

# **Economic Recessions under Capitalism**

Paul Ormerod

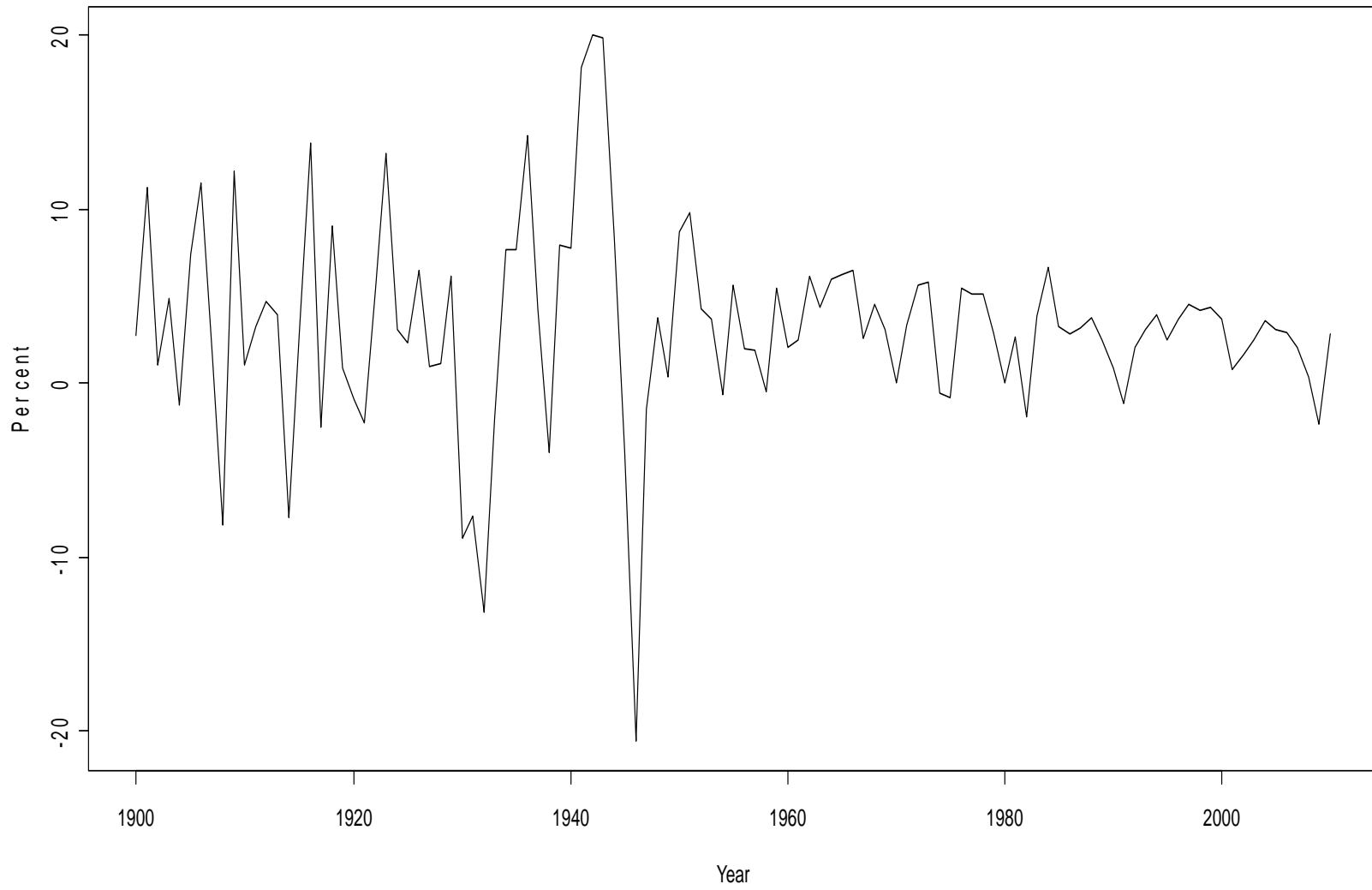
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Volterra Partners, London and University of  
Durham

