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Scenarios and Stress Tests: Models and Judgement

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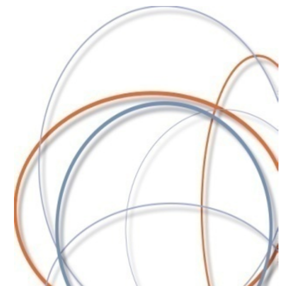
Background Thoughts

- ‘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

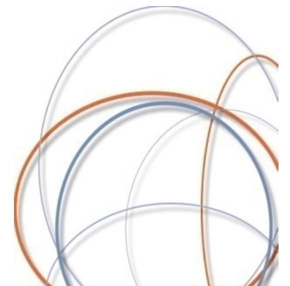


Risk, Uncertainty and Model Uncertainty

- 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

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?



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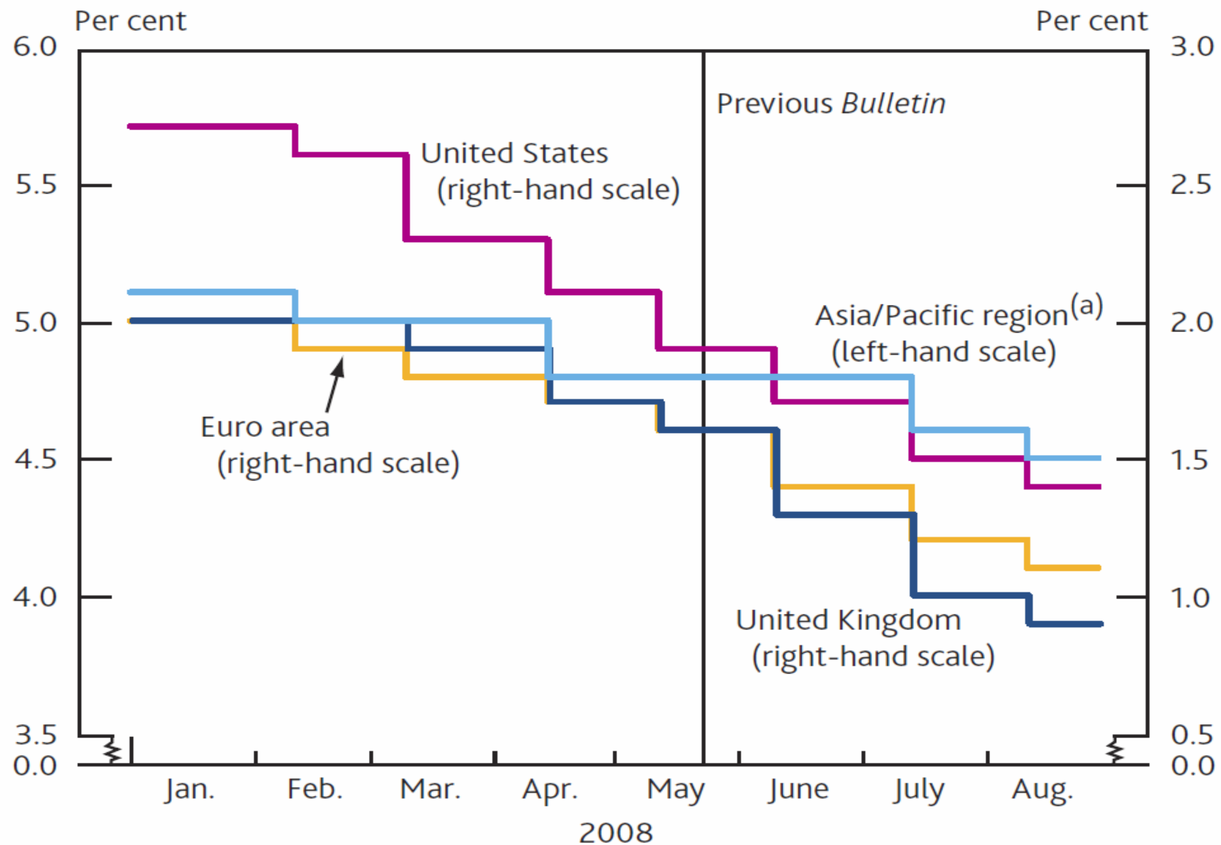

