

The Venturesome Economy

How Innovation Sustains Prosperity in a More Connected World

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Introductory Remarks (Apéritif)

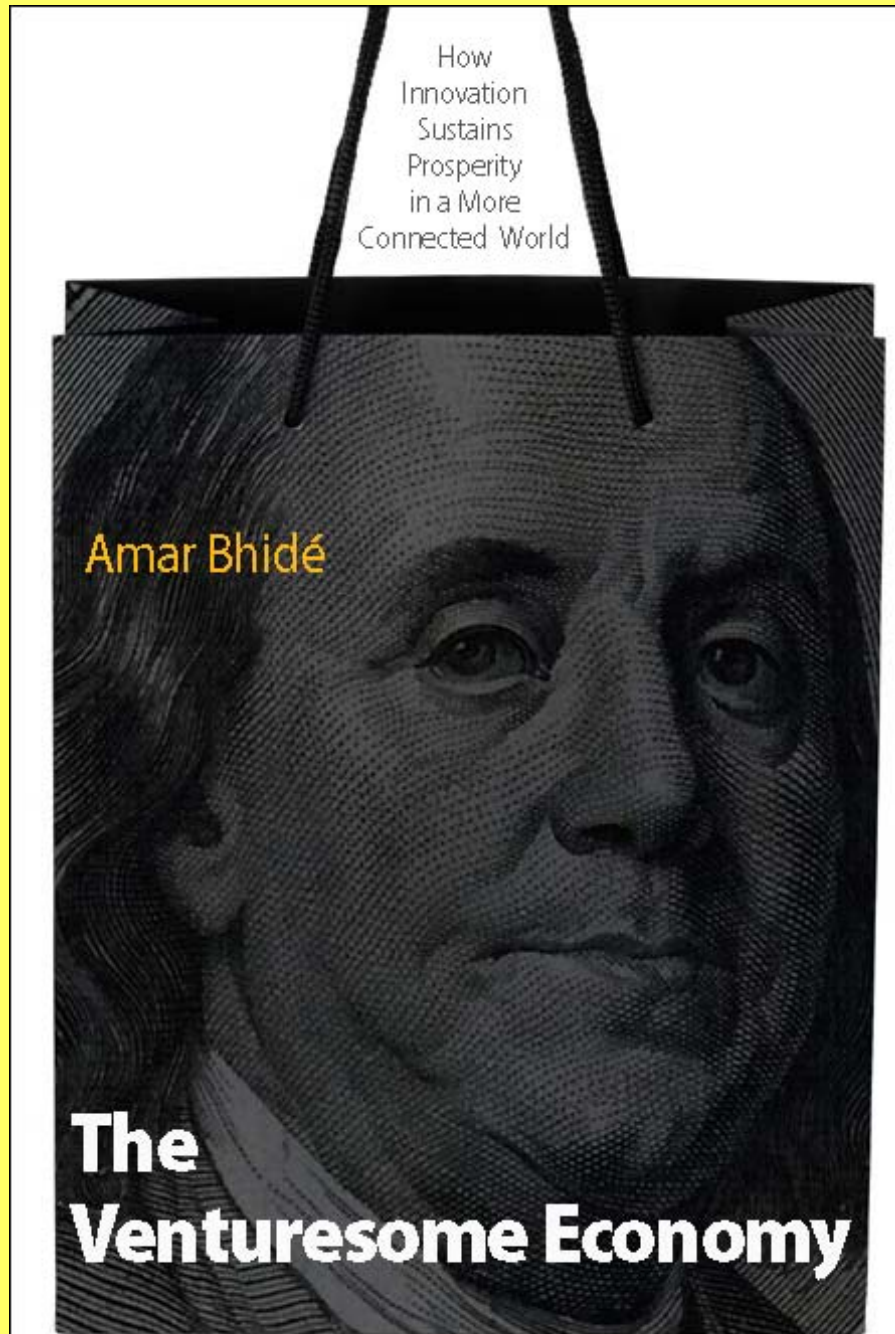
The financial crisis?

Hold that thought!

Globalization, China, India old hat

What's New?

Cover?