# Overview

- Outline of the mainstream economic theory
- What are the key empirical features of recessions under capitalism which a scientific model should be able to explain?
- Thinking of the problem as one of coupled networks and narrative

Annual percentage change in real US GDP,1900-2010



# Dynamic stochastic general equilibrium (DSGE)

- Woodford, *Macroeconomics*, 2009; Tovar, *Bank for International Settlements*, 2008
- Oliver Blanchard, chief economist IMF, MIT Discussion Paper, **August 2008**, 'The State of Macro':
- 'For a long while after the explosion of macroeconomics in the 1970s, the field looked like a battlefield. Over time however, largely because facts do not go away, a largely shared vision both of fluctuations and of methodology has emerged..... *The state of macro is good*'
- 'DSGE models have become ubiquitous. Dozens of teams of researchers are involved in their construction. Nearly every central bank has one, or wants to have one. '

# DSGE (1)

- A single agent (the representative agent) represents the behaviour of the entire economy
- The agent maximises utility over time, choosing between consumption and leisure
- The agent has two decisions to make in every period
- how much of time to spend at work producing output (income) and how much to take in leisure
- how much of this output to allocate to investment, which will increase future levels of output, and how much to consume now

## DSGE (2)

- A temporary reduction in productivity today encourages the agent to work less now than in the future, because it will earn relatively more per hour in the future than it does today
- It may work sufficiently less for it to seem as if is unemployed
- But according to DSGE, it is actually a rational agent maximising its expected lifetime utility by choosing to minimise its working hours
- The Great Depression as an 'extended voluntary holiday' Krugman
- DSGE models introduce some market imperfections, but the above is the core of the theory

# The data

- Annual data on GDP growth, 17 countries, 1871-2010
- Angus Maddison, *Monitoring the World Economy 1820-1992*, OECD, Paris, 1995
- Quarterly data only exist after World War Two, and in many countries not until the 1960s or 1970s
- Recession is defined as periods when GDP growth is  $< 0$
- There are alternatives e.g. the period before GDP regains its previous peak level, but qualitatively the results are robust w.r.t. this
- P Ormerod, 'Risk, recessions and the resilience of the capitalist economies', *Risk Management*, 2010

# Empirical results overview

- Most recessions are very short – 70 per cent only last 1 year, 90 per cent no more than 2 years
- Capitalism is resilient – the recovery period is in general not dependent on the size of the recession
- The cumulative size of recessions has a very right-skew distribution
- The wait-time between recessions is also right-skewed
- Global recessions, when most countries are in recession, are comparatively rare
- Most recessions are *not* financial in origin
- Suggestions that financial recessions are rare and the Great Depression of the 1930s was unique
- A promising modelling approach is heterogeneous agents with cascades of sentiment on a network, to account for the majority of recessions



## How general is the experience?

- 17 countries. Is the distribution of the cumulative sizes of recessions in each country the same?
- 136 pair-wise Anderson-Darling tests of null hypothesis. Rejected at  $p = 0.05$  only 11 times
- Implies pooled data is homogeneously distributed
- It suggests that there are features which are common to recessions across countries, so in principle a general theoretical model can explain recessions
- certain aspects of the statistical analysis of the data would become more problematic if the pooled data contained heterogeneity across countries

