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FEAR OF SERVICE OUTSOURCING: IS IT JUSTIFIED?

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ABSTRACT

The recent media and political attention on service outsourcing from developed to developing countries gives the impression that outsourcing is exploding. As a result, workers in industrial countries are anxious about job losses. This paper aims to establish what are the hypes and what are the facts. The results show that although service outsourcing has been steadily increasing it is still very low, and that in the United States and many other industrial countries "insourcing" is greater than outsourcing. Using the United Kingdom as a case study, we find that job growth at a sectoral level is not negatively related to service outsourcing.

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I. INTRODUCTION

Outsourcing of services has received an enormous amount of attention in the media and political circles in recent times. In just five months, between January and May 2004, there were 2,634 reports in US newspapers on service outsourcing, mostly focusing on the fear of job losses.[1] In particular, there have been reports about jobs moving from industrial countries like the United States and the United Kingdom to developing countries such as India. These concerns are not limited to the United States. Similar reports appeared in newspapers in other industrial countries such as the United Kingdom, which had 380 reports on outsourcing in its newspapers during the same period. Newspapers in Australia have also published similar reports. Figure 1 plots a quarterly count of news stories or commentaries in major newspapers and newswire service reports on international service outsourcing from the first quarter of 1991 to the first quarter of 2004 in the United States and the United Kingdom, which we have constructed using an electronic database on newspaper articles (FACTIVA). Both indexes show a clear upward trend in media interest in international outsourcing of services.[2]

All this media hype would lead one to believe that service outsourcing is some new phenomenon that has exploded. What has stirred such an interest in outsourcing? Many people would argue that outsourcing is indeed just a normal part of international trade, whereas others see it as something different. To date, there is not even agreement on what the term outsourcing means. The *American Heritage Dictionary* defines it as "The procuring of services or products...from an outside supplier or manufacturer in order to cut costs." Some people interpret "outside" to mean outside the firm, and others outside the country. Both usages are common. But since the main concerns in industrial countries are with "exporting jobs" to developing countries, we will restrict our attention to international outsourcing. We delve further into the meaning and origins of outsourcing in the next section.

What is new about outsourcing today is that it is increasingly in services. Although international outsourcing of material inputs is still far more quantitatively important than services for a typical industrialized economy, which we show below, the current wave of anxiety in advanced economies is mostly about international outsourcing of services. There is a sense in which services outsourcing is qualitatively different from material outsourcing in terms of the "stress effect." In the past, the service sector was largely considered impervious to international competition. Accountants did not fear that someone abroad would take their high-paying jobs, but they certainly benefited from the cheaper imported manufactured goods that open trade allowed. For this reason, service sector professionals were likely to have been staunch supporters of open trade. With the improvement in the communication technology such

[1] During the two-week period, from March 1 to March 15, 2004, there were 270 such stories that simultaneously mentioned outsourcing and either job loss or unemployment in the same story.

[2] The index for the United States exhibits local peaks in 1996, 2000, and 2004, which are all presidential election years.

as the internet, services can cross political borders via the airwaves. Jobs in fields ranging from architecture to radiology seem much more at risk. While it was possible for firms to relocate abroad in the past, they had to give up something—their closeness to important markets, for example. With the new technologies they can retain these links while also obtaining access to cheap, but well-trained labor. The lack of control and the worry that outsourcing could spread contributes to the fears of white collar workers. A study conducted by the University of Maryland found that, in the United States, among those with incomes over $100,000, the percentage actively supporting free trade slid from 57 percent in 1999 to 28 percent in January 2004 (Rajan and Wei, 2004).

Whether there is any basis for this anxiety has not been carefully examined. Besides newspaper articles, which are largely based on management consultant reports, there is very little empirical research on service outsourcing. We present an overview of the literature in Section III. The growth of service outsourcing and its effects deserve closer attention for a number of reasons. First, there does appear to be a backslide in support for free trade policies, particularly among white-collar workers. Even if there were no evidence of job losses arising from outsourcing, the fear itself of losing one's job is of concern. These kinds of fears lead to lobbying for protectionist type policies. For example, in Australia there were news reports of lobbies by Australian software companies to restrict (other) Australian firms' ability to outsource software designs to India. In the United States, the Senate passed restrictions on foreign outsourcing for federal contracts in March 2004 (though it did not become law). Trade and Industry Secretary Patricia Hewitt stated that the United Kingdom will not pass protectionist legislation (see *Financial Times,* 5/3/2004, page 6). If support for protectionist policies increases, then this may not continue to be their stance. In addition, even though we may expect service outsourcing to lead to long-run benefits, there may be short-term adjustment costs in the form of job losses. Many theoretical trade models assume full employment and perfect factor mobility between sectors, but rigidities in the labor market can lead to short-term employment effects. It is important, therefore, to assess how large these effects are in order to inform the policy debate on possible relocation assistance programs.

The main objective of this paper is to investigate and to establish what are the hypes and what are the facts about service outsourcing. First, we develop a set of stylized facts describing the trends in service outsourcing, which we present in Section IV. We focus on business services and the computing and information service trade as these most closely reflect the service categories that are generally thought of as being outsourced. Some of our results correct some misleading impressions that one may derive from the news media, while others complement them. We examine the following questions: Has service outsourcing exploded in recent years? How does it compare with the level of material outsourcing? Who are the biggest outsourcers of services? Who are the biggest recipients of service outsourcing from the rest of the world (the "insourcers")? And are there big job losses arising from service outsourcing?

A number of interesting results emerge. We show that service outsourcing has been steadily increasing but is still at very low levels. For example, in the United States, imports of computing and business services as a share of GDP were only 0.4 percent in 2003. This share has roughly doubled each decade—from 0.1 percent in 1983 to 0.2 percent in 1993, and to

0.4 percent in 2003, based on IMF's balance of payments trade data. A similar picture emerges from industry level outsourcing intensity ratios, which we constructed using input/output coefficients. These show that material outsourcing is at much higher levels than service outsourcing.

Interestingly, in the United States and in many other industrial countries, exports of these services are greater than imports. The United States has a net surplus in services and this surplus has been increasing in recent years. This highlights that trade in services, like trade in goods, is a two-way street. In value terms the United States is the largest importer and exporter of combined computing and business services. However, when scaled by GDP, the proportion of outsourcing-type trade in the United States is low compared with the rest of the world. Based on 2002 figures, its share of imports of business services as a proportion of its GDP ranks 117th in the world, with the United Kingdom ranking 85th. In comparison, China, which ranked 99th in the world, is ahead of the United States. The countries with the highest ratio of imports of business services to GDP are Angola, the Republic of Congo, Mozambique, and Ireland.

The second main contribution of the paper is provided in Section V, where we analyze the effects of service and material outsourcing on employment, using the United Kingdom as a case study. We find there is no evidence that outsourcing led to employment losses in the United Kingdom during the period 1995 to 2001 in either the manufacturing to the services sectors. In section VI we present our conclusions.

II. WHAT'S IN A NAME?

The use of the term outsourcing has not been standardized. Outsourcing generally refers to the procuring of material inputs or services by a firm from outside the firm. Outsourcing can be domestic or international. Examples of domestic outsourcing would include, say, a Detroit-based automobile company that contracts out the production of some of its parts to a firm in Cleveland, Ohio; or if the auto firm contracts out its employee food service to a local restaurant which in turn provides the service on the site of the auto firm. Issues relating to domestic outsourcing have not featured prominently in the media. The main concern in the public debate is mostly about international outsourcing, particularly the outsourcing by firms in advanced economies to firms located in low-wage countries.

In this paper, we focus on international outsourcing, defined as the procuring of service or material inputs by a firm from a source in a foreign country. This term includes both intra-firm international outsourcing (by which the foreign provider of the input is still owned by the firm) and arm's-length international outsourcing (by which the foreign provider of the input is independent from the firm using the input). International outsourcing is part of a country's imports (of goods and services).

Interestingly, the earliest use of the word "outsource" that we have traced appears to refer to international outsourcing of services. According to the Oxford English Dictionary (http://dictionary.oed.com), the earliest use was about the British auto industry contracting out engineering design work to Germany and appeared in an article in 1979 in the *Journal of Royal*

Society of Arts, Vol. CXXVII, 141/1.[3, 4] For whatever reason, many other early uses of the terms "outsource" and "outsourcing" also tend to be related to the automobile industry, though they could refer to material inputs as well as services. The earliest use of the terms in the United States that can be traced electronically, according to FACTIVA, appeared in the *Harvard Business Review* in 1980, and in a major U.S. newspaper in 1981.

Another commonly used word for outsourcing is offshoring. The word "offshore" has a long history and can be traced at least to 1895, according to the on-line version of Oxford English Dictionary. It means "moving away from the shore" or "foreign." Using "offshoring" to refer to international outsourcing in the way we have defined above has a much shorter history.

The word "insourcing" was once used to refer to the production of something inside a company that it used to contract out.[5] In this paper, we define it as outsourcing in the opposite direction (from foreign-located firms to domestic firms). For example, the phrase U.S. "insourcing" refers to the outsourcing from the rest of the world to the United States.

III. RELATED LITERATURE

This section reviews the literature on outsourcing. It starts with a discussion of empirical studies on material and service outsourcing, and then moves on to the relevant theoretical models.

A. Empirical

In the empirical literature, while there is a large set of papers on material input outsourcing, there is very little on service outsourcing.

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[3] The original sentence stated: "We are so short of professional engineers in the motor industry that we are having to outsource design work to Germany."

[4] There are interesting historical examples of outsourcing much earlier than 1979, for example when the British military used German mercenaries to fight U.S. revolutionaries, but our focus here is on outsourcing services related to the production process.

[5] The earliest use that we have traced (using FACTIVA) appeared in an article by Dale Buss in the July 20, 1984 issue of the *Wall Street Journal*, "Whether Ford, GM Keep Small-Car Output in U.S. May Hinge on Firms' Labor Talks." The original sentence reads, "… Ford's Mr. Pestillo says that the company could eventually become efficient enough to 'insource' production of such things as manual transmissions, which it currently purchases from the outside." Note that, as in the case of early uses of "outsourcing," this term was also used in association with the auto industry.