Optimistic story, with novel twists:

Improvement in domestic activity, not exports

Critique of techno-nationalism, not protectionism



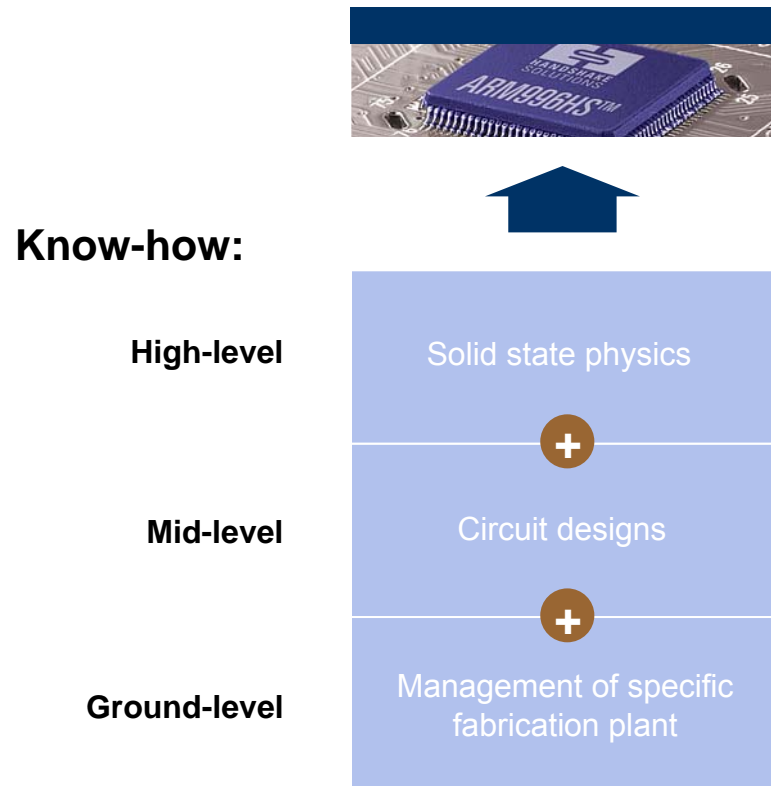
Common law-style enquiry

- ⇒ Emerged from in-depth study of 106 VC-backed businesses
- ⇒ Realities of modern economy and technostucture

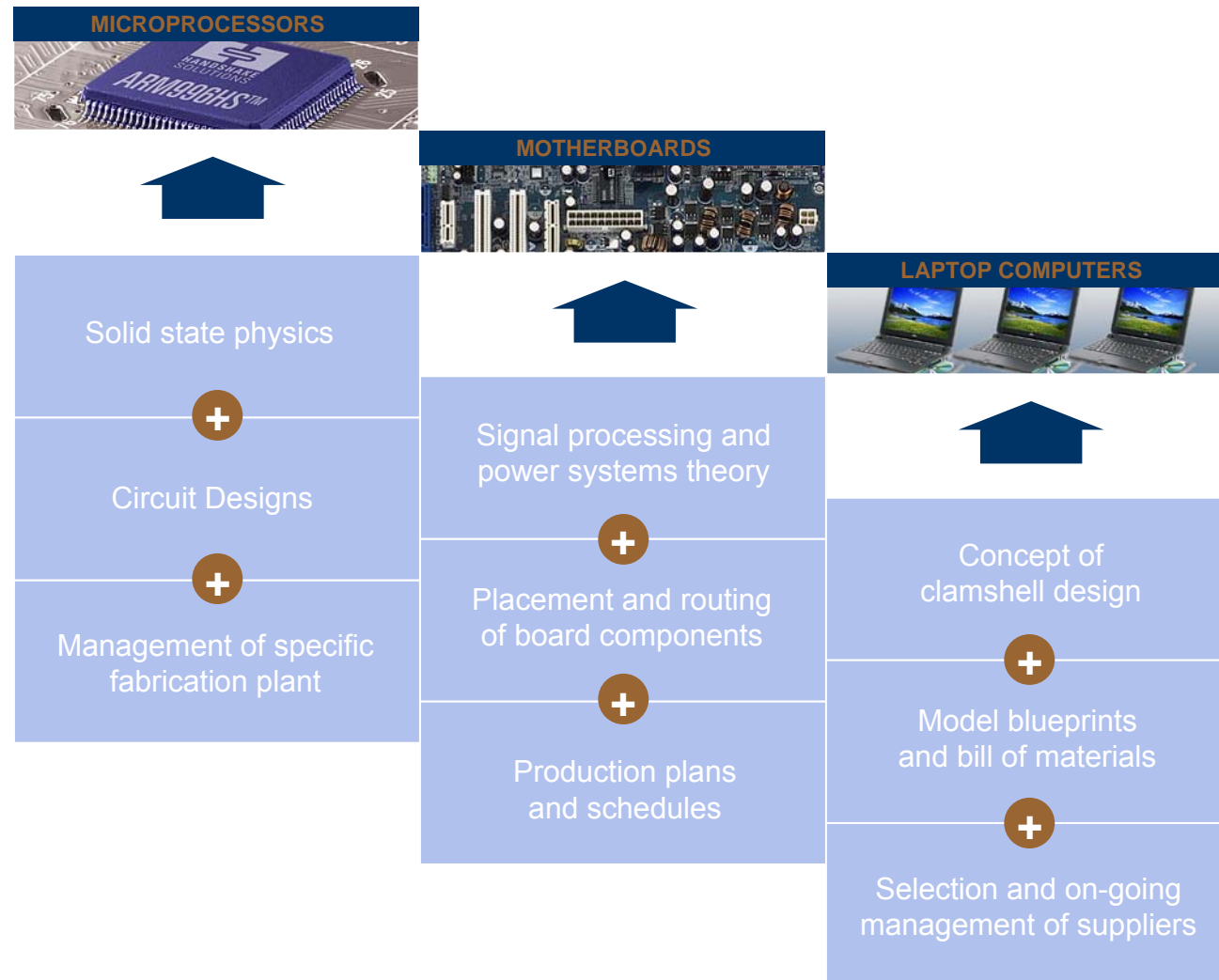
Crucial modern reality: Massively multi-player innovation game

