

'Networks: the Missing Link in the Policy Debate in Macroeconomics'

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Paul Ormerod

www.paulormerod.com



Overview

- Background
- How do we use networks to develop economic theory?
- Illustration of the impact of networks
- Networks, Keynes and macroeconomics

Mainstream macro before the crisis

- The dominant theme in macro since the 1980s was Real Business Cycles, developed into Dynamic Stochastic General Equilibrium (DSGE)
- The mainstream really did believe that the major problems of macro had been solved
- Robert Lucas, Presidential Address to American Economic Association 2003 “the central problem of depression-prevention [has] been solved, for all practical purposes”
- 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.”



J-C Trichet, Governor of ECB, Nov 2010

- When the crisis came, the serious limitations of existing economic and financial models immediately became apparent. Macro models failed to predict the crisis and seemed incapable of explaining what was happening to the economy in a convincing manner. As a policy-maker during the crisis, I found the available models of limited help. In fact, I would go further: in the face of the crisis, we felt abandoned by conventional tools.
- We need to develop complementary tools to improve the robustness of our overall framework. In this context, I would very much welcome inspiration from other disciplines: physics, engineering, psychology, biology.
- Bringing experts from these fields together with economists and central bankers is potentially very creative and valuable.
- Scientists have developed sophisticated tools for analysing complex dynamic systems in a rigorous way. These models have proved helpful in understanding many important but complex phenomena

The limits to the standard model

- **Vernon Smith:** ‘I urge students to read narrowly within economics, but widely in science. Within economics there is essentially only one model to be adapted to every application: optimization subject to constraints due to resource limitations, institutional rules and /or the behaviour of others, as in Cournot-Nash equilibria. *The economic literature is not the best place to find new inspiration beyond these traditional technical methods of modelling*’



Networks and agent behaviour

- 2 key assumptions of rational economic behaviour are 1) independence of agents 2) fixed tastes and preferences
- “the very act of consumer choice in social network markets is governed not just by the set of incentives described by conventional consumer demand theory, but by the choices of others in which an individual’s payoff is an explicit function of the actions of others.” Potts et al. *J Cultural Economics*, 2008
- Relax the two assumptions, so that 1) individuals can influence each other’s choices directly, rather than indirectly via the price mechanism 2) tastes and preferences evolve over time
- We can use network theory to specify the topology of the connections: who can influence who in any given context