Material Outsourcing

A number of papers have studied the evolution of material outsourcing in the United States and other member countries of the Organization for Economic Cooperation and Development (OECD). For example, see Feenstra and Hanson (1996), Campa and Goldberg (1997), Hummels, Ishii and Yi (2001), Yeats (2001), Hanson, Mataloni and Slaughter (2004), and Borga and Zeile (2004). Generally, these studies found a steady increase in the extent of international outsourcing of material inputs (measured in different ways by different authors) over time. For example, Yeats (2001) estimates that 30 percent of OECD exports of machinery and transport equipment comprised parts and components in 1995, and 26 percent in 1978. This share is the highest for the United States and increased from 36 percent in 1978 to 40 percent in 1995; in Europe it increased from 26 percent to 28 percent; and in Japan from 15 percent to 26 percent. However, when looking at the share of components imported in apparent consumption of transport and machinery for 1995, the EU shows the highest share at 16 compared to 11 percent in the United States and 8 percent in Japan.

In addition to examining the magnitude and trends in material outsourcing, the literature has studied their effects on productivity and the wage skill premium. Egger and Egger (2001) find that there is a negative effect of international material outsourcing on the productivity of low-skilled workers in the short run, but a positive effect in the long run. They found that international outsourcing of materials contributed to 3.3 percent of real value added per low-skilled worker in the EU from 1993 to 1997. They attribute the negative short-run effect to imperfections in the EU labor and goods markets.

Several papers have studied the effect of international outsourcing of material inputs on the wage skill premium. By relocating the unskilled-intensive parts of the production process from relatively skill abundant countries to unskilled-abundant countries, outsourcing is expected to increase the relative demand for skilled labor in the skill-abundant country and hence increase the skill premium. Empirical evidence in the United States (Feenstra and Hanson, 1996, 1999) and the United Kingdom (Hijzen et al, 2002) confirm this finding. Feenstra and Hanson (1999) show that outsourcing contributed between 17.5 to 40 percent of the increase in the non-production wage share over the period 1979 to 1990. Feenstra and Hanson (1997) also show that liberalized foreign investment and trade led to an increase in the skill premium in Mexico too. The foreign assembly plants located on the border were created by U.S. firms outsourcing their less skill-intensive parts, which are more skill intensive relative to other industries in Mexico.

Service Outsourcing

The literature becomes much thinner when it comes to international outsourcing of services. Focusing on the information technology (IT) sector in the United States, Mann (2004) argues that globalization—specifically international outsourcing of IT hardware led to a fall of 10 to 30 percent in prices of IT hardware, which translated into higher productivities in all sectors that use IT hardware. Mann then argues that IT software—a form of international outsourcing of services—should be expected to benefit the economy in the same way as IT

hardware. Furthermore, if one assumes that IT software is more price elastic than IT hardware, then the expected productivity gains could be even higher. Finally, Mann documented that IT industries had exhibited a high job growth, so the international outsourcing does not appear to hurt job growth in that sector.

Amiti and Wei (2004), using data on all manufacturing industries in the United States, find that service outsourcing is positively correlated with labor productivity in the United States but material outsourcing is insignificant. Gorg and Hanley (2003) show that international outsourcing of services had a positive impact on productivity in the electronics industry in Ireland between 1990 and 1995. They also found that outsourcing of tangible inputs did not have a significant effect on productivity during this period. Girma and Gorg (2003) find positive evidence of service outsourcing on labor productivity and total factor productivity in the United Kingdom between 1980 and 1992, but they are unable to distinguish between domestic and foreign outsourcing.

Studies on service outsourcing and employment effects have mainly been conducted by management consultants. For example, McKinsey Global Institute's report (2003) is a widely quoted study on service outsourcing. It makes a prediction on job loss due to outsourcing from 2003 to 2015 and computes the distribution of gains between the country that does the outsourcing and the one that receives the outsourcing. The underlying methodology used to make the calculations is not entirely transparent in the report, making it difficult to assign standard errors to the estimates. The McKinsey report also makes the point that the amount of job losses due to outsourcing is a relatively trivial share of overall job losses during the normal course of a business cycle. Brainard and Litan (2004) provide an overview of these studies, and focus on the distributional effects of outsourcing, pointing out that it is the low paid jobs that are being replaced with higher paid jobs. They also provide a number of policy prescriptions for the United States. Shultze (2004) provides some indirect evidence of job losses related to service outsourcing and concludes that the effect is very small.

A more rigorous study of the effects of service outsourcing on employment is provided in Amiti and Wei (2004) using U.S. data. This study also concludes that there is a small negative effect of service outsourcing on employment when using highly disaggregated data. Some details of this study are provided in Section V of this paper.

B. Theoretical

Although there is a rich body of literature that models a firm's decision on where to locate different parts of the production stage, all these models assume perfect inter-sectoral labor mobility so they do not make predictions on net job losses. For example, Jones and Kierzkowski (1990, 1991, and 2001), Dixit and Grossman (1984), Krugman and Venables (1995), Deardorff (1998a and b), Yi (2003) and Amiti (2004) develop models of where different parts of the production stage will be located. When trade costs or technological progress leads to international fragmentation of different parts of the production stage, firms engage in input trade, and this can be thought of as part of outsourcing. These are models of non-integrated firms, where different firms own different production stages, and hence the type of trade that

takes place is referred to as arm's-length trade. Outsourcing can also take place between vertically integrated firms, such as in Helpman's (1984) model of vertical foreign direct investment, which is referred to as intra-firm trade.[6] Antras (2003) introduces incomplete contracts to study ownership decision (whether firms should own the plants producing intermediate inputs or not); and Antras and Helpman (2003) combine the ownership decision with the decision on whether intermediate input producing plants should be located abroad or not. In all of these models, the focus is on the outsourcing of material inputs but these could, in principle, be re-interpreted as service inputs.

Trade economists generally assume full employment and perfect factor mobility between sectors within a country, for example, as in the Heckscher-Ohlin model, so then all the action is on factor prices, i.e., the net employment effects are essentially assumed away. And in this kind of model you do not need to have a large amount of trade to affect factor prices. All you need is for goods prices to change, which then affect factor prices (i.e. Samuelson–Stolper theorem). These international price changes can arise for many reasons. For example, the threat of foreign competition in itself can drive down goods prices even if the trade does not take place.

The H-O model is generally considered to be a long-run model, i.e., with factors perfectly mobile. So in this model trade can lead to sectoral employment changes as one sector contracts and another expands but no net job losses. In the short run, there may be rigidities that prevent perfect factor mobility and hence give rise to net employment effects. For example, Sachs and Shatz (1994) argue that any of the following factors could give rise to net employment losses in manufacturing: "(i) the low-wage workers have a positively sloped supply elasticity, so that a decline in their wage leads to a decline in labor force participation; (2) low-wage workers are unionized, and unions maintain wages above full-employment levels; or (3) low-wage workers have alternative employment opportunities in non-manufacturing (such as services), so that they leave the manufacturing sector entirely when international competition puts downward pressure on wages." Krugman (1995) presents a H-O model with rigid factor prices to show how trade can give rise to big employment effects. If one were to also introduce frictions in inter-sectoral labor mobility then these effects would be even larger.[7]

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[6] This slicing up of the production chain across different countries has also been referred to in the literature as international production sharing, globalized production, de-localization, fragmentation, intra-product specialization, intra-mediate trade, and offshoring. Intra-firm international outsourcing has also been related to vertical foreign direct investment, and vertical specialization.

[7] The McKinsey report indicated that more than 69 percent of workers who lost jobs due to imports in the United States between 1979 and 1999 were re-employed (this is based on U.S. Bureau of Labor Statistics data). Of course, this means that 31 per cent were not re-employed, highlighting that there may be some rigidities in the labor market.

IV. Global Patterns of Service Outsourcing—The Untold Stories in the Media

In this section, we document a set of features about patterns of global service trade that have been under-reported or misreported by news media. Specifically, we aim to address the following questions. Is there a discreet and abrupt rise in service outsourcing in industrialized economies in recent years? What is the relative importance of service outsourcing versus material outsourcing? Who are the biggest outsourcers of services in the world? Who are the biggest recipients of service outsourcing from the rest of the world?

We first provide a description of the data used to measure outsourcing before moving on to the results.

A. Measurement of Outsourcing

Outsourcing is generally difficult to measure because information on which parts of the production stage are contracted out are not readily available, so we need to rely on indirect measures. We construct two different types of measures of outsourcing. The first is an economy-wide measure based on imports of computing (which includes computer software designs) and other business services (which include accounting and other back-office operations), using data from International Monetary Fund's Balance of Payments Statistics Yearbook, which in turn is compiled from the reports to the IMF by the national authorities of member countries. This is the main data source we use to explore patterns of cross-border services trade.

We chose to focus on trade in computing and information and other business services because these are the categories that most likely encompass outsourcing activities. The other categories, such as travel and education, are less likely to include such activities so we excluded them from the study. We would expect that business services should predominantly comprise inputs used by firms, but the computing category is likely to include a higher component of final consumer purchases. However, it is impossible to specify the exactly how much of the trade is in final consumer services. As a robustness check, at least for the U.S. data, we compared the trends in the IMF statistics with those provided by the Bureau of Economic Analysis (BEA). The BEA splits services trade by affiliates and non-affiliates. The affiliate trade is undertaken by multinational corporations, between parents and affiliates, so more closely reflects outsourcing trade. We found that the trends for affiliate trade are similar to those indicated by the IMF data.

The second measure of service outsourcing is calculated on an industry basis for the United Kingdom, as Feenstra and Hanson (1996, 1999) do for material inputs for the United States. For a given industry i, its outsourced services as a share of total non-energy inputs, OSS_i, is calculated as follows:

$$OSS_i = \sum_j \left[\frac{\text{input purchases of service } j \text{ by industry } i}{\text{total nonenergy inputs used by industry } i} \right] * \left[\frac{\text{imports of service}_j}{\text{production}_j + \text{imports}_j - \text{exports}_j} \right]$$

The first square bracketed term is calculated using input/output tables. The denominator includes all non-energy material inputs, listed in Appendix II, plus the following nine service industries: telecommunications; banking and finance, insurance and pension funds, and auxiliary financial services; renting of machinery; computer services; research and development; legal activities, accountancy services, market research, and management consultancy; architectural activities and technical consultancy; advertising; and other business services.[8]

The second square bracketed term is calculated using international trade data from the IMF's Balance of Payments Statistics Yearbooks. Unfortunately, imports of each input by industry are unavailable. As a proxy, an economy-wide import share is applied to each industry. To illustrate, the U.K. economy imported 20.5 percent of business services in 2001. We then assume that each industry (in the manufacturing and service sectors) imports 20.5 percent of the business services used in that year. On average, a U.K. industry uses 4.5 percent of business services as a proportion of total non-energy material inputs. So the outsourcing intensity of business services for a typical industry would be 0.205*0.045=9.2 percent. We then aggregate across the nine service inputs to get the average service outsourcing intensity for each industry. The breakdown of the two components of the outsourcing intensity ratio for each service category is provided for 1992 and 2001 in Table 1.

