

Potential for using agent based modelling in government

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The views expressed in this presentation are those of the author and do not necessarily reflect UK government policy

“The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influence, are usually the slaves of some defunct economist.”

John Maynard Keynes

Outline



- **Areas where agent-based modelling could be valuable to government**
- **What policy makers need**
- **Alternatives and opportunities**

Better regulation

- **Government aims to reduce the burden of regulation on business – while still looking for greater compliance with more rules from a wider set of businesses**
- **Addressing regulation of SMEs in a range of environmental, health, workplace and other areas is critical, but traditional regulation is too expensive - for government and industry – and price mechanisms are often ineffective. For example, PMSU work on the fisheries industry where government regulation costs equal total industry profits, compliance is still low and industry contains thousands of mobile SMEs**
- **Research shows that SMEs and micro-enterprises have distinct behavioural characteristics. They do not act as “economic man” and issues of transaction cost, rigidities and local issues predominate**
- **Role for agent based modelling in testing mixes of instruments and approaches to “soft” and “hard” regulation – including role of social networks and compliance.**

Building new markets – choice and contestability



- Public service reform is an on-going government aim – increasing investment and changing the way services are delivered
- Key component of this in health, education and other areas is using various types of contestability and choice mechanisms to give incentives for performance and innovation, and allow best providers to expand.
- “Normal” market economics only provides a partial guide to how these systems will operate, as they involve a complex mix of financial and non-financial incentives, rules and objectives.
- Agent-based modelling could provide important system understanding in this area, allowing virtual pilots of different approaches
- Also applicable in emerging new markets for infrastructure and public good pricing: road pricing; energy efficiency permits; resource allocation permits etc.

Responsibility/Social networks

- In many areas future individual choices are the key determinant of the success of public policy e.g. health spending and healthy lifestyles
- No simple “social engineering solutions” but government realises the need to understand how to pro-actively balance rights and responsibilities of citizens (see PMSU Personal Responsibility Think Piece)
- Agent based modelling can provide new ways of thinking about social networks, influence and the dynamics of individual behaviour
- Agent-based approaches also have applications in looking at “negative networks” such as illegal drug use, extremism/terrorism, organised crime etc. Where responses to interventions are often poorly understood and unanticipated consequences are rife.

What Policy Makers Need

- Policy makers often want a “meta-understanding” not detailed modelling:
 - » “Stylised facts” based on other applications
 - » Thought experiments based on logical models
 - » Outlines of likely patterns or scenarios that may emerge
 - » “Bad practice” examples showing costs of not using these approaches
- In many areas discussions are dominated by (usually implicit) assumptions from economics and statistical approaches which have difficulty handling complex network based interactions (cause vs correlation debates)
- There is a need to provide simple theoretical models for government analysts (c.f. systems theory in the 5th Discipline) and relevant training
- Detailed numerical modelling will be useful – especially in generating real life examples – but often too slow and expensive to influence higher level decisions.

Alternatives to Agent-Based Modelling

- Gaming/Game Theory:
 - » Extensively used in MOD to generate force planning scenarios
 - » Could be a cheaper and quicker way of testing market structures – especially using commercial “gaming lab” approaches
 - » More understandable for senior decision makers?
 - » Game theory provides a rich set of stories to explain regulatory dynamics etc – added value of agent based modelling?

- Viral communication:
 - » Communication professionals are increasingly selling viral and bottom up communication and influencing approaches
 - » These are based on models of consumer behaviour – often fail to capture “citizen” aspects important to public policy

- Systems dynamics:
 - » Trend in using SD models in more agent based ways – often clunky fixes but providers exist to market them to HMG

Possible Ways Forward

Policy making systems have yet to absorb systems approaches – agent based modelling has a high hill to climb

- Theory and examples:
 - » Need a clear exposition of approach and how it complements insights from economics, game theory and systems theory
 - » Need to have a library of examples of where agent based modelling has added value – and where not using it has led to problems
- Link to gaming as a way in?
 - » Gaming and agent based approaches could be powerful complementary approaches – putting a human face on the models
- Simple robust tools and training
 - » Need a Vensim or Stella for agent based modelling – plus practitioners
 - » Develop training in the approach of systems training by Jake Chapman

It is better to be roughly right than precisely wrong

John Maynard Keynes

Further Information

All Strategy Unit reports and background papers can be found at www.strategy.gov.uk

Information on policy making methods can be found at www.policyhub.gov.uk

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