Keynes *QJE* 1937

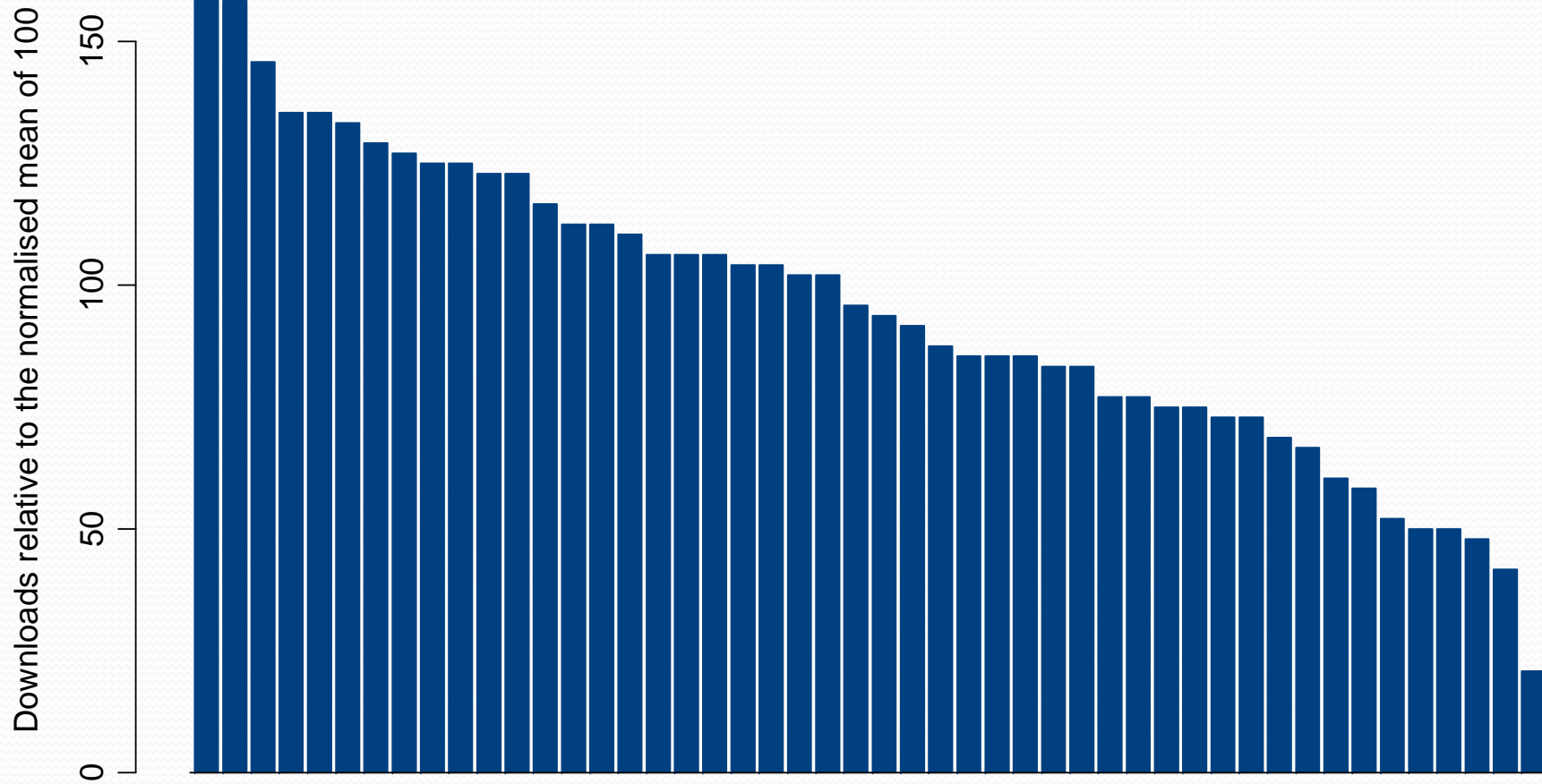
- ‘We have, as a rule, only the vaguest idea of any but the most direct consequences of our acts’
- ‘How do we manage in such circumstances to behave in a manner which saves our faces as rational economic men?’
 1. ‘we assume the present is a much more serviceable guide to the future than a candid examination of past experience would show it to have been hitherto’
 2. ‘we assume that the existing state of opinion is based on a correct summing up of future prospects, so we can accept it as such unless something new and relevant comes into the picture’
 3. ‘We endeavour to fall back on the judgement of the rest of the world... **The psychology of a society of individuals each of whom is endeavouring to copy the others** leads to what may be called a conventional judgement



