

The explosion in microelectronics

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TECHNOLOGICAL developments and innovations have sharply reduced the costs of communication and transportation, modifying the geographical distribution of economic powers and forcing industries to adapt to these changes.

The price of new technology (digital and communications) has declined drastically — by the mid-1990s a Pentium chip PC was costing 1/10,000 times of the IBM mainframe of the early 1970s. The changes induced have radically altered the demand for skills and the nature of trade, requiring sympathetic changes in the roles and policies of governments and economic actors, as sovereignty of nation states becomes increasingly restricted, if not meaningless.

The boom in microelectronics and telecommunications has changed the nature of markets (forcing concomitant changes in the structure of firms) and has shifted the balance of economic power between domestic classes, countries and continents. It has created new channels of social mobility while rendering obsolete many old skills and jobs. By reducing the importance of transportation costs it has reinforced the concepts like comparative advantage based on factors of production that still remain immobile (e.g. labour) in a world otherwise characterized by freely-flowing finance, technology, information and services.

This revolution, which has reduced communication and transaction costs is having, and will continue to have, far-reaching results. To begin with, these developments have enhanced the mobility of large volumes of capital in what are smoothly operating financial markets, the regulations on information of ownership of capital, introduced after September 11 notwithstanding.

These near frictionless financial markets are becoming less dependent on intermediaries like brokers. With the enhanced mobility of capital the local investors of yesterday have today become players in global markets. This increased mobility of capital across international borders has also made somewhat irrelevant the major assumption of conventional trade theory regarding the international immobility of factors.

The opportunities created by new communications technology has increased the span of coordination and control and just in-time technology reducing inventory requirements and warehousing costs, thereby enabling the creation of virtual firms like amazon.com and prospects for outsourcing through a global network of production and marketing outlets.

The revolution in microelectronics and telecommunications has enabled: a) transmission of information through fibre optics and satellite based communication systems at reduced costs; b) information storage and recall through increased memory of the chip; and c) information processing (through developments in the micro-processor).

Resultantly, the importance of comparative advantage and international division of labour has increased — high transaction costs are no longer a constraint to firms to locate or outsource operations based on comparative cost advantage. The logic of large firms which tended to integrate their operations, irrespective of core competency, as a means to reduce transaction and search costs, has been nullified.

In particular, the new communications technology has brought new areas, like services (computer software, consultancy), into the framework. Earlier services were not tradable across time and space. Now they can be exported via the internet and even stored electronically and used a long time after they have been produced. Now that services are tradable they can be included as a component in the comparative advantage of developing countries, export of labour-intensive services (typing, programming, call centres, etc.).

Computers can be used to automate low productivity tasks previously performed by office secretaries. The tradability of services across space, the reduced attraction of large markets and shrinking importance of economies of scale are all combining to provide developing countries the opportunity to sell their labour-intensive services and manufactures.

Computers combined with new telecommunications technologies are enhancing to productivity significantly. Unfortunately, these productivity increases are not being measured by the existing set of out-

regarding the international mobility of factors.

In the information age services do not have to be consumed where and when produced. Owing to the microelectronic revolution they can be traded across not only geographical boundaries but also time barriers, as they can now be stored electronically.

Moreover, the globalization of markets has decreased the importance of single large specifically located markets (since everyone can access this global market), thereby intensifying competition.

Globalization has forced adaptations in technology with companies switching from large fixed investments to computer-led, if not controlled, flexible specialization, changing structures of firms to enable quicker responses. In a highly competitive global market experiencing rapid changes in product mix, design and technology, fixed investments, having become less attractive and more expensive, will now play a reduced role. Along with lower fixed costs of search for markets and customers and of advertising, the factors identified above have reduced the importance of economies of scale, increasing the scope and potential to exploit opportunities for product differentiation. The role of the standardized mass market is diminishing and that of exclusive niche markets for differentiated products growing.

ly increases are not being measured by the existing set of output and performance indicators. For instance, telecommunications output is measured in minutes of calls, a measurement that ignores the massive increase in transmission capacity through the introduction of faster modems and faxes. Again, output in finance, health and education is measured in terms of hours worked. Using this definition the measured growth in productivity would be zero. As the share of these sectors in the economy rises, so does the extent by which productivity is underestimated. With the rapid developments in technology productivity, growth is, therefore, being underestimated by larger amounts.

Similarly, the output of the banking sector is measured in terms of cheques processed — this declines with ATMs replacing bank clerks. The customer convenience and time saved is not measured.

However, tax evasion in the digital age has become easier, since many transactions that were earlier conducted across well defined geographical borders are now conducted in cyber space and can be concealed from tax authorities. Resultantly, an increasing share of the tax burden is being borne by the relatively immobile unskilled labour.

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