Development and effective use of new products
(or services) requires...

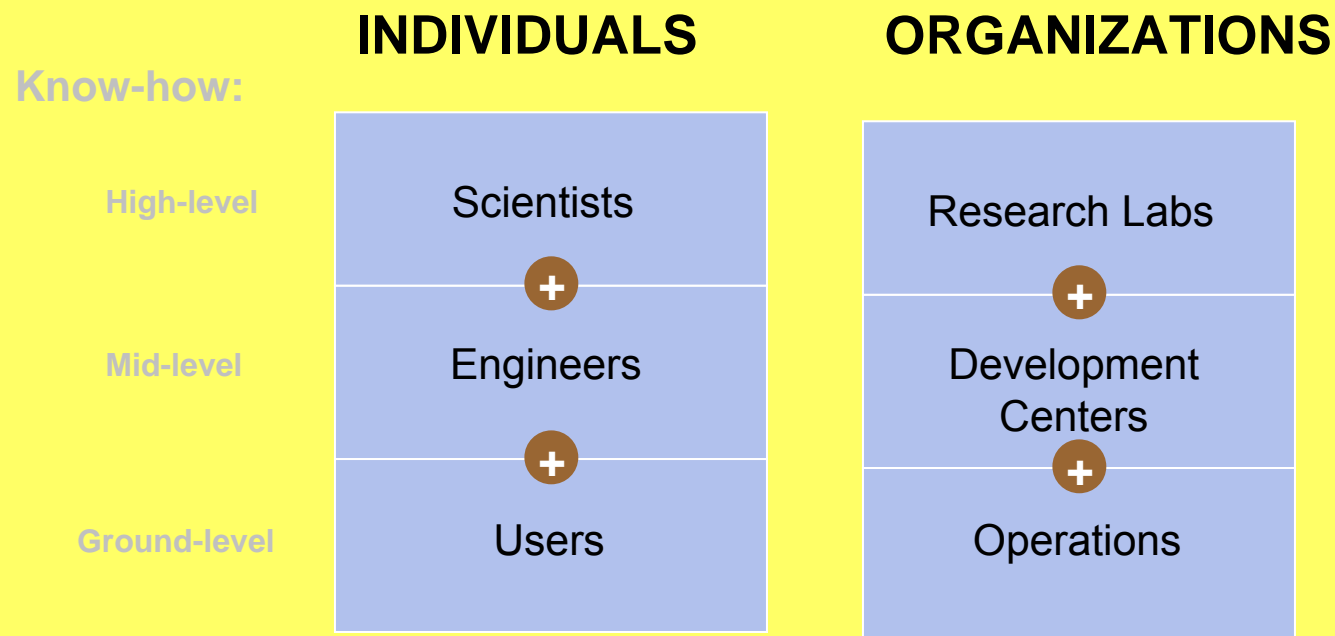
...multi-level technical know-how



...multi-level product development



...specialization of individuals and organizations (“multi-player)..