The music download experiment: an example of copying

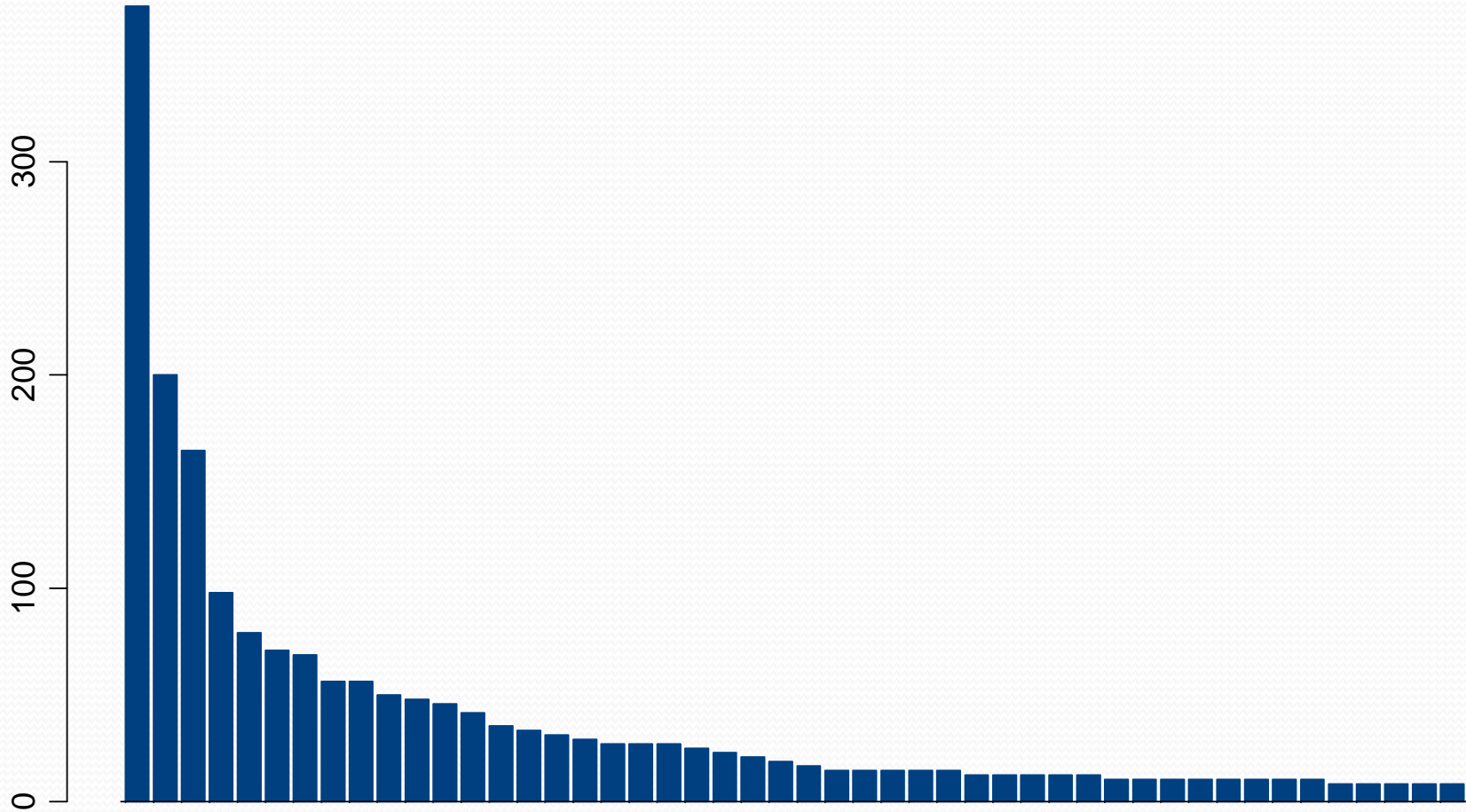
- Salganik, Dodds, Watts, 'Experimental study of inequality and unpredictability in an artificial cultural market', *Science*, 2006
- Students downloaded previously unknown songs either with or without knowledge of previous participants' choices
- This information was both ranked and unranked
- Students also gave the songs a rating

