C OFFSHORING SERVICES: RECENT DEVELOPMENTS AND PROSPECTS

1. OFFSHORING: MORE FEARS AND HOPES THAN FACTS?

Despite the recovery in the world economy in 2003 and 2004, unemployment remained high in many industrial countries. Even in those countries which reported a strong recovery, such as the United States and the United Kingdom, employment levels recovered only moderately, leading many observers to wonder about a "jobless recovery". Although employment growth typically lags behind in each cyclical output recovery, sluggishness in services sector employment seemed to be a new development. In previous downturns, the services sector continued to generate new jobs. The information communications technology (ICT) sector – one of the most dynamic sources of new employment in the 1990s – not only slowed down in terms of job growth, but actually experienced a decline in the payroll after the ICT crash in 2000-01. Many dot.com companies and telecom firms closed down or had to downsize as investment outlays in IT hardware and software decreased in OECD countries.[1]

In those bleak times in 2002 and early 2003, when the recovery was still rather fragile, a number of reports emerged highlighting the potential for substantial cost savings to firms which could source some of their in-house supplies – in particular information technology (IT) services – from low-cost locations. These reports, released mainly by business consulting firms and industry associations, had discovered a new "mega-trend": the offshoring of services. The authors of these reports argued that thanks to the increased digitization of information and increased availability of broad bandwidth communication at low prices, a large spectrum of IT jobs could from now on be provided at far lower costs from low-income countries to firms and consumers in high income countries. These opportunities ranged from low-skilled jobs, such as data entry typists and phone operators in call centers, to high skilled jobs, such as software developers. Forrester Research (2002) describes nine services occupation categories subject to potential offshoring, which combined represent 44 per cent of total US employment in 2002 according to Kirkegaard (2004a). Van Welsum and Vickery (2005) reported that in 2003, the occupations potentially affected by offshoring represented 19.2 per cent of total employment in the EU, 18.6 per cent in Canada and 18.1 per cent in the United States (2002).

In the 1990s, a large number of multinational firms had already partially shifted the work of certain back office supply jobs (such as payroll, invoicing and accounting) to countries where they could be provided at lower cost. However, with the arrival of broad bandwidth lines at low costs and the increased digitization of information in all sectors (in particular services), the attraction of a significant cost reduction in the production of goods and/or services was becoming irresistible for any firm in a competitive environment.[2]

Within a very short time, reports from management consulting firms were picked up by the media. Newspapers and TV stations reported a new threat to employment in developed countries through the relocation of services jobs to developing and East European countries. Most of the reports focused on jobs in the United States and the United Kingdom that were threatened with relocation to India. This new development was often likened to the offshoring of manufacturing jobs to Mexico and China in the recent past. The rise in the number of newspaper reports (on offshoring services) has been well documented by Amiti and Wei (2004) for the 1991-2004 period. A spectacular rise occurred in such reports during the course of 2003 and through the first quarter of 2004. There were 2,634 reports in US newspapers on services outsourcing activities in the first five months of 2004. Most of the reports caught media attention because of their projections of the (cumulative) number of jobs that would be lost in the United States due to the relocation of jobs to low cost locations over the next five or ten years.

For developing countries, offshoring seems to be unequivocally beneficial for employment, exports and economic growth. In particular, developing countries with a large English speaking population, a good telecoms infrastructure and a large pool of IT professionals, such as India and the Philippines, are expected

[1] EITO (2004) reports that global ICT markets (including hardware and software) slowed sharply in 2001-2003. IT markets in the US decreased in 2001 and 2002 and those of Europe and Japan in 2002 and 2003 (see Appendix Table 1).

[2] This does not imply that all digitizable services can be moved abroad. Some services activities using digitized information rely on intimate knowledge of the services provider and need face-to-face contact.

to reap large employment and income gains from these new possibilities. It is not only the number of jobs but also the quality of jobs which are particularly attractive to these countries. These new jobs are relatively well paid, they are in industries which are not dependent on natural resources and they can be considered environmentally friendly. Prospects for the Indian economy and trade have been portrayed by some observers to be largely dependent on the dynamic expansion of the services sector (see Mattoo et al., 2004). Projections abound which indicated the potential for significant export growth. In 1999, the Indian National IT Task Force set a software export target of $50 billion by 2008.[3] The NASSCOM-McKinsey (2002) report expected exports of software, call center and transaction processing services to reach $57 billion in 2008, a sixfold increase from the FY 2001-02 level. Employment in the Indian IT industry, direct and indirect, could reach 4 million people in 2008. The NASSCOM-KPMG (2004) study anticipated annual export growth in offshored IT services of 30 to 40 per cent in "the next few years."

What about the developed countries? Notwithstanding the public concern alluded to above, most studies conclude that the repercussions of service offshoring in high income countries are mixed, but positive overall. Productivity and profits are expected to rise, and the "loss" of offshored jobs should be compensated by increased employment and perhaps higher wages in the medium-term, provided labour markets are suitably flexible. While the potential for substantial cost reductions attracts the attention of management boards, the prospects of job losses and increased international competition in the services sector alarms both the trade unions and the broader public. Given widespread concern in respect of wage and employment prospects in services industries which were only moderately exposed to foreign competition in the past, governments and legislators are being asked to act to protect domestic jobs. In the United States, these concerns have provoked a flurry of proposed legislation in 34 states, all intended to restrict offshoring services activities (see UNCTAD, 2004b; Klinger and Sykes, 2004). In most cases the proposed bills intend to prohibit work on state contracts to be performed overseas or by individuals not authorised to work in the United States.[4]

The most curious aspect of this heated debate is that all the expectations and fears of offshoring and the backlash against it in the high income countries are based on very partial, selective information, mostly from private sources[5] or anecdotal evidence.[6] It has proved difficult up to now to glean hard evidence from official balance of payments data or employment records. Recently, a number of studies and new statistical information have pointed to the "modest" size of the services offshoring trend if viewed from a macro-economic perspective. The annual growth rates cited alone might look impressive, but as a percentage of total inflows and outflows in the relative labour markets, or as a percentage of total services trade, the numbers are far less impressive.

In the following Section an attempt is made to clarify the discussion by first defining what in this essay is meant by "offshoring" and "outsourcing." The Section will then go on to consider measurement problems related to this activity.

2. THE DEFINITION OF OFFSHORING AND OUTSOURCING

There is no commonly accepted definition of "offshoring" in the public debate nor in the economic literature. However, the term "offshoring" is widely used as a particular subcategory of "outsourcing". The latter has been defined as "the act of transferring some of a company's recurring interval activities and decision rights to outside providers, as set in a contract".[7] The typical consequence of such a decision is a decline of employment in the plant/firm which is doing the "outsourcing" and a rise in employment in the plant/firm from which

3 See Indian Council on International Economic Relations (ICRIER), "Report on Trade in Software Services", December 1999.

4 Most of the proposed state contract bans are legally suspect and courts are likely to find such measures inconsistent with federal foreign affairs power and the US Constitution's foreign commerce clause, according to Klinger and Sykes (2004).

5 Data on India's software exports are collected by NASSCOM, a private industry association, on behalf of the Reserve Bank of India.

6 For a summary of anecdotal evidence of offshoring services activities in India, see Morgan (2003).

7 Greaver II (1999).

the supplies are sourced thereafter. The vagueness of the term is often related to the fact that it is not made clear if the change in sourcing of supplies refers to the plant level, the firm level or to the national level. The term "recurring interval activities" might include a given level of in-house supplies in a stagnant business environment, but the meaning is less clear in an expanding environment in which additional supplies from the outside do not necessarily result in an absolute reduction of employment but tend to limit its expansion. It is also useful to distinguish between a replacement of the supplies which takes place between plants of the same firm or from a non-affiliated firm (control-ownership), and whether the new sourcing is from plants in the home country or abroad (location). In certain cases, the sourcing decision goes hand-in-hand with new investment abroad, which leads some observers to focus the outsourcing debate on outright plant closures, with output being replaced by new greenfield investment abroad. But this latter definition seems to be too narrow to capture the scope of outsourcing discussed here.

Chart 1 might be helpful in clarifying the terminology used later in this essay. Four types of "outsourcing" are reported, using location and control/ownership as distinguishing criteria:

1. **Captive onshore outsourcing** implies a shift in intra-firm supplies to an affiliated firm in the home economy.
2. If the shift in sourcing of supplies benefits a non-affiliated firm in the home economy, one can describe it as **non-captive onshore outsourcing**. The term "onshore" could be replaced in both cases by "local" or "domestic".
3. **Captive offshoring** describes a situation in which future supplies are sourced from an affiliated firm abroad.
4. The fourth variant of outsourcing may be labeled **non-captive offshoring** and refers to the case when the new supplier is a non-affiliated firm and located abroad.[8]

From an international perspective, the latter two categories of outsourcing, namely captive and non-captive offshoring, are of particular interest.

Chart 1
Types of outsourcing

		Located in home economy	Located abroad
Shifting intra-firm inputs/supplies to	Non-affiliated firm	local/domestic/ onshore outsourcing	offshore outsourcing = offshoring
	Affiliated firm	captive onshore outsourcing	captive offshore outsourcing = captive offshoring

Source: adapted from OECD (2005a).

A major problem with the definitions above is that they do not concord easily with officially collected economic data. Outsourcing decisions are made at the micro level of plants or firms, while the official data are generally collected at the sectoral and national level. In the case of "offshoring", current statistical concepts do not allow a link to be made between import statistics and a management decision to substitute a product/ service produced in-house by an imported product. Moreover, in contrast to merchandise trade, services trade flows recorded in balance of payments (BOP) statistics are generally not broken down by region and country,

[8] OECD (2005a) uses a somewhat different terminology. This report considers "offshoring" as a subcategory of "outsourcing". "Captive onshore outsourcing" is referred to as "internal domestic supply" by the OECD and "captive offshoring" is labeled as "internal offshoring".

which hampers analysis of the geographic aspects of services offshoring.[9] A further difficulty in services trade statistics is due to the importance of the large internal services transactions of multinational firms. Many of these internal across-border transactions might not be reported.

Another obstacle arises if one attempts to look at the sectoral breakdown of offshoring. The sectoral affiliation of a firm might not match the product or service which is offshored. An automobile company might offshore its accounting services and a bank might offshore its IT services. Employment and the net value-added produced in the home country in the automobile (banking) sector might fall as a consequence of offshoring without a corresponding increase in the imports of automobiles (financial services). These difficulties in the sectoral allocation of offshored activities also affect the estimate on the offshore potential of an economy. Obviously, services activities can also be offshored by non-services sectors.

3. THE ECONOMICS OF OUTSOURCING

(a) Outsourcing is not a new phenomenon

Developments in the car industry over the past century illustrate the processes and driving forces behind outsourcing. It took 700 parts to make a T-Ford in the early 20th century. With this relatively limited number of parts, it was possible to combine the benefits of large-scale mass production with the benefits of a high degree of specialization within a single plant. The gains from this kind of specialization have been acknowledged as early as 1736 in Adam Smith's description of the pin factory, and demonstrated at a large scale with perfected technology by the car industry. Workers were highly specialized and typically performed one single task along an automated assembly line, while the plant was vertically integrated and produced the car starting from raw materials.

Over time, competitors to Ford emerged, and consumers became richer and demanded more comfort, higher speed and better designs from their cars. A multitude of models were developed, each fitted with comfortable seats, air-conditioning, radios and other entertainment, along with numerous devices to improve safety, comfort, fuel efficiency, and to reduce noise and emissions of pollutants. As cars became more complex, it was no longer possible to combine mass production and specialization within one single plant. The number of tasks outgrew the number of operations that could be efficiently and effectively organized and coordinated within one plant. Furthermore, skills in mechanical engineering were no longer sufficient to produce and sell a car. Skills in electronics, design, marketing and many other fields were required. This multitude of tasks and skills required organizational/managerial innovations in order to accommodate increased complexity while maintaining cost effectiveness. Outsourcing has been central to the more or less continuous restructuring of the industry. The car manufacturers have identified the strategically important tasks and competencies and focused attention and in-house production on these. Non-core tasks and competencies are purchased from outside suppliers.

Which activities are considered strategic or core has changed over time. But the trend has been that an increasing number of parts and services are considered non-core and are produced by external suppliers. Over time, a network of several layers of suppliers located in a large number of countries has emerged. The contractual relationship between a car manufacturer and a supplier depends on the strategic importance of the component in question. Some suppliers may have entered a long-term contract entailing joint product development with the car manufacturer and have typically located close to the final assembly plant. Other suppliers may be located further afield and provide standard components on short-term contracts. The input-output tables for the US economy in 2002 show that 70 per cent of the cost of a car came from parts, components and services purchased from external suppliers. A quarter of total purchases of intermediate inputs were on services.[10] How much of this is imported cannot be

[9] Some traders, for example the EU, Japan and the US provide a regional/country breakdown of their balance of payments data but on a rather aggregated product/services level.

[10] Source: US Department of Commerce, Bureau of Economic Analysis (BEA) (2004), http://www.bea.doc.gov/bea/dn2/i-o_annual.htm. Accessed 25.11.2004.

derived from the tables.[11] What is clear, however, is that without the development towards increased specialization and outsourcing, today's cars would either be closer to the T-Ford technology or they would be beyond the budget of ordinary people, even in high-income countries.

Services industries are undergoing similar developments as the car industry in the past, and similar gains should be expected. There are, however, worries in developed countries, particularly in the United States, that offshoring will export jobs to low-cost countries leaving behind unemployment and downward pressure on wages. And in poor countries there are high hopes and expectations that offshoring will be the future engine of growth and job creation. As discussed below, offshoring has hitherto been on a modest scale, but projections from a number of sources suggest that the potential is immense. It is therefore useful to take a close look at the limits to offshoring at the firm, industry and international level.