An analogous measure is constructed for material outsourcing for each industry *i*, denoted OSM_i. In total, our sample consists of 78 industries (69 manufacturing industries and 9 service industries).

A number of potential problems with our outsourcing measures should be noted. First, they are likely to under-estimate the value of outsourcing because the cost of importing services is likely to be lower than the cost of purchasing them domestically. So it would be preferable to have quantity data rather than current values but this is unavailable for the United Kingdom. Second, applying the same import share to all industries is not ideal, but given the unavailability of imports by industry this is our "best guess". This strategy was used by Feenstra and Hanson (1996, 1999) to construct measures of material outsourcing. This approach apportions a higher value of imported inputs to those industries that are the biggest users of those inputs. Although this seems reasonable, without access to actual import data by industry it is impossible to say how accurate it is. Third, the total use of inputs by industry only includes those inputs purchased

[8] The three finance categories, banking and finance, insurance and pension funds, and auxiliary financial services are aggregated into one category to match the employment data. For the same reason, we aggregate the three categories legal activities, accountancy services, and market research and management consultancy.

from a different industry so services produced within the industry are not included, hence the extent of outsourcing is unlikely to be precisely measured. Despite these limitations, we believe that combining the input use information with trade data does provide a reasonable proxy of the proportion of services imported from abroad.

B. Outsourcing Trends in Developed Countries

International outsourcing of services has increased in the United States but still remains low, based on our economy-wide measure using IMF international trade data. Imports of computer and information plus other business services as a share of GDP were only 0.4 percent in 2003. This share has roughly doubled in each decade—from 0.1 percent in 1983 to 0.2 percent in 1993, and to 0.4 percent in 2003. The United Kingdom has a higher outsourcing ratio than the United States—at 0.9 percent in 1983, 0.7 percent in 1993, and 1.2 percent in 2003.

A similar picture emerges from industry level outsourcing intensity ratios, which were constructed using input/output coefficients. Figure 2 presents the average outsourcing intensity ratios across manufacturing and service industries, weighted by output. These ratios indicate that on average the share of service imports in the United Kingdom increased from 3.5 percent in 1992 to 5.5 percent in 2001. These figures are higher than those for the United States, which increased from 0.4 percent to 0.8 percent over the same period (see Amiti and Wei, 2004). But in both cases there is clearly an upward trend.

Material outsourcing intensities are significantly higher than service outsourcing in both the United Kingdom and United States. Material outsourcing is around 27 percent in the United Kingdom and 12 percent in the United States. From Figure 2, we see that in the United Kingdom material outsourcing peaked in 1996 and has been on a downward trend since then. In the United States it has been steadily increasing but at a slower pace than service outsourcing.

In sum, service outsourcing is much lower than material outsourcing, but it is increasing at a faster pace.

C. Which Countries Are the Biggest Outsourcers?

Media reports might give the impression that outsourcing is mostly about the United States and other industrialized countries contracting out services to India and a few other developing countries. This is not entirely correct.

To set the record straight, we look at the trade data in two categories of services that have been most intensely reported: computer and information services and other business services. In value terms, other business services (which we will refer to as just business services) are by far the larger of the two categories.

Using data for 2002, the latest year for which internationally comparable data were available, the top outsourcers of business services in dollar amounts are United States

(US$41 billion), Germany (US$39 billion), followed by a group of countries with trade approximately of the same order of magnitude, Japan ($25 billion), the Netherlands (US$21 billion), Italy (US$20 billion), France (US$19 billion), and the United Kingdom (US$16 billion). Interestingly, India and China—two countries that have been portrayed as major recipients of outsourcing in the media—are themselves significant outsourcers of business services (with a value of US$11 billion for India and US$8 billion for China, and ranked 11th and 18th in the world, respectively). Table 2 lists the value of imports for these services for selected countries with their rankings in the world.

In the categories of computer and information services (which is quantitatively an order of magnitude smaller than business services), the top five importers are Germany, United Kingdom, Japan, Netherlands, and Spain. The United States is a close 6th. China is ranked at 10th place. Unfortunately, there is no data from the IMF's Balance of Payments Statistics Yearbook for India on trade in computer and information services.

Of course, larger economies naturally trade more than smaller ones. Therefore, to get a sense of the importance of outsourcing for a local economy, it is important to scale the value of imports by the size of the economy. For example, if one scales imports of business services by local GDP, none of the countries mentioned above would appear in the top ten list. In fact, smaller economies like Angola, the Republic of Congo, Mozambique, Ireland, and Vanuatu turn out to be much more outsourcing-intensive, with the ratio of imported business services to GDP exceeding 10 percent. In contrast, the United States has an outsourcing ratio in business services less than half of a percent of its GDP (ranked 117th in the world), and the United Kingdom slightly over 1 percent of its GDP (ranked 85th). As a comparison, India imports a larger amount of business services as a share of GDP (2.4 percent) than the United States and the United Kingdom. Table 3A lists the share of imports of services as a proportion of local GDP and their ranks. The country rankings are almost the same if one scales the value of service imports by local total service value-added. See Table 3B.

In sum, the notion that large industrialized countries outsource more intensely than other economies is not supported by the trade data.

D. Who Are the Biggest "Insourcers"?

Like trade in goods, trade in services is a two-way street. Most countries receive outsourcing of services from other countries as well as outsource to other countries. In recent times, the word "insourcing" has been used as a shorthand for the amount of outsourcing a country receives from the rest of the world. We use exports of business and computing services as a proxy for insourcing.

Who are the biggest insourcers or the recipients of global outsourcing? In dollar terms, the top five recipients in 2002 are the United States (US$59 billion), the United Kingdom (US$37 billion), Germany (US$28 billion), France (US$21 billion), and the Netherlands

(US$20 billion). India, a country that has received the most media attention as a recipient of outsourcing, is ranked at 6th place (US$18.6 billion); and China is ranked at 14th place (US$10 billion). It is worth emphasizing that India is one of the biggest exporters of business services in the world but there are five industrialized countries ahead of it. The data show that the top recipients of global service outsourcing tend to be rich, industrialized countries, rather than poor developing countries.

However, if one scales the value of exports by the size of local GDP, smaller economies turn out to be more insourcing-intensive than the larger ones. For example, from Table 5 we see that the top three insource-intensive economies are Vanuatu, Singapore, and Hong Kong SAR, each with exporting services as a share of local GDP exceeding 10 percent. By this metric, India is somewhat more insourcing-intensive than the United Kingdom (3.8 percent of GDP vs. 2.4 percent); and China is somewhat ahead of the United States (0.8 percent of GDP vs. 0.6 percent).

E. Who Are the Biggest Surplus Countries?

At this point, it is natural to consider the balance of payments implications of service outsourcing. Are industrialized economies more likely to run a deficit in services trade than developing countries? The answer is a resounding no. In fact, the largest surplus countries of combined computing and business services in the world are the United Kingdom and the United States.

Figure 3 plots the time series of the US imports, exports, and the net balance of business services. Tables 5 and 6 rank countries in terms of exports of business services and computing, and net balance, respectively. We note that the United States has been running a surplus in this service category every year since 1980, as does the United Kingdom. They are in fact, the largest and the second largest surplus countries in the world, respectively. In other words, if every country reduced its overall service outsourcing, the United States and the United Kingdom would be the biggest two losers in terms of net dollars lost in service trade. The U.S. current account deficit would become bigger, not smaller.

However, the patterns for other industrialized countries are more varied. For example, in business services, Germany has been running a small deficit every year throughout our sample, between 1980 and 2001. France had been consistently running a small surplus until the end of the sample when it switches to a mild deficit. There does not seem to be a consistent pattern of a country being in net surplus or deficit in business services solely based on the level of development. For example, in India, imports and exports of business services were fairly balanced in much of the early part of the sample. However, starting from 1996, exports have really taken off, surpassing imports by an ever widening margin, resulting in a reasonably large surplus position today. For China, the relative size of imports and exports of business services alternates between periods, though it ends the sample with a small surplus.

Figure 4 plots time series of imports, exports and the trade balance in computer and information services. The patterns are broadly similar to trade in business services, with both the United States and United Kingdom showing a net surplus, and China alternating between a

surplus and deficit. The new feature in computing trends relative to business services is that Ireland is the largest surplus country in computing.

To sum up, the presumption that global service trade is dominated by lopsided one-way outsourcing from developed countries to developing countries is not supported by the data. If anything, several major industrialized countries, notably the United States and the United Kingdom, export more outsourcing type services than they import from the rest of the world. It is particularly important to note that the United States and United Kingdom are net exporters of services since the media seem to equate outsourcing with job losses (and insourcing with job gains). Of course, to assess whether there are in fact any short-term job losses arising from outsourcing we need a more rigorous analysis, which we turn to in the next section.

V. DOES SERVICE OUTSOURCING REDUCE JOBS?

A factor behind the recent anxiety in advanced economies over service outsourcing is the fear of losing jobs at home. If labor were perfectly mobile between sectors then a job lost in one sector would be gained in another. However, if one adds rigidities to the labor market in a trade model then outsourcing could lead to net employment losses, at least in the short run. In this case, even a small amount of outsourcing could lead to large job losses. But outsourcing could also lead to job growth. On the one hand, every job lost is a job lost.[9] On the other hand, firms that have outsourced could and should become more efficient and expand production and expand employment in other lines of work. If firms relocate their relatively inefficient parts of the production process to another country, where they can be produced more cheaply, they can expand their output in production stages for which they have comparative advantage. These productivity benefits can translate into lower prices generating further demand and hence create more jobs. This job creation effect could in principle offset the direct job losses due to outsourcing.

As the predictions from the theory are ambiguous, we turn to the data. We estimate the effects of outsourcing on employment using a common empirical specification of labor demand (see Hamermesh, 1993) as follows:[10]

$$\ln L_{it} = \alpha_0 + \alpha_1 \ln w_{it} + \gamma \ln \omega_{it} + \delta \ln y_{it} \qquad (2)$$

where w is the wage rate, ω is a vector of other input prices, and y is the level of output. In general, an increase in the wage is expected to have a negative effect on employment demand, whereas an increase in the price of other inputs would lead firms to substitute away from the

[9] Note that this would also be true for domestic outsourcing. The main difference is that the job lost with domestic outsourcing is necessarily gained in another sector in the domestic economy. But with foreign outsourcing this job is lost to a foreign country, hence the focus on international outsourcing.

[10] This is derived from a cost function using Shepard's lemma.

more expensive inputs toward labor. Of course, an increase in output would lead to higher employment.

