Background Thoughts

- ‘Quantitative managers have the ability to evaluate an enormous universe of investment opportunities in an expeditious and dispassionate manner. Thus, multi-dimensional well-constructed investment processes will likely continue to enjoy success’ – Lazard Investment Research, 6 June 2008

- ‘Six sigma events are happening daily’ – The Market Oracle, 16 September 2008

- ‘Take heed of computation! How woefully and wretchedly we have been misled by it!’ – John Owen, Chancellor of the University of Oxford, 1690

- Regulators are beginning to demand at least some evidence that senior management understands at least some of the risk analysis it is given
Frank Knight (1921) made the distinction between risk and uncertainty:

- Risk is when we have a good approximation to the probability distribution of outcome
- Uncertainty is when we have little or no idea of it
- Both Keynes and Hayek thought uncertainty was an important cause of the business cycle
- But even model uncertainty causes problems
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Some issues

- What was the probability of a recession in the UK in 2009?
- What is the sustainable medium/long term growth rate of the UK economy?
- What is the potential range of inflation in the medium term?
Chart 4 Expected real GDP growth for 2009

Source: Consensus Economics.

(a) Comprises 16 countries.
Annual percent change in real UK GDP
1950-2008

Time

per cent

-2 0 2 4 6

Histogram of annual percent change in real UK GDP
1950-2008
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How do we get a very low probability of a recession?

- The 1994-2008 data is Gaussian
- The probability of growth being less than zero in any given year is only 0.5 per cent
- The 1950-2008 data is fat tail
- The probability of growth being less than zero in any given year is 12.5 per cent
- The 1974-2008 data is fat tail
- The probability of growth being less than zero in any given year is 17.5 per cent
- Which data period was relevant?
What is the sustainable growth rate of the UK economy?

- Affects the growth of consumer markets and profits
- The ‘output gap’ - the difference between actual and trend output - is believed to be important by many policymakers
- So this influences the path of interest rates
20 year moving average of annual rate of growth of UK GDP
1890-2009
Issues

- Which period do we choose to calibrate a model?
- Correlation between growth in years (t to t+19) and (t-1 to t-20) is -0.11!
- What are the ‘drivers’?
- For a number of years, the Treasury estimated it was 2.5 per cent; at the very end of the Brown regime they hinted it was 2.75 per cent; now the OBR have reduced the figure to 2.25 per cent
- Thoughtful judgement made explicit is likely to be as good as any formal ‘model’
In the ‘long run’ there is no connection between inflation and the state of demand (Friedman, 1968)

But how long is the long-run?

Most economists believe a short/medium term trade-off exists

But empirical Phillips curves are notorious for their lack of consensus

Which variables represent ‘demand’

The curve is not time-invariant, and there are $N$ explanations why this is the case

Lemma: if $M$ is the number of empirical Phillips curves in existence, then $N \geq M$
INFLATION vs. UNEMPLOYMENT

United States, 1871-2009
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The same questions

- What data?
- What period?
- What model?
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<th></th>
<th>US</th>
<th>UK</th>
<th>Germany</th>
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<tr>
<td>Min</td>
<td>-10.5</td>
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<tr>
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<tr>
<td>Max</td>
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Note: excluding 1921-24 for Germany
Fuzzy clustering shows 3 clear regimes

- Steady: low inflation, low unemployment
- Weak: very low (negative) inflation, high unemployment
- Disruption: high inflation, high unemployment
- 3 distinct regimes in each of the 3 countries
- 94 per cent of the time either 2 out of the 3 or all 3 are in the same regime
- The transition can be abrupt
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Cluster memberships, UK, 1871-2009

Memberships UK

Steady  Weak  Disruption
On inflation, judgement on which regime will obtain is more important than any specific model.

On sustainable growth, judgement on optimism or pessimism about a country is more important than a technical model.

In the short-term, judgement on the relevant data period to calibrate models is more important than any specific model.