

Economic Globalization and the Information Technology Revolution

Lawrence J. Lau, Ph. D., D. Soc. Sc. (hon.)

Kwoh-Ting Li Professor of Economic Development

Department of Economics

Stanford University

Stanford, CA 94305-6072, U.S.A.

June 2000

Phone: 1-650-723-3708; Fax: 1-650-723-7145

Email: ljlau@stanford.edu; Website: www.stanford.edu/~ljlau

1. The Information Technology (IT) Revolution

- ◆ The widespread access to, sharing of, and use of information (knowledge) in economic activities through technology
- ◆ It is greatly facilitated by the “Internet”
 - ◆ The communication, transmission and distribution of information are no longer limited by space and time
 - ◆ Information is accessed and transmitted in real time and at low marginal cost
 - ◆ Information flow can be targeted to specific individuals and audiences
- ◆ Complementarity of information with tangible and intangible capital
 - ◆ The increased flow of information greatly enhances and multiplies the benefits of tangible as well as intangible capital, such as human capital, R&D capital, and knowledge capital, and vice versa--complementarity
 - ◆ Example: the installation of new software or new database on existing computers

2. Implications of the IT Revolution

- ◆ “Internet” time
 - ◆ Real time information transmission and retrieval
 - ◆ What used to take days and weeks of research is now available with a few clicks of the “mouse”
 - ◆ Real time monitoring and communication
 - ◆ Capacity for real time response
- ◆ “Internet” distance
 - ◆ Proximity and geographical location are no longer as important

3. Impacts on the Microeconomy

- ◆ The shortening of the “Product Cycle”--reduction in “time to market”--mandates a reduction in fixed costs as well as timely responses, and hence de-verticalization and out-sourcing
 - ◆ The average product cycle has shortened from 5 years to between 12 and 18 months
- ◆ Significant reductions in transactions costs
 - ◆ The costs of internal management, monitoring and control
 - ◆ The costs of inter-firm coordination
 - ◆ The IT revolution enhances predictability and reliability of division of labor across firms and thus shifts the advantage to “De-verticalization”, “Out-sourcing”, and “Globalization” of supply chains
 - ◆ Reduction in transactions costs enables the exploitation of efficiencies in specific segments of the design, manufacturing, marketing and distribution process
 - ◆ Many services have become highly tradable or potentially highly tradable
 - ◆ e.g., software, back-office paper work, design, quality assurance, entertainment
 - ◆ The reductions in transactions costs more than offset the increased costs of transportation and communication due to globalization

Impacts on the Microeconomy

- ◆ De-verticalization and out-sourcing permit efficient sharing of resources and thus enable the realization of economies of scale and learning-by-doing effects in particular tasks
 - ◆ e.g., firms do not typically generate their own electricity; the semiconductor foundry business; delivery services such as United Parcel Post (UPS) and Federal Express
- ◆ Realization of the benefits of targeted incentives in specific tasks or segments of the traditional business
- ◆ Significant reductions in the costs of market creation, expansion differentiation, and segmentation --a market without geographical boundaries
 - ◆ Aggregation of users/consumers to create new and diverse markets consisting of consumers who may be geographically dispersed
 - ◆ e.g. vegemite; vegetarians; exceptionally large and small sizes of clothing

The Product Cycle under the IT Revolution

- ◆ The product cycle will continue to shrink (time to market) because
 - ◆ More and more timely information is available
 - ◆ There is less vested interest (e.g., fixed costs, inventory, labor contracts) in prolonging a product's life time and because of competition; these fixed and quasi-fixed costs are reduced by de-verticalization and out-sourcing
 - ◆ The ease of customization
 - ◆ Product cycle as substitutions and rearrangements of the supply chain, e.g., shifting from metal to plastics
 - ◆ Strategic alliances of the moment made possible by timely and accurate exchange of information
 - ◆ Traditional life-time employment in the same industry and product segment is no longer possible

4. De-Verticalization or Fragmentation of Production

- ◆ De-Verticalization or “Fragmentation”--Vertical division of labor-- Separation of design, manufacturing, marketing, inventory and distribution functions (generalized out-sourcing)
- ◆ Logistics and supply chain management--managing a production process not all of which lies within a single firm
- ◆ Emphasis on “core competence”
- ◆ Focus on adding value
- ◆ Aligns incentives within the different supply segments
- ◆ Facilitates competition through lowering the barriers to entry (lower capital requirements)
 - ◆ e.g., semiconductor design firms

The Concept of De-Verticalization Is Not New

- ◆ Vertical division of labor--subcontracting
 - ◆ e.g., the construction industry in developed market economies--all the “trades” (services) are traditionally performed by specialist subcontractors
- ◆ “Original Equipment Manufacture” (OEMs) in developing economies
 - ◆ Nike, Polo, Dell, Compaq, brand name products
- ◆ “Fabless” semiconductor companies and contract manufacturing
 - ◆ e.g., Taiwan Semiconductor Manufacturing Corporation, Solectron, Flextron
- ◆ “Original Design and Manufacture” (ODMs)
- ◆ Outsourcing of services
 - ◆ e.g., processing of credit cards (many credit card issuers are nominal issuers only); information processing for financial institutions
- ◆ Can the design and marketing and manufacturing of the automobile be separated in the future?