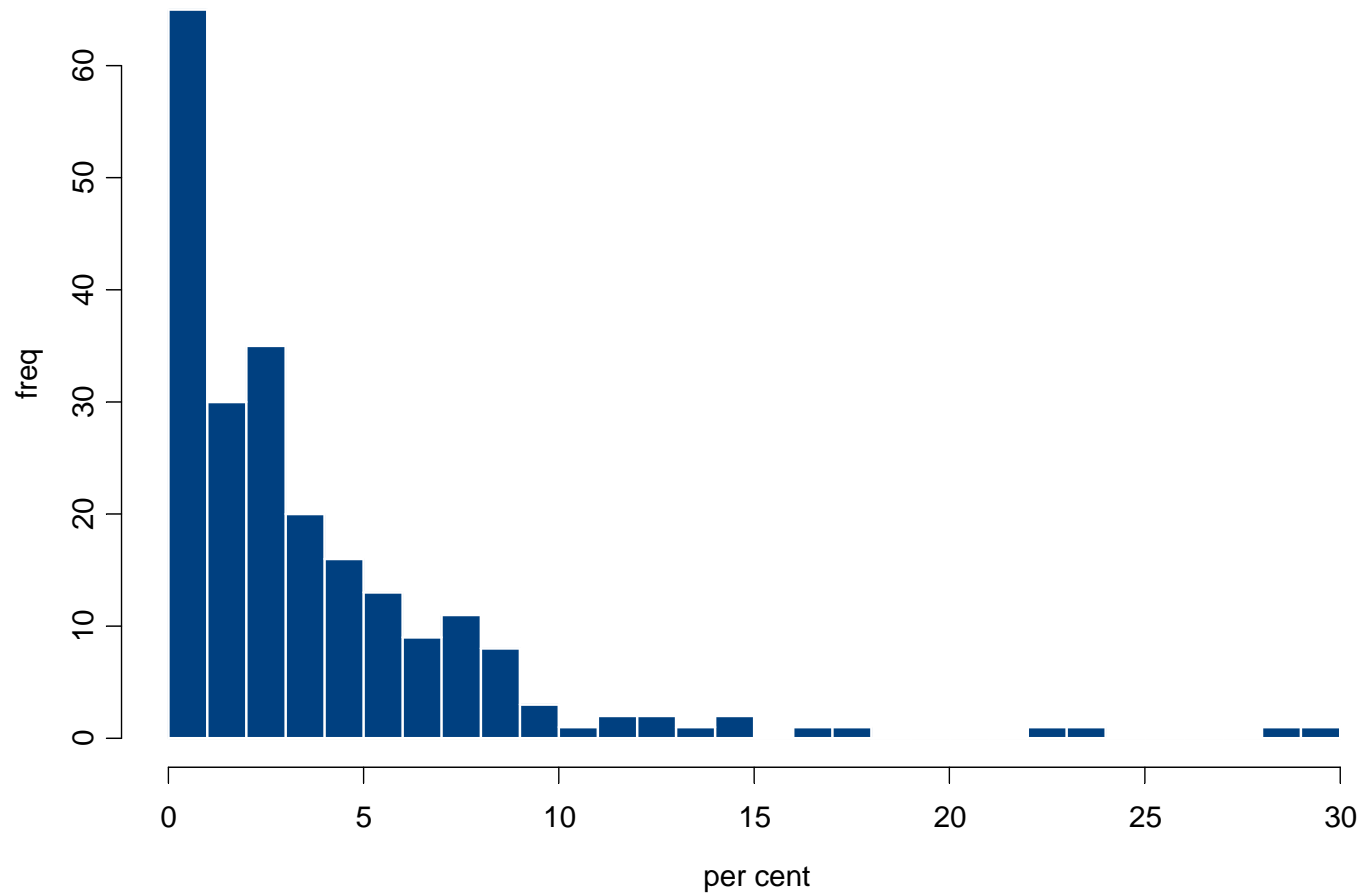
## Duration of recessions i.e. number of consecutive years in which real GDP growth is less than zero

- Number which last 1 year            175
- 2 years                                    63
- 3 years                                    20
- 4 years                                    6
- 5 years                                    5
- 6 years                                    1
- 7 years                                    1
- These experiences span a wide range of policy attitudes and institutional frameworks