At the firm level, there are technical, strategic and managerial limits to offshoring. Technical limits relate to the extent to which services are separable from the core activities of the firm in question. Strategic limits relate to the need of companies to control strategic assets, while managerial limits relate to managerial capability and the costs of dealing with foreign suppliers. Market forces apply to offshoring in much the same way in every sector. If demand for IT skills and English-speaking workers increase sharply in services-exporting countries, wages will start to rise and the price gap between local and imported services will narrow. As shown by Bhagwati et al. (2004) the supply of skilled workers in India is scarce, and is likely to remain so in the foreseeable future.[12] In other words, the situation is not one of an almost unlimited supply of adequately skilled workers. A rise in demand is therefore likely to drive up wages.

At the international level, the familiar forces of comparative advantage and intra-industry trade drive offshoring in the same way as these two forces drive trade in general. Comparative advantage and intra-industry trade are complementary. Trade between countries that are significantly different when it comes to relative factor endowments is driven by comparative advantage. Trade between similar countries is motivated by the desire for a broader variety of goods and services ("love of variety"). Offshoring enables countries to exploit comparative advantage and obtain variety through trade at the same time. Offshoring of IT services and business processing, for example, can be characterized as vertical trade within the same industry. The offshored services are usually less skill-intensive and less capital-intensive than those retained in the home country, and trade is mainly driven by comparative advantage. The final product, be it manufactured goods such as cars or computers, or services such as financial services, is often subject to horizontal intra-industry trade.

Even though the bulk of offshored services located in developing countries are in the low-skilled end of the outsourcing industry, all IT occupations require higher skills than the average Indian worker has, and offshored activities are relatively skill-intensive in the Indian context. Furthermore, there are pockets of relatively high-skilled services being offshored to state-of-the-art firms in, for example, India or South Africa.

Finally, one needs to keep in mind that a sharp increase in imports relative to exports would lead to deterioration of the current account of the balance of payments in the importing country and set in motion adjustments in the real exchange rate.

(b) Make-or-buy; onshore or offshore?

This Section takes a closer look at the limits to outsourcing at the firm level. Which services activities will a firm conduct in-house and which will be purchased from independent outside suppliers? What are the parameters

[11] Intermediate use of motor vehicles, bodies and trailers and parts from "own sector" was, according to the input-output tables, about $132 billion in 2002. Imports of car parts (HS 1996 categories 8706, 8707, 8708) the same year were about $31 billion, according to Comtrade. This is only a rough indicator of the extent of international production networks, since the US and Comtrade use different classifications. Imports of category parts and accessories for motor vehicles (HS 96 8708) came from 95 countries of which Canada, Japan and Mexico were the largest sources of inputs.

[12] According to Bhagwati et al. (2004) only 6 per cent of the Indian population between 18 and 24 years of age is enrolled in colleges and universities. And of these only a tiny fraction has the minimal English skills that would make them function well in occupations such as call answering. Furthermore, it is argued that with the exception of a few elite institutions, the higher education system in India is in "a dire state and starved of resources." Nevertheless, in a country with a population of 1.1 billion, of which a large proportion is below the age of 25, the absolute number of skilled people is still large.

that determine the make-or-buy decision? These are fundamental questions for analysing the potential for offshoring in the absence of good and comprehensive data. The major determinants of the make-or-buy decisions are the following:

- technical and institutional separability;
- to what extent the task is standardized;[13]
- transaction and managerial costs within the firm relative to outside suppliers;
- production costs; and
- the size of the market.

Separability is obviously a precondition for outsourcing. Recent innovations, particularly in IT, have made an increasing number of service tasks separable in time and space. Services that basically collect, manipulate or organize information can be codified, digitized and separated from other tasks within the firm, and then become candidates for outsourcing. A number of entirely new information-based services and occupations have also emerged with the diffusion of IT. Examples are software developers and IT consultants and help-desk services, but also search services, and new types of media and content have opened opportunities for new independent service suppliers.

Standardization and automation were important driving forces in the development of extensive networks of more or less independent suppliers in the car industry. Once information-based services have been codified, digitized and separated, they can also be standardized and in some cases automated. Some can even be reduced to a set of instructions or tasks that workers can follow routinely. Examples of information-based services that can be codified, standardized and outsourced are accounting, billing, payroll, booking and many more. These are typically non-core tasks, both in manufacturing and services companies, and are increasingly outsourced to specialized external suppliers. In addition, as computer software has become standardized, many IT services have also become non-core and can be outsourced.[14]

Managerial costs can be considerable within large companies and probably increase more than proportionally with the complexity of the task and the number of tasks being conducted, as already noted for the car industry. Furthermore, many of these costs are independent of the production volume (they are fixed) and constitute a higher share of total cost the smaller the scale of production. With outsourcing, such fixed managerial costs are limited to searching for a supplier and negotiating a contract, and these costs can be considerably lower than setting up in-house production. This is the most important reason why outsourcing is attractive. There are also variable managerial costs such as monitoring and coordinating production. These costs are usually lower with in-house production than with outsourcing, and make outsourcing less attractive. The make-or-buy decision is thus based on finding the balance between fixed and variable costs that results in the lowest total costs. The more standardized an activity, the lower the managerial cost of outsourcing. This is illustrated by Chart 2, which shows the relationship between unit cost (including fixed and variable managerial costs and production costs) and standardization.[15] A task is more standardized as we move to the right on the horizontal axis. At low levels of standardization, when the task in question is specific to the firm, it is likely to be produced in-house. The least standardized tasks are typically the strategic or core tasks and these are likely to remain in-house. The same goes for new tasks that are not (yet) standardized and high-skilled tasks that cannot easily be codified, while the standardized tasks are the first to be outsourced.

The relevance of market size for the make-or-buy decision was recognized at least as early as the 1950s. If firms must reach a minimum scale in order to break even, the number of firms that can operate profitably

[13] In the literature "asset specificity" is the term used to capture the extent to which an input is customized for the downstream consumer.

[14] See Carr (2004) for a discussion.

[15] Unit production costs differ with location but not with organizational form and not with the degree of standardization. Fixed managerial costs vary both with location and organizational form. The left-hand side starting point of the cost curves is fixed managerial costs plus unit cost of production. Variable managerial costs vary both with organizational form and location and decline more than proportionally with the degree of standardization.

is limited by the size of the market. Likewise, within a firm a minimum scale is needed in order to employ specialists in all tasks and keep them fully occupied. But as firms grow, a larger administration is needed in order to coordinate activities and govern relations between divisions and individuals. At one point the cost of additional administration exceeds the benefits of additional tasks or components being produced in-house. Outsourcing is thus a way of avoiding expanding unit costs, but the existence of a network of outside suppliers requires a sufficiently large market.

Market size is important for one more reason that has to do with the risks related to outsourcing. The outsourcing firm must be sure that the supplier delivers the agreed quantity and quality of inputs at the agreed time, whether it is a service or a component. If not, the production process can be brought to a halt and in an environment with just-in-time production systems this can be extremely costly. Furthermore, if quality is not as agreed, the value of the outsourcing firm's brand name can deteriorate. If the market is large and there are a large number of alternative firms to search among, the chance of finding a good match is better and the chance of finding an alternative should a supplier fail is also better.[16]

Turning to the other side of the outsourcing agreement, there are also uncertainties facing the outside supplier. Producing the agreed quality and quantity may require investment in new skills, new equipment and product development. Workers in call centres in India, for example, have to learn how to speak English the American way in order to enter into outsourcing contracts with American customers and they may have to install software that is compatible with the customers' and so on. If these investments are of little value outside the outsourcing contract, the sub-contractor may be left with costly but useless assets should the outsourcing firm breach or terminate the contract. Also, for this reason the types of tasks and components that are first outsourced are those that are standardized. This is the least risky for both parties. As discussed elsewhere in this essay, standardization facilitates international trade, and as observed here, it also facilitates outsourcing.

So far, we have focused on managerial costs and not touched upon the production costs of the activity in question. If the outside supplier is located in the same country as the outsourcing firm, one should expect that production costs are the same, since the factors of production are purchased in the same market. If the activity in question can be offshored to a low-cost location, there are additional gains in terms of lower production costs, but there are also additional managerial costs. The latter depend on whether offshoring is through foreign direct investment (captive offshoring) or through entering a contract with an independent foreign supplier. In the case of captive offshoring, the costs of acquiring local knowledge about laws and regulations, the availability of non-tradable local inputs and so on have to be incurred in addition to the cost of setting up or acquiring the foreign firm. The additional managerial costs of non-captive offshoring consist only of searching for a partner and negotiating a contract. Captive offshoring thus involves a stronger commitment of the firms' resources than offshoring to independent suppliers.

There are also additional variable managerial costs related to offshoring. These are due to differences between the two countries involved in terms of language, laws, government regulations, currency, and usually also due to distance, since even digitized service provision requires some face-to-face communication between the contracting parties. The emphasis of many service-exporting countries on liberalization of service delivery through the movement of natural persons (mode 4 in the GATS) clearly indicates that face-to-face communication is still important. The additional costs related to differences between countries should be about the same for both types of offshoring, while it still holds that monitoring and coordination costs are lower within the firm (captive offshoring) than with outside suppliers (non-captive offshoring).

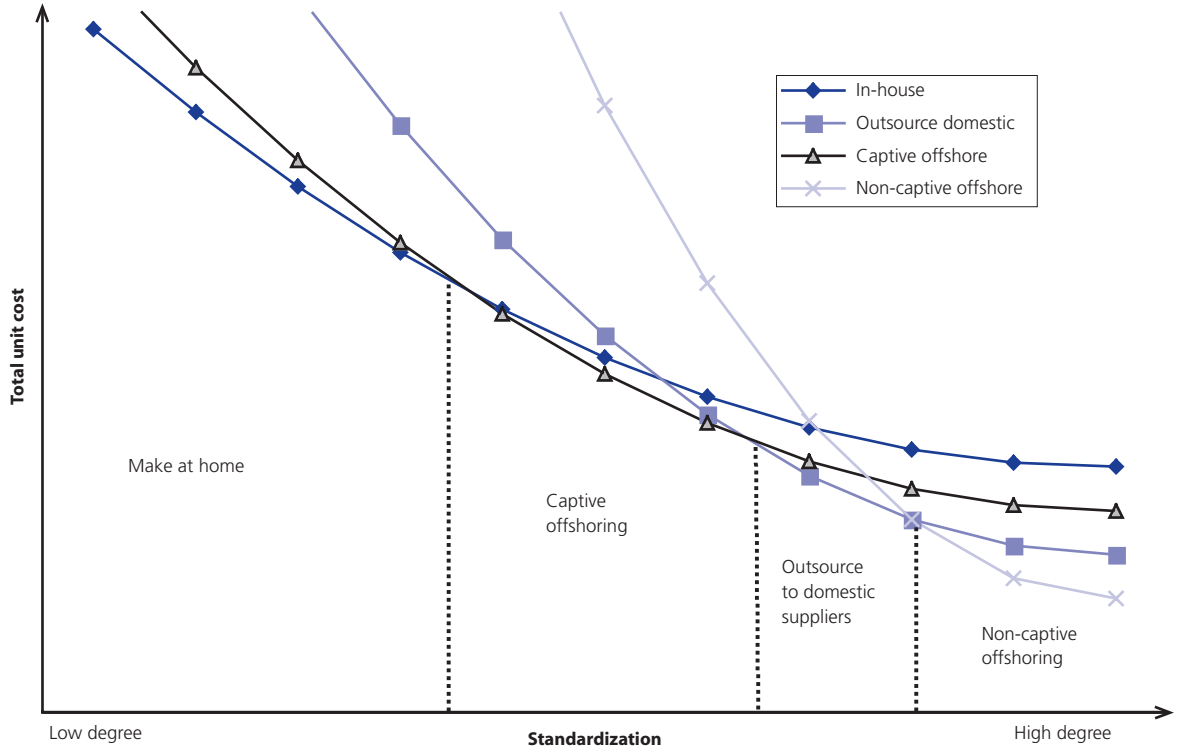
Fixed managerial costs differ between the four types of outsourcing as follows:
Captive offshoring > local in-house production > non-captive offshoring > local outsourcing.

Unit production costs are lowest with offshoring, and in Chart 2 this compensates for higher fixed managerial costs and makes captive offshoring cheaper than domestic in-house production at high levels

[16] See Grossman and Helpman (2002) for a discussion of the relation between market size and search costs.

of standardization.[17] Finally it is recalled that monitoring and coordination costs are lower with in-house production (at home or abroad) and lower with domestic outsourcing than non-captive offshoring. Unit costs as a function of the degree of standardization for all four types of outsourcing are depicted in Chart 2.

Chart 2
Costs, standardization and types of outsourcing



The Chart shows that an activity needs to reach a certain level of standardization before it is profitable to outsource it. When that threshold is reached it is still the best option to keep production within the firm, but locate production to a low-cost country. With further standardization it becomes profitable to outsource the activity to an independent supplier, but to a local one. Only at relatively high levels of standardization will it pay off to offshore to an independent producer, given the cost function depicted in this chart. Moving from left to right on the standardization axis can be interpreted as moving from the strategic core of the firm towards non-core, standard activities. It is important to bear in mind that while developing software is the core business of a software firm, it is not a core business of, say a bank, and the latter will outsource maintenance and adaptation of software to outside suppliers while a software firm will not. A high degree of standardization is closely related to mature technology. Chart 2 can thus be interpreted to mean that high-technology firms undertaking mainly high-technology activities are likely to retain most activities in-house, although they do engage in captive offshoring to some extent. Low-technology firms undertaking mainly low-technology activities, in contrast, are likely to outsource.