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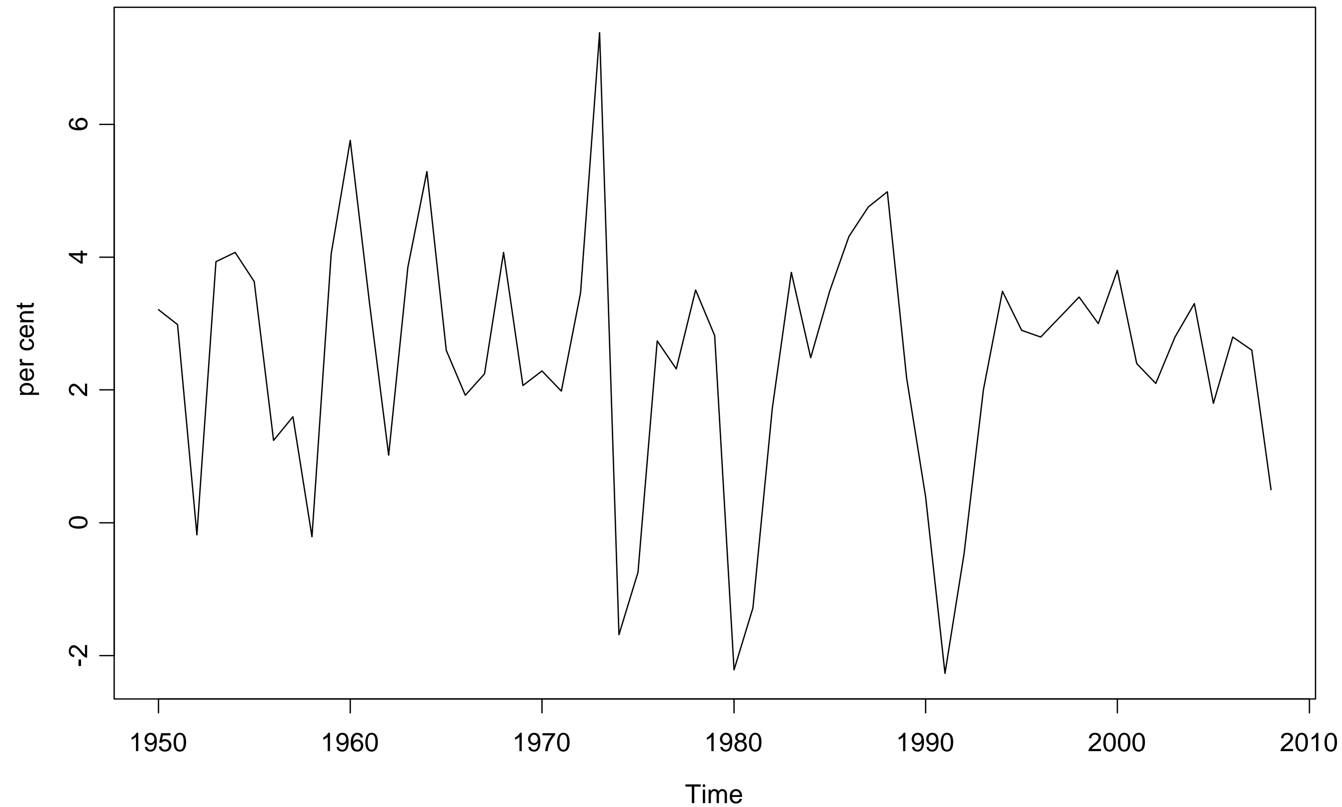