The question arises as to which input prices to use for outsourcing. If the firm is a multinational firm deciding on how much labor to employ at home and abroad then it should be the foreign wage. But not all of outsourcing takes place within multinational firms and also with outsourcing from many countries it is unclear which foreign wage to include, if any. Firms that import inputs at arm's-length don't care about the wages but instead are concerned about the price of the imported service. Since we do not have prices of imported services we use the outsourcing intensity as an inverse proxy of price of imported service inputs, i.e., the lower the price of imported service inputs the higher the outsourcing intensity. For other input prices, such as the rental rate on capital, we assume that all firms face the same price, which we assume is some function of time, $r=f(t)$.

We take first differences of equation (2), denoted by Δ, giving the following estimating equation,

$$\Delta \ln L_{it} = \alpha_0 + \alpha_1 \Delta \ln w_{it} + \alpha_2 \Delta \ln OSS_{it} + \alpha_3 \ln OSM_{it} + \beta \Delta \ln \omega_{it} + \gamma \Delta \ln y_{it} + \delta D_t + \varepsilon_{it} \quad (3)$$

where $\Delta \ln OSS_{it}$ is the log difference in service outsourcing intensity, and $\Delta \ln OSM_{it}$ is the log difference of material outsourcing intensity. We also include up to two period lags of these variables to take account that employment effects may not be instantaneous. This first difference specification controls for any time-invariant industry-specific effects such as industry technology differences. We also include year fixed effects, D_t, to control for any unobserved effect common across all industries, such as changes in the cost of capital, and in some specifications we also include industry fixed effects.

In our companion paper (Amiti and Wei, 2004), we estimate this equation using U.S. data, where we found the effect on jobs depends crucially on the level of disaggregation. When the U.S. economy was decomposed into 450 sectors, a faster growth in outsourcing at a sector level is associated with a small negative growth in jobs in that sector (i.e., $\alpha_2<0$). However, when the U.S. economy was decomposed into 96 sectors (still very disaggregated but less so than the 450-sector classification), there is no correlation between job growth and growth of outsourcing at the sector level. These results seem sensible. At sufficiently disaggregated levels, every outsourced job is a job lost. Hence, job growth and outsourcing may be negatively related. At the other extreme, for the economy as a whole, outsourcing is likely to change only the sectoral composition of the jobs, but not necessarily the aggregate level of employment. The interesting finding is that one does not need to aggregate the sector very much. Even when the U.S. economy is disaggregated into 96 sectors, one can already see enough creation of new jobs in the outsourcing-intensive sectors that can offset jobs lost due to outsourcing.

A nagging question is whether the results from the U.S. case are applicable to European and other advanced economies. Therefore, it would be useful to re-examine this question for

another economy. In this section of the paper, we turn to a case study of the United Kingdom. The United Kingdom makes an interesting comparison with the United States. First, as we have shown at the beginning of this paper, the anxiety over service outsourcing in the United Kingdom is likely to be as high as in the United States, as indicated by the intensity of news coverage if scaled by the size of the economy. Second, the United Kingdom actually engages in about three times as much service outsourcing as a share of its GDP (1.2 percent in 2001) as the United States (0.4 percent in 2001).

Statistical Results

The data we use is for the United Kingdom from 1995 to 2001. It includes 69 manufacturing industries and 9 service industries. The list of industries and details of the variables are provided in Appendices 1 and II.

To fix ideas, we first look at some examples of sectors with the fastest and the slowest employment growth and their associated growth in service outsourcing. The top five and bottom five industries ranked by total employment growth are presented in Table 7A; and the top five and bottom five industries ranked by service outsourcing growth are presented in Table 7B. From Tables 7A and 7B, we see that no uniform pattern emerges between service outsourcing and employment growth. For example, the "other transport equipment" sector has the second highest growth in employment and one of the highest growth in service outsourcing, yet the "preparation and spinning of textile fibers" sector experienced negative employment growth over the period and was ranked one of the biggest outsourcing sectors. In contrast, both the "man made fiber" and the "machine tools" sectors experienced a large decline in employment growth, yet the "man made fiber" sector experienced high service outsourcing growth and the "machine tools" sector experienced a rapid decline in service outsourcing. A scatter plot of service outsourcing growth and employment growth for all 78 industries is presented in Figure 5.

In Tables 8 and 9, we present our results using statistical analysis to relate job growth at a sectoral level to the change in service outsourcing at the same disaggregated level. Tables 8A and 8B present the results for the manufacturing industries and Tables 9A and 9B present the results for the service industries. In the first column of Table 8A, we simply look at correlations between employment and outsourcing and the first period lag; and in the second column we add second period lags. In both of these specifications service outsourcing appears to have a positive effect on employment. In the third column we add wages and output as specified in equation (3). As hypothesized, wage has a significant negative effect on employment, and output has a significant positive effect. Even with these additional controls, service outsourcing still has a positive significant coefficient.

However, there is some concern that taking first time differences might induce measurement error, particularly when the variables are aggregated at the industry level. To address this concern, we re-estimate the equations using two period differences, which we

present in columns (4), (5) and (6) of Table 8A.[11] Now, we see that service outsourcing has a significant positive coefficient only at the 10 percent significance level, in column (4) where only one period lags are included, and an insignificant effect when we add second period lags in column (5). In column (6), where we add wages and output, the outsourcing coefficient remains insignificant, but wages still has the hypothesized negative sign and output has the expected positive sign. So the positive coefficient on service outsourcing is not robust to specifications with longer time differences.

In Table 8B, we conduct further sensitivity analysis to determine whether there is any effect from service outsourcing on manufacturing employment. Again, the first three columns present the results with one-period time differenced variables, and the last three columns with two-period time differenced variables. The first column in Table 8B includes the price of output rather than the amount produced, in order to allow outsourcing to affect employment through the scale affect. For example, outsourcing of services could result in more efficient production and hence lower prices of output resulting in increased demand for output, which in turn increases derived demand for labor. Here the outsourcing coefficient is only significant at the 10 percent level (in column 1), and insignificant in column (4) with two period differenced data. In columns 2 and 3, and 5 and 6 we go back to controlling for output (instead of price) and add a lagged dependent variable to take account of persistence. A similar picture emerges, with a positive significant coefficient on service outsourcing with one period differenced data, and barely significant in two period differenced data.

As a final check, we add industry fixed effects to take account of the differences in unobserved industry characteristics such as differences in technology that could be driving employment growth. Again, the service outsourcing coefficients are significant with one period differenced data and insignificant with two period differenced data.

The main message from Tables 8A and 8B is that outsourcing does not have a negative effect on manufacturing employment. The positive coefficient is not robust across specifications, and in none of the specifications did we see a negative coefficient. The insignificant effect on employment may be explained by the level of industry aggregation. For example, a worker may lose her job due to outsourcing but then find a job in another firm within the same industry classification. Then the effect would not show up in aggregate data.

In Tables 9A and 9B, we present the results for the services industries. All the specifications are the same as for the manufacturing industries except we include nominal output instead of real output because service price indices were unavailable. The first two specifications in Table 9A that look only at partial correlations show an insignificant effect for both one period difference and two period difference specifications. The only specification with a significant negative effect at the 5 percent level is with two period differenced data in Table

[11] Ideally, one would take longer time differences to wash out the measurement error but this was not possible with a short time series of seven years. See Griliches and Hausman (1986).

9B, column (3) but this is a small net effect and is not robust across specifications. For example, once we add industry-specific effects, this effect disappears. So there does not appear to be any robust significant negative effect from service outsourcing on service industries.

In sum, the statistical results would appear to suggest that jobs displaced by service outsourcing are likely to be offset by new jobs created in the same sector.

VI. Concluding Remarks

In developed countries, there is a tremendous amount of anxiety over international outsourcing of services. The anxiety comes in part from the perception one may obtain from the news media that global service trade is exploding and that it is dominated by lopsided, one-way outsourcing from developed countries to developing countries, and that this will lead to massive job losses in countries such as the United States and United Kingdom.

This paper presents a body of evidence that suggest neither aspect of anxiety is well supported by the data. In particular, most developed countries are not particularly more outsourcing-intensive (when adjusted for economic size) than many developing countries. In any case, many developed countries tend to run surpluses—i.e., the rest of the world outsources more to them than the reverse—in those categories most often featured in the news media, for example, business services and computer and information services. In fact, the United States and the United Kingdom have run the largest and second largest surpluses in services trade in the world in recent years.

Using data on 78 sectors in the United Kingdom, we found no evidence to support the notion that sectors with higher growth of service outsourcing would have a slower rate of job growth. In our companion paper on the U.S. economy (Amiti and Wei, 2004), we find that a negative effect on employment can be detected if the economy is decomposed to 450 sectors, but the negative effect disappears when one looks at slightly broadly defined sectors (96 sectors in the US economy). These results suggest that service outsourcing not only would not induce a fall in aggregate employment, but also has the potential to make firms/sectors sufficiently more efficient, leading to enough job creation in the same sectors to offset the lost jobs due to outsourcing.

To conclude, the risk of service outsourcing dramatically reducing job growth in the advanced economies has been greatly exaggerated.

Table 1. Outsourcing of Services

1992					
Services	Share of Service				Import of Service j
	Mean	Std Dev	Min	Max	
Telecommunications	0.0153	0.0373	0.0012	0.2937	0.1360
Finance and Banking	0.0467	0.0322	0.0165	0.2758	0.0316
Renting of Machinery	0.0137	0.0099	0.0020	0.0704	0.1167
Computer Services	0.0112	0.0185	0.0012	0.0916	0.1290
Research and Development	0.0083	0.0314	0.0000	0.2764	0.1494
Legal, Accountancy and Management Services	0.0319	0.0533	0.0031	0.2789	0.0612
Architectural Activities and Technical Consultancy	0.0235	0.0316	0.0029	0.2337	0.0808
Advertising	0.0198	0.0260	0.0000	0.1364	0.0785
Other Business Services	0.0291	0.0661	0.0000	0.3677	0.2153
2001					
Services	Share of Service				Import of Service j
	Mean	Std Dev	Min	Max	
Telecommunications	0.0158	0.0393	0.0022	0.3175	0.1170
Finance and Banking	0.0429	0.0232	0.0073	0.1762	0.0775
Renting of Machinery	0.0158	0.0162	0.0016	0.1290	0.0877
Computer Services	0.0211	0.0302	0.0027	0.1543	0.0922
Research and Development	0.0069	0.0161	0.0000	0.1440	0.1740
Legal, Accountancy and Management Services	0.0372	0.0588	0.0020	0.2823	0.0604
Architectural Activities and Technical Consultancy	0.0256	0.0287	0.0058	0.2231	0.0794
Advertising	0.0252	0.0360	0.0016	0.2250	0.0731
Other Business Services	0.0429	0.0978	0.0018	0.5554	0.2048

Table 2. Who Are the Biggest Absolute Outsourcers, 2002? [1/]

Million US Dollars

Rank	Country	Business Services	Rank	Country	Computer & Information Services
1	United States	40,929	1	Germany	6,124
2	Germany	39,113	2	United Kingdom	2,602
3	Japan	24,714	3	Japan	2,148
4	Netherlands	21,038	4	Netherlands	1,586
5	Italy	20,370	5	Spain	1,572
6	France	19,111	6	United States	1,547
9	United Kingdom	16,184	9	France	1,150
11	India	11,817	10	China, P.R.	1,133
18	China, P.R.	7,957	14	Russia	592
20	Russia	4,583			

[1/] For India, information on computer and information services is not given in the IMF Balance of Payments Yearbook.