The shape and position of the curves in Chart 2 depend on the characteristics of the firm in question. It is well known that even firms in the same country and the same industry differ widely in terms of productivity and costs. A high-productivity firm is able to produce more from a given amount of inputs than a low-productivity firm. A highly productive firm can afford to pay higher fixed costs than a less productive firm, and is therefore more likely to both outsource and offshore. Its reward for doing so is to further improve its cost competitiveness. The firms with the lowest productivity, in contrast, are unable to offshore and may not even be able to compete with those who do, and could be driven out of business (Antras and Helpman, 2004). This is a creative destruction process where the least productive firms will be driven out of business while larger and more productive firms prevail and expand, improving average productivity in the offshoring industry as a whole.

[17] Chart 2 shows a stylized example using parameters that reproduce the results from Antras and Helpman (2004).

The position of the curves in Chart 2 also depend on relative wages in the two countries involved, communication and travel costs between the two locations, and differences in the general business climate in the two locations. The larger the wage gap between home and foreign locations, the more firms will choose the offshoring option. By the same token, the lower the trade costs between the two locations, the larger the number of firms that will choose one of the offshoring types. Transport costs decrease with the weight-to-value ratio of the product, which is one of the reasons why the electronics sector has lent itself easily to offshoring. For digitized services, the weight-to-value ratio is zero, and trade costs consist of costs of telecommunications, payment systems and travel, including the time and money required to obtain a visa.[18] When these costs go down, offshoring is likely to increase.

The risks of outsourcing are lower the better the institutional and infrastructural quality in the location of the contracting partner. A high-quality legal framework reduces the costs of enforcing a contract. The less standardized the service being outsourced, the more important is the legal framework. Similarity in legal frameworks at home and abroad reduces the costs of establishing and enforcing contracts with independent foreign suppliers. The weaker the legal framework and the larger the differences between the partner countries, the higher the risk of offshoring and the fewer the firms that will engage in offshoring. The United States and the United Kingdom are the leading outsourcing countries. India's and Ireland's success in attracting offshoring business has been partly attributed to their English-speaking workforce. Outsourcing from the other leading industrial countries is much less extensive. Furthermore, their sourcing of services tends to be from countries which are closer to home geographically and/or culturally. A large share of German outsourcing contracts goes to Central Europe, while a large share of Spain's outsourcing contracts go to Latin America.[19]

Low wages and poor quality of institutions and infrastructure typically go together. Therefore, offshoring businesses are more likely to go to middle-income countries than to least-developed countries. Among the low-income and least-developed countries, large countries are more likely to attract outsourcing businesses. Finally, it should be noted that institutional and infrastructural quality at the national level are not always the most relevant variable to look at. In some cases, notably in India, software parks and other special zones have excellent infrastructure and effective one-stop-shops for sorting out the legal formalities of establishing and running a business, even if the average quality in the country as a whole leaves much to be desired.

To summarize this Section, the driving forces for outsourcing and offshoring services are first and foremost technology development, notably ICT, and economic growth. Growth leads to and feeds on a higher degree of specialization. Developments in IT have made it possible to standardize, digitize and outsource a number of services, of which some are offshored. The location of offshored services depends on:

- labour costs;
- trade costs;
- the quality of institutions – particularly the legal framework;
- the tax and investment regime;
- the quality of infrastructure – particularly telecommunications;
- skills – particularly language and computer skills.

Improvement in the regulatory environment, such as trade liberalization for imported inputs, lifting of foreign investment restrictions, favourable taxation and low-interest export credits have complemented the dynamic export performance of the two largest IT traders, namely Ireland and India (see Box 1). To conclude, offshoring is likely to be concentrated on non-core standardized services. Large and highly productive firms are the most likely to engage in offshoring. Host countries of offshoring activities are likely to be relatively low-cost, with good telecommunications infrastructure, and a reasonably good record on the rule of law. Being close to the offshoring partner in terms of physical distance and/or language and culture also helps.

[18] These costs have fallen sharply between the mid-nineties and 2003. See Appendix Table 3.

[19] See Farrell (2004) and *Financial Times IT Review* 01.12.2004.

Box 1: Public policies and the development of India's software exports

In 1986, the Indian government promulgated a policy giving "software exports, software development and training" a prominent position in its economic policy objectives. In order to address various obstacles to the expansion of software exports, the government introduced the "Software Technology Park" scheme and established an Autonomous Society, the "Software Technology Park of India" (STPI) in 1991. This Society is in charge of managing data communication infrastructure facilities and other services such as technology assessments and professional training of software exporters. By July 2004, 40 software technology parks have been set up under the aegis of STPI. Twenty more STPI centres are planned in the next eight years. In March 2004, all STPI centers combined have attracted 4,644 units, of which 3,544 are already exporting software. Although STPI centers can be found in 16 Indian States, those of Karnataka, Tamilnadu, Maharastra and Andra Pradesh accounted for three-quarters of India's software exports in 2002-03.

What are the main benefits for firms established in STPI centers?

- STPI provides state-of-the-art High Speed Data Communication (HSDC) facilities and 35 international gateways;
- duty-free imports;
- exemption from payment of local duties;
- exemption from corporate income tax up to March 2010;
- single window for government clearance;
- foreign ownership up to 100 per cent allowed for firms established in STPI centers.

These various forms of public support (trade facilitation, infrastructure, a favourable tariff and tax regime, and liberal FDI regulations) have created clusters of software exporters. The increasing importance of STPI centres in India's software exports is best illustrated by the rise in the share of STPI units in India's total software exports. In 1992-93, STPI units accounted for 8 per cent of India's software exports and ten years later, when India's exports had greatly expanded, this share has risen to 81 per cent.

Source: Based on STPI website information, in particular from its Annual Report 2003-04 (http://www.stpi.softnet/areport3.html).

4. THE SCOPE OF OFFSHORING SERVICES TODAY

Gauging the size of the offshored services activities is not a small task. The various official statistical sources available are in general not adequate to record a phenomenon which in the field of services is rather new. Statistical classifications of industries or activities need quite some time to adjust to structural changes in an economy. It is therefore not surprising that most of the information on services offshoring is based on private surveys and anecdotal evidence. While these surveys are useful in catching early emerging developments, their findings are not always easy to integrate into a broader picture by relating them to the entire domestic or even the global economy. It could be that the surveys report on a new branch of business, which records spectacular annual growth rates over a couple of years, while the size of the activities of that branch remain small at a more aggregate level. This Section focuses on the offshoring of IT services, the activity which has attracted the most attention over the last few years. The discussion below is also concentrated regionally, as it highlights in particular the offshoring of IT services between India and the United States, the two countries which are at the centre of the IT offshoring phenomenon.

Two approaches to measuring services offshoring are attempted below. First, estimates (including of private consulting firms) are presented. These are estimates of the size of IT markets and the development of outsourcing and offshoring in the IT sector for recent years. This information is subsequently compared, where possible, with official BOP data on cross-border transactions in computer and information services (and other professional services), which include offshored IT (and business process) services .

(a) Surveys on the size of services offshoring in recent years

- The OECD (2005a) reports the size of the global market for outsourced IT and business process (BP) services to be close to $260 billion in 2001. The value of offshored IT and business service activities are put at $32 billion, representing 12.3 per cent of the global IT market. Domestic outsourcing is given at $227 billion. Two-thirds of all offshoring is estimated to be captive offshoring, in other words referring to intra-firm trade. This estimate of the total IT and business process services market does not include IT services provided from affiliated firms in the home market (or "internal domestic supply" in the OECD terminology);

- McKinsey (2003) reports that US companies offshored IT and business process (BP) services worth $26 billion to 12 major markets in 2001. The share of US companies in global offshoring activities is estimated at 70 per cent and this implies a global value for all offshored IT and BP services in the order of at least $35 billion in 2001. The 12 markets exclude major EU markets and therefore the above estimate somewhat underestimates the global offshoring of US companies worldwide;

- The European Information Technology Observatory (EITO) (2004) reports a global market for IT services and software of €591 billion in 2003 (measured in 2002 exchange rates). Converted into current 2003 dollars this estimate is equivalent to an amount of about $710 billion in 2003. This estimate excludes BP services. Adjusted for exchange rate and market growth between 2001 and 2002, the EITO estimate exceeds that of OECD (2005a) by a large margin, despite its narrower sectoral coverage. EITO (2004) also indicates that the growth of IT markets had been significantly faster than GDP growth in the 1995-2000 period, but became less dynamic than GDP growth in the 2000-2004 period;

- Gartner (2004b) reports that global software and IT expenditure amounted to $663 billion in 2003. BP services are again excluded. Software expenditure alone reached $93.8 billion and that of IT services $568.9 billion. Gartner (2004a) claims that "outsourcing will account for 53 per cent of the total worldwide IT services market in 2004". This would be equivalent to $322 billion in 2004 and about $285 billion in 2003. No data are given for the share of offshored IT services in the total of outsourced activities and software expenditure is not taken into account.

The two most recent studies above suggest IT and software expenditure worldwide in the order of $650 to $710 billion in 2003. Total outsourced IT services (excluding software) are about $285 billion (based on Gartner (2004b). Offshored IT and BP services are estimated to have been in the order of $40 to $45 billion in 2003.[20] For the same year, world exports of business services are estimated at close to $500 billion. These values can be compared to world GDP and world commercial services exports, valued respectively at $36,000 billion and $1,800 billion in 2003.

(b) IT services trade as measured by Balance of Payments (BOP) statistics

The second approach to measuring the size and evolution of services offshoring is based on (national) balance of payments (BOP) data. Although not all services imports result from offshoring activities services, all offshored services should be included. Thus, cross-border services trade provides an upper limit for any estimated value of offshored services. BOP data record transactions between economic entities resident in two different economies. Among the limitations of BOP data in measuring services offshoring, three stand out. First, detailed sectoral reporting of services trade is not always available at the national level. Second, the

[20] The McKinsey (2003) estimate of $35 billion for offshored IT services in 2001 is grossed up by 25 per cent, the same rate as the increase in global trade of computer and information and other business services between 2001 and 2003.

detailed sectoral definition available might be inadequate to capture IT and BP services and third, the volume of recorded cross-border services trade among affiliated firms might be sharply affected without any change in captive offshoring.[21]

Missing BOP data can be a serious challenge in estimating accurately world exports (imports) of IT services. BOP data on services trade provided in the IMF Balance of Payments statistics cover 130 economies which represent more than 95 per cent of world services trade in the years 2000-2003. However, from these 130 economies, only 80 report trade in computer and information services. A distortion might also be introduced by the fact that international trade in IT services is likely to be better registered on the export side rather than on the import side. This is largely due to the fact that a statistical agency can obtain information more easily from a few large exporters than from a large number of importers of varying size.

Another major obstacle to capturing offshored services in imports is the fact that the standard classification of IT services in BOP statistics is either too small or too large to measure IT and business process services (BPS). Official BOP statistics combine computer and information services at the most detailed level. This category does not, in principal, catch business process services but includes information services (mainly services of news agencies). World exports of "computer and information services" were estimated at $75 billion in 2003. These and other data discussed above are reported in Table 1. Business process services such as accounting, auditing, bookkeeping, research and development, call centers, transcription services etc. are included in the category "other professional services". The share of business process services in this category is most likely less than one-half, but might account for the largest part of this category in a small number of countries. World exports (and imports) of the BOP category "other professional services" are estimated to amount to at least $420 billion in 2003.

Classification problems arise not only because of methodology but also quite often because there is a problem of availability. Many countries do not provide BOP data according to the detailed standard category breakdown. Numerous countries do not report any imports of computer and information services or other professional services at the detailed level, but subsume these two categories into others at a more aggregated level. In some cases, the reported data of computer and information services might also include services which should be grouped elsewhere. Indian BOP data report "software" exports which could be mistaken for "computer and information services," but this category also includes IT-enabled services which should be more adequately classified under "other professional services." These differences in classification approaches by various national providers of BOP statistics tend to distort the research findings. One consequence of this could be that the share of India in world exports of IT services is considerably overstated if India includes categories which other countries exclude, and even more so if some major services traders do not supply any detailed information on their trade in computer and information services.

Table 1
Global IT markets, trade and offshored IT services
(Billion dollars)

A. Surveys

Source	Reference year	IT Market size	Outsourced IT services	Offshored IT services (incl. BPS)
OECD (2005a)	2001	...	260	32
McKinsey (2003) (WTO)	2001	...	...	35
McKinsey (2003) (WTO)	2003	...	...	45
EITO (2004)(WTO)	2003	710	...	...
Gartner (2004b)	2003	663	322	...

B. Balance of Payments Statistics

Source			Business services	Computer and information services
WTO and IMF BOP	2003	world exports	494	75
	2003	world imports	458	47

[21] OECD (2005a) discusses the measurement problems of IT services trade in BOP statistics on pages 92 through 95. See also van Welsum (2003).

Few national BOP statistics allow us to divide cross-border transactions between affiliated and non-affiliated firms. In US BOP statistics, this distinction is made and affiliated services imports could be considered as a proxy for captive offshoring of companies resident in the United States. Many surveys confirm that at present, most offshoring takes the form of captive offshoring. This view is supported by data on US IT services imports. In 2003, affiliated trade accounted for 63 per cent of US computer and information services imports, and for 77 per cent of US imports of other business, professional and technical services, a proxy for business process services. However, this conflicts with the information given above on Indian software exports. According to NASSCOM India's software exports of 2003-04 are provided largely by Indian-owned companies. Is India's case different from others?

Unfortunately, there are a number of limitations to the use of affiliated trade as a proxy for the size or the expansion of captive offshoring. Although international trade among affiliated firms includes (captive) offshoring activities, not all trade among affiliated firms is due to offshoring. Some of the imported supplies from affiliated firm(s) abroad might have never been produced in-house in the home country, and therefore cannot be attributed to offshoring activities.