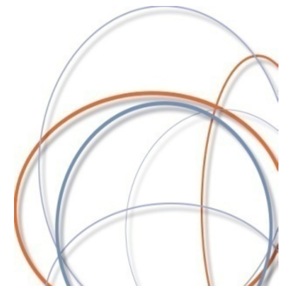

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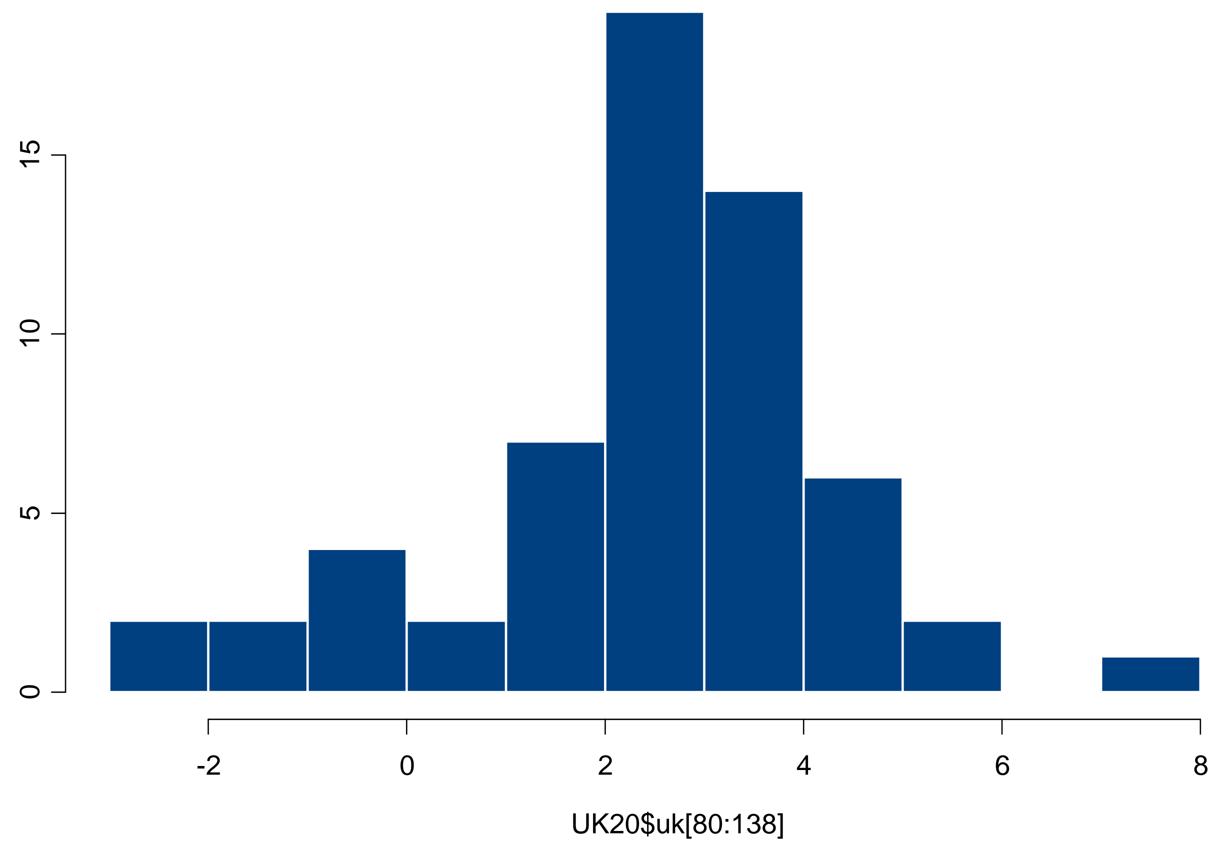

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How do we get a very low probability of a recession?

- 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?
- Ormerod, Rosewell, Cook, 2005, 'Estimating the uncertainty around forecasts for GDP growth and inflation: a stress testing approach'

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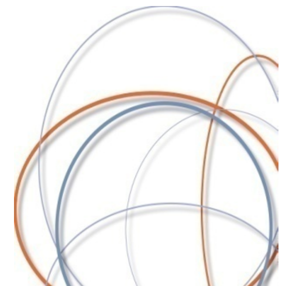
What is the sustainable growth rate of the UK economy?

