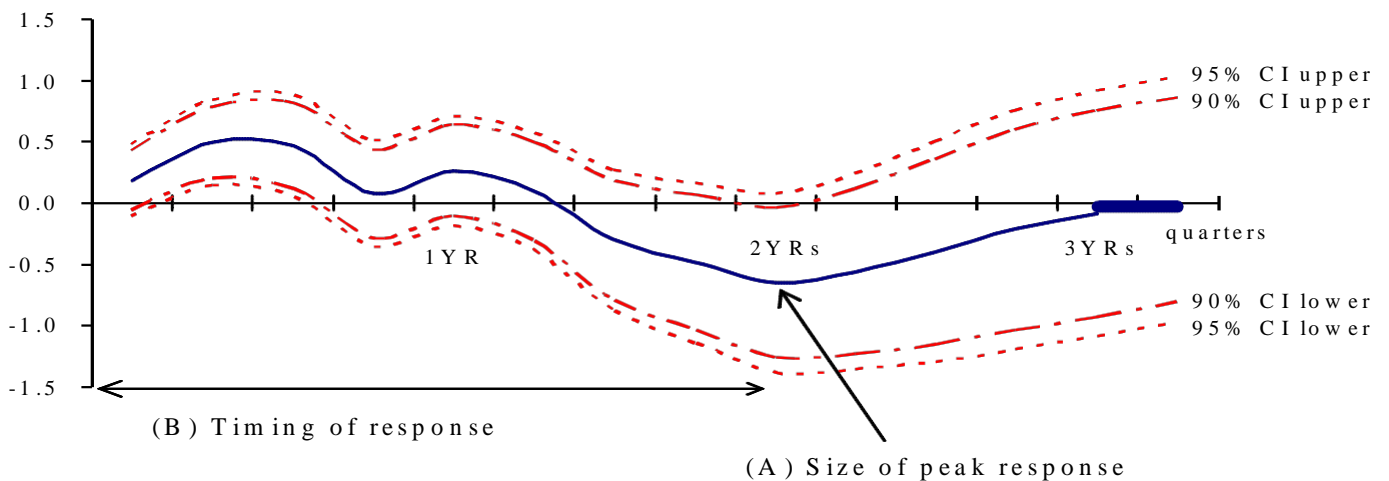


Figure 1 illustrates the key elements that characterise the impacts of monetary tightening on activity, using the example of the UK ‘Mechanical Engineering’ sector. The size of the response at its maximum is indicated at (A) and represents a given percentage contraction in sectoral GVA, the time taken to reach this size of response is given by the distance (B) and is measured in quarters following the policy change. Finally the significance of the response is demonstrated by the fact that the 90% confidence interval about the peak response does not encompass zero.

Table 1 summarises these key findings for each of the sectors for which the estimated response is statistically significant<sup>2</sup>. Again we report the maximum percentage reduction in GVA observed in response to a 1 standard deviation increase in the official interest rate, along with the time taken in quarters to reach this response in [.] and indicate the significance of this response, where \* and \*\* indicates the estimate is significantly different from zero at the at the 10% level of significance and \*\* at the 5% level.

Table 1: Disaggregated responses of UK GVA

	Size (%)	Timing	Sig.
Electrical Engineering	-0.728	[7]	*
Mechanical Engineering	-0.650	[8]	*
Agriculture, Forestry and Fishing	-0.541	[1]	**
Mining and Quarrying	-0.490	[2]	**
Construction	-0.367	[4]	**
Non-metallic minerals	-0.250	[8]	*
Paper, Printing and Publishing	-0.210	[3]	**
Financial Services	-0.192	[8]	*
Ownership of Dwellings	-0.149	[9]	*
Food, Drink and Tobacco	-0.117	[0]	**
Government and Other Services	-0.066	[1]	*

The strongest estimated responses to monetary tightening within the UK are felt within the Electrical and Mechanical