Number of downloads of each of the 48 songs No social influence

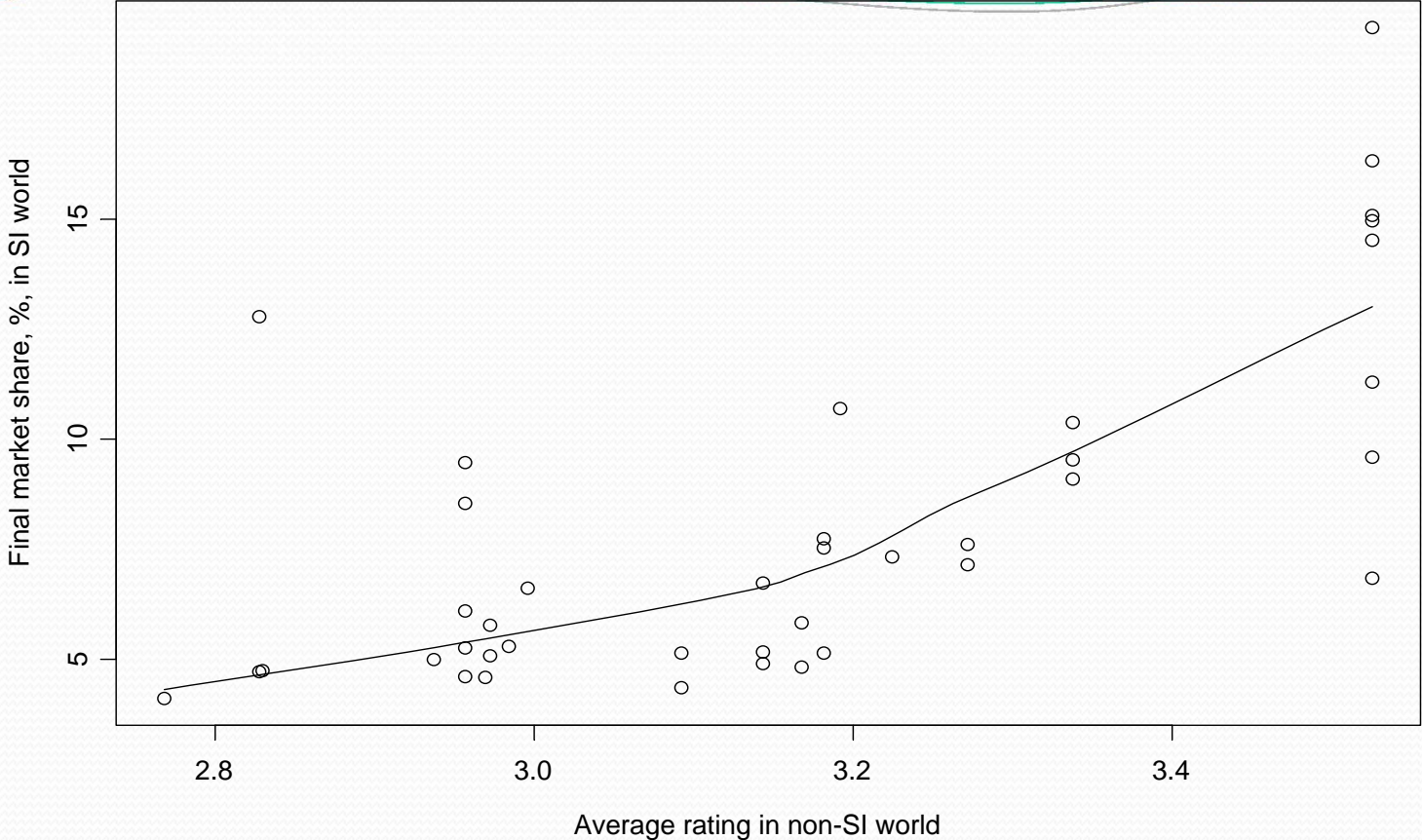


Number of downloads of each