- 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



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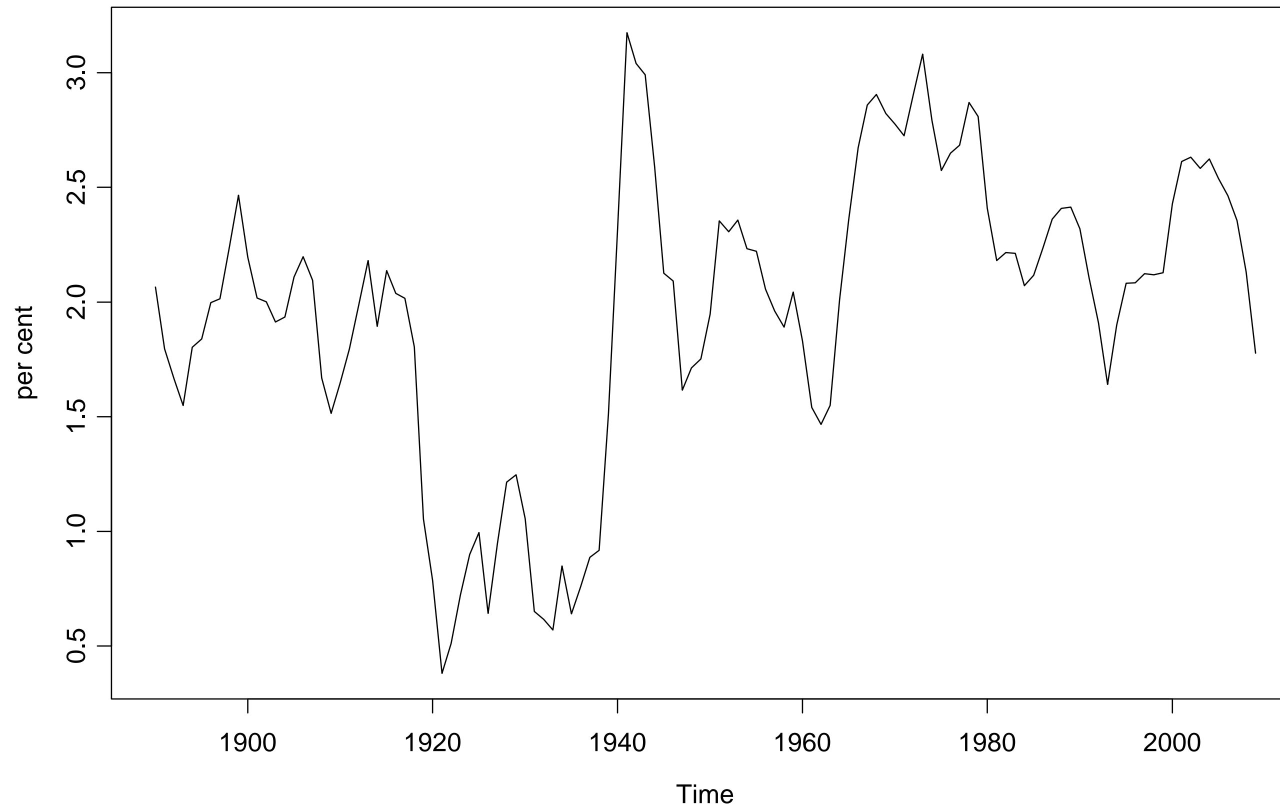
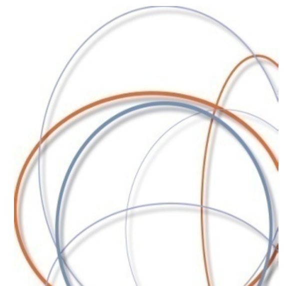


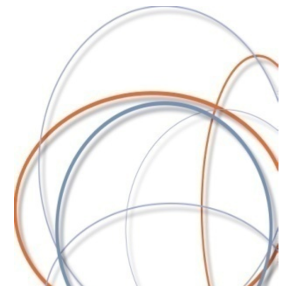
Issues

- 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'



