

# Roundtable on Cloud Computing (CC) Potential Research Topics

Neil Gandal (Tel Aviv University, CEPR)

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# Brief Background

- **Definition - CC** is Internet based computing, with services accessed directly over Internet.
- **Three Layers (Economist 1.1.11):**
  - SaaS (Software as a Service) - 'web based' applications (like Gmail) - \$ 11.7 Billion
  - PaaS (Platform...) - essentially an OS in cloud (Microsoft, Google), which has in house or 3<sup>rd</sup> party applications - \$ 311 Million
  - IaaS (Infrastructure...) number crunching + data storage and management services (computer servers) - Amazon 80%-90% - \$ 1 Billion

# Important Research Topics

- **Platform Competition in the Cloud**
  - Cloud computing will usher in a new generation of 'platform competition.'
  - Network Effects, Compatibility, & Standards will be important in determining how competition evolves
- **Economics of Cloud Security**
  - Question of optimal information security policies has attracted the attention of academics, corporations, and nation states.
  - How will change to public cloud computing affect the "robustness" of the electronic society?

# Platform Competition in Cloud

- Revenues predicted to increase from \$13 Billion in 2010 to \$56 Billion in 2020
- IaaS (LOW-cost, large-scale data storage and data management in remote servers) will grow only to \$4 Billion by 2020
- Both SaaS (web based applications) and PaaS (platform + applications) expected to experience huge growth
- The way 'platform' competition plays out in the cloud will have a major affect on information technology industry

# Platform Competition in Cloud

- Microsoft and Google both have virtual operating systems (platforms)
- Microsoft Azure and Google AppEngine
- Both have office software applications in cloud.
- Platform Competition in Cloud will be affected by:
  - In house vs. 3<sup>rd</sup> party applications
  - Other Platforms - Glide - its 'cloud' applications run on all major desktop platforms
  - Compatibility between Cloud and on-premise OS

# Economics of Cloud Security

- Economics of information security has become an important research area. Why?
- Information security breaches often due to the absence of appropriate incentives, rather than lack of technological solutions
- Example: suboptimal investment in security (Anderson, 2006)
- Workshop on the Economics of Information security (WEIS) - annual meetings
- Interdisciplinary research essential

# Economics of Cloud Security

- Shift from in-house (local or private cloud) computing and “public” cloud computing changes incentives.
- Public clouds may have different 'security' incentives than firms working in-house
- Industrial Organization of the Cloud industry will likely affect security incentives
- Attacker incentives will also be affected
- How will change to public cloud computing affect the resilience to electronic society to catastrophes (either natural or intentional ones)?