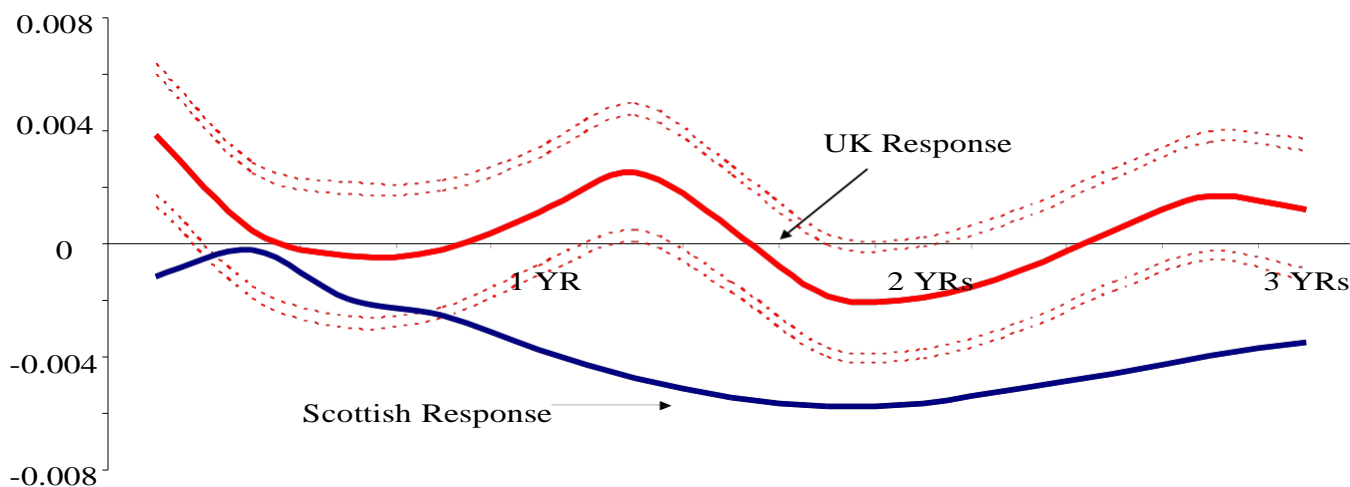
Engineering industries, both of which are relatively capital intensive. The full extent of the decline is felt after 7-8 quarters, that is within two years of the initial interest rate hike.

Previous studies, including Ganley and Salmon’s decade old analysis of UK data led us to expect strong responses from construction and related sectors, and our estimates suggest that construction along with non-metallic minerals show the third and fourth largest declines in GVA. In general, the services sectors are affected to a lesser degree, though Financial Services, Ownership of Dwellings and Government and other Services certainly show a significant downturn in activity.

Table 2 presents the same summary information for the estimated responses of disaggregated Scottish GVA to interest rate hikes. So far as possible, we employed the same disaggregation as for the UK wide data. Within the significantly affected sectors we can usefully distinguish between i) those for which significant impacts were found in both the UK and Scottish data; and ii) sectors for which the impact of monetary tightening was found to be significant in either the UK as a whole or in Scotland, but not in both.

Four sectors fall into the first group, with significant impacts estimated using both UK and Scottish data. In terms of their contributions to aggregate GVA, the largest sector in the group is ‘Government and Other Services’ which accounted for 24% and 27% of UK wide and Scottish specific GVA in the base year (2002). The ‘Financial Services’ sector is also in this group and accounted for 7 and 8% of GVA respectively, and the remaining industries are two of the largest sub-sectors within manufacturing, ‘Electrical Engineering’ and ‘Food, Drink and Tobacco’. Again, both account for a slightly larger proportion of total GVA in Scotland than in the UK as a whole, so

Figure 2: the % response of GVA in financial services to a 1 standard deviation increase in the official interest rate



compositional effects work to give a stronger interest sensitivity of Scottish GVA. In addition, in each of these four sectors the maximum impact estimated on Scottish data exceeds the confidence interval around the same sector's UK wide response (though only just in the case of 'Electrical Engineering', see below). We interpret this as indicating that monetary policy changes in all four sectors have a significantly stronger impact on the Scottish economy.

Table 2: Disaggregated responses of Scottish GVA

	Size (%)	Timing	Sig.
Electrical Engineering	-1.339	[8]	**
Chemicals	-1.012	[2]	**
Electricity, Gas and Water	-0.946	[3]	**
Petroleum and Nuclear Fuel	-0.653	[1]	*
Financial Services	-0.574	[7]	*
Food, Drink and Tobacco	-0.551	[0]	**
Retail and Wholesale	-0.330	[0]	**
Misc. Manufacturing	-0.318	[0]	*
Real Estate and Business Svcs	-0.253	[1]	*
Government and Other Services	-0.215	[3]	**

The significantly different impact of monetary policy is particularly evident in the case of 'Financial Services', see Figure 2.