Inflation: Model Uncertainty

- 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 $N \geq M$



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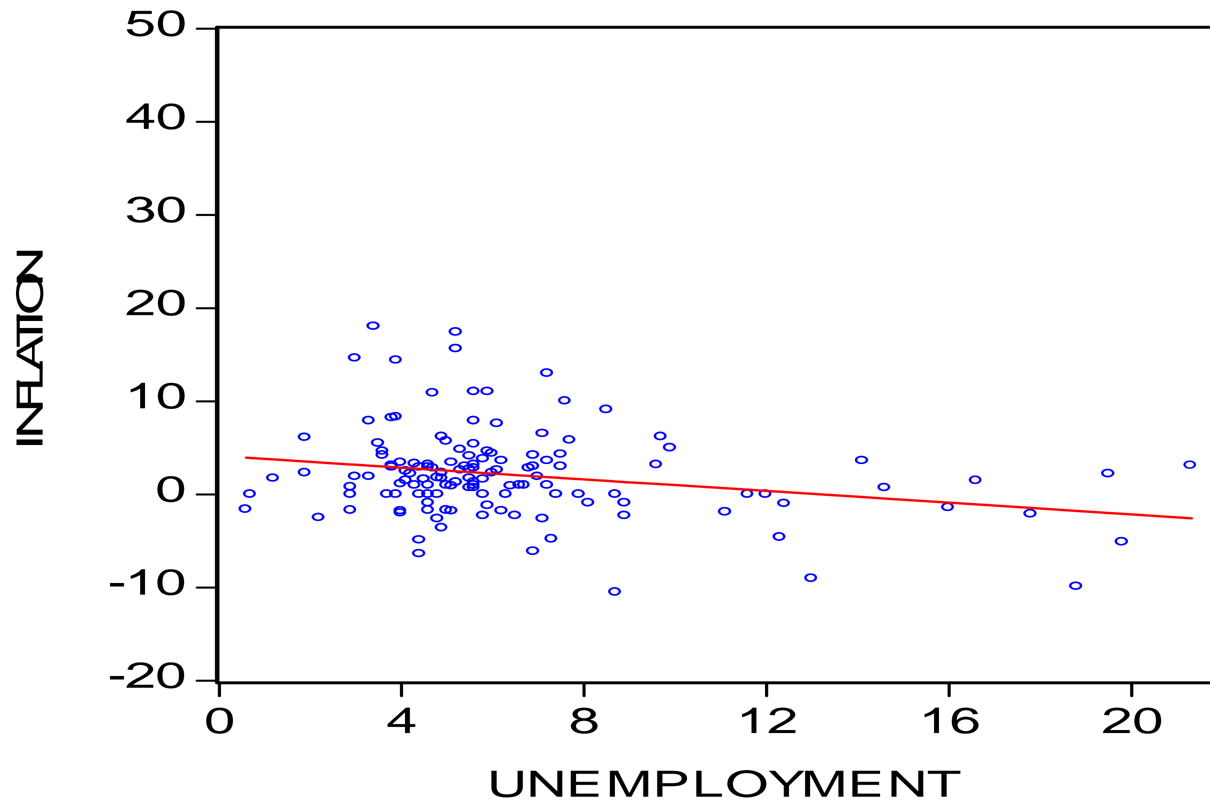
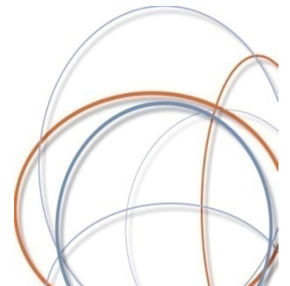
United States, 1871-2009



The same questions

- What data?
- What period?
- What model?



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Summary statistics of inflation, 1871-2009

	US	UK	Germany
Min	-10.5	-15.0	-11.0
Median	1.7	2.0	1.9
Mean	2.1	3.1	3.0
Max	18.0	22.5	49.0

Note: excluding 1921-24 for Germany

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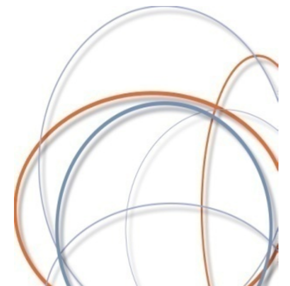
Fuzzy clustering shows 3 clear regimes

- 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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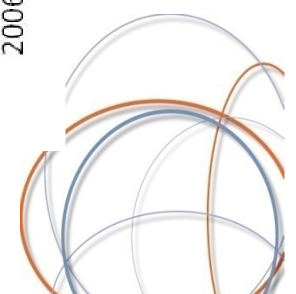
Cluster memberships, UK, 1871-2009

Memberships UK

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%

1871 1876 1881 1886 1891 1896 1901 1906 1911 1916 1921 1926 1931 1936 1941 1946 1951 1956 1961 1966 1971 1976 1981 1986 1991 1996 2001 2006

□ Steady □ Weak ■ Disruption



Judgement

- 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