Source: IMF, Balance of Payments Statistics Yearbook.

Table 3. Who Are the Biggest Relative Outsourcers (2002)? [1/]

A. Ratio to Local GDP (%)

Rank	Country	Business Services	Rank	Country	Computer & Information Services
1	Angola	35.01	1	Cyprus	2.06
2	Congo, Republic of	22.33	2	Luxembourg	1.25
3	Mozambique	17.41	3	Moldova	0.71
4	Ireland	15.44	4	Belgium	0.57
5	Vanuatu	14.22	5	Guyana	0.48
44	India	2.40	13	Germany	0.31
57	Germany	1.96	29	Russia	0.17
74	France	1.33	30	United Kingdom	0.17
75	Russia	1.33	43	China, P.R.:	0.09
85	United Kingdom	1.03	48	France	0.08
99	China, P.R.	0.63	57	Japan	0.05
103	Japan	0.62	73	United States	0.01
117	United States	0.39			

B. Ratio to Value-added of Local Service Sector (%)

Rank	Country	Business Services	Rank	Country	Computer & Information Services
1	Angola	1.39	1	Luxembourg	1.60
2	Congo, Republic of	0.80	2	Moldova	1.43
3	Papua New Guinea	0.35	3	Guyana	1.19
4	Mozambique	0.33	4	Ireland	0.81
5	Ireland	0.28	5	Belgium	0.79
37	India	0.05	12	Germany	0.45
59	Germany	0.03	26	Russia	0.31
70	Russia	0.02	29	China, P.R.	0.27
78	China, P.R.	0.02	33	United Kingdom	0.23
80	France	0.02	53	France	0.11
90	United Kingdom	0.01	59	Japan	0.08
104	Japan	0.01	74	United States	0.02
115	United States	0.01			

[1/] There is no separate information on computer and information services in the balance of payment's of India.

Source: IMF, Balance of Payments Statistics Yearbook.

Table 4. Who Are the Biggest Absolute Insourcers (2002)? [1/]

Million US Dollars

Rank	Country	Business Services	Rank	Country	Computer & Information Services
1	United States	58,794	1	Ireland	10,426
2	United Kingdom	36,740	2	United Kingdom	5,675
3	Germany	27,907	3	United States	5,431
4	France	20,864	4	Germany	5,185
5	Netherlands	20,074	5	Spain	2,487
6	India	18,630	10	France	1,191
8	Japan	17,401	11	Japan	1,140
14	China, P.R.	10,419	12	China, P.R.	638
29	Russia	2,012	25	Russia	137

[1/] There is no separate information on computer and information services in the balance of payment's of India.

Source: IMF, Balance of Payments Statistics Yearbook.

Table 5. Who Are the Biggest Relative Insourcers, 2002? [1/]

A. Ratio to Local GDP (%)

Rank	Economy	Business Services	Rank	Economy	Computer & Information Services
1	Vanuatu	17.13	1	Ireland	8.54
2	Singapore	14.98	2	Cyprus	2.19
3	Hong Kong SAR	11.53	3	Luxembourg	1.09
4	Papua New Guinea	10.55	4	Costa Rica	0.91
5	Luxembourg	9.78	5	Belgium	0.76
21	India	3.79	17	United Kingdom	0.36
33	United Kingdom	2.35	24	Germany	0.26
50	France	1.45	42	France	0.08
54	Germany	1.40	49	United States	0.05
79	China, P.R.	0.82	51	China, P.R.	0.05
88	Russia	0.58	54	Russia	0.04
90	United States	0.56	59	Japan	0.03
95	Japan	0.44			

B. Ratio to Value-added of Local Service Sector (%)

Rank	Economy	Business Services	Rank	Economy	Computer & Information Services
1	Papua New Guinea	32.95	1	Ireland	15.64
2	Vanuatu	23.85	2	Guyana	1.50
3	Singapore	21.93	3	Costa Rica	1.46
4	Swaziland	16.06	4	Luxembourg	1.40
5	Hong Kong SAR	13.46	5	Armenia	1.09
13	India	7.82	18	United Kingdom	0.51
44	United Kingdom	3.28	24	Germany	0.38
53	China, P.R	2.45	38	China, P.R.	0.15
64	Germany	2.07	42	France	0.12
66	France	2.03	51	Russia	0.07
87	Russia	1.04	52	United States	0.07
91	United States	0.76	60	Japan	0.04
94	Japan	0.66			

[1/] There is no separate information on computer and information services in the balance of payment's of India.

Source: IMF, Balance of Payments Statistics Yearbook

Table 6. Who Are the Biggest Surplus and Deficit Countries, 2002? [1/]

Rank	Economy	Business Services	Rank	Economy	Computer & Information Services	Rank	Economy	Total
Surplus countries			**Surplus countries**			**Surplus countries**		
1	United Kingdom	20555.96	1	Ireland	9882.71	1	United Kingdom	23628.68
2	United States	17864.30	2	United States	3884.00	2	United States	21748.30
3	Hong Kong SAR	15424.54	3	United Kingdom	3072.72	3	Hong Kong SAR	15663.41
4	India	6813.44	4	Canada	1077.12	4	India	6813.44
5	Singapore	3826.12	5	Spain	914.65	5	Singapore	3826.12
6	China, P.R.	2462.05	15	France	41.39	9	China, P.R.	1967.20
10	France	1752.32				10	France	1793.70
Deficit countries			**Deficit countries**			**Deficit countries**		
135	Russia	-2570.90	95	Russia	-454.30	137	Russia	-3025.20
139	Korea	-4450.90	96	China, P.R.	-494.85	139	Italy	-4001.71
140	Japan	-7313.51	97	Italy	-674.85	140	Korea	-4555.30
141	Indonesia	-7985.71	98	Germany	-939.29	141	Indonesia	-7985.71
142	Germany	-11205.43	99	Japan	-1007.74	142	Japan	-8321.25
143	Ireland	-13882.01	100	Brazil	-1118.10	143	Germany	-12144.72

[1/] Positive numbers in this table represent net insourcing of services (surplus), and negative numbers represent net outsourcing (deficit).

Source: IMF, Balance of Payments Statistics Yearbook

Table 7A. United Kingdom: Top Five and Bottom Five Sectors of Employment Growth, 1995-2001[1/]

Industry	Total Employment Growth (%)	Rank of Total Employment Growth	Service Outsourcing Intensity Growth (%)	Rank of Service Outsourcing Growth
Top Five				
Computer and related activities	144.0	1	5.2	58
Other transport equipment	73.9	2	72.6	8
Renting of machinery and equipment	52.9	3	17.1	39
Advertising	52.0	4	8.2	51
Television and radio transmitters	46.5	5	-9.5	68
Bottom Five				
Preparation and spinning of textile fibers	-47.0	74	100.2	4
Knitted and crocheted fabrics and articles	-48.2	75	6.7	55
Wearing apparel; dressing and dying of fur	-53.4	76	29.3	29
Finishing of textiles	-54.0	77	-4.2	65
Footwear	-69.0	78	-46.1	78

Table 7B. United Kingdom: Top Five and Bottom Five Sectors of Service Outsourcing Growth 1995-2001[1/]

Table 7B. Top Five and Bottom Five Sectors of Service Outsourcing Growth (UK, 1995-2001)

Industry	Total Employment Growth (%)	Rank of Total Employment Growth	Service Outsourcing Intensity Growth (%)	Rank of Service Outsourcing Growth
Top Five				
Man-made fibers	-38.9	73	185.8	1
Vegetable and animal oils and fats	3.8	30	132.5	2
Cement, lime and plaster	-31.3	71	118.5	3
Preparation and spinning of textile fibers	-47.0	74	100.2	4
Production and distribution of electricity	-8.4	48	91.3	5
Bottom Five				
Cutlery, tools and general hardware	-6.9	46	-16.2	74
Building and repairing of ships and boats	-5.2	43	-18.6	75
Sports goods, games and toys	-23.7	61	-23.5	76
Machine tools	-28.2	67	-28.3	77
Footwear	-69.0	78	-46.1	78

[1/] Industries in this study are aggregated into 84 sectors, which are based on SIC (92) 3-digit codes.

Sources: Employment data are from the Annual Employment Survey (AES, 1995-1997) and Annual Business Inquiry (ABI, 1998-2001). Service outsourcing ratios are calculated from input-output tables.