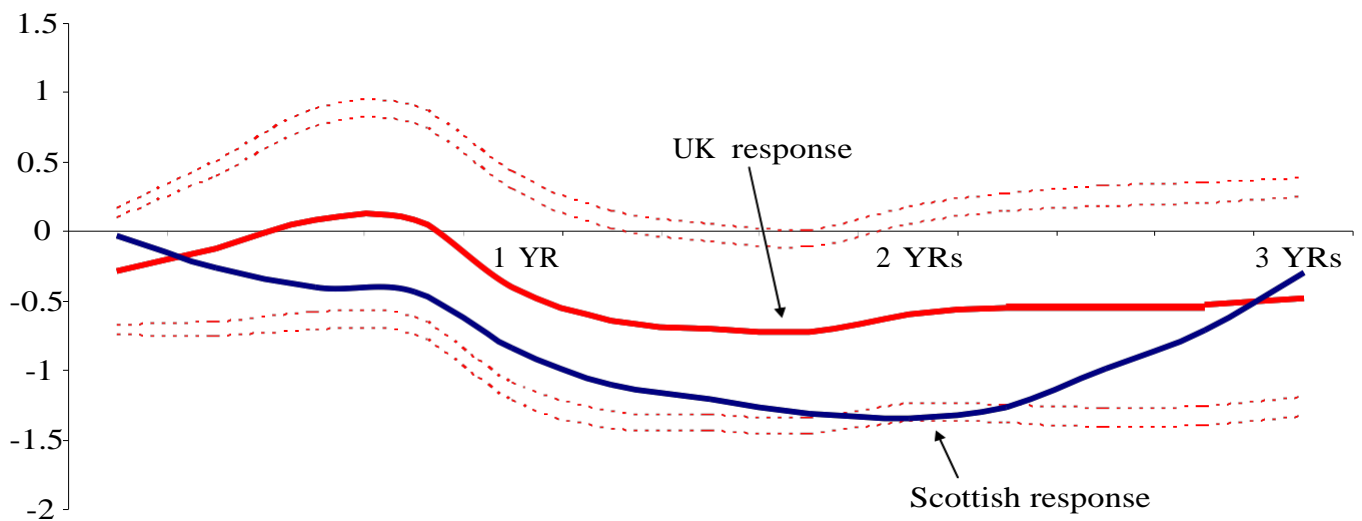
The impact on the Scottish Financial Services sector falls outside the UK confidence bands after three quarters<sup>3</sup>. In both the UK wide and Scottish estimates the maximum decline occurs two years after the policy shock, but the estimated decline sustained by the Scottish sector is significantly larger. It is worth considering the possible factors behind this difference. One possible explanation could be that the UK figures are dominated by activities in London which are dependent on global rather than

domestic activity, and hence relatively more sheltered from the impact of domestic interest rate changes. There is of course a strong and outward looking concentration of activity in this sector in Edinburgh, and increasingly in Glasgow too, but given the relatively greater focus on life assurance, fund management and general insurance the influence of global activity seems likely to be weaker, so too is the extent to which the sector is shielded from domestic policy change. More generally, outside of London, activity in this sector is likely to be more closely linked to activity in the relevant region.

The 'Electrical Engineering' results are also worth highlighting. Our estimates, shown in Figure 3, reveal only moderate differences in the impacts of the monetary tightening for the UK and Scotland. The point estimate of the Scottish peak response is certainly larger, but it lies within the 90% confidence interval around the UK result, and only just outside the 95% interval. There is a small difference in the estimated timing of the response too, but the main factor driving a greater response within Scotland will be the compositional effect, since the sector forms a greater component of manufacturing and aggregate GVA in Scotland than the same sector within the UK as a whole (in the 2002 base year Electrical Engineering contributed 20% of Scottish manufacturing GVA, the comparable figure for the UK was 12%).

Another group of sectors worth highlighting are those for which the impact of monetary tightening was found to be significant in Scotland, but not in the UK as a whole. These include 'Petroleum and Nuclear Fuel', 'Chemicals', 'Electricity Gas and Water' and 'Retail and Wholesale'. Together these sectors contributed 15.6% of Scottish GVA in the base year of 2002 and these sectors contribute to the greater overall interest sensitivity of economic activity in Scotland.

Figure 3: the % response of GVA in electrical engineering to a 1 standard deviation increase in the official interest rate



Against this, we estimated significant responses in UK wide data, and no significant response in the corresponding Scottish data, for five industries, 'Mechanical Engineering', 'Construction', 'Mining and Quarrying', 'Paper, Printing and Publishing' and 'Agriculture, Forestry and Fishing'. Together these industries accounted for 12.2% of UK GVA in 2002 (12.4% in Scotland).