With respect to the evolution of affiliated trade, one has to take into account that a large part of the rise in affiliated trade in recent years is associated with a high level of mergers and acquisitions. The merger of two firms leads to an increase in affiliated trade even without any change in production and employment patterns, as the unaffiliated trade between the two firms will be considered as affiliated trade after the merger. The same reasoning applies in the case of an acquisition. The US Department of Commerce (BEA) notes that "... in 1998-2001 newly acquired affiliates accounted for most of the growth in sales of services through US affiliates".[22] Therefore, the BOP (and MNC sales through affiliates) data tend to overstate the growth of captive offshoring activities. Affiliated trade can therefore be a poor proxy for the level and/or the rate of expansion in captive offshoring in a given industry.

But trade with affiliates can also pose several sectoral classification problems. As previously noted, a prominent feature of offshoring services is that companies with their main business activity outside the IT sector want to replace their in-house IT service supplies with purchases from specialized IT firms abroad. A US insurance company, for example, offshores some of its IT services to an affiliated firm in India. US balance of payments data would record this flow as imports (debits) in IT services from a foreign affiliate only if the affiliate's primary industry classification is in IT services. If the foreign affiliate is also classified (as the parent company) as an insurance company, the transaction would be classified as an insurance service flow and not as a supply of IT service.

(c) Major traders in global IT services trade, 2000-2003

Using BOP data to arrive at an estimate for global trade in IT services, defined as computer and information services (CIS), is therefore not a straightforward exercise. The IMF BOP statistics provide balance of payments data for most countries but as seen above, the detailed breakdown for IT services is not always available. Therefore, the missing data had to be added from national sources (e.g. India and the United States) or crudely estimated (e.g. Denmark and Switzerland and many developing countries).

World exports of computer and information services are estimated to be in the order of $75 billion in 2003. Exports of other professional services (OPS) amounted to $420 billion. In 2003, the share of these two services categories in world commercial services exports are about 4 and 24 per cent respectively. The cumulative export growth of the two categories combined over the 2000-2003 period was 31 per cent, and thus faster than that of total commercial services (21 per cent) and merchandise exports (16 per cent).

The two major exporters of computer and information services in 2003 are, according to BOP data, Ireland and India, which are also generally considered to be the main destinations for offshoring IT services (see Table 2). Both countries reported net exports of computer and information services in excess of $10 billion and

[22] Borga and Mann (2004).

their export growth is faster than global exports over the 2000-2003 period. The United States, the United Kingdom and Germany followed the two leaders at a distance. The United Kingdom and Germany exported less than half of Ireland's exports. Israel ranked as the sixth largest exporter, again in line with other surveys which report this country as a major destination for services offshoring. Despite their reputation as the major global offshorers of IT services, the United States and the United Kingdom are both major net exporters of computer and information services. However, their import growth of CIS has exceeded their export growth since 2000.

Table 2
The major traders in computer and business services, 2000 and 2003
(Million dollars)

A Computer and information services (CIS)

		Exports		Imports		Balance	
		2000	2003	2000	2003	2000	2003
1	Ireland	7490	14372	277	386	7212	13987
2	India	7059	11282	553	465	6506	10817
3	United States	6722	7619	4435	5198	2287	2421
4	United Kingdom	4321	6987	1270	2915	3051	4073
5	Germany	3798	6565	4970	7245	-1172	-680
6	Israel	4119	3657	n.a.	n.a.	n.a.	n.a.
7	Spain	2043	2916	1227	1662	816	1253
8	Canada	2428	2282	899	1027	1530	1256
9	Netherlands	1166	2054	1187	1543	-21	511
10	Sweden	1191	1993	1067	1179	124	814
11	France	803	1255	742	1235	61	20
Memo items:							
	World	51736	75106	38590	46703	13146	28403
	EU (15)	23683	40700	14316	20651	9367	20049

B Business services (computer and information services and other business services (OBS))

		Exports		Imports		Balance	
		2000	2003	2000	2003	2000	2003
(6)	Ireland	9398	21115	14091	22641	-4693	-1526
(8)	India	10409	15734	6771	11475	3638	4259
(1)	United States	47404	52469	27922	33477	19482	18992
(2)	United Kingdom	37780	51785	17915	23033	19865	28752
(3)	Germany	28001	38322	37128	47141	-9127	-8819
(11)	Israel	6903	6780	n.a.	n.a.	n.a.	n.a.
(7)	Spain	10113	16427	11429	16935	-1316	-508
(9)	Canada	12830	13549	10525	11436	2305	2113
(5)	Netherlands	16693	24099	17873	26132	-1180	-2033
(10)	Sweden	7673	13141	8669	11827	-996	1315
(4)	France	20126	25340	16232	25721	3894	-380
Memo items:							
	World	376119	494167	365170	457828	10949	36339
	EU (15)	178616	267993	180341	251981	-1724	16012

Note: Figures in brackets indicate export rank in 2003.
Source: IMF, Balance of Payments Statistics, CD ROM December 2004, national statistics and WTO estimates.

In 2003, according to current BOP data, the largest importer of computer and information services was Germany. German imports of CIS exceeded even those of the United States, which ranked second in 2003. Other major importers of CIS are the United Kingdom, Japan and Spain. The three largest net importers of computer services are Japan, Brazil and Germany.

An outstanding feature of the BOP data provided in Table 2 is the fact that Ireland and India are very modest importers of CIS and that their imports do not show a steady increase similar to the global trend.

A disturbing aspect of the official BOP data is the large discrepancy between exports and imports at the global level. World CIS exports exceed imports by a wide margin (nearly $30 billion) throughout the 2000-2003 period. Even within the EU(15), a wide discrepancy can be observed between intra-trade measured on the export side and intra-trade recorded on the import side (about $6 billion in 2002).

Combining CIS and other business services (OBS) into business services has the advantage that the misclassifications between the two categories are no longer a problem, but the coverage of the sector becomes very large. Nevertheless, it is worth noting that at this more aggregated level the ranking and net-exporting positions of the various economies change dramatically from those observed for CIS only (see Table 2, Part B). Now the top exporters in 2003 (for CIS and OBS) are the United States and the United Kingdom, well ahead of Germany, France and the Netherlands. The United States and the United Kingdom are also large net exporters while Germany and Japan are large net importers of CIS and OBS. Ireland remains a large exporter, but its imports exceeded exports in 2003, while India retains a net exporter position. India's ranking in aggregated CIS and OBS export category, however, decreases from number 2 to number 11.

The estimated size of global offshore activities depends crucially on the accuracy of the data provided by the major offshorers and the countries providing the offshored services. As mentioned above, national BOP data report Ireland to be the largest exporter of IT services worldwide followed by India. There exists a considerable discrepancy in reported global exports and imports of IT services, which could be due to over-reporting on the export side or to under-reporting on the import side, or to a combination of the two.

Looking more closely at the major exporters, the recorded exports of Ireland are astonishingly large if one takes into account the limited level of employment in this sector in Ireland. Ireland is reporting exports of IT services two times larger than the United States, while it employed "only" 24,000 IT specialists in 2003. A special feature of Irish IT services exports is the inclusion of software licences. Previously, these licences were included with merchandise exports of computer hardware, for which Ireland is a major distribution centre in Western Europe. Most of the Irish CIS exports go to the EU (15), but no further country detail by EU Member is given. Therefore, it is currently impossible to link with certainty the $6 billion intra EU trade surplus to an over-reporting of Ireland's CIS exports. According to the IMF BOP Manual, software licence fees should be classified under the category "royalties and licence fees," in which Ireland reports a large deficit (of $10 billion) in 2003.

Another major source of the difference between world exports and imports of CIS could be due to over-reporting of India's CIS exports. First, there is the question of allocating BPS with CIS. Indian sources indicate that some non-CIS services, such as IT-enabled services, are included in its "software" exports. For example, the Reserve Bank of India's (RBI) Annual Report 2004 shows that Indian "software" exports worth $12.2 billion in Fiscal Year (FY) 2003-04 include IT-enabled business services, such as call centers, valued at $3.6 billion.

Second, a large, although decreasing share of India's "software exports" are reported to be delivered "onsite".[23] It could well be that these onsite service deliveries might be classified as local sales of foreign affiliates in partner countries (GATS mode 3) and thus are not included in BOP data. Third, the "onsite" delivery of CIS by Indians employed abroad should be considered as Indian exports only as long as these employees have not become local residents. There is a rule that employees staying abroad for more than one year should be considered residents of the host country. Thereafter, the earnings of these employees are no longer counted in the BOP statistics but might appear (in subsequent periods) in the form of worker remittances. In Box 2, an attempt is made to reconcile the reported discrepancies in the bilateral services trade statistics between India and the United States.

[23] NASSCOM (2005) reports that nearly 41 per cent of India's IT offshore revenues stem from onsite delivery in FY 2003-04.

Box 2: Closing the gap between Indian and US statistics on bilateral CIS trade

One part of the excess of exports over imports of CIS at the world level can be attributed to the discrepancy between Indian exports of IT services to the United States reported by the Reserve Bank of India and US Department of Commerce data on US imports of IT services from India. At the detailed sectoral level of CIS trade, some estimates are needed to reconcile the detailed bilateral data from Indian and US sources. Our adjusted data for 2003 indicate that India records IT exports (including IT-enabled services) to the US of about $6.8 billion, while the US data suggest CIS imports from India close to $0.9 billion.

How does one get these numbers? India's "software" exports to the world amounted to $11.282 billion in calendar year 2003. NASSCOM, which collects this information and provides it to the Indian Central Bank, indicates that 69 per cent of these exports went to North America in fiscal year 2002-03. On the assumption that 60 per cent of India's "software" exports had been destined for the US market, this would be equivalent to $6.77 billion in calendar year 2003.

Turning to the adjustment on the side of US imports, US unaffiliated imports of IT services from India amounted to $330 million in 2003. Including the (estimated) imports from affiliated firms the number reaches $900 million, provided that the share of unaffiliated trade in US bilateral trade with India is the same as in US global IT imports (namely 36.5 per cent). US services imports (including affiliated trade) from India, without transport, travel and royalties and license fees, amounted to $1,139 million in 2003. This represents an upper limit for total US CIS imports from India. This suggests that the $900 million figure remains consistent with the broader US data.

But the $0.9 billion remains far off the Indian CIS export data in 2003. Even if one takes into account that India's "software" exports include many business services other than IT services, a reconciliation with official US BOP numbers is not possible even at a more aggregate level. A reconciliation between Indian and US data in respect to India's software exports is only possible if one takes into account the earnings of Indian IT specialists which are beneficiaries of US H-1B visas and are considered by the US Department of Commerce as local residents. Unfortunately, it was not possible to obtain information on the number of Indian IT specialists and beneficiaries of H-1B visas who had already worked in the United States for more than one year. Given the annual approval of beneficiaries (provided in Appendix Table 9), it is possible that their number could have been close to 80,000 in 2003. If one multiplies this employee number with the average annual earnings (about $60,000) one obtains total earnings of $4.8 billion, a sum which could largely close the gap found in the statistics above.

While the general perception among the US public appears to be that the United States is importing more services from India than it is exporting, US balance of payments statistics report a surplus in favour of the United States. The most detailed sectoral breakdown of US data by country (which covers both affiliated and non-affiliated trade) refers to the category "Other private services," which is defined as total private services less travel, transport and royalties and license fees. At this level, US services exports to India stood at $2.1 billion, while imports amounted to $1.1 billion in 2003. Throughout the 2000-03 period, the United States consistently reported a bilateral trade surplus. It may be concluded that the US BOP data provide a more positive picture for US services trade than might be gleaned from the discussion of US job losses attributed to offshoring services to India.[24]

(d) Survey data versus BOP data

In 2003, BOP data on global "computer and information services" exports amounted to $75 billion, exceeding survey-based estimates of globally offshored IT and business process services of about $45 billion by a

[24] See also van Welsum (2004).

considerable margin. However, it cannot be deduced from these numbers that offshored IT services account for more than one-half of global IT services exports, as not all imports reflect offshored services and CIS does not – at least theoretically – include IT-enabled services. McKinsey (2003) does not provide a breakdown of IT services and business process services and therefore no "guesstimate" can be made of the share of offshored IT services in total world exports of CIS. On the other hand, the offshored IT and business process services ($45 billion) can be compared to world exports of CIS combined with other professional services ($494 billion), or with total world services exports. The $45 billion of offshored IT services (broadly defined) accounted for less than 10 per cent of world exports of business services and for 2.5 per cent of world exports of commercial services in 2003.

BOP data have several advantages over the survey data provided by business consultants. First, they reveal the relative size of IT services in total services trade and also allow the calculation of net exports. Second, in some cases, BOP data supplied by partners provides a check on reported bilateral trade flow data via mirror partner statistics.

There is strong anecdotal evidence of IT jobs and call center jobs being offshored to India, Ireland (and elsewhere), but until very recently the estimated value of these offshored services has been rather modest if related to total international services trade. Both the United Kingdom and the United States are still the world's largest net exporters of business services. While for the United States imports of CIS and OBS combined have grown faster than exports between 2000 and 2003, the opposite can be observed for the United Kingdom (see Table 2). India, which according to the BOP data ranks as number two among CIS exporters, is still a net exporter of business services (CIS and OBS), but the growth of exports in this larger services group lagged behind the expansion of imports in the 2000-03 period. The Indian BOP data would tend to support the view that India is "losing" jobs in OBS trade and is "gaining" in CIS trade, on the crude assumption that the sectoral trade balance can be taken as an indicator of a "job balance." India's business services trade surplus rose by only $0.6 billion between 2000 and 2003 which does not point to a massive net transfer of jobs. Ireland, the top exporter of IT services, actually records a trade deficit if CIS are combined with OBS in 2003 (see part B of Table 2).