Table 8A. United Kingdom: Manufacturing Employment and Service Outsourcing, 1995-2001

Dependent variable	Δln(employment)					
	One Period Difference			Two Period Difference		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Δ ln $(OSS)_t$	0.079*	0.128**	0.105**	0.104*	0.091	0.100
	(0.048)	(0.065)	(0.047)	(0.053)	(0.077)	(0.062)
Δ ln $(OSS)_{t-1}$	0.063*	0.027	0.063***	-0.012	0.042	0.051
	(0.033)	(0.033)	(0.018)	(0.04)	(0.054)	(0.032)
Δ ln $(OSS)_{t-2}$		-0.047	0.004		-0.068	0.011
		(0.039)	(0.02)		(0.062)	(0.044)
Δ ln $(OSM)_t$	-0.056	-0.094	-0.009	0.118	-0.346	-0.202
	(0.157)	(0.169)	(0.111)	(0.19)	(0.241)	(0.208)
Δ ln $(OSM)_{t-1}$	-0.115	-0.132	0.043	-0.328**	0.233	0.276
	(0.123)	(0.139)	(0.072)	(0.128)	(0.198)	(0.179)
Δ ln $(OSM)_{t-2}$		-0.346***	0.034		-0.637***	-0.066
		(0.129)	(0.088)		(0.155)	(0.143)
Δ ln $(wage)_t$			-0.742***			-0.683***
			(0.036)			(0.048)
Δ ln $(wage)_{t-1}$			0.069			0.052
			(0.045)			(0.09)
Δ ln $(wage)_{t-2}$			0.081			0.112**
			(0.07)			(0.056)
Δ ln $(real\ output)_t$			0.444***			0.461***
			(0.081)			(0.13)
Δ ln $(real\ output)_{t-1}$			0.254***			0.193**
			(0.067)			(0.095)
Δ ln $(real\ output)_{t-2}$			-0.028			0.043
			(0.074)			(0.097)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	No	No	No	No	No	No
N	345	276	256	276	207	192
R^2	0.12	0.18	0.76	0.14	0.17	0.72

Legend : * p < 0.1; ** p < 0.05; *** p < 0.01

Note: In columns (4) to (6), all variables are differenced over two periods i.e. $\Delta x(t)=x(t)-x(t-2)$

Table 8B. United Kingdom: Manufacturing Employment and Service Outsourcing–Sensitivity Tests, 1995–2001

Dependent variable	Δln(employment)					
	One Period Difference			Two Period Difference		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \ln (OSS)_t$	0.093	0.096**	0.096**	0.067	0.089*	0.120
	(0.058)	(0.043)	(0.039)	(0.07)	(0.051)	(0.077)
$\Delta \ln (OSS)_{t-1}$	0.042*	0.046***	0.045***	0.038	0.001	0.038
	(0.024)	(0.017)	(0.015)	(0.049)	(0.026)	(0.032)
$\Delta \ln (OSS)_{t-2}$	-0.005	-0.010	0.013	-0.020	-0.019	0.037
	(0.025)	(0.018)	(0.021)	(0.05)	(0.035)	(0.057)
$\Delta \ln (OSM)_t$	-0.168	0.006	-0.022	-0.338	-0.155	-0.13
	(0.143)	(0.102)	(0.123)	(0.248)	(0.178)	(0.193)
$\Delta \ln (OSM)_{t-1}$	-0.078	0.023	-0.042	0.203	0.212	0.068
	(0.089)	(0.075)	(0.101)	(0.221)	(0.158)	(0.108)
$\Delta \ln (OSM)_{t-2}$	-0.089	0.013	0.011	-0.343**	-0.125	-0.054
	(0.08)	(0.085)	(0.078)	(0.166)	(0.118)	(0.147)
$\Delta \ln (wage)_t$	-0.790***	-0.753***	-0.847***	-0.766***	-0.692***	-0.799***
	(0.045)	(0.037)	(0.065)	(0.072)	(0.045)	(0.118)
$\Delta \ln (wage)_{t-1}$	-0.003	0.249**	-0.093**	0.055	0.557***	-0.059
	(0.045)	(0.105)	(0.070)	(0.103)	(0.125)	(0.058)
$\Delta \ln (wage)_{t-2}$	0.018	0.075	-0.021	-0.032	0.085*	-0.010
	(0.074)	(0.067)	(0.048)	(0.07)	(0.047)	(0.091)
$\Delta \ln (real\ output)_t$		0.434***	0.431***		0.403***	0.417**
		(0.075)	(0.081)		(0.105)	(0.16)
$\Delta \ln (real\ output)_{t-1}$		0.161	0.337***		-0.054	0.304***
		(0.072)**	(0.111)		(0.089)	(0.086)
$\Delta \ln (real\ output)_{t-2}$		-0.080	0.058		-0.104	0.117
		(0.084)	(0.060)		(0.075)	(0.121)
$\Delta \ln (price)_t$	0.186			0.137		
	(0.278)			(0.393)		
$\Delta \ln (price)_{t-1}$	-0.319			-0.531		
	(0.283)			(0.664)		
$\Delta \ln (price)_{t-2}$	0.204			0.520		
	(0.152)			(0.344)		
$\Delta \ln (employment)_{t-1}$		0.259**			0.716***	
		(0.112)			(0.100)	
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	No	No	No	No	No	Yes
N	256	256	256	192	192	192
R^2	0.64	0.77	0.86	0.52	0.81	0.89

Legend : * p < 0.1; ** p < 0.05; *** p < 0.01

Note: In columns (4) to (6), all variables are differenced over two periods i.e., $\Delta x(t)=x(t)-x(t-2)$

Table 9A. United Kingdom: Service Sector Employment and Service Outsourcing, 1995–2001

Dependent variable	Δln(employment)					
	One Period Difference			Two Period Difference		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Δ ln (OSS)$_t$	-0.011	0.324	0.156	0.348	0.314	0.134
	(0.328)	(0.434)	(0.215)	(0.554)	(0.816)	(0.257)
Δ ln (OSS)$_{t-1}$	-0.227	-0.138	-0.080	-0.455	-0.591	-0.170
	(0.477)	(0.53)	(0.199)	(0.43)	(0.427)	(0.137)
Δ ln (OSS)$_{t-2}$		-0.133	0.354		0.567	0.858***
		(0.306)	(0.211)		(0.698)	(0.171)
Δ ln (OSM)$_t$	-0.036	0.485	-0.376*	0.216	0.221	-0.693**
	(0.268)	(0.456)	(0.203)	(0.562)	(0.894)	(0.242)
Δ ln (OSM)$_{t-1}$	-0.180	-0.202	0.086	-0.472	0.007	0.431*
	(0.329)	(0.391)	(0.234)	(0.491)	(0.938)	(0.231)
Δ ln (OSM)$_{t-2}$		-0.255	0.072		-0.408	0.041
		(0.226)	(0.167)		(0.612)	(0.204)
Δ ln (wage)$_t$			-0.939***			-0.975***
			(0.069)			(0.095)
Δ ln (wage)$_{t-1}$			0.112			0.187
			(0.083)			(0.12)
Δ ln (wage)$_{t-2}$			0.057			0.120
			(0.068)			(0.094)
Δ ln (nominal output)$_t$			0.797***			1.181***
			(0.229)			(0.268)
Δ ln (nominal output)$_{t-1}$			0.141			-0.197
			(0.226)			(0.283)
Δ ln (nominal output)$_{t-2}$			0.203			0.343*
			(0.186)			(0.17)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	No	No	No	No	No	No
N	45	36	36	36	27	27
R^2	0.24	0.28	0.91	0.14	0.33	0.95

Legend : * p < 0.1; ** p < 0.05; *** p < 0.01

Note: In columns (4) to (6), all variables are differenced over two periods i.e., $\Delta x(t)=x(t)-x(t-2)$

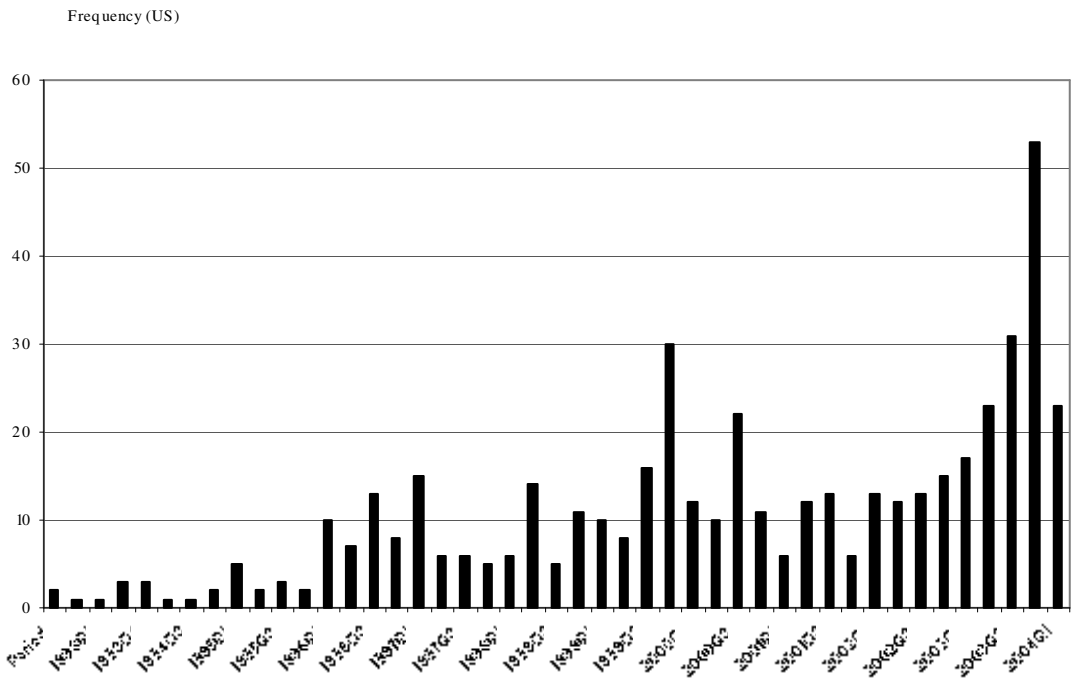
Table 9B. United Kingdom: Service Sector Employment and Service Outsourcing–Sensitivity Tests, 1995–2001

Dependent variable	Δln(employment)			
	One Period Difference		Two Period Difference	
Variable	(1)	(2)	(3)	(4)
$\Delta \ln (OSS)_t$	-0.169	-0.387	-0.45**	-0.451
	(0.263)	(0.390)	(0.183)	(0.579)
$\Delta \ln (OSS)_{t-1}$	-0.129	-0.674*	-0.267**	-0.783
	(0.157)	(0.332)	(0.097)	(0.476)
$\Delta \ln (OSS)_{t-2}$	0.167	-0.257	0.472***	-0.023
	(0.225)	(0.320)	(0.147)	(0.577)
$\Delta \ln (OSM)_t$	-0.334*	-0.686	-0.671***	-0.889
	(0.177)	(0.393)	(0.177)	(0.722)
$\Delta \ln (OSM)_{t-1}$	0.248	-0.369	0.534***	-0.113
	(0.188)	(0.321)	(0.168)	(0.394)
$\Delta \ln (OSM)_{t-2}$	0.093	-0.165	0.161	-0.669
	(0.121)	(0.285)	(0.128)	(0.824)
$\Delta \ln (wage)_t$	-0.864***	-0.952***	-0.861***	-0.806*
	(0.073)	(0.132)	(0.067)	(0.295)
$\Delta \ln (wage)_{t-1}$	0.607**	0.060	0.833***	0.202
	(0.242)	(0.133)	(0.133)	(0.228)
$\Delta \ln (wage)_{t-2}$	-0.044	-0.002	-0.063	0.03
	(0.074)	(0.094)	(0.054)	(0.166)
$\Delta \ln (\text{nominal output})_t$	0.556**	0.257	0.630**	-0.183
	(0.238)	(0.346)	(0.206)	(1.179)
$\Delta \ln (\text{nominal output})_{t-1}$	-0.211	-0.095	-0.455*	-0.123
	(0.21)	(0.216)	(0.22)	(0.320)
$\Delta \ln (\text{nominal output})_{t-2}$	0.083	-0.166	0.115	-0.779
	(0.162)	(0.375)	(0.117)	(1.258)
$\Delta \ln (\text{employment})_{t-1}$	0.612**		0.815***	
	(0.29)		(0.138)	
Time Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	No	Yes	No	Yes
N	36	36	27	27
R^2	0.93	0.96	0.97	0.92