The largest industry in this last group is 'Construction' and the absence of a significant response to interest rate hikes in Scottish construction is somewhat surprising. However, factors such as lower than average owner occupation rates in Scotland, a lesser prevalence of buy-to-let mortgages, historically more muted cycles in house prices and less scope for mortgage equity withdrawal are all likely to be important in explaining the lesser impact of interest rate hikes on the Scottish construction sector.

It would be useful to explore these sectors in more detail, to investigate why activity is more interest sensitive in Scotland. A recent study by Experian for the BBC provided the first "debt imprint" for the UK (Knight, 2007). They found that most of the locations with the highest percentage of people defined as living on the breadline were in the Midlands, the north of England and Scotland, and that people in Manchester and Glasgow suffer the most from financial stress. The high prevalence of unsecured consumer credit in parts of Scotland could certainly be part of the explanation for the greater interest sensitivity of activity in the Retail and Wholesale sector.

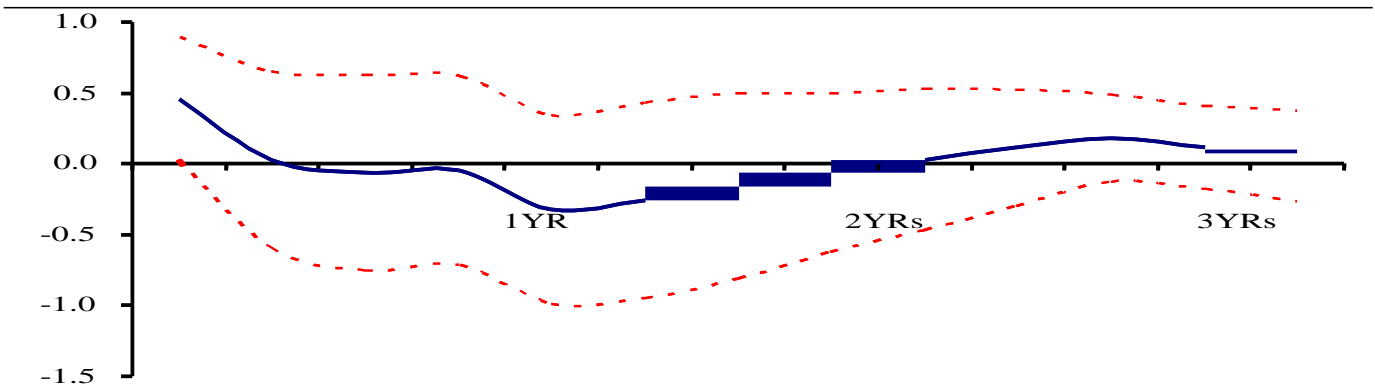
In general the methodology we have applied is useful for identifying stylised facts and drawing comparisons across regions. Identifying the causes of these differences requires analysis outside the VAR framework. Existing studies of differential responses across US states or across

countries within the Euro area have emphasised differences in access to credit and differences in external orientation of firms (see for example Carlino and DeFina, 1998, and Dedola and Lippi, 2005).

A final feature of our results, which has also been observed in earlier studies, is a significant *increase* in GVA in some sectors during the first year following monetary tightening, before we see the expected decline in activity. In our disaggregated results we find an initial positive response in a total of twelve UK sectors, and in seven Scottish sectors. Referring back to Figure 1, UK Mechanical Engineering GVA increases during the first six months after the monetary tightening. As far as we are aware, the existing literature has not attempted to explain this result. We offer one possible explanation. Specifically we suggest that there may be a link between the observed positive initial response of GVA and the operation of the exchange rate channel in the transmission of monetary policy.

As we noted in the introduction, unexpectedly tighter monetary policy should quickly result in inflows of financial capital, and an appreciation in the exchange rate. Figure 4 illustrates the estimated response of the sterling effective exchange rate to the increase in the official interest rate. Although this appreciation is short lived, it is statistically significant. This exchange rate appreciation will tend to weaken competitiveness and depress demand for finished goods, but it is also likely that the costs of imported inputs into production will fall. It follows that sectors which import a large proportion of their intermediate inputs should initially benefit from reduced costs in the immediate aftermath of the rate hike, and we argue that this cost reduction effect that may explain the short lived positive impact of monetary tightening on activity in several sectors.