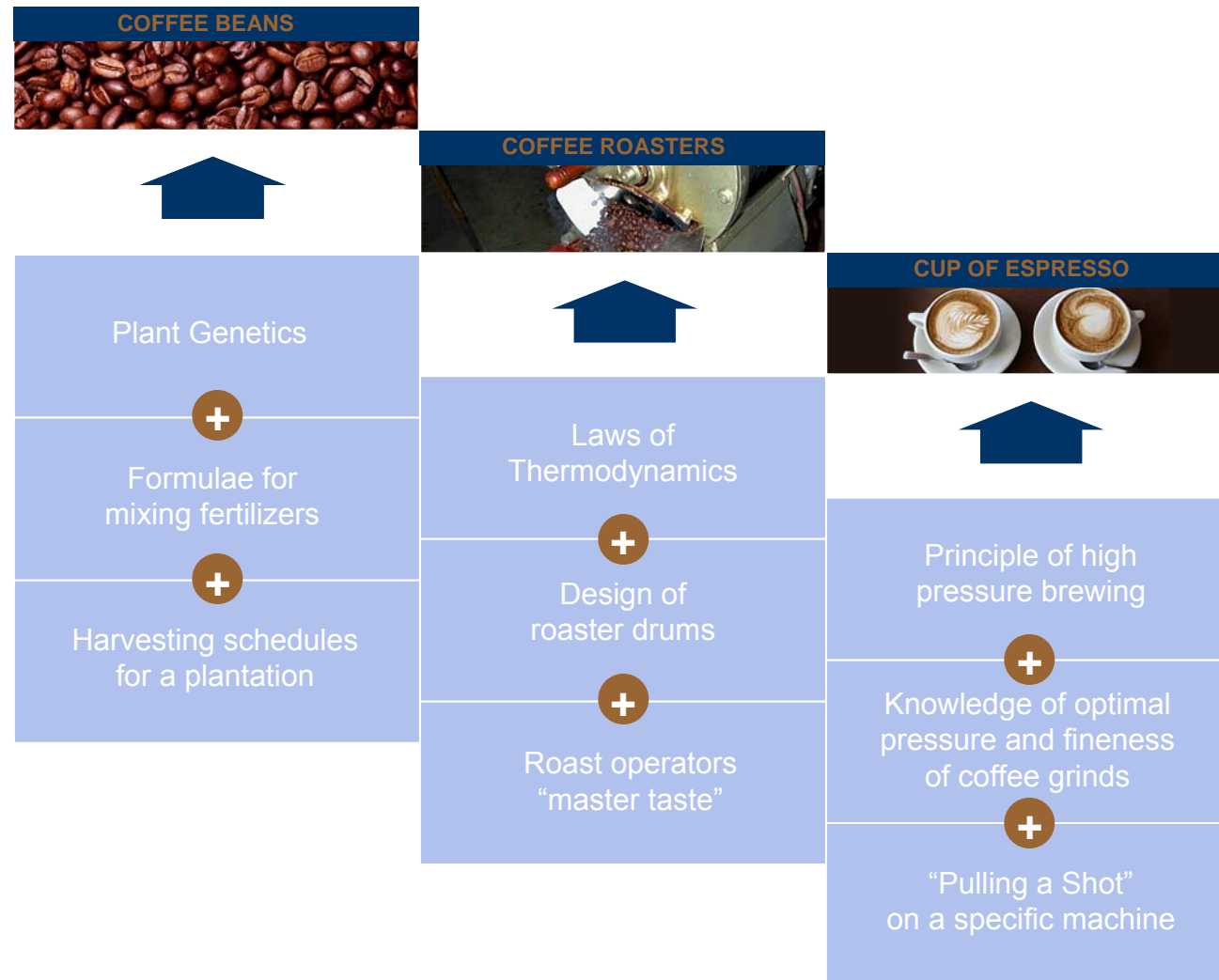


...technological advances complemented by new:

Sales and Marketing practices

Managerial and “business model” innovations

Levels Of Innovation For Know-how And Products II



Today's Talk (table d'hôte)

I. Field-based view of innovation and globalization

- a) How VC-backed businesses innovate
- b) Extent and nature of cross border engagements

II. The big-picture – why the 'North':

- a) Should embrace not fear catch-up (the erosion of its 'lead')
- b) Avoid techno-nationalist prescriptions

Ia. How VC-backed businesses innovate

Mid-level know-how

- ⇒ Start with high-level know-how from lab or inventor
- ⇒ Rely on distributors and customers to develop ground-level know-how
- ⇒ Technical and non-technical

Two-thirds developed mid-level products (e.g. enterprise software)

Provide services or serve service function, regardless of level.

Nature of process

Iterative (“trial and error”)

Interactive (on-line vs. off-line)

⇒ Especially for mid-level innovators

Rapid

Big-picture implications

Research in China and India increases inputs
available for mid-level innovators

Role of users, especially in mid-level innovation

Ib. Cross-border interactions – cautious voyagers

Some poster-children of globalization:

⇒ *Odyssey Logistics*

⇒ *eSilicon*

Exceptions, not the rule

Limited cross-border marketing

61% of companies derived 10% or less of revenues from international; 4% of companies > 50%

Domestic focus facilitates iterative development

“We need to touch and feel every customer and get a detailed understanding of exactly how they are using the product and its other potential applications. We need to hear off-the-cuff remarks—they can reveal a great deal. Ideally, I want people who are a bicycle ride away.”

Iterative development (cont.)

“When you are getting your initial product out, you want to be right there on the customer site, helping the deployment and learning about missing features so you can feed that back into your product and sales pitch. Unless you can establish a repeatable sales process in your backyard, it’s very challenging and risky to go anywhere else.”

Reasons for continued domestic market focus

Uncertainty about suitability of 'combination match'

Costs: Localization + sales & distribution +
management

Striking variations by type of markets served

Median international sales low for mid- and ground level..

⇒ High-level: 30 percent

⇒ Mid-level: 10 percent

⇒ Ground-level: 0 percent

... And for service companies

⇒ Manufacturing: 65 percent

⇒ Service industries or functions: 0 percent

Uncertainty and costs affect market choices; favor:

English speaking countries + countries where
English is widely spoken

Technologically advanced countries

⇒ India and China are still struggling with trying to cover their basic needs. They are a long way from getting to the problems that our products solve, and I don't think they will get there for another 50 years.

Europe over Japan

Europe over Japan – time zones, travel time & culture

“Japan is a completely different business culture. I cannot go fix up a robot in Japan without my senior contact knowing about it, even though it may not concern him, and his technical personnel may be perfectly capable of handling it. In the U.S. or in Europe, if a service guy gets a call that says a machine is broken, he goes directly to the factory, takes out his tool kit, and fixes the thing.”

Europe over Japan (cont)

“In Japan, you call Hiro San, you apologize profusely for the machine not working. You assure him time and time again that this is not a sign of flawed design, that you have looked into the problem, and you found that this is the first time it has happened, and that you have all the personnel and the knowledge needed to fix it. You promise that you will keep him posted and secure his blessing. Then you go and fix the machine. Then you call him back and explain to him what happened and why it won't happen again. You give him your cell phone number, you give him your home number, and you tell him that if he has any questions, he can call you at any time. Of course he would never do that. But you have to tell him that.

Big-picture implications

Mid-level/service innovations more “optimized” to local markets than high-level products or know-how

Sales, marketing and support costs play a crucial role in realizing the value of innovations

Offshoring: limited for core development

24 had some form of offshoring activity from own offices.

⇒ 11 for core product development (vs. ancillary subcomponents or software testing).

40 with offshoring relationships

⇒ 8 to develop core products or components of core products.

Development at home facilitates dialogue with customers

All our customers are now based in the U.S., and it's very important that the people who are developing our software are in regular communication with our customers... They need to be visiting the customers' physical locations, see how the software is being used by talking to end users, and use that knowledge to design new features and capabilities”

Dialogue with customers (cont.)

“You have to tell the people offshore exactly what you want. Programmers in the U.S. can figure things out for themselves, because they’re involved in developing the prototype; they go to customer meetings, and they understand the underlying business process. Offshore programmers are one step removed.”