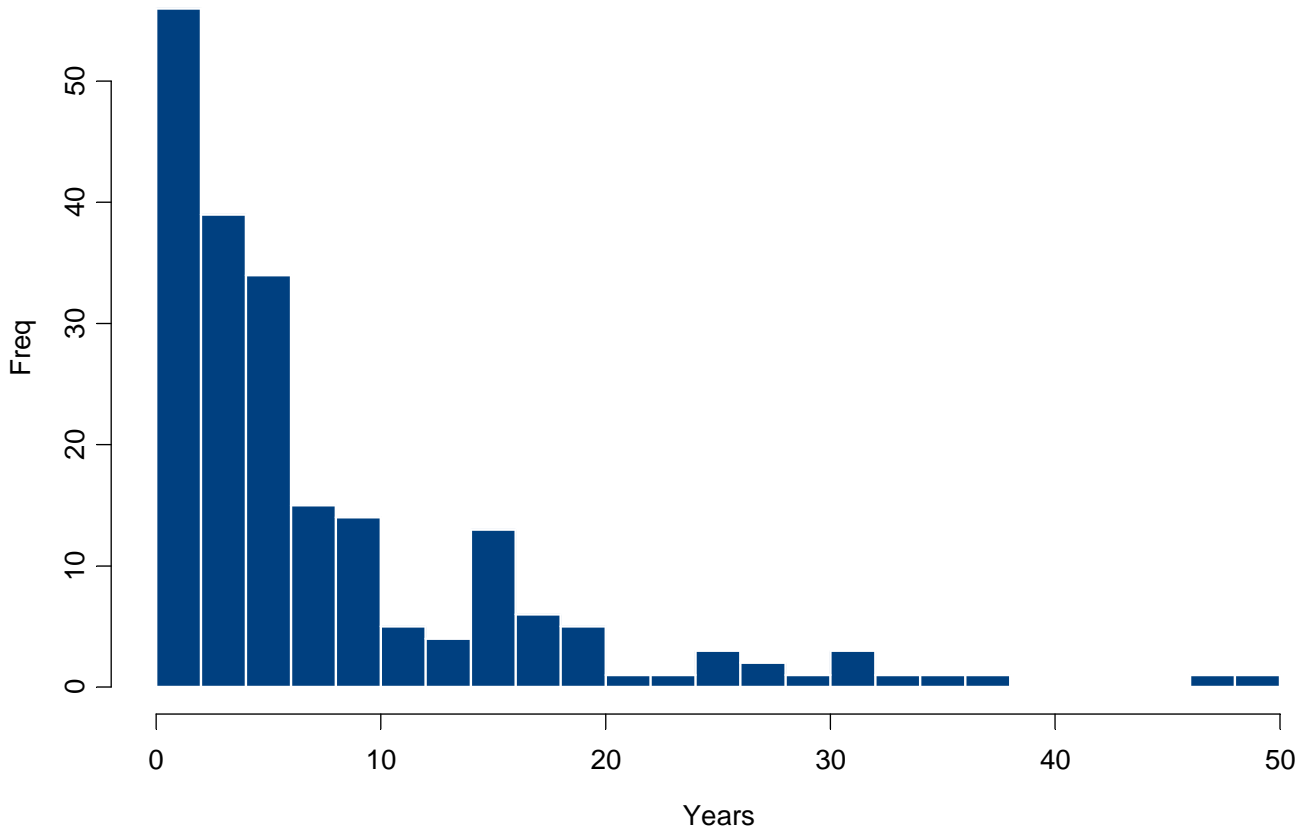
## Duration and size of initial shock

- Percentage lasting 1 year is the same if we split the sample into initial shock  $<$  and  $>$  1 per cent
- This is true for all shocks up to and including 6 per cent
- This accounts for more than 90 per cent of recessions

