Seminar

Addressing Information Gaps in Business and Macro-Economic Accounts to Better Explain Economic Performance

New York, 23 – 24 June 2008
United Nations, Conference room C

Public sector intellectual property
Innovation and intellectual property
Martin Fleming
Innovation and Intellectual Property

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June 24, 2008
High Level Summary

- The economics of business have fundamentally changed
- Global economic transformation brings increased market size, service sector development and emergence of open source software
- Early evidence suggests that IP assets are priced in alignment with the products they support
# Five Historical Waves of Economic & Social Transformation

<table>
<thead>
<tr>
<th>Wave</th>
<th>Period</th>
<th>Events</th>
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<tbody>
<tr>
<td>1. The Industrial Revolution</td>
<td>1771-1829</td>
<td>Panic 1797, • Formation of Mfg. industry, • Repeal of Corn Laws opening trade</td>
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<tr>
<td>2. Age of Steam and Railways</td>
<td>1829-1873</td>
<td>Panic 1847, • Standards on gauge, time, • Catalog sales companies, • Economies of scale</td>
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<td>3. Age of Steel, Electricity and Heavy Engineering</td>
<td>1875-1920</td>
<td>Depression 1893, • Urban development, • Support for interventionism</td>
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<td>4. Age of Oil, Automobiles and Mass Production</td>
<td>1908-1974</td>
<td>Crash 1929, • Build-out of Interstate highways, • IMF, World Bank, BIS</td>
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Since 2000 Global Gains in GDP Growth have been Driven by End-Users of Technology

Sources of Worldwide GDP Growth

- **ICT Capital**
- **Non-ICT Capital**
- **Labor Hours**
- **Labor Quality**
- **Total Factor Productivity**

In the *Wealth of Nations*, Adam Smith shows that specialization in “The Pin Factory” depends on the size of the market.

- A visit to a 1776 pin factory shows a process under one roof in which the unschooled worker, with no access to its special machines, would be lucky to turn out a single pin a day.

- With specialization, ten to fifteen men can make twelve pounds in a day.
  - There may be 4,000 pins to a pound; therefore ten men can make 48,000 pins a day, or nearly 5,000 pins apiece. Every two weeks; a million pins.

- Because the business must cover its fixed costs, the extent of the market, the scale of the business, and how much the business can sell determines the degree of specialization.

- To Adam Smith, this had mainly to do with transportation costs.

- “The division of labor is limited by the extent of the market.”

*Source: David Warsh; Knowledge and the Wealth of Nations, A Story of Economic Discovery; (W.W. Norton & Company, New York, 2006)*
Industry Transformation in Response to Economic Pressures Drives Productivity Growth

US Industries 1977 - 2001

Relative Prices

Productivity

-10% -5% 0% 5% 10% 15% 20%

Create National Service Innovation Roadmaps

<table>
<thead>
<tr>
<th>Emerging Demand</th>
<th>Define the Domain</th>
<th>Vision and Gaps</th>
<th>Bridge the Gaps</th>
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<tr>
<td><strong>Service Innovation</strong></td>
<td><strong>Service Systems</strong></td>
<td><strong>Service Science</strong></td>
<td><strong>Stakeholder Priorities</strong></td>
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<tr>
<td>▪ Growth in service GDP and jobs</td>
<td>▪ Customer interactions enabling value creation</td>
<td>▪ Discover principles of complex service systems</td>
<td>▪ Education</td>
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<tr>
<td>▪ Service quality &amp; productivity</td>
<td>▪ Dynamic configurations of resources</td>
<td>▪ Systematically create, scale and improve systems</td>
<td>▪ Research</td>
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<tr>
<td>▪ Sustainability</td>
<td>▪ Increasing scale, complexity and connectedness of service systems</td>
<td>▪ Foundations laid by existing disciplines</td>
<td>▪ Business</td>
</tr>
<tr>
<td>▪ Demographics</td>
<td>▪ Service Networks</td>
<td>▪ Progress in academic studies and practical tools</td>
<td>▪ Government</td>
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<td>▪ Globalization</td>
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<tr>
<td>▪ Opportunities for businesses, governments and individuals</td>
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The Sum of Community Innovations with the Linux Operating System far exceed what any Single Vendor could create

- Leverage investment to meet unique needs
  - Share investments within company
  - Invest for particular products

- Investments are matched many times over
  - Development model is not free
  - Small investments can be highly leveraged
  - Multiple hierarchies of leverage

- Enterprise Linux Investments
  - IBM, Intel, HP, Red Hat, Novell, and many more

- Academia, Research

- Tailored Industry Investment

- Hobbyist Investment
The Intellectual Property Landscape

**OPEN**
- Collaboration
- Interoperability

**PROPRIETARY**
- Closed
- Income and Royalties

A Spectrum of Collaboration and Competition

- Open Standards and Open Source
- Patent Pledges and Commons
- Royalty Income
- Exclusive Use
Open Collaborative Research Program Success

More than 20 Scientific Publications

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<th>IPCO 2008</th>
<th>VLDB 2007</th>
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<tr>
<td>The 13th Conference on Integer Programming and Combinatorial Optimization</td>
<td>ACM/IEEE International Conference on Software Engineering (ICSE)</td>
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</table>

12+ Open Source Contributions

- COIN-OR
- eclipse
- WALA

Talent Pipeline / Recruiting

- PhD pipeline
- Faculty as academic visitors to IBM research
- Research Staff Member hiring

Improved Collaborations

- New partnerships
- Improved efficiency
The Determination Of Pricing In An Intellectual Property Marketplace
Database Of IP Transactions Established In 1999, Containing 4823 Observations Of Which 350 Licensed PC Patent Rights

### Payment Types
- **Fixed Payment**: 87%
- **Royalty Bearing**: 13%

### Transaction Types
- **Grant Patent Rights**: 93%
- **Cross License**: 6%
- **Grant Technology Rights**: 1%

### Geography
- **European Union**: 50%
- **Asia Pacific**: 34%
- **Latin America**: 2%
- **North America**: 14%

### Patent Intensity
- **Low**: 75%
- **Medium**: 22%
- **High**: 3%
Price Index

- PC intellectual property hedonic price index is broadly consistent with technology and end product price trends.
- Calculating the average annual quality-adjusted price percent change of -12.3%

Price Index

*PC intellectual property hedonic price index resembles the hedonic price index for the operating systems category.*

Summary of Innovation and Intellectual Property

- Historic transformation underway in the use of technology in new business models and operations.
- Increased competitiveness is driving innovation and industry transformation.
- Innovation and emerging business opportunities increasing exploit intellectual property assets.
- Intellectual Property prices track price trends of final product – not labor rates or other input costs.