NETWORK ECONOMICS: HOW THE ECONOMY IS CHANGING DRAMATICALLY

Paul Ormerod
www.paulormerod.co.uk
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Themes

- How technology is changing the way we make decisions in the 21\textsuperscript{st} century
- Why network effects are now the main driver of behaviors
- Why most government policies are based on an obsolete model
- Why the financial crisis was caused by network effects
- Why “black swans” are much more frequent in a networked world
- How to detect and monitor the evolving strength of network effects on markets
- How different network effects imply different strategies
- Why “community management” of networks is now the key to corporate success
A policy maker’s perspective

- Jean-Claude Trichet, Governor ECB, November 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.
The world of the 21\textsuperscript{st} century

- In 1900, most of the world’s population lived in villages. Now, over half live in cities
- The internet is transforming the world like the printing press did in the 15\textsuperscript{th} century
- Consumers now face a stupendous proliferation of choice – over 10 billion – billion! – choices are available in New York City alone
- Many of these products are complex, hard to evaluate
- We are \textbf{far} more aware than ever before of the behaviour/opinions/choices of others
- Consumer tastes and preferences are not stable
- They evolve. Specifically, they evolve by copying what other people do
- Copying – ‘social influence’ – is now a key driver of behaviour
Decision fatigue
The music download experiment: an example of copying

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

Average rating in non-SI world

Final market share, %, in SI world

2.8 3.0 3.2 3.4

5 10 15
Two key empirical features

- Non-Gaussian distribution at a point in time
- Turnover in rankings within the distribution over time
Cultural evolution (1)

- Cultural evolutionary theory retains preferential attachment as the basis for individual decisions amongst alternatives.
- But it allows agents to innovate and select something which no agent has previously done before (Shennan and Wilkinson 2001, Lieberman et al. 2005, Bentley and Shennan 2007).
- Agents select amongst existing alternatives using preferential attachment with probability $(1 - \mu)$ and make an entirely new choice with probability $\mu$.
- There is a substantial amount of evidence from a variety of contexts that $\mu$ is small, not greater than 0.1 (for example, Eerkens 2000, Larsen 1961, Rogers 1962).
Cultural evolution (2)

- In the basic version of the model, the attributes of the various choices do not matter – agents are ‘neutral’ between them.
- The model is known for $m = 1$ and for $m = ‘all’$, where $m$ is the number of previous steps back an agent looks at i.e. how many previous decisions of other agents?
- $m$ can be allowed to take any value between 1 and all.
- Turnover in rankings is a natural feature of this model.
- As $\mu$ increases, the outcome becomes more egalitarian.
- As $m$ increase, the outcome becomes more egalitarian.
Agents copy very recent choices of others

(popularity vs. frequency)
Agents copy many past choices of others
Key questions

- How strong is social influence compared to product attributes (price/quality etc) in your market?
- Who influences whom?
- What is the *structure* of the influence network?
- Community management is the key to success
Footprints

- ‘Social influence’ leaves characteristic footprints in the data
- Different types of influence structure leave different footprints
- ‘Not all trappers wear fur hats’ Amarillo Slim, former World Poker Champion
- The number of people who follow you on Twitter, the number of people who read your blog may tell us very little about your actual influence
- The footprints we look for are patterns of connections, not the connections themselves
regular laptop
On-line survey: How many of your friends bought the same brand as you?

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<th></th>
<th>All or most</th>
<th>Few or none</th>
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<tr>
<td>High end laptop</td>
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*Source: GFK*
The implications of a social influence world

- The objective attributes of a product become less important
- The key is to identify who exercises influence and use the marketing strategy to target these people
- Combine Big Data with analytical results from network theory for marketing success