...and with sales and marketing staff

“It’s not just the time difference and language barrier of dealing with a country like India. You also struggle with communication in the same country, even in the same location, because engineers speak a different language from salespeople and product-marketing people. Even with everybody being American, if you have a development center somewhere in the middle of the U.S. and the rest of the team in California, you really run into problems. You want people right next to you, not in India or Alabama.”

Partitioning problems: Complexity + rapid response favors co-location of *all* development staff

We often don't know what we want until the day before we do it. There are many spontaneous "Ahas!" in our technical development... There are a lot of moving parts, and there isn't a clear roadmap.

"Our iteration cycle has to be very, very fast. If we get a request from a customer, we have to respond very quickly."

...And that's not all..

Management constraints

Not any faster – Brooks's Law

Less than suitable supply

Other activities (e.g. QA) less problematic

Broader implications: Offshoring not imminent threat

Large-scale offshoring of core mid-level innovation unlikely.

Greater offshoring of testing (and other activities that are “well suited”) desirable

Ila: Embrace or Resist?

Cross-border interactions increasing even if
pace and current extent exaggerated

Inevitably “Northern” share of high level know-
how will decline

Techno-Nationalistic view: Lead or Lose

Equate national prosperity with international leadership in high-level science and technology

Techno-Nationalistic view: Lead or Lose

Example: Richard Freeman

“Leadership in science and technology gives the US its comparative advantage [and] contributes substantially to economic success.

“By increasing the number of scientists and engineers ...low income countries like China and India can compete with the US in technically advanced industries..

Richard Freeman (cont.)

The “loss of technological superiority overall is likely to be disastrous for U.S. workers and firms.”

Evidence of 'decline'

Science and engineering PhDs

Publications, citations patents, bachelors degrees

Large increase in outward R&D investment

⇒ 50< MNC research facilities in China in 1997; >500
2004

European View

Gordon Brown (2006)

- ⇒ China and India had 4 million graduates a year to Britain's 400,000 as well as more computer scientists and engineers
- ⇒ Every advanced industrial country knows that falling behind in science means falling behind in commerce and prosperity

European Council: Lisbon agenda

- ⇒ The EU invests less of its GDP in research and development than its main competitors
- ⇒ Insufficient scientists and researchers—5.3 per 1000 in the workforce compared to 9 per 1000 in the U.S. and 9.7 per 1000 in Japan

Puzzle:

Why has the US maintained (or possibly expanded) its productivity and per capita income lead while the EU and Japan have increased their shares of PhDs, scientific articles etc.?

Hypothesis: Techno-nationalism and North-South models ignore crucial features of modern technostructure

Why reduced share of high-level research doesn't harm

Value appropriated by innovators small –
consumers capture most of the surplus

Massive unbundling of manufacturing and
innovation (going on for decades)

⇒ Great high-level research rarely creates much domestic
value-added

⇒ Assumption that only final goods traded false

***But why is more China/India research good for
the North?***

1. High-level innovations more mobile.

More offshore high-level research

- ⇒ Provides more raw material for lower level innovations
- ⇒ Encourages local innovators to exploit comparative advantage (in developing and marketing) lower level innovations
- ⇒ Increasing domestic consumer surplus

Productivity/wages domestic workforce?

2. Growth of Service Economy

Everything isn't becoming globally traded; offsetting

trends:

⇒ More trading of tradeables

⇒ But also large and growing 'un-traded' service sector – 70% of
GDP/employment

Localized service sector innovations crucial

Increase productivity of large proportion of domestic workforce (and consumer surplus)

But must be well-adapted to local conditions

And, locally deployed

Why should innovators invest in localization and marketing in 'mature' economies?

3. Venturesome Consumption

Assumption: Passive, undeserving beneficiaries

⇒ “[Innovators] have brought the cost of a transistor down to less than a millionth of its former level. Yet, most of the benefits from those discoveries have been reaped not by the innovating firms, but by the users of the transistors. In 1985, I paid a thousand dollars per million transistors for memory in my computer. In 2005, I paid less than ten dollars per million, and *yet I did nothing to deserve or help pay for this windfall.*” (Romer)

Reality: Users play 'venturesome' ('entrepreneurial') role...