of the 48 songs Strong social influence

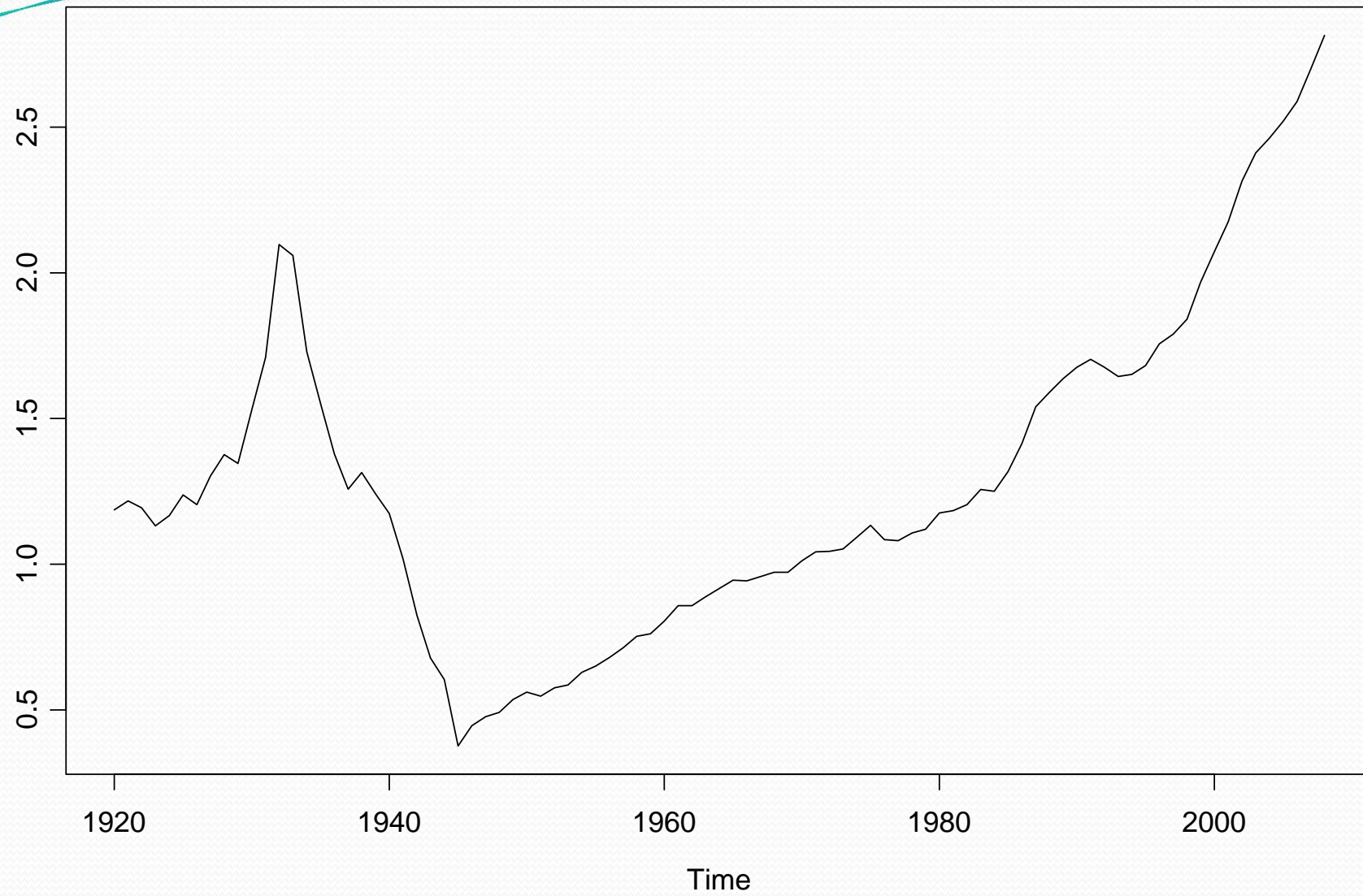
Downloads relative to the normalised mean of 100