**Figure 4: The % response of the sterling effective exchange rate to a 1 standard deviation increase in the official interest rate**



## Conclusion

The recent return to tighter monetary policy refocuses attention on the likely response of economic activity. Using disaggregated data for the UK and for Scotland we have been able to estimate sector specific responses to monetary tightening, and we have identified similarities and differences in these responses. Ideally it would be useful to look at other regions of the UK as well as Scotland. Overall we do find some evidence of stronger impacts of monetary tightening on the Scottish economy, reflecting both greater interest sensitivity of some sectors and a stronger contribution of interest sensitive sectors in total activity. We draw particular attention to Financial Services and Electrical Engineering. Against this, the absence of a significant impact of monetary tightening on the Scottish Construction sector is surprising but we discuss some of the factors that may explain this. We also suggest that particularly in the sectors that show differential impacts to monetary policy changes there is scope for further research outside the VAR framework to assess the driving forces behind the observed differences.

The Bank of England clearly has an interest in quantifying and understanding these impacts of policy tightening, but monetary policy focused on targeting UK inflation obviously cannot respond to regional differentials. However, to the extent that there are differential effects of UK monetary policy we would argue that there should be greater emphasis on identifying and potentially addressing the causes of these differences. In addition we argue that there

is a role for strengthening the operation of other adjustment mechanisms, including labour market flexibility and the regional operation of national fiscal stabilisers.

## Endnotes

<sup>1</sup>In view of criticisms advanced at this approach by Rudebusch (1998) our full paper also reports results of a number of experiments that check the robustness of our inference.

<sup>2</sup>There are five industries/sectors for which we found no significant impact of the monetary tightening on activity in either the UK or Scotland. Two of these are services sectors – ‘Hotels and Catering’ and ‘Transport, Communications and Storage’. Theoretically we should not be too surprised at this result. The sectors are not particularly capital intensive, and are less reliant on activity in other sectors than say Financial Services. The other three sectors with no significant impact of monetary tightening are sub-sectors within manufacturing, specifically ‘Textiles, Clothing and Footwear’, ‘Metals and Metal Products’ and ‘Transport Equipment’.

<sup>3</sup>Although the confidence intervals around the Scottish estimated response are not indicated on the chart, to aid legibility, it is notable that the UK response at 2 years also lies outside the Scottish confidence intervals.

## Annex: Sectoral disaggregation

Agriculture, Forestry and Fishing
Mining and Quarrying
Manufacturing
Electricity, Gas and Water
Construction
Retail and Wholesale
Hotels and Catering
Transport, Storage and Communication
Financial Services
Real Estate & Business Services <sup>a</sup>
Government and other services

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### *Classification within manufacturing:*

Food, Drink and Tobacco
Textiles, Clothing and Footwear
Wood Products <sup>b</sup>
Paper, Publishing and Printing
Petroleum and Nuclear Fuel
Chemicals and Chemical Products
Rubber Products <sup>b</sup>
Non-Metallic Minerals <sup>b</sup>
Metals and Metal Products
Mechanical Engineering
Electrical Engineering
Transport Equipment
Other Manufacturing <sup>b</sup>

### Notes:

- a. UK Real Estate and Business Services data is further disaggregated into Real Estate, Renting and Business Activities (Ka) and Ownership of Dwellings (Kb).
- b. The Scottish data aggregates Wood products, Rubber products, Non-Metallic Minerals and Other Manufacturing into a single "Manufacturing n.e.s." category.

### References:

Carlino G and DeFina R (1998) 'The Differential Regional Effects of Monetary Policy', *The Review of Economics and Statistics*, Vol 80 (4), pp 572-587.

Darby, J and H.Phillips (2007) Exploring the implications of UK monetary policy for sectors of the UK and Scottish economies, CPPR Discussion Paper, forthcoming.

Dedola L and Lippi F (2005) 'The Monetary Transmission Mechanism: Evidence from the Industries of Five OECD Countries', *European Economic Review*, Vol 49, pp 1543-1569.

Department of Trade and Industry (2004) 'Regional Competitiveness and the State of the Regions' Department of Trade and Industry, London.

Ganley, J and Salmon C (1997) 'The Industrial Impact of

Monetary Policy Shocks: some stylised facts', Working Paper, No 68, The Bank of England

H M Treasury (2001) 'Productivity in the UK: 3 – The Regional Dimension', H M Treasury, London.

HM Treasury (2004) 'Public Spending Review 2004: Public Service Agreements 2005-2008', HM Treasury, London.

Knight, J (2007) 'Financial Stress: worst in the North' <http://news.bbc.co.uk/2/hi/business/6364207.stm>, 15 February.

Rudebusch G D (1998) 'Do Measures of Monetary Policy in a VAR Make Sense', *International Economic Review*, Vol 39 (4), pp 907-931.

Young, A (1998) 'Ready, Eddie, go, in the race to condemn' *The Herald* (Glasgow), October 23.