Logistics Revolution and the Supply Chain

- ◆ Just-in-time inventory system has been used by Japanese manufacturers (mostly captive suppliers)
- ◆ Quality assurance, possibly by third parties, is required
- ◆ Standardization, uniform grading, and a common platform (wafer size, resolution of equipment, software) are also needed
- ◆ Savings from consolidation of transportation, inventory and warehousing, reduction in the transactions cost of communication, and increased timeliness of delivery, it also reduces the transactions cost of marketing and distribution
- ◆ Competition among suppliers and potential suppliers

The Story of a Super-Market

- ◆ Scanner at the checkout stand
- ◆ Direct and instantaneous communication with the supplier
- ◆ Just-in-time delivery by the supplier
- ◆ Efficient inventory maintained by the supplier
- ◆ Coordination of inventory and production by the supplier
- ◆ Savings realized by the super-market--no paper-work, no inventory, no warehouse, no trucks

5. Economic Globalization under the IT Revolution

- ◆ Products and firms can no longer last forever
- ◆ Specialization of firms in “Tasks” rather than “Products”
 - ◆ Global vertical division of labor--global supply chains
- ◆ Trade in “Intermediate Inputs” and “Services” rather than finished “Products”
 - ◆ A substantial proportion of world trade is intra-company trade
- ◆ Realignment of the traditional industrial structure
- ◆ Down-sizing as well as proliferation of firms
 - ◆ Outsourcing
 - ◆ Reduction of middle management
 - ◆ Small and medium-sized firms can have access to high quality services previously unavailable on the market
 - ◆ Small and medium-sized firms can specialize in niche markets
- ◆ Specialization results in lower prices, greater output, and more new varieties of products and services

6. Impacts on the Macroeconomy

- ◆ Increases in productivity lower the cost of production and hence reduce the upward pressure on prices and keep the rate of inflation low
- ◆ Existing demands for goods and services are supplied by new entrants into the businesses, most of them small and medium-sized start-up firms, using new technology.
 - ◆ e.g., internet bookstores wipe out real brick and mortar bookstores; internet securities trading knock out traditional stock brokerages (however, there is still a role to play--assurance of fulfillment, assumption of credit and performance risks--reputation and brand name are still important)
 - ◆ The new firms will take away the business from the old firms--"Creative Destruction"
- ◆ An environment that encourage new businesses must be created and maintained, so that new jobs are created faster than old jobs are destroyed

Impacts on the Macroeconomy

- ◆ The rise of completely new businesses
 - ◆ “Cuusoo” (Japan)--consumer participation in the design of new products
 - ◆ e.g., special suppliers of tools for left-handed individuals
- ◆ The concept of national origin of a product or a service becomes fuzzy

7. Implications for Developing Countries

- ◆ Globalization is here to stay
- ◆ Globalization facilitates and encourages worldwide search for sources of supply--hence new opportunities but also competitive challenges
- ◆ Globalization under the IT revolution facilitates and encourages “de-verticalization” or “fragmentation”--the need to identify, improve and sharpen “core competence” in order to survive; productivity can actually be enhanced by taking advantage of the opportunities for “de-verticalization” and “out-sourcing”
- ◆ Uncertainty created by globalization of supply chains--competition
 - ◆ Social safety net, nimble businesses and flexible workers
 - ◆ Hospitable legal, tax and competitive environment for start-up firms
 - ◆ Promotion of a culture of open communication and mobility; acceptance of risk and failures; network externalities and the benefits of networking

Implications for Developing Countries

- ◆ One-time permanent increase in potential output
- ◆ Developing countries have the ability to leap-frog--there are no vested interests to protect; no existing business to be cannibalized; there can be creation without destruction
 - ◆ e.g., mobile and wireless telephones; debit and credit cards instead of checks
- ◆ Investment in intangible capital is needed to exploit this potential
 - ◆ Human capital; Firm-specificity versus worker-specificity (flexibility, adaptability and re-employability)
 - ◆ R&D capital--learning and diffusion

Implications for Developing Countries

- ◆ Investment in the Infrastructure
 - ◆ Traditional economy requires physical infrastructure--railroads, roads, ports, airports, power, etc.
 - ◆ New economy requires, in addition, virtual infrastructure
 - ◆ United Parcel Service (UPS), Federal Express; Trading platforms; Telecommunication (Fiber optic links); Enabling technologies
 - ◆ The legal infrastructure
 - ◆ Enforcement of contracts; prevention and prosecution of fraud
 - ◆ Intellectual property rights
- ◆ The possibility of local adaptation--taking advantage of local conditions
 - ◆ e.g., the Legend story
 - ◆ language
 - ◆ local supply and demand conditions, e.g., stability of the voltage of the electric power supply