Supply impetus or core idea (Von Hippel)

Co-development through participation in experimentation and dialogue

Risk-taking (bearing "Knightian" uncertainty)

Resourceful problem solving – developing "lower level" know-how (e.g. more than 50 million spreadsheet and database users)

... *Venturesomeness stimulates innovations and is essential to realizing their economic value*

The U.S. economy: Winning by Using

Trade deficit in high tech symptom of strength

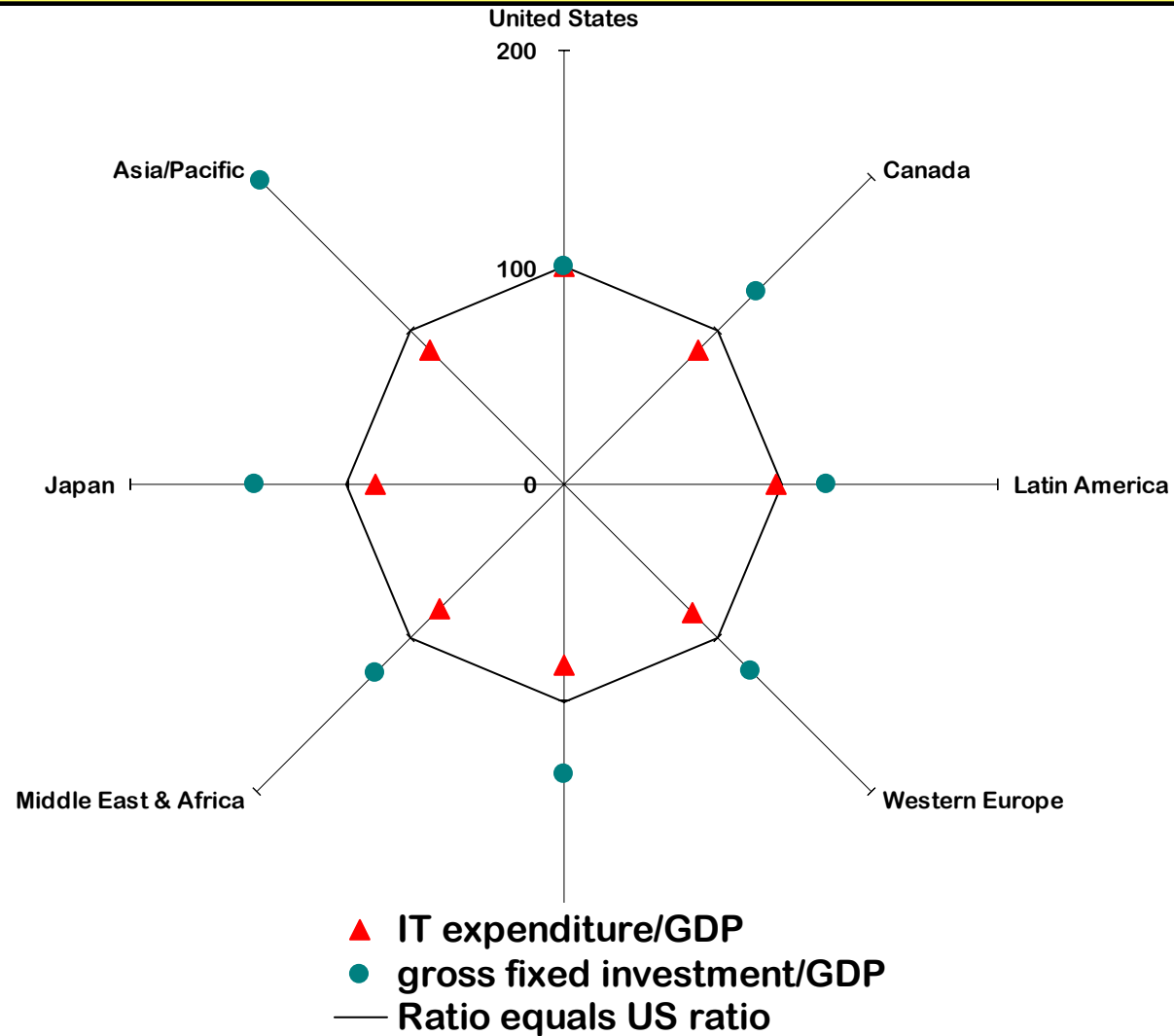
IT < 10% of GDP

But significant impact on the other 90+%

Source of productivity edge over Europe and

Japan: More -- and more effective -- IT
spending in the service sector

Total IT spending/GDP 2004 by Region



More IT spending reflects greater capacity of service industries to extract value

Bloom, Sadun and Van Reenen:

⇒ US multinationals in UK spend 41% more than industry average

⇒ “Significantly higher productivity of IT capital” – accounted for “almost all the difference between the overall productivity of ...U.S. owned and all other establishments.”