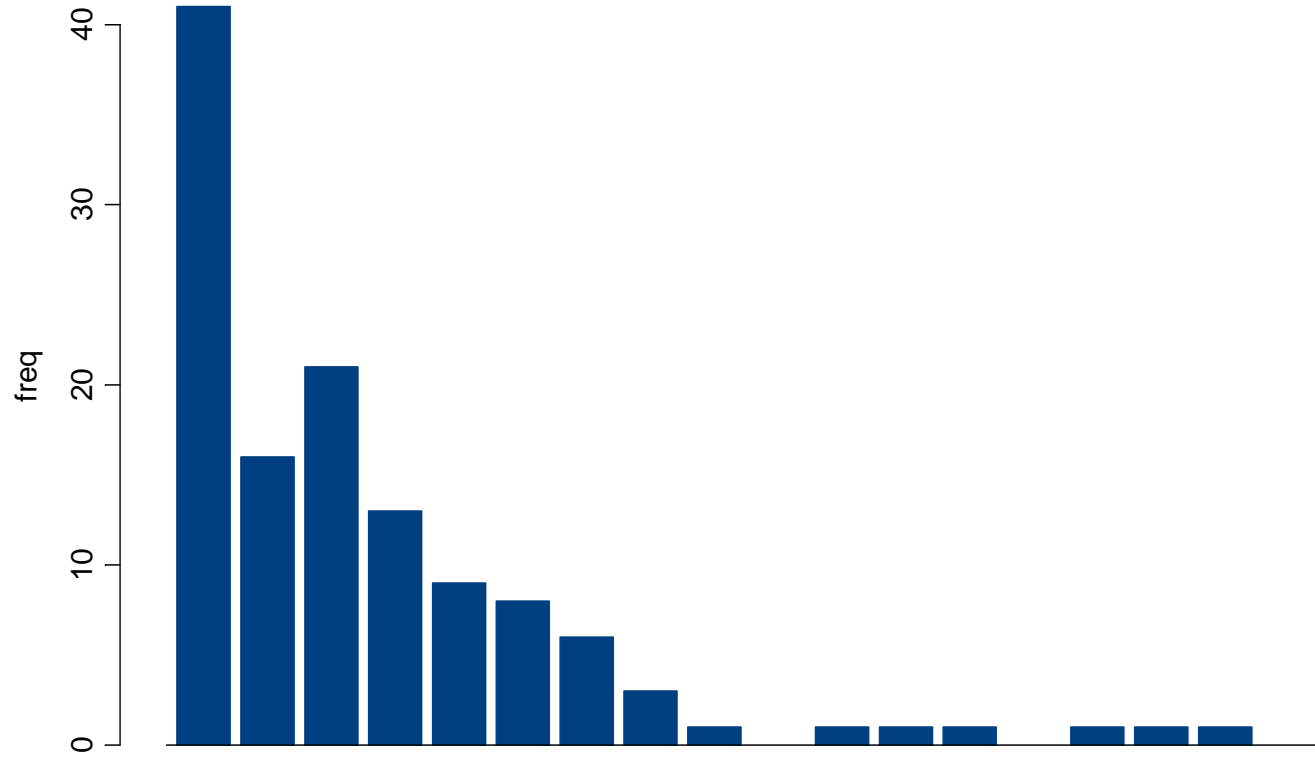
Cumulative fall in GDP, per cent, all recessions since 1871  
17 Western countries, excluding war years



Histogram of wait times in years between recessions in capitalist economic 1871-2010



Histogram of number of countries in recession in the same year  
17 countries 1871-2009 excl. war years



Number: 0 to 17

# Endogenous cascades on coupled networks

- Doyne Farmer, Mauro Gallegati, Cars Hommes, Alan Kirman, Paul Ormerod, Silvano Cincotti, Anxo Sanchez, and Dirk Helbing, 'A complex systems approach to constructing better models of the economy', *EPJ*, 2012, forthcoming
- Use ICT to identify structure of relevant networks at a point in time, and how they evolve over time e.g.
- Credit networks
- Financial markets
- Inter-firm transactions (a goal not a reality)
- Transactions by individual consumers
- Electronic text analysis to measure expectations and sentiment
- 'Early warning' analysis of memes/narratives which may get global traction

# Binary choice with externalities: a simple illustration of cascades

- T Schelling, *J Conflict Resolution*, 1973 ['I don't because the other guys don't!']; D Watts, *Proceedings of the National Academy of Sciences*, 2002
- Heterogeneous agents (fixed population) are connected on a network and can be in one of two states of the world (though this can be generalised to  $k$  states)
- Agents switch depending upon their individual threshold (propensity to switch) and the states of the world of their neighbours