Legend : * p < 0.1; ** p < 0.05; *** p < 0.01

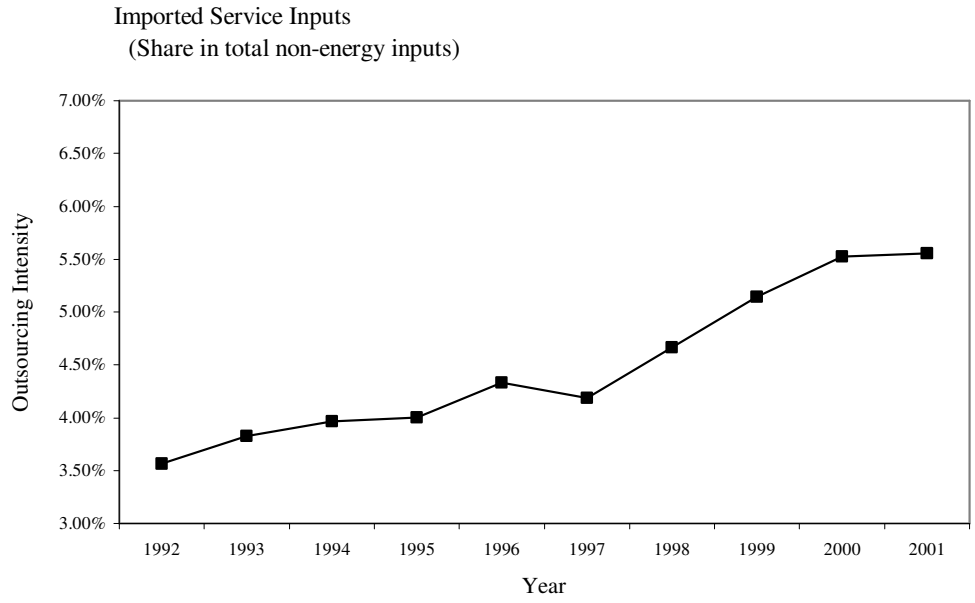
Note: In columns (4) to (6), all variables are differenced over two periods i.e., $\Delta x(t)=x(t)-x(t-2)$

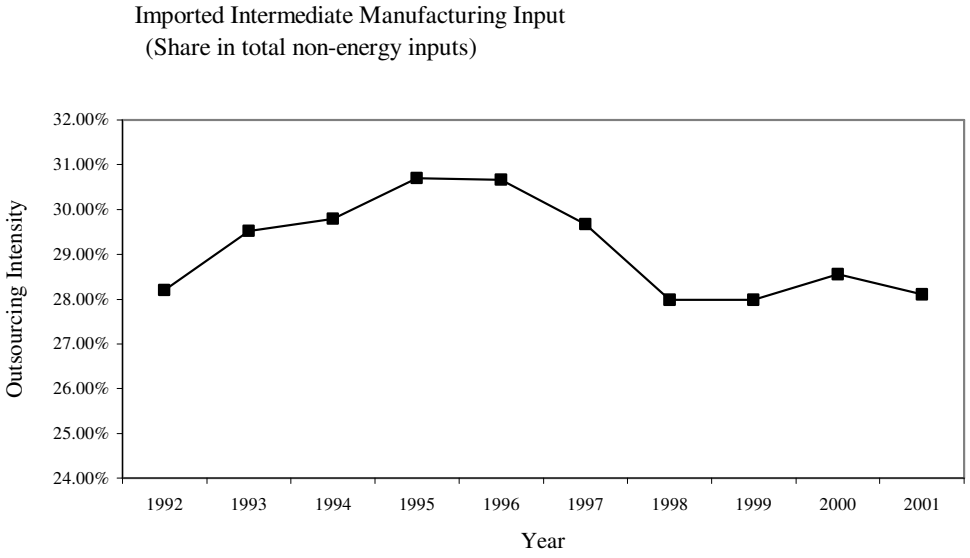
Figure 1. News count of Outsourcing



US news sources: Dow Jones News Service, Financial Times, The New York Times (Abstracts), The Seattle Times, The Wall Street Journal, The Washington Post.

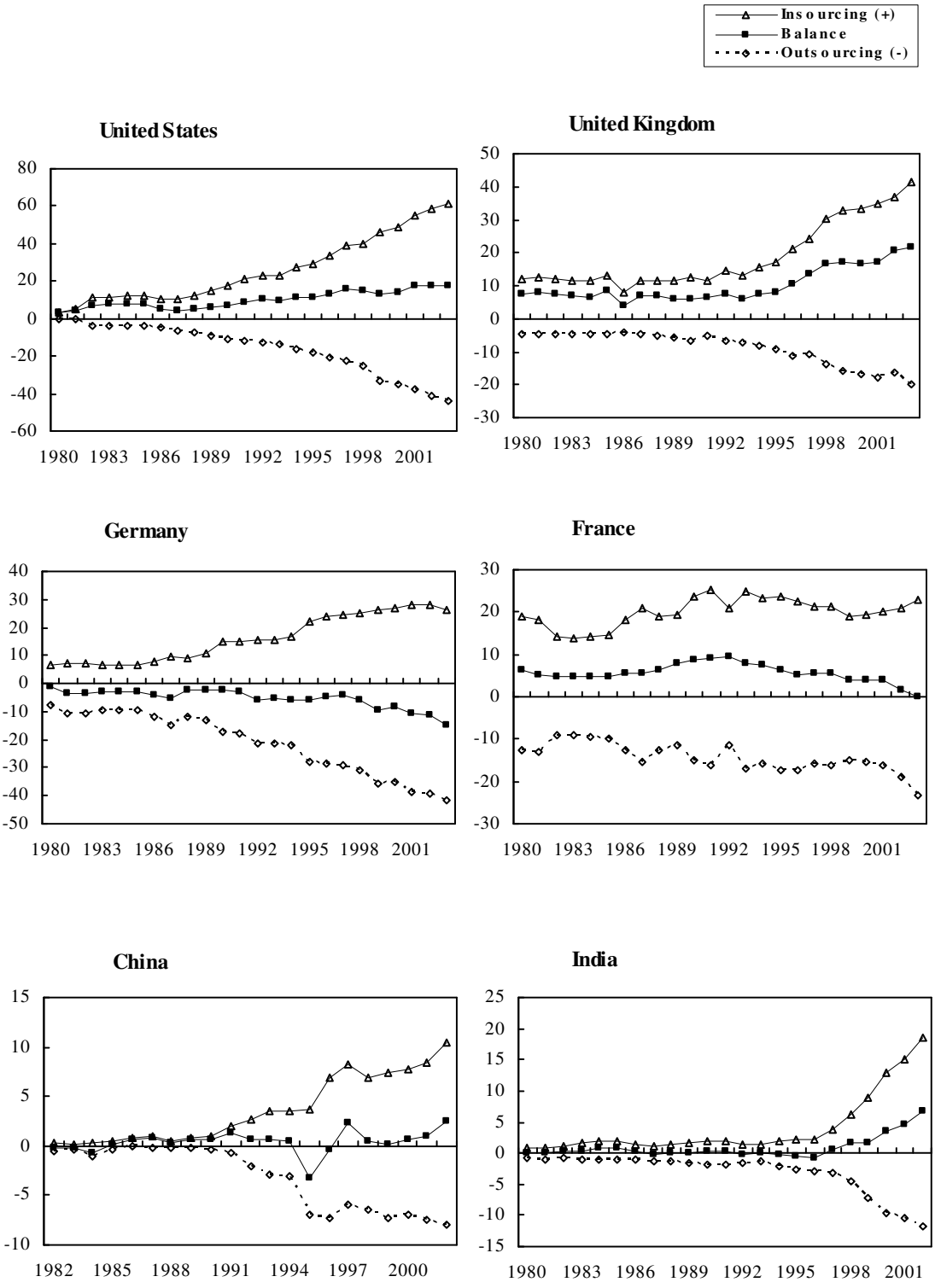
Figure 2. United Kingdom: Outsourcing Intensity of Intermediate Inputs
(Weighted Average Across All Industries by Outputs)