Norway vs. Japan

But what if service sector jobs go offshore?

4. Non-destructive Creation

Essential feature of technological progress, although overshadowed by “creative destruction”

- ⇒ Efficiency improvements (creative destruction) alone cannot sustain growth
- ⇒ New want innovation absorbs resources + encourages efficiency growth

New products, even if manufactured off-shore, generate domestic service employment and value added.

Offsets losses due to creative destruction and offshoring

IIb: Policy Implications

Techno-nationalism: Right policy for the wrong reasons?

⇒ Sputnik effect?

Technology increases optimal role of government

But, ever more of a good thing doesn't make it great

Much benefit from cutting-edge research; but:

“Easy to impede growth by excessive research, by having too high a percentage of scientific manpower engaged in adding to the stock of knowledge and too small a percentage engaged in using it. This is the position in Britain today.” Carter and Williams (1964)

Evidence of an “undersupply”?

National Academies' *Gathering Storm* report:

The case for increasing grants

⇒ “The economic value of investing in science and technology has been thoroughly investigated. Published estimates of return on investment (ROI) for publicly funded R&D range from 20% to 67%.”

But:

- ⇒ Outdated -- 1 of 11 studies pertains to last decade
- ⇒ Cherry picking 10 of 11 sector specific (Mansfield 1991 exception)

National Academies' *Gathering Storm* report: Subsidizing R&D

Eight studies showing public returns > private returns

⇒ But greater financial incentives don't always elicit more effort,

⇒ *Roger Federer at Wimbledon*

⇒ ...and more effort doesn't always produce better results

⇒ *Big pharma R&D*

Ignores role of lower level technical and “complementary”
marketing/managerial know-how

⇒ Potential bottlenecks

⇒ Require investment (even if not counted as such)

⇒ Generate Spillovers

More engineers scientists: Romer (2002) scheme

“Scientists and engineers are the basic input into the discovery process, the fuel that fires the innovation engine”

US lags in the in the fraction of 24-year-olds who receive science and engineering degrees

\$1 billion program to provide 50,000 fellowships for graduate work in the natural sciences and engineering

Labor market failure?

Share of managerial + professional jobs doubled since 1940

Spontaneous increase in bureaucratization unlikely

Service sector innovations require higher ratios of managerial to technical personnel

Bresnahan and Greenstein study of client server

Realities of modern economy and technostucture

Reduce congruence with

- ⇒ Subsidizing R&D but not marketing
- ⇒ Education (“more engineers”) and immigration preferences (“more PhDs, fewer bachelors”)

Public policy Example - Treating U.S. Health-Care

Heavy spending for mediocre outcomes

⇒ Health R&D in government budget 6X Japan and 10X Austria, Sweden and Switzerland + private institutions + tax credits

Discourage “frivolous” marketing expenditures (without which new drugs and treatments would be useless

Doctors may say they get their information from reading medical journals, but pharmaceutical company salesmen play a more important role

Case Study

⇒ *Helicobacter pylori* and peptic ulcers

Treating U.S. Health-Care : The bigger issue

Organizational, legal, and regulatory problems

Expenditures on pharmaceuticals in US just 12.9 percent of health-care costs in 2003

⇒ *Lower* than share in the OECD share (17.7%)

Implies really terrible return on non-pharma spending

NOT a “research” (or China India problem)

Not a zero sum game..

“Should the industry of Ireland, in consequence of freedom and good government, ever equal that of England, so much the better would it be [for] England. As the wealth and industry of Lancashire does not obstruct but promote that of Yorkshire, so the wealth and industry of Ireland would not obstruct but promote that of England.”

Adam Smith, 1779

Postscript: A silver lining to the financial tarnish?

What went wrong?

(Potential) gains for real economy innovation

See:

www.bhide.net/accident_waiting_to_happen.html

Question Time

How
Innovation
Sustains
Prosperity
in a More
Connected World

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**The
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