(e) Trade and employment in IT services

The emergence of offshoring services activities has raised expectations and concerns in respect of employment. Various reports have highlighted the current and potential repercussions on employment linked to an increase in offshoring services activities. The projections of two consulting firms on the repercussions of offshoring have attracted a good deal of attention. John C. McCarthy, vice president of Forrester (2002), projected the total number of accumulated job losses in the US economy due to offshoring to be in the order of 3.5 million by 2015 and Gartner projected "that up to 25 per cent of the traditional IT jobs in many developed countries will be situated in emerging markets by 2010".[25] Press articles provided anecdotal evidence of job losses in IT occupations in developed countries due to offshoring, while new IT jobs were reported to have been created in developing countries, particularly in India. Most observers agree that the offshoring of IT jobs is not a recent development, but has only gained momentum in the last few years.

In the following Section the focus will be, first, on employment and wage developments of the IT sector in the United States, which is generally considered to be in the forefront of the "new" trend in offshoring services activities. Thereafter, recent employment trends in Ireland and India are discussed.[26] In reviewing the recent employment and wage data in order to grasp the impact of offshoring, one has to take into account that the level of national employment (and wages) is subject to both cyclical variations and structural changes (such as offshoring). Therefore, one has to ask if the decline in employment in the IT industry or in IT occupations observed in many high income countries in 2002 was due to a fall in demand for IT services in general, to increased offshoring, or perhaps to other factors.

[25] Gartner (2004b).

[26] Information on migration of ITS specialists can be found at OECD (2005a) *OECD Information Technology Outlook 2004*, Chapter 6, ICT skills and employment, Paris: OECD. Available online http://www.oecd.org/document/22/0,2340,en_2649_33757_34238742_1_1_1_1,00.html. Accessed 02/03/05.

In the United States, the majority of computer occupations are found outside the computer services industry and it is therefore necessary to look at what happened to the employment level by occupation. Between 1997 and 2000, the annual average number of computer and mathematical occupations rose sharply in absolute and relative terms. The average annual growth in the employment of computer system analysts was 13.3 per cent, almost ten times larger than for all occupations. In 2001, the number of employed computer analysts increased on average slightly while that of all occupations stagnated. In 2002, the number of computer occupations contracted sharply. Thereafter, employment in computer and mathematical occupations recovered between December 2002 and December 2003 at a rate slightly less than the overall recovery in occupational employment. However, in the course of 2004, employment growth in computer occupations was up by 5.5 per cent and again exceeded markedly growth in all occupations (1.2 per cent) (see Appendix Table 5).

Wages of computer systems analysts have recorded stronger increases than those for all occupations on average between September 1997 and July 2003. However, if one breaks out the period from 2002 to 2003 wages of this group remained slightly behind those of all occupations (see Appendix Table 6). At the time of writing, there is no more recent information available on occupational wages, but wage developments in the IT services industry might be taken as a proxy for the wages paid to computer systems analysts in all sectors. In 2004, the weekly wages in the computer systems design and related services sector decreased slightly, while those for all non-farm employment increased by 2.2 per cent.

What can be learned from this information on US employment and wages? Employment in US computer occupations had been more affected by the downturn than all occupations in 2002 and 2003. However, in 2004 employment growth in these occupations again exceeded overall employment growth, as it had done in the years before 2000. In the course of 2004, the computer (and mathematical) workforce increased by 174,000, accounting in total for 3.357 million people, or 2.4 per cent of the total US occupational workforce at the end of 2004. This represented a new peak level in computer occupations in both absolute and relative terms, although a precise comparison with previous peak employment is not possible due to a break in the time series.[27]

According to US data, wages did not react as quickly to the economic downturn as did employment levels. Until 2002, there was no sign of a particular weakness in the wages of computer analysts. Only in 2003, and perhaps in 2004, did wages increase less than for all occupations. Despite this recent weakness relative to other wages, it should be recalled that at an average hourly wage of $33.25, computer and system analysts earned nearly twice as much as all other occupations in 2003. The strength in the rebound in employment in 2004, and the resilience of wages of computer occupations, do not support the view that offshoring services of high-skilled IT specialists had a marked impact on overall US employment in these occupations up to the end of 2004.

Statistics on layoffs also indicate an improved employment situation in 2004. The US Department of Labor reported that the annual number of separations caused by layoffs in software and computer services (industries not occupations) decreased steadily from 36,016 in 2001 to 16,230 in 2003 and declined further in the first three quarters of 2004.[28] Typically, only a very small fraction of the mass layoffs in these industries are linked to offshoring. According to the US Department of Labor, the share of separations due to overseas relocation among all separations caused by layoffs (across all non-farm industries) ranged between 1 per cent and 1.3 per cent annually from 2000 to 2003. Unfortunately, this information is no longer reported from January 2004 onwards.

US employment and wages in computer occupations in recent years should perhaps not be compared with the exceptional situation at the end of the 1990s when the United States faced a severe shortage of IT specialists, accentuated by the dot.com boom, fears of the IT millennium or 2YKbug, and a major upgrade in standard business software (Windows 2000). This particular situation led the US administration to relax its immigration policy through the American Competitive and Workforce Improvement Act of 1998, in order to attract foreign IT specialists. In FY 2001, 191,000 foreigners obtained an H-1B visa in order to work in the United States in

27 US Department of Labor, *The employment situation: December 2004* and http://www.bls.gov.

28 US Department of Labor News, November 18, 2004, *Extended Mass Layoffs in the Third Quarter of 2004,* Table 6.

computer-related occupations. In the following years, and under the double shock of the burst of the dot.com boom and the tragedy of 9/11, the number of approved petitions for H-1B visas was more than halved, reaching 75,000 in FY 2002 and 85,000 in FY 2003. The decline of H-1B beneficiaries clearly reflects reduced demand for IT occupations. On the other hand, even in FY 2003 there was still a need to recruit foreigners to fill specific vacant IT jobs in the United States (see Appendix Table 9). The absolute decline in the number of approved H-1B IT specialists between FY 2001 and FY 2002/FY 2003 (more than 100,000) indicates that it is likely that foreign IT specialists accounted for most of the decline in US computer occupations between November 2000 and November 2003 (160,000).[29]

It is interesting to note that at $60,000 in FY2002 and FY2003, the median annual earnings of H-1B beneficiaries in computer-related occupations closely match the average wages paid domestically in this occupation (see Appendix Table 9 and annualized hourly wages given in Appendix Table 6). Onshore outsourcing by US firms of IT services to domestic providers of IT services employing H-1B beneficiaries is therefore unlikely to be driven by wage cost considerations. It seems more likely that persistent skill shortages in the US economy play the most prominent role in approvals of H-1B visas.

Ireland is often said to be among the main beneficiaries of offshoring IT activities and reports the world's largest IT services exports in recent years. IT services employment in Ireland depends largely on exports of IT services. Although Ireland remained an attractive location for offshoring IT services, it nevertheless recorded a dramatic decline in the employment of its IT industry after 2001. According to Ireland's Industrial Development Agency (IDA), the country's employment in IT services declined by nearly one-quarter between 2001 and 2003, falling to a level of 24,000 people in 2003. The Irish experience illustrates the dramatic fall in the global demand for IT services between 2001 and 2003, which more than offset any Irish gains in employment from offshoring. A less known feature of Irish IT employment is that the majority of its employees had been foreigners throughout the 2000-2003 period (see Appendix Table 7). In any case, Ireland's employment levels are too modest to have a significant impact on employment in major IT markets.

Compared with Ireland, India's software industry is in quite a different league, as it employs at least 20 times more IT specialists than Ireland (see Appendix Table 8). Contrary to the United States and Ireland, employment in India's software industry (excluding IT-enabled services (ITES)) expanded steadily by more than one-third between FY 2001-02 and FY 2003-04, adding 150,000 people to the payroll in the sector. According to NASSCOM (2005) India's software industry employed 568,000 people in FY 2003-04. About 5 per cent of them worked in the domestic sector. Employment in "business services" (or ITES) which comprise customer care, finance and payment services, more than doubled between FY 2001-2002 and FY 2003-04, reaching 245,000 people. Employment in the (narrowly defined) software sector, which uses high-skilled IT specialists, still accounted for more than two-thirds of India's total software industry (incl. ITES) in FY 2003. However, its expansion was less dynamic than that of business services, which employs primarily low-skilled workers.

A large number of Indian IT specialists work abroad to deliver services "onsite". This poses the question whether they should be included in India's or in the host country's employment data. If an Indian IT specialist works for Indian firms temporarily abroad, one should consider him as part of India's IT sector employment. However, if the Indian IT specialist works for a longer period abroad, one should count him at some point in the host country's employment figures. It could be that India's IT specialists working abroad for longer than 3 months are still considered to be Indian residents and therefore included in India's employment data, although according to international statistical standards they should be considered as residents in the receiving country. In recent years, this could easily add up globally to more than 200,000 people, roughly one-third of India's recorded IT specialists (narrowly defined). It seems that employment statistics provided by NASSCOM covers Indian IT specialists working abroad but employed by an Indian software house as part of Indian software employment in captive user organizations. Employment in this sector reported the smallest increase between FY 2001-02 and FY 2003-04, but still remained the largest employer among all the four sectors identified (see Appendix Table 8). This interpretation could fit with reports that in the past most software exports were delivered "onsite," while in recent years direct exports (supplied from India) have become more prominent.

[29] Kierkegaard (2004a) draws a similar conclusion in respect of the decline in approved H-1B visas.

IT employment in the United States and India account for only a small share of total employment in either country. In the United States, the 3.4 million employees in computer occupations accounted for 2.3 per cent of total occupations at the end of 2004. Employment in the computer systems design and related services industry amounted to 1.16 million people, or 0.9 per cent of total non-farm employment (based on establishment data). In India, the 813,000 employees in the "software" sector (broadly defined) represent about a quarter of one per cent of India's active labor force (estimated at 320 million) in FY 2003-04. It is worth recalling the actual size of IT employment in the current offshoring debate in order to appreciate more fully the potential impact of outsourcing on each of these economies.

US employment growth in IT occupations was marginal in 2003, but strengthened significantly in the course of 2004, while India's employment in (the narrowly defined) software industry expanded by about one-third over the last two fiscal years. Obviously, India's share in the supply of global IT services has increased over the last years. India's software exports expanded much faster than world markets. But not all the gains in India's market share in the global supply of IT services should be attributed to offshored IT services. Although the expansion in India's software industry is largely driven by its IT services exports, not all of them are replacing IT services previously provided in-house in firms of the importing country.

5. IMPLICATIONS OF OUTSOURCING AND OFFSHORING

(a) Implications for the outsourcing/offshoring country

Since services account for between two-thirds and three-quarters of total employment in developed economies, productivity gains in this sector are essential to economic growth and improvements in welfare. Furthermore, since services constitute a large and growing share of GDP in developed as well as emerging economies, world trade growth would probably slow down relative to world income growth in the long run if services were not traded. World trade has been an important engine of world growth and development during the post-World War II period and trade in services, including offshoring, will sustain this process. In short, offshoring contributes to a continuation of the post-World War II trend of increased international integration, where trade as a share of GDP has increased and led to growth through specialization, technology diffusion and shifting comparative advantage. It is not new, but represents a deepening of existing trends.

As explained in Section 3, innovation can take the form of development of new goods, services or processes. New goods and services are typically specific to the innovating firm and are produced in-house. However, as the product, service or process matures, it becomes standardized and a possible candidate for outsourcing. The process at the firm level is one of adding new innovations at the technology frontier, spinning off mature goods and services while maintaining a focused and productive organization. The finance sector springs to mind as the most prominent service sector subject to this dynamic. However, services such as entertainment, media, software development, engineering, architecture, design and even education and health, have started to standardize and outsource routine tasks. In the health sector, this could enable highly skilled health personnel to focus on providing and improving treatment rather than spending a lot of time on routine tasks. Both in manufacturing and services, what is typically retained within the organization are those tasks that are of strategic importance and hence the tasks that contribute directly to distinguishing the final product from that of competitors.[30]

At the national level the process is one of changing comparative advantage with the accumulation of physical and human capital, and shifting the areas of specialization to higher-technology activities. IT has opened the services sector to this dynamic, and vertical disintegration in service sectors is increasingly common. An indication of the extent to which a sector is vertically integrated is the ratio of value added to gross output, i.e. the share of the sales value that has been produced in-house. The most important in-house production factor is labour. Typically, vertically integrated industries have a high share of compensation to employees in their total cost structure. This is very clearly illustrated in Table 3, which shows cost shares in five different industries in the US. The shares are calculated from the input-output table from 2002.

[30] IT services provided within manufacturing firms are also subject to outsourcing.

Table 3
Cost structure in selected United States' industries, 2002

Cost component	Motor vehicles	IT services	Other business services	Administrative support services	Computer systems design
Total material inputs	53.6	10.3	5.7	8.2	3.2
Wholesale and retail trade	6.2	1.1	0.8	2.4	0.4
Transport and storage services	2.3	1.7	1.4	1.7	0.4
Publishing industries (includes software)	0.0	0.4	0.4	0.1	0.0
Broadcasting and telecommunications	0.4	6.0	2.8	2.2	1.5
Information and data processing services	0.2	2.3	0.8	1.1	0.7
Financial and legal services	1.8	8.9	7.8	6.9	2.8
Miscellaneous professional, scientific and technical services	2.8	7.5	10.4	5.3	1.7
Computer systems design and related services	0.1	1.7	0.7	0.4	0.6
Management of companies and enterprises	1.2	0.6	0.5	1.7	0.2
Administrative and support services	0.2	6.6	5.7	5.9	3.1
Other services	3.8	6.9	4.8	3.6	2.8
Compensation of employees	18.6	33.7	38.6	46.3	63.3
Taxes on production and imports, less subsidies	0.5	0.9	0.7	1.3	1.4
Gross operating surplus	8.3	11.4	19.0	12.8	17.7
Memo:					
Total value added share	27.4	45.9	58.3	60.4	82.4

Source: US Department of Commerce, Bureau of Economic Analysis (2004).