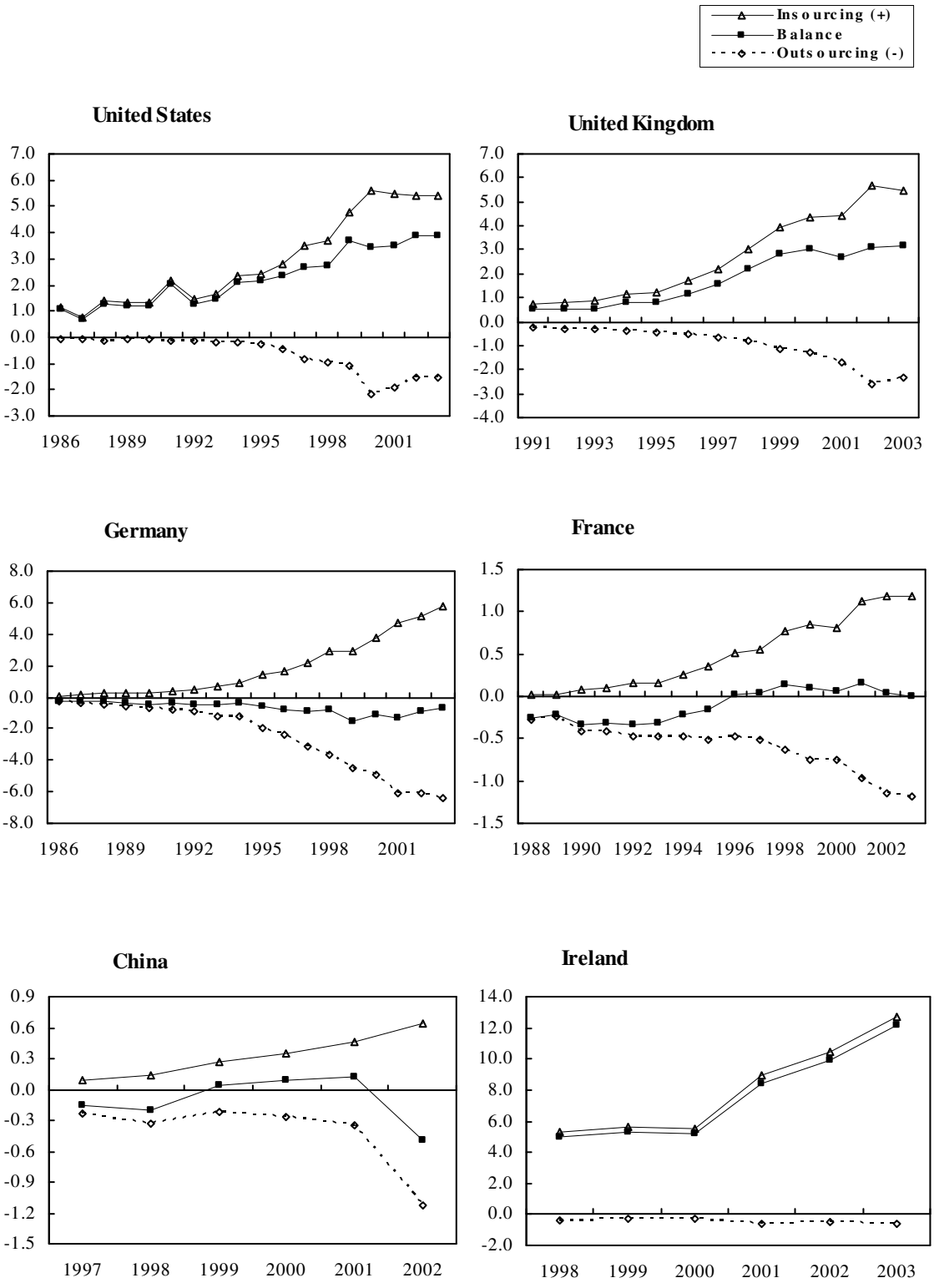
Source: Input-Output Tables - United Kingdom National Accounts

Figure 3. Insourcing and Outsourcing of Business Services
(billion dollars)



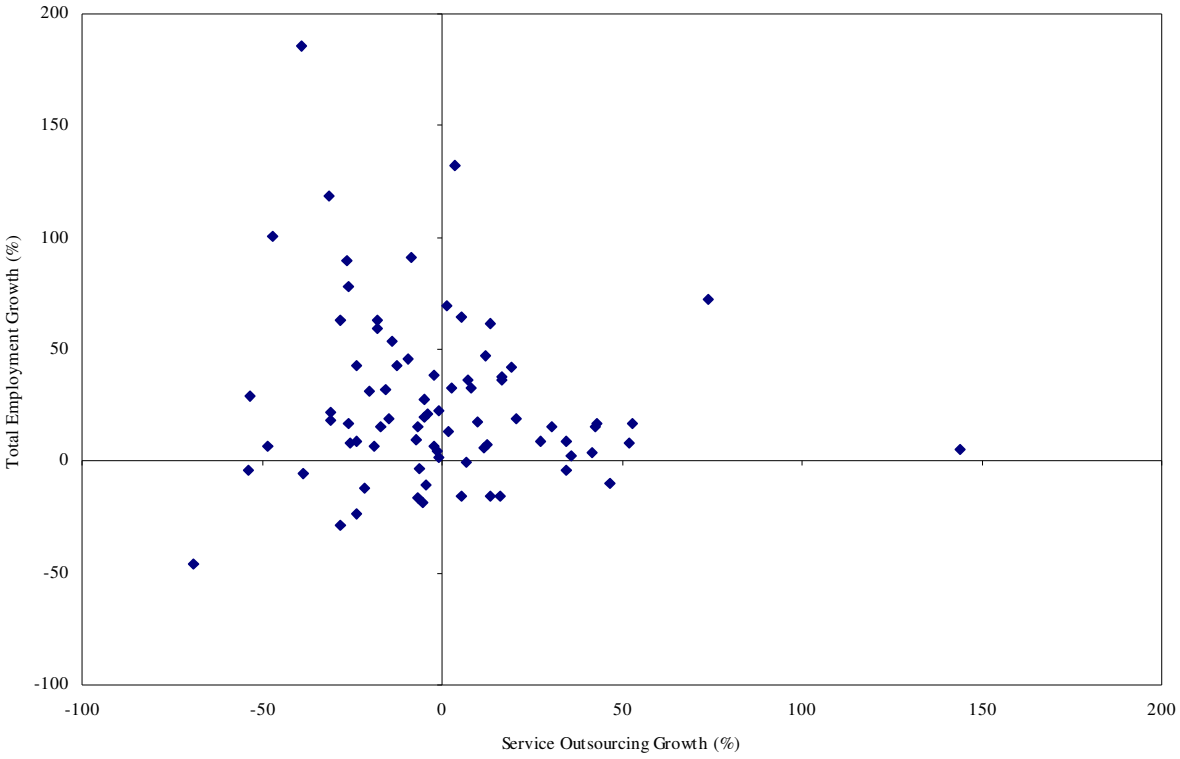
Sources: IMF Balance of Payments Statistics Yearbook and International Financial Statistics.

Figure 4. Insourcing and Outsourcing of Computer and Information Services
(billion dollars)



Sources: IMF Balance of Payments Statistics Yearbook and International Financial Statistics.

Figure 5. United Kingdom: Service Outsourcing Growth and Employment Growth, 1995-2001



Appendix 1: Data Sources

Variable	Source	Description/Notes
Trade Data: imports and exports of computing and information services; and other business services	IMF Balance of Payments, International Financial Statistics	
News count	FACTIVA, Dow Jones & Reuters, www.factiva.com	
Input/output tables*	National Statistics online, United Kingdom, (www.statistics.gov.uk)	
Total compensation		
Output in current values		
Employment**	Annual Employment survey (AES)	Great Britain, SIC92 3 digit, 1995-98
	Annual Business Inquiry (ABI)	United Kingdom, SIC92 5 digit 1998-2001
	Census of Employment, Northern Ireland	Northern Ireland, 1995 and 1997
Price Indices***	National Statistics online, United Kingdom, (www.statistics.gov.uk)	Manufacturing industries only, SIC92.

Notes:

* In order for the information from all sources to match, certain industries are aggregated together. The employment data from ABI are first aggregated into SIC92 3-digit level so as to match the categories of AES. A second stage of aggregation happens whenever there is a multiple-to-multiple correspondence between the I/O tables codes and the SIC92 3-digit codes. Finally, after dropping out industries which are either not of interest to this study, such as agriculture and mining sectors, or with incomplete information, we are left with 69 manufacturing industries, and 9 service industries, listed below.

** The regional coverage of the two sources of employment information are different. In order to make the two data comparable, the following steps were taken. First, the data for employment from Northern Ireland were added to employment data from Great Britain to get employment figures for United Kingdom for 1995-1997. Note, for 1996 the employment in north Ireland is taken as a simple average of 1995 and 1997 employment. There still remain some industries for which there is no corresponding data in Northern Ireland. For these industries, the information of the overlapping year (1998) serves as a bridge to merge the whole series, with the employment of Great Britain industries assumed to be constant ratios of those of United Kingdom.

***These price indices are available at different levels of disaggregation (SIC 92 classification) and do not correspond to industries in our sample in a one-to-one fashion. Hence, we constructed a weighted average of these PPI (using average employment for the United Kingdom for the period 1998 to 2001as weights – the only years available at the appropriate level of disaggregation) to get price indices at 3 digit SIC level.

Appendix II. List of Industries in the U.K. Sample

Manufacturing Industries -

IO	Industry Name
8	Meat processing
9	Fish and fruit processing
10	Oils and fats
11	Dairy products
12	Grain milling and starch
13	Animal feed
14	Bread, biscuits etc
15	Sugar
16	Confectionery
17	Other food products
18	Alcoholic beverages
19	Soft drinks and mineral waters
20	Tobacco products
21	Textile fibres
22	Textile weaving
23	Textile finishing
24	Made-up textiles
25	Carpets and rugs
26	Other textiles
27	Knitted goods
28	Wearing apparel and fur products
29	Leather goods
30	Footwear
31	Wood and wood products
32	Pulp, paper and paperboard
33	Paper and paperboard products
34	Printing and publishing
36	Industrial gases and dyes
37	Inorganic chemicals
38	Organic chemicals
39	Fertilisers
40	Plastics & synthetic resins etc
41	Pesticides
42	Paints, varnishes, printing ink etc
43	Pharmaceuticals
44	Soap and toilet preparations
45	Other chemical products
46	Man-made fibres
47	Rubber products
48	Plastic products

IO	Industry Name
49	Glass and glass products
50	Ceramic goods
51	Structural clay products
52	Cement, lime and plaster
53	Articles of concrete, stone etc
54	Iron and steel
55	Non-ferrous metals
56	Metal castings
57	Structural metal products
58	Metal boilers and radiators
59	Metal forging, pressing, etc
60	Cutlery, tools etc
61	Other metal products
62	Mechanical power equipment
63	General purpose machinery
64	Agricultural machinery
65	Machine tools
66	Special purpose machinery
67	Weapons and ammunition
68	Domestic appliances nec
69	Office machinery & computers
70	Electric motors and generators etc
71	Insulated wire and cable
72	Electrical equipment nec
73	Electronic components
74	Transmitters for TV, radio and phone
75	Receivers for TV and radio
76	Medical and precision instruments
77	Motor vehicles
78	Shipbuilding and repair
79	Other transport equipment
80	Aircraft and spacecraft
81	Furniture
82	Jewellery and related products
83	Sports goods and toys
84	Miscellaneous manufacturing nec & recycling
85	Electricity production and distribution
88	Construction

Total Manufacturing Industries = 69

Service Industries -

IO	Industry Name
99	Telecommunications
100	Banking and finance
101	Insurance and pension funds
102	Auxiliary financial services
106	Renting of machinery etc
107	Computer services

108	Research and development
109	Legal activities
110	Accountancy services
111	Market research, management consultancy
112	Architectural activities and technical consultancy
113	Advertising
114	Other business services

Total Service Industries = 9

Note: Shading indicates industries that have been grouped together to match input/output classifications. Specifically, industries 14-17, 18-19, 25-26, 36-40, 100-102, and 109-111 are treated as 6 groups of industries.

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