Final market share in SI world and average rating non-SI world



Total private debt in America compared to the size of the economy



Keynes and expectations

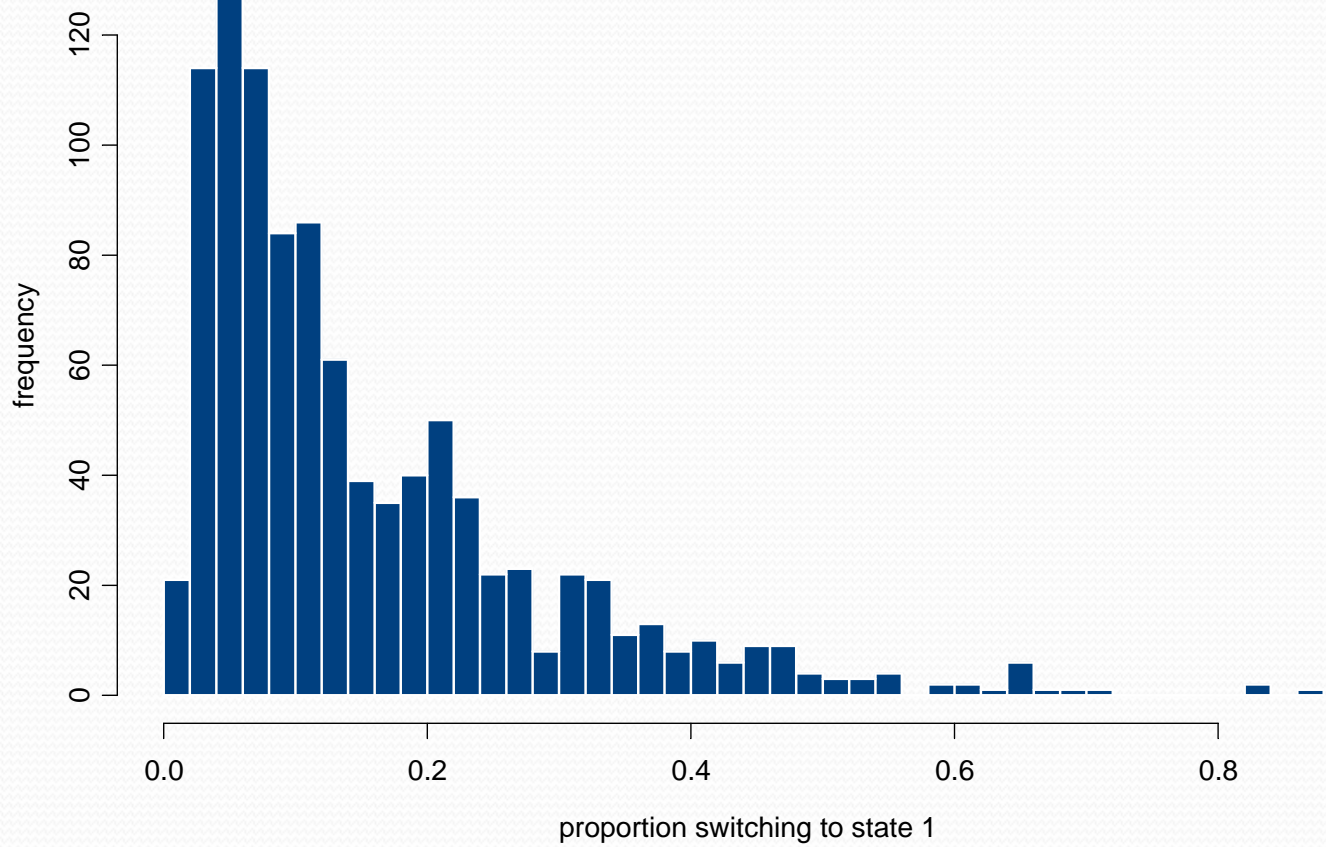
- Clear distinction between short-run (chapter 5 of the *General Theory*) and long-run expectations (chapter 12 ‘The State of Long Term Expectation’).
- Short-term expectations are formed by simple autoregressive rules
- Longer term are subject to inherent uncertainty
- (chapter 22) “the basis for such expectations is very precarious. Being based on shifting and unreliable evidence, they are subject to sudden and violent changes”
- Keynes refers to the “uncontrollable and disobedient psychology of the business world”; “waves of irrational psychology”; sentiment being generated as the “outcome of mass psychology of a large number of ignorant individuals”;
- In modern terminology, we have agents on a network which at any point in time are in one of k states of the world, where k is the degree of optimism/pessimism. There is some kind of threshold rule by which individual agents alter their state of the world according to the state of the world of their neighbours



Binary choice with externality

- Much of the agent based/network literature which focuses on the spread of ideas/behaviour, essentially involves ‘binary choice with externalities’ (Schelling , *J Conflict Resolution*, 1973, Watts, *Proceedings of the National Academy of Sciences*, 2002)
- Heterogeneous agents are connected on a network and can be in one of two states of the world
- Agents switch depending upon their individual threshold (propensity to switch) and the states of the world of their neighbours
- With this model, the process of ‘adoption’ of shared conceptions is essentially one of copying (imitation)
- A much more general version; Bentley, Ormerod, Batty, ‘Evolving social influence in large populations’, *Behavioral Ecology and Sociobiology*, 2011

Distribution of size of cascade: identical initial shock
1000 solutions, small world network



How big is the fiscal multiplier?

- No consensus despite decades of econometric research
- Laury, Lewis, Ormerod (*Nat Inst Ec Review*, 1978) for the UK, the range is 0.5 to 1.2
- Ramey (*J Ec Lit* 2011) range for the US is 0.8 to 1.5
- Barro and Redlick *QJE* 2011 argue it is even less
- Sentiment makes it very hard to estimate



Is Ricardian equivalence operating?

- In the 1930s, net saving by the private sector fell sharply
- In the recent financial crisis, it rose sharply
- Is this because of sentiment, of greater awareness of the potential consequences of public debt?



The Euro crisis

- This persists because no single narrative has succeeded in getting traction across the whole of the relevant network
- Until one does, whether it is that the Euro will be fine or that it will collapse, the situation will remain unresolved



Animal spirits are the key

- How do governments send signals which persuade the corporate sector to start spending the large surpluses which it has accumulated?
- Managing sentiment across networks is a very hard problem!