Compensation of employees, taxes and operating surplus represent the value that is created within companies, while material inputs and the different categories of services inputs are purchased from other companies. The most mature industry of the five, motor vehicles, has by far the lowest wage cost share, and by far the highest share of inputs sourced from other firms. At the opposite end of the spectrum is computer systems design, where more than 60 per cent of total costs are wage costs and as much as 82 per cent of total sales value is generated within the companies. It is further worth noticing that the share of services in intermediate input is quite low, while the share of material inputs is very high in the motor vehicle industry, suggesting a shift in the industry's core activities from manufacturing to services such as R&D, design and marketing. The large sectors producing intermediate services for other sectors are other business services and administrative support services. Both have a high share of in-house value added.

In the following, some experiments are done on the basis of the cost structure depicted in Table 3 in order to assess the possible impact of outsourcing and offshoring. Two types of changes are analysed. First, companies that purchase services from outside firms could shift sourcing from local suppliers to foreign suppliers. Second, local service suppliers could outsource some of the activities that are at present performed in-house to outside suppliers locally and abroad. The discussion assumes offshoring to non-affiliate firms, while the modifications that need to be made with captive offshoring are discussed towards the end of the Section.

Scenario 1: 10 per cent of intermediate purchases of IT services from all US industries are shifted to India and the cost saving is 40 per cent.[31]

According to the US input-output table for 2002, intermediate purchases of IT services in the US economy were close to $90 billion. If 10 per cent were offshored to India, costs would be reduced from $90 to $85.4 billion (5.1 per cent) and the reduction in total cost in the economy would be hardly discernible. This includes only the direct effects of offshoring. Indirect effects would be transmitted in the economy through backward and forward linkages, but these are not taken into account here.

[31] See Farrell (2004) for an estimate of net costs savings of outsourcing of services to India.

Scenario 2: 5 per cent of US purchases of business services and administrative support services are shifted to India. The net unit cost of the offshored service is 40 per cent lower than local supply. As a reaction to increased competition from Indian suppliers, the local services companies outsource 10 per cent of their in-house activities to outside firms, half to India and half to local suppliers. It is assumed that outsourcing to local firms reduces unit costs by 10 per cent.[32] Again only direct effects are estimated.

Purchase of business services (i.e. "Miscellaneous professional, scientific and technical services") and administrative support services amounted to $824 and $412 billion respectively in 2002. If 5 per cent of this was offshored to India at 40 per cent lower costs, this would save the economy 25 billion dollars, or slightly more than 0.1 per cent of total costs in the US economy.[33]

If the two intermediate services sectors respond to increased competition by offshoring 10 per cent of their activities to outside suppliers, of which half went to India and half to local suppliers, an additional $28 billion would be saved. The total cost savings of the two steps would be close to 0.3 per cent of total industry output value in the United States (or 0.5 per cent of GDP). The total impact on the economy of reduced costs in the two services sectors depends on how the savings are spent. The cost savings could be passed on to customers through lower prices, or they could be captured by the firms through higher profits or by workers through higher wages. The more competitive the market, the larger the share of cost savings will be passed on to customers through lower prices.

- Lower price of the service. If the tax rate and profit margin are kept constant, the price of business services and administrative support services would decline by the same percentage as the cost - 2.5 per cent in this case. As already noted, the price level in the total economy would decline by about 0.3 per cent. The business services sector also supplies investment products to other sectors. A 2.5 per cent price reduction could increase real investment in these investment products, possibly by around 2.5 per cent, adding about $750 million or 0.05 per cent to total investment;

- higher profit margin. If firms avoid passing cost savings on to customers, and maintain their output prices, the profit margin would increase from 24 to 27 per cent in business services and from 15 to 18 per cent in administrative support services. This could lead to a higher investment rate in the sector and better services in the longer run, which could in turn have a similar effect as a lower price, as discussed under the previous bullet point. There is, however, no one-to-one relationship between profit margin and investment, and all or part of the additional profits could simply add to shareholders' consumption expenditure;

- higher wages. If the cost savings from outsourcing was captured by the remaining workers in the outsourcing companies, some of the gains would be spent, and some would be saved, contributing to higher investment. It would probably also lead to pressure for higher wages in other sectors which draw on the same pool of skills – and subsequent pressure to outsource to save costs also in these sectors.

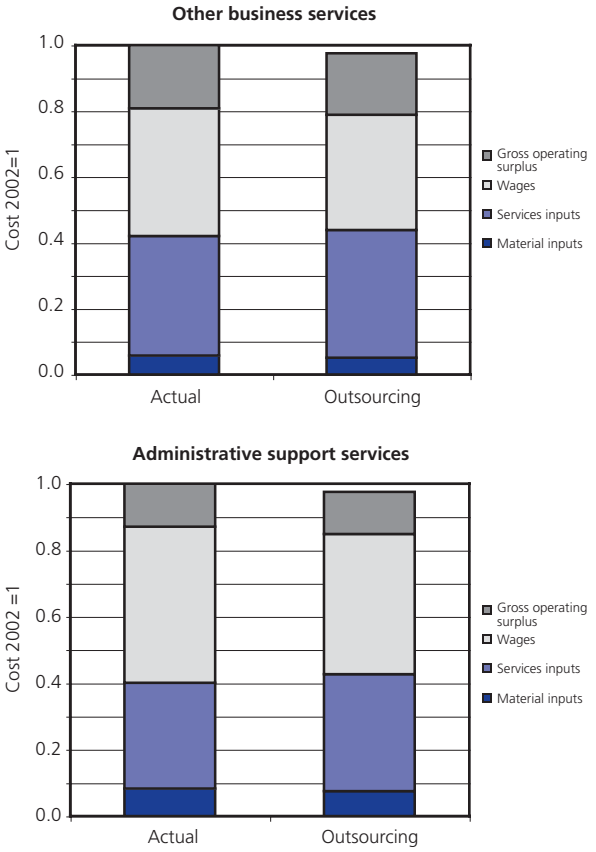
In reality, the gains from outsourcing are a mix of these three elements, but lower costs contribute to higher income and more investment, whichever way the gains from outsourcing and offshoring are spent. The difference is the relative importance of these effects and probably the time it takes for the gains to work their way through the economy. The change in cost structure if gains are used for price reductions is depicted in Chart 3.

[32] This percentage is chosen somewhat arbitrarily and serves as an example, since little is known about exactly how much is saved at a sectoral level from outsourcing to domestic suppliers.

[33] Total costs are equal to total output value.

It is known that the total employment level and the aggregate trade balance of an economy are determined by domestic macro-economic policy, while trade policy and technical changes at home and abroad affect the composition of trade and employment. Offshoring services to non-affiliated firms abroad has the same effect as trade in intermediate inputs in general: it improves productivity in the offshoring firm through lower costs of each individual offshored input, as illustrated by Chart 3, and through a broader variety of inputs. Further, it has the usual effect of reducing the relative income of the production factor that is used intensively in the import-competing activity. In most conceivable cases this improves welfare for the world as a whole and for the United States. However, since the United States is a large economy, its trade volumes and cost structures affect world market prices. If the United States exports relatively information-intensive goods and services and the relative price of these decline in world markets as a result of additional US supply, there is a negative terms of trade effect. However, the scale of offshoring at present, and likely developments during the next couple of decades, are nowhere near the scale that would cause a deterioration of terms of trade which outweighed the productivity gains (see Bhagwati et al. 2004).

Chart 3
Cost structure before and after outsourcing
Scenario 2



Although offshoring is unlikely to have a negative impact on total welfare in the United States and other developed countries, there are likely to be distributional effects. In Section 3 it was shown how differences in factor prices, notably wages, affect the offshoring decision. But the causality does in fact run both ways. Labour demand and wages in the activities being offshored tend to go down, while lower costs of imported inputs tend to raise productivity and reduce costs, allowing for higher rewards to domestic workers. Which effect is the strongest is an empirical question and depends on the human and physical capital intensity of the outsourcing sector, both on average and in the activities being outsourced (Kohler, 2004), and on the mobility of capital in the case of captive offshoring (Eckel, 2003).

Empirical evidence so far suggests that the productivity effect by and large has dominated, although the effects of offshoring cannot be distinguished clearly from the effects of the dot.com bubble and the bursting of the bubble. From September 2000 to September 2004, average weekly earnings of production workers in computer systems design and related services (NAICS code 5415) increased by 10.8 per cent, as compared to an increase of 9.5 per cent for average weekly earnings in the total US private sector. However, computer systems design services (NAICS code 541512) experienced an increase in weekly earnings of only 1.8 per cent during the same period, lagging behind the overall economy. A recent study (Baily and Lawrence, 2005) finds that about 100,000 computer programmer jobs were lost due to offshoring to India during the period 2000-2003. These were jobs in basic programming. However, in the same period more skill-intensive jobs were being created for software engineers and computer and network system analysts. This is precisely what one would expect with changing comparative advantage and technological changes that make services tradable.

Captive offshoring introduces an additional dimension into the analysis since it affects the relative endowments of capital and labour both in the outsourcing and recipient country. In general an outflow of capital results in a shift in employment from capital-intensive to labour-intensive sectors in the capital-exporting country.[34] The

[34] This is a prediction of the so-called Rybczynski theorem.

opposite is true in the capital-importing country. This is to some extent counterbalanced by the repatriation of profits. In any case, the capital flows will probably have to be larger than observed for captive offshoring of services to have a discernible effect on the total composition of employment in the United States.

It is also important to ask what is the alternative to offshoring. It may well be a defensive strategy by the offshoring company in order to maintain market share in the face of increased import competition in the market for its final output. In that case, the alternative to offshoring is not domestic production but a loss of market share and downsizing. This is particularly relevant in industries that perform a mix of high-skilled and low-skilled activities, where the low-skilled activities constitute a relatively large share of total costs.

(b) Impact of outsourcing on the service-exporting country

As noted in 4(b), the bulk of trade in IT-enabled services is in the category of captive offshoring. The discussion on the impact for service-exporting countries therefore draws on insights from the theory of multinational enterprises, FDI and trade. The possible gains from FDI in host countries are the following:

- employment creation (in cases of unemployment and underemployment);
- increase in total investment (in capital-constrained host countries);
- technology spillovers;
- linkages to the local economy.

A possible negative effect can be crowding out of local industries. The IT-enabled services sector in many of the major exporters (India, Ireland and the Philippines) is mainly producing for exports and thus falls under the export-platform FDI category. This type of FDI is unlikely to crowd out local industries, particularly if unemployment and capital constraints exist in the host country.

Many of the IT-enabled services enterprises that export from India and other poor countries would probably not have established there at all if not for the purpose of exporting, since local demand for such services is unlikely to have initiated or sustained them. This is because the existence of specialized services suppliers requires that both the supplier and the customer have IT hardware (computers and telecommunication lines), and computer and telecommunication penetration in India is low. The telephone penetration rate (fixed and mobile lines) was only 5.2 per 100 inhabitants in 2002, while in the Philippines it was about 22. This compares for example to 33 lines per 100 inhabitants in China and 40 in Mexico (ITU, 2004). According to NASSCOM (2005), Indian domestic sales in the software and services industry accounted for $3.4 billion out a total of $15.9 billion sales in 2003/04.

India and the Philippines have substantial unemployment and underemployment problems and they are probably also capital-constrained. Therefore, jobs created and investments made in the IT services exporting sector are likely to be net additions to total employment and investment. A recent study (Baily and Lawrence, 2005) estimates that the number of software-related jobs created in India in order to service the US market is about 135,000, while NASSCOM (2005) suggests that there were 195,000 "active export focused IT professionals" in 2003, while the corresponding figure for the Philippines was 20,000.

Ireland is not capital-constrained and does not have an unemployment problem today, but some 15-20 years ago it was among the European countries with the highest unemployment rate, at almost 17 per cent in 1985 and 1986. The unemployment rate went down to 3.9 per cent in 2001, but picked up slightly after 2001 following the burst of IT bubble (OECD, 2005b). ICT (both software and hardware) has been an important part of Ireland's amazing catch-up with the leading EU economies since it became a member in 1973 (Barry and Curran, 2004; Barry, 2004). ICT services accounted for 7 per cent of total employment in services in 2002. About a tenth of the enterprises were foreign-owned but these accounted for 77 per cent of turnover and 44 per cent of employment (Central Statistics Office, Ireland, 2004).[35] Ireland has been highly successful in

[35] Foreign-owned enterprises play a more important role in ICT manufacturing, where 97 out of 136 enterprises were foreign-owned and accounted for 84 per cent of employment and 97 per cent of turnover (Central Statistics Office, Ireland, 2004).

attracting export platform FDI and foreign-owned firms accounted for 89 per cent of Ireland's services exports in 2002 (Barry, 2004). Furthermore, over time the foreign firms have established linkages to the local economy and their demand for skilled labour has motivated investment in human capital.

The extent to which captive offshoring creates linkages and/or spillovers to the local economy is crucial for its development effect. Linkages are found to be small for export-platform FDI in general. Spillovers are more difficult to measure and entail technology transfers, for example via a skills pool on which domestic and foreign companies can draw. Another impact stems from investments in infrastructure that are made in order to attract or accommodate foreign firms, but also benefit local firms and the community at large. Finally, there could be a demonstration effect, inspiring local entrepreneurs as well as other foreign companies to invest in the same country. In particular, if one or more of the major multinationals offshore to a country, others are more likely to follow suit (Barry, 2004).

Export-led growth in the newly industrialized Asian countries (NICs) in the 1960s was founded on investments in industries that were at the frontier of the countries' technological capacity and for which domestic demand had not yet reached levels that could sustain a scale-effective industry. These exporting industries became recipients of technology transfers from abroad and channels for technology diffusion to local suppliers, creating linkages and thereby serving as engines of growth. Rapid export growth from export processing zones, in contrast, has not generated sustained development unless the exporting industries have over time become integrated into the local economy. Drawing on this experience, it can be concluded that the development effect of hosting offshored services depends on the extent to which these services become integrated with the local economy over time.

Turning to the impact on income distribution in exporting countries, it has been shown that in Mexico, outsourcing of manufacturing activities from the United States has actually led to an increase in demand for skills and an increase in wage inequality – the opposite of what one would expect in trade between a rich and a poorer country (Feenstra and Hanson, 1997). The reason is that while the activities being outsourced are relatively unskilled and labour-intensive in the United States, they are relatively skills-intensive in Mexico due to the differences in industrial structure between the two countries. A similar effect is observed in outsourcing of services to e.g. India, although the evidence is more of an anecdotal nature. Routine information processing is low-skilled labour intensive in the United States and other developed countries, but the skills requirement is well above what the average Indian worker possesses. Besides, multinational companies tend to pay higher wages than local companies, further contributing to wider wage gaps.[36] Therefore, offshoring is likely to increase employment and exports in India, but may not have a similarly favourable effect on income distribution, at least in the first instance.

6. OFFSHORING AND THE GATS: WHAT IS AT STAKE?

This Section discusses how offshoring is related to the GATS Agreement, and what opportunities might exist for extending opportunities for trade involving offshoring under transparent and predictable multilateral arrangements. Since 1995, the GATS has provided a framework for the liberalization of virtually all services sectors. Based on a so-called "positive list approach", it allows governments to undertake specific commitments sector by sector and according to four modes of supply.[37]

[36] See for example Lipsey (2002) for a survey on home and host country effects of FDI.

[37] Cross-border supply (mode 1) is defined to cover services flows from the territory of one Member (A) into the territory of another Member (B); consumption abroad (mode 2) refers to situations where a service is supplied in the territory of Member A to a service consumer of another Member B; commercial presence (mode 3) implies that a service supplier of one Member (A) establishes a commercial presence in the territory of another Member (B) to provide a service; and the presence of natural persons (mode 4) consists of persons of one Member (A) entering the territory of another Member (B) to supply a service.

The most relevant mode of supply for offshoring activities is the so-called "cross-border supply" of services (or "mode 1"), which is defined as "the supply of a service from the territory of one Member into the territory of another Member" (Art. I:2(a)). Examples of cross-border delivery include international transport, the supply of services through telecommunications or mail, as well as services embodied in exported goods.[38] Electronic transactions also fall *inter alia* under mode 1.

In the discussions on electronic commerce, there was a generally shared view among WTO Members that the GATS was technologically neutral, in the sense that "it does not contain any provisions that distinguish between the different technological means through which a service may be supplied."[39] This principle, referred to as "technological neutrality" means, in particular, that mode 1 specific commitments undertaken during the Uruguay Round, when Internet was not widely used by the business community, do cover Internet transactions. The principle of technological neutrality has been endorsed by a recent WTO dispute settlement panel. In the *United States – Gambling* dispute, the Panel considered that the definition of mode 1 in Article I:2(a) "does not contain any indication as to the means that can be used to supply services cross-border. This indicates [...] that the GATS does not limit the various technologically neutral possible means of delivery under mode 1. [...] a market access commitment for mode 1 implies the right for other Members' suppliers to supply a service through all means of delivery, whether by mail, telephone, Internet, etc., unless otherwise specified in a Member's Schedule."[40] One should note, however, that this panel report has been appealed. It is thus too early to consider this statement as formally endorsed by WTO Members.

Should an Internet transaction also be considered as mode 2, defined as the supply of a service "in the territory of one Member to the service consumer of any other Member" (so-called "consumption abroad", Art. I:2(b)). For mode 1, the supplier is situated outside the territory of the Member having undertaken the commitment. In theory, the main distinction between mode 1 and mode 2 is that the service is delivered within the territory of the Member for the former mode and outside the territory in the case of mode 2. However, electronic delivery blurs this distinction, and the physical presence of the consumer is not necessarily a relevant criterion for determining the place of delivery of a service. So far, WTO Members have discussed this issue mainly in relation to financial services and have not reached a clear understanding on how to address it. As the same problem arises in all sectors where services can be supplied electronically, and as these have increased with the development of the Internet, this means that the scope for potential controversial situations has expanded as well. However, in practice, a problem may only arise when, for a given sector, the level of commitment is different for mode 1 and mode 2 (for instance, there is an "Unbound" for mode 1 and a "None" for mode 2). An understanding among Members on whether mode 1 and /or mode 2 are/is relevant for electronic supply might facilitate negotiations. Pending an agreed solution, the best approach may be to ensure a similar level of commitments for both modes 1 and 2.

The degree of market opening consolidated under the GATS is determined by specific commitments undertaken by each Member in its national schedule. GATS specific commitments can be defined as legal guarantees enjoyed by foreign services suppliers, governing conditions of access to a market and conditions of competition *vis-à-vis* domestic suppliers. In GATS terms, the concept of market access entails six quota-type and other specified restrictions. National treatment refers to the obligation to accord to services and service suppliers of other Members treatment no less favourable than the treatment accorded to national services and service suppliers. Members have the possibility to select the sectors and modes of supply for which they are ready to undertake specific commitments. Moreover, these specific commitments can be qualified with various types of limitations, thus allowing a Member to tailor them to its specific national policy objectives. Therefore, specific commitments undertaken under mode 1 – and mode 2 – in relevant sectors (professional services, computer services, financial services, but also health and education, for instance) do guarantee a certain level of transparency

38 See *Guidelines for the Scheduling of Specific Commitments Under the General Agreement on Trade in Services (GATS)*, adopted by the Council for Trade in Services on 23 March 2001, WTO document S/L/92, paragraph 28.

39 *Work Programme on Electronic Commerce – Progress Report to the General Council*, adopted by the Council for Trade in Services on 19 July 1999, WTO document S/L/74, paragraph 4.

40 *United States–Measures Affecting the Cross-Border Supply of Gambling and Betting Services*, Report by the Panel, WTO document WT/DS285, circulated on 10 November 2004 (hereinafter *United States – Gambling*), paragraph 6.281 and 6.285. Note that the Report was appealed on 7 January 2005; the Appellate Body Report is expected at the beginning of April 2005.

and predictability to countries supplying services under these modes, including offshoring-related services. Full market access and national treatment commitments mean that the "importing" Member cannot maintain or implement any of the six market access measures listed in Article XVI and cannot discriminate, *de jure* or de facto, against foreign services and service suppliers. Moreover, the undertaking of specific commitments triggers the application of other GATS disciplines, related in particular to transparency requirements, good regulatory practice, behaviour of monopolies, and also the Annex on Telecommunication Services.

Services trade in most sectors is heavily regulated and the need to regulate is likely to increase as competition develops. The GATS explicitly recognizes "the right of Members to regulate, and introduce new regulations, on the supply of services within their territories in order to meet national policy objectives". Members reaffirmed this principle in the *Negotiating Guidelines* which provide the framework for the current negotiations.[41] Policy objectives include, *inter alia*, the protection of the consumer or the need to ensure the quality of the service and/or the qualifications of the supplier. The GATS does not seek to influence policy objectives, but establishes a framework of rules to ensure that services regulations are administered in a reasonable, objective and impartial manner, and are not more burdensome than necessary. Furthermore, Members are currently developing disciplines to ensure that certain types of non-discriminatory measures (qualification requirements and procedures, technical standards and licensing requirements) are based on objective and transparent criteria, and do not constitute unnecessary barriers to trade in services. Applying these measures to cross-border trade raises a number of questions which should be given closer consideration. For instance, does a measure impact differently on services supplied electronically as opposed to those supplied by suppliers who are present within the territory of the Member (modes 3 and 4)? Does the electronic supply of services call for different types of regulatory approaches? For instance, how are qualification and licensing requirements enforced with respect to suppliers situated outside the territory of the "importing" Member?

Another relevant aspect of the GATS framework is its exception provisions. Article XIV, for instance, contains general exceptions which are obviously pertinent for electronic transactions. This provision allows in certain conditions Members to depart from their GATS obligations, including their specific commitments, to take measures necessary to achieve certain public policy objectives, such as the protection of public morals and the maintenance of public order. In this context, it is also worth noting that Article XIV(c) permits, *inter alia*, Members to take measures necessary to protect the privacy of the personal data of individuals and the confidentiality of individual records and accounts, and to prevent deceptive and fraudulent practices.

The current services negotiations offer an opportunity to improve existing commitments, and undertake new commitments. But how far have modes 1 and 2 been consolidated in Members' schedules in previous negotiations? A WTO Secretariat study[42] reveals that mode 1 has attracted overall far fewer commitments than mode 3, for instance. One explanation may be that Members have considered this mode of supply not to be technically feasible for given sectors (which they sometimes explicitly indicated with an "Unbound*"). Indeed, cross-border supply is irrelevant – and will remain so – for a number of activities which, by their very nature, require physical proximity between the consumer and the supplier (hotel and restaurant services, hairdressing services, for instance). However, one should note that the assumptions concerning the "technical feasibility" of trading services cross-border may have changed since the end of the Uruguay Round as a result of technological developments. Uncertainties about how to enforce regulatory measures with respect to suppliers situated abroad may be another explanation which prompted governments to retain the right to prohibit all suppliers for reasons of "regulatory prudence". But the main characteristic of mode 1 commitments is that they are mostly consolidated as "None" (i.e. no limitation) or "Unbound"; limitations are less common than for mode 3, for instance; fewer types are used (they include mainly nationality, residency and commercial presence requirements) and they are found mainly in financial, telecoms and professional services. Another interesting characteristic is that the level of bindings for individual modes, including mode 1, does not differ significantly between developed and developing countries. However, such general patterns would need to be interpreted with care since, for a given mode, there may be big variations from one sector to another.

41 *Guidelines and Procedures for the Negotiations on Trade in Services*, adopted by the Special Session of the Council for Trade in Services on 28 March 2001, WTO document S/L/93.

42 WTO (2001).

Specific commitments undertaken with respect to mode 2 are significantly more liberal than those for the other three modes of supply. Most of the time, limitations scheduled for mode 1 have not been repeated under mode 2. This may be a potential source of difficulty given the discussions surrounding the status of electronic transactions.

It is important to recall that the absence of specific commitments in a given sector does not mean the absence of trading opportunities. In fact, actual access conditions for services supplied electronically, in particular information technology services and business process outsourcing, tend to be rather liberal. Of course, scheduling commitments in relevant sub-sectors would add transparency and predictability for business operators.

It is also useful to recall that some general GATS disciplines do apply to services trade even in the absence of specific commitments. The most important of such disciplines is no doubt the obligation not to discriminate among services or services suppliers based on their nationality (MFN obligation). Other generally applicable disciplines include transparency requirements (obligation to publish all measures of general application and to establish enquiry points mandated to respond to other Members' information requests), establishment of administrative reviews and appeals procedures and disciplines on the operations of monopolies and exclusive suppliers.

While modes 1 and 2 are no doubt most relevant for the development of offshoring activities, the fact that two-thirds of all offshoring is "captive" offshoring (see Section 4 (c)) suggests that lifting foreign investment restrictions may contribute to developing offshoring activities in "exporting" countries. Mode 3 commitments by the countries "exporting" offshoring activities may further contribute to the development of offshoring centers, in particular in developing countries.

Is the GATS equipped to promote further liberalization of offshoring-related services? Some commentators consider that the current framework is "far from ideal".[43] In addition to the uncertain status of electronic delivery as in relation to mode 1 and mode 2 discussed above, the main criticism concerns the current classification system, which would inadequately reflect "new" services, as well as the "positive list approach" which, coupled with the request-offer process used in the negotiations, would slow down liberalization efforts. Proposals to correct these perceived deficiencies range from the use of model schedules for cross-border trade of IT and BPO services (such schedules were used in the negotiations on telecommunications and maritime transport, for instance), to undertaking a horizontal commitment to liberalize cross-border trade in a wide range of services (such horizontal commitments would mean, in fact, adopting a negative list approach for modes 1 and 2).

Turning to classification first. The GATS does not require Members to follow any specific classification system to describe committed sectors and sub-sectors. So far, most Members have based their schedules on the so-called "Services Sectoral Classification List", which was established by the Secretariat of the GATT in 1991.[44] This list is based on the 1991 UN Provisional Central Product Classification[45] (CPC Prov.) and lists 12 services sectors, disaggregated in about 160 sub-sectors, indicating for each of them the corresponding CPC number. The Services Sectoral Classification List is generally acknowledged to be outdated in a number of sectors. As a result, it is unclear where individual IT and BPO activities are covered. It should be noted, nevertheless, that problems related to classification are not limited to IT and BPO services; they affect other equally important sectors, such as energy, telecommunication, environmental services, etc. In the Committee on Specific Commitments, Members have started to review the classification of various sectors – including computer and related services – but there has been no tangible result so far. By early 2005, no Member had proposed to give consideration to the classification of BPO services.

Secondly, when defining the framework for the new round of services negotiations, Members explicitly stated that the negotiations should preserve the existing structure and principles of the GATS (including the

43 Mattoo and Wunsch-Vincent (2004).

44 WTO document MTN.GNS/W/120, dated 10 July 1991.

45 *Services Sectoral Classification List*, Note by the Secretariat, WTO document MTN.GNS/W/120, (hereinafter 'W/120').

positive list approach), and they established the request-offer approach as the main method of negotiation.[46] Proponents of this approach – among them most developing countries – were motivated by the expectation these principles would give them more flexibility in deciding which sectors to liberalize. Adopting a negative list approach for commitments under modes 1 and 2 would contravene such expectations. Moreover, such an initiative would inevitably trigger similar proposals for other modes, in particular mode 3. A model schedule does have merits, but an equally strong case could be made for other sectors (such as energy services).

As a result of technological developments, cross-border trade in services has gained significant economic importance and the development of offshoring-related activities certainly contributed to this renewed interest. As a result, mode 1 already figures prominently in the ongoing negotiations.[47] However, this focus may not necessarily be sufficient in itself to warrant drastically different solutions, and to run the risk of fragmenting the agreement in order to create a special regime for offshoring-related services. Equally strong arguments could be made for strengthening liberalization in other sectors and other modes of supply. The current structure of the GATS allows specific commitments to be undertaken and should be able to further the liberalization of cross-border trade. Weaknesses of the GATS systems which may impair the liberalization of offshoring-related services (obsolete classification, liberalization targeted at only a few activities without taking into account the commercial reality, for instance) raise more horizontal questions because they affect nearly all services sectors. They should be addressed as such.

7. CONCLUSIONS

In reviewing the international trade and the employment data of major countries prominently engaged in the offshoring of IT services, one is tempted to conclude that most of the expressed expectations and fears related to the size and dynamics of offshoring of IT services are exaggerated. At present, the impact of offshoring services jobs is far stronger in the popular perception than on actual production, employment and trade patterns. The number of jobs affected today by offshoring IT services is small if related to the overall employment levels in the developed countries most affected. It is also small in the countries which have started exporting IT services if related to their total employment. According to BOP data, the leading beneficiaries of the IT service offshoring are Ireland and India. Ireland reports "only" about 24,000 people were employed in its software industry in 2003, a level markedly lower than in 2001. Ireland's exports of computer and information services are reported to amount to $14.4 billion, the largest in the world. Indian software industry employment (narrowly defined) amounted to 568,000 people in fiscal year 2003-04, representing an increase of 37 per cent since fiscal year 2001-2002. Again, according to NASSCOM(2005), 95 per cent of India's software industry employment is export-oriented and only 5 per cent works for the domestic market. A large part of India's IT specialists still work abroad and many of them are included in the host country's employment data. Indian employment and trade data indicate that the most dynamic component of services offshoring is not within the high-skill-intensive IT sector, but in the generally low-skilled business services sector. Employment in the latter sector doubled in India within the last two years. Nevertheless, even the broadly defined IT sector accounts for less than 0.25 per cent of the employed Indian labor force.

In Ireland and India, the rise of the IT sector was strongly supported by the respective governments, which created a favorable business environment. Government support was not limited to infrastructure and educational training, but included trade facilitation, a favorable tax regime and FDI-friendly regulations. However, government support alone cannot be credited for the success of the IT and IT-enabled services industry in these two countries. Realizing the potential of new technological innovations such as low-priced bandwidth communication lines and the digitization of many information-based services also needed companies with the managerial skills to take advantage of both low-cost labour and new market opportunities.

[46] *Guidelines and Procedures for the Negotiations on Trade in Services,* adopted by the Special Session of the Council for Trade on Services on 28 March 2001, WTO document S/L/93.

[47] See, for instance, the Communication from Chile, India and Mexico, *Joint Statement on Liberalization of Mode 1 under GATS negotiations,* WTO document JOB(04)/87, 28 June 2004.

Past experience has shown that opportunities provided by technological change contribute markedly to economy-wide productivity gains, which are the source of all lasting income gains. All major technological changes require adjustment of production capacities and the employment structure. In the (net) offshoring economies, flexibility in periods of adjustment reduces the losses which some firms and employees inevitably will experience at the beginning. The adoption of new technologies and management methods is usually stretched over a significant trial and error period and the normal turnover rates (or churn rates) in the labour markets accommodate structural changes to a large extent. Some of the projections made by Forrester (and other companies) in respect to the expansion of offshoring might be chilled in a harsher environment for the IT sector in the coming years.

In ten years' time, "the new wave of globalization" brought by the offshoring of services will be compared with previous revolutions such as e-commerce. The projections of the expansion of e-commerce in the mid-90s was not as significant as predicted, but this new technology has found its niche in the retail distribution (accounting for less than 2 per cent of US retail sales in 2004.[48] Likewise, offshoring of IT and IT-enabled services will increase significantly in size in the coming years without upsetting national employment levels in the countries which offshore, given the normal turnover rates in labour markets. Neither will it dramatically change the overall employment situation in the countries providing the offshored services, given their large labour force growth in the years ahead.

Finally, as far as the GATS is concerned, offshoring is one of many services sectors that could be subject to multilateral market access commitments under GATS auspices, aimed at increasing predictable and transparent trading opportunities. It was noted, however, that improvements in GATS, particularly in relation to such matters as the definitional distinction between mode 1 and mode 2 and the need for clarity with regard to scheduling nomenclature, would make it easier for WTO Members to contemplate new commitments with less uncertainty as to their implications.

[48] US Department of Commerce, News, Quarterly E.Commerce Sales, 3rd quarter 2004, 19 November 2004.

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APPENDIX TABLES

Appendix Table 1
International ICT markets by region, 2001-2003
(€ million at constant 2002 exchange rates and percentage)

	Value	Annual percentage change		
	2003	2001	2002	2003
Information Communication Technology (ICT)				
Europe (incl. Eastern Europe)	631012	3.2	0.1	1.2
United States	670897	-1.3	-2.7	0.0
Japan	254502	7.0	3.3	-0.8
Rest of World	514381	6.7	5.0	4.7
Total	**2070792**	**2.8**	**0.7**	**1.4**
Information Technology (IT)				
Europe (incl. Eastern Europe)	298395	1.6	-3.0	-0.8
United States	392417	-4.5	-6.3	0.4
Japan	114613	3.8	-0.8	-0.5
Rest of World	128050	2.8	1.7	1.4
Total	**933476**	**-0.7**	**-3.6**	**0.0**
Telecommunications				
Europe (incl. Eastern Europe)	332616	4.8	3.2	3.0
United States	278480	3.9	2.8	-0.6
Japan	139889	10.0	6.8	-1.1
Rest of World	386331	8.2	6.3	5.9
Total	**1137316**	**6.3**	**4.5**	**2.5**

Source: EITO (2004).

Appendix Table 2
The major traders in other business services, 2000-2003
(Million dollars)

	Exports				Imports			
	2000	2001	2002	2003	2000	2001	2002	2003
Ireland	1908	4386	5208	6743	13814	16597	19384	22255
India	3350	3889	4358	4452	6218	6771	7673	11010
United States	40682	38078	40567	44850	23487	21630	24959	28279
United Kingdom	33459	35404	40612	44797	16645	17782	19045	20118
Germany	24203	25832	25318	31757	32158	36234	35877	39896
Israel	2784	2892	2908	3124	3700	3935	3533	3624
Spain	8070	9402	10931	13511	10202	11266	12376	15273
Canada	10402	9856	10233	11266	9626	9576	9505	10409
Netherlands	15527	16562	20074	22045	16686	18537	21038	24589
Sweden	6482	6912	8659	11148	7602	8777	9512	10648
France	19323	21804	20693	24086	15490	10358	19227	24486
Japan	17709	16245	17401	18042	24296	23808	24715	23149
China	7663	8448	10419	17427	6959	7504	7957	10371
Luxembourg	...	...	2069	2387	...	...	1779	2234
Italy	13789	17024	17043	22254	17799	19962	20370	24644
Brazil	4568	4613	4319	4133	3434	4203	3543	4379
Russia	1740	1343	2012	2978	3367	3594	4583	5046
Memo items:								
World	324383	333750	358727	419061	326580	333217	357958	411126
EU (15)	154934	172228	186926	227293	166025	176535	195194	231330

Source: IMF, Balance of Payments Statistics, CD ROM December 2004, national statistics and WTO estimates.

Appendix Table 3
The decline in leased line pricing, 1992-2004
(Indices, 1992=100)

OECD average	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
56/64 kbit/s													
2 km	100	100	123	132	139	120	121	81	77	71	66	58	56
50 km	100	101	103	94	89	76	68	41	44	39	37	32	32
200 km	100	101	108	106	77	71	63	41	42	37	35	33	32
2 Mbit/s													
2 km	100	102	110	111	112	107	101	63	62	60	54	52	48
50 km	100	101	92	87	83	77	64	42	46	42	38	35	32
200 km	100	101	98	91	82	77	65	44	48	41	37	34	31

Source: OECD, OECD Information Technology Outlook 2004.

Appendix Table 4
Increasing role of Software Technology Parks of India in India's IT exports
(Billion dollars and percentage)

Fiscal Year	India	STPI units exports	Share of STPI units
1992-93	0.220	0.017	8
1993-94	0.325	0.037	11
1994-95	0.489	0.078	16
1995-96	0.753	0.217	29
1996-97	1.099	0.501	46
1997-98	1.722	0.921	54
1998-99	2.600	1.497	58
1999-00	3.958	2.679	68
2000-01	6.206	4.389	71
2001-02	7.653	6.190	81
2002-03	9.526	7.682	81

Source: Software Technology Parks of India (STPI) (http://www.stpi.soft.net/areport12.html).

Appendix Table 5
US Total employment by occupation, total and computer occupations, 1997-2004
(Thousands and percentage)

	All occupations	Computer and mathematical occupations	of which: Computer systems analysts and scientists
A. Thousands			
1997	129558	1494	1236
1998	131463	1747	1471
1999	133488	1847	1549
2000	135208	2074	1797
2001	135073	2103	1810
2002	136485	2030	1742
2002-Dec [a]	136599	3163	...
2003-Dec	138556	3183	...
2004-Dec	140278	3357	...
B. Percentage change (annual)			
1998	1.5	16.9	19.0
1999	1.5	5.7	5.3
2000	1.3	12.3	16.0
2001	-0.1	1.4	0.7
2002	1.0	-3.5	-3.8
2003-Dec	1.4	0.6	...
2004-Dec	1.2	5.5	...
1997-2000	1.4	11.6	13.3

[a] Break in series.
Source: US Bureau of Labor Statistics, the Current Population Survey (CPS) (Household data).

Appendix Table 6
Hourly wages of computer systems analysts in the United States, 1997-2004
(Dollars)

Year	All occupations (a)	Computer systems analysts and scientists (b)	Relative wage of computer systems analysts and scientists (b):(a)
1997 (Sept)	15.09	26.79	1.78
1998 (Dec)	15.72	27.89	1.77
1999 (Sept)	15.36	28.49	1.85
2000 (July)	15.80	29.26	1.85
2001 (Jan)	16.23	30.33	1.87
2002 (July)	17.18	32.86	1.91
2003 (July)	17.75	33.25	1.87

Source: US Department of Labor, National Compensation Survey (www.bls.gov/ncs/home.htm).

Appendix Table 7
Employment in Ireland's software industry, 1993-2003
(Thousands and percentage change)

Year	Total	Irish nationals	Foreign nationals
A. Thousands			
1993	8.9	4.5	4.4
1995	11.8	5.8	6.0
1997	18.2	9.2	9.0
1998	21.6	9.3	12.4
1999	24.9	11.1	13.8
2000	30.0	14.0	16.0
2001	31.5	15.0	16.5
2002	27.9	12.6	15.3
2003	23.9	10.7	13.2
B. Percentage change			
1998	19	1	38
1999	15	20	11
2000	21	26	16
2001	5	7	3
2002	-11	-16	-7
2003	-14	-15	-14
1997-2000	64.8	52.2	77.8
2000-2003	-20.2	-23.5	-17.4

Source: IDA, Ireland.

Appendix Table 8
Employment in India's software industry, 2000-2004
(Thousands and percentage)

	Total	Software Export sector	Software Domestic sector	Software Captive user org.	Business Services (ITES)	Total (excl. ITES)
A. Thousands						
1999-00	284	110	17	115	42	242
2000-01	430	162	20	178	70	360
2001-02	522	170	22	224	106	416
2002-03	661	205	25	260	171	490
2003-04	813	260	28	280	245	568
B. Percentage change						
2000-01	51	47	18	55	67	49
2001-02	21	5	10	26	51	16
2002-03	27	21	14	16	61	18
2003-04	23	27	12	8	43	16

Source: NASSCOM, Indian IT Industry Factsheet (available at http://www.nasscom.org/download/IndianITIndustryFactsheet.pdf).

Appendix Table 9
Indian speciality occupation workers in the United States (H-1B), FY 2000-2003
(Petitions approved and median annual earnings)

	H-1B petitions approved			
	All nationalities		Indian nationals	
	Total	computer related (03)	Total	computer related (03)
		(a)	(b)	(c)
FY 2000	257640	148426	124697	103763
FY 2001	331206	191397	161561	136646
FY 2002	197537	75114	64980	47477
FY 2003	217340	83114	79166	...

	Wages and wage sum of H-1B computer specialists of all origins and Indians			
	Earnings (annual) computer related Median value dollars (d)	Estimated earnings computer analysts Million dollars (e)=(a)*(d)	Estimated earnings of Indians Million dollars (b)*(d)	Estimated earnings of Indians IT specialists Million dollars (c)*(d)
FY 2000	55000	8163	6858	5707
FY 2001	58000	11101	9371	7925
FY 2002	60000	4356	3899	2849
FY 2003	60000	4986	4750	...

Note: Fiscal year 2000 refers to the period October 1, 1999 through September 30, 2000.
Sources: US Immigration and Naturalization Services (FY 2000 and 2001) and US Department of Homeland Security (FY 2002 and 2003).