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World Trade Organization

Economic Research and Statistics Division

The Impact of Mode 4 on Trade in Goods and Services

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THE IMPACT OF MODE 4 ON TRADE IN GOODS AND SERVICES

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Abstract[1]

This paper estimates the impact of liberalization of temporary movements of individual service suppliers on trade in goods and services. In particular, the paper looks at the impact of the so-called forth mode to provide a service on trade in services under the other three modes: cross-border service supply (Mode 1), consumption abroad (Mode 2) and commercial presence abroad (Mode 3). Estimates are obtained using a gravity model of trade augmented for a measure of temporary movements of service suppliers. Estimates of the size of a country's Mode 4 trade in services are based on specific information regarding the number of temporary foreign workers occupied in the service sector and their estimated average earnings, thus overcoming the limitations of traditional measures of Mode 4 based on remittances or compensation for employees. We find a positive and significant effect of temporary movements of service providers on merchandise trade and services trade under Mode 1 and 3. No significant relationship is found between services trade under Mode 2 and Mode 4.

JEL classification: F13, F23, F29

Keywords: Mode 4, trade negotiations, trade in services, FDI

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I. INTRODUCTION

Globalization has been characterized by increasing trade in goods and services and increasing cross-border flows of investments, accompanied by a surge in international movement of workers. The reduction of transport and communication costs, the greater and low cost availability of imported goods from their homeland have made it easier for people to move abroad. Migrants can read online newspapers from their home country, use cheap phone cards to keep in touch with their relatives, find the ingredients to cook their homeland recipes and travel regularly back home at relatively low costs. Although permanent migration accounts for most of movement of workers across countries in developed countries, the temporary movement of workers has been growing the most over the last decade.

Today many different barriers to the movement of people remain. These include: stringent visa requirements, quotas, application of economic needs test (for example, employers might be required to search for a national employee before employing a foreign one), limits on the recognition of professional qualifications. In the current round of services negotiations in the WTO, a significant number of Members have expressed keen interest in further facilitating the movement of natural persons to supply services.

The General Agreement on Trade in Services (GATS) identifies four modes to trade in services. These are:

- Mode 1. Cross-border supply: when a service crosses a national border. An example is the purchase of insurance by a consumer from a producer abroad.
- Mode 2. Consumption abroad: when a consumer travels abroad to consume from the service supplier, such as in tourism, education, or health services.
- Mode 3. Commercial presence: when a foreign owned company sells services (e.g. foreign branches of banks).
- Mode 4. Temporary movement of natural persons: when independent service providers or employees of a multinational firm temporarily move to another country.

The negotiations on Mode 4 began during the Uruguay Round and resulted in Members scheduling commitments mainly on intra-corporate transfers of high-level personnel and business visitors. In this current round of services negotiations, developing countries stress the need to expand the coverage of these commitments to other categories of workers, including low-skilled workers.

Estimates suggest that the economic gains from a further liberalization of the temporary movement of workers can be large. Using a CGE approach Winters and Walmsley (2002) estimate the effect of an increase in developed countries' quotas on both skilled and unskilled temporary labour equivalent to 3% of their labour forces. They find that such a policy would lead to a $156 billion increase in welfare for developing and developed countries together. The largest share of these gains would arise from increased movements of low-skilled workers as opposed to high-skilled workers.

In their main simulation Winters and Walmsley (2002) assume that temporary migrants can be employed in any sector of the host economy, thus disregarding the fact that Mode 4 liberalization under GATS only refers to service suppliers. The authors also perform separate simulations where temporary migrants only move to services sectors. They find similar results, but those hinge strongly on the assumption that permanent labour in the host economy cannot leave services sectors in reaction to wage decreases. It is also questionable whether and to which extent Mode 4 inflows affect wages at all, as WTO Members have the option under GATS to condition the liberalization of Mode 4 flows on minimum wage restrictions, which prevent firms from paying lower wages to foreign workers than to their domestic workers.[2]

[2] See WTO (2004).

The important contribution of this paper is that we use a direct measure for Mode 4 flows in our empirical exercises. Estimates of the size of a country's Mode 4 trade in services are obtained using specific information regarding the number of temporary foreign workers occupied in the service sector and their estimated average earnings, thus overcoming the limitations of traditional measures of Mode 4 based on remittances or compensation for employees.

Using this measure for Mode 4 flows to the US and the UK we provide estimates for the impact of Mode 4 liberalization on trade flows between the US and the UK and their partner countries. Theoretical considerations suggest that Mode 4 liberalization should have a positive impact on trade. Evidence of a positive impact of immigration flows on merchandise trade exists, but these studies do not distinguish between permanent and temporary movement of people and do not single out service providers. Using our new measure of temporary movement of service providers, we fill up this gap.

Finally, we test whether flows of temporary workers have had an impact on other modes of service supply: cross-border supply (Mode 1), consumption abroad (Mode 2) and commercial presence abroad (Mode 3). Theoretical considerations suggest that Mode 4 liberalization can either substitute or complement other modes to provide a service. To our knowledge there is no study on the relationship between liberalization of Mode 4 and trade in services under other modes.

This paper is organized as follows. Section II introduces the notion of "temporary movement of service suppliers (Mode 4)" as defined under GATS and presents the data used in this paper. Section III gives an overview of the theoretical links between Mode 4 flows on the one hand and trade in goods and services on the other hand. Section IV presents the regression results and section V concludes.

II. MEASURING MODE 4

GATS Article I:2(d) defines Mode 4 as “the supply of a service by a service supplier of one Member, through presence of natural persons of a Member in the territory of any other Member “. The Annex on Movement of Natural Persons Supplying Services under the Agreement specifies that two categories of measures are covered – those affecting natural persons who are “service suppliers of a Member” (i.e. self-employed suppliers who obtain their remuneration directly from customers), and those affecting natural persons of a Member who are “employed by a service supplier of a Member in respect of the supply of a service”. These natural persons can be employed either in their home country and be present in the host market to supply a service or be employed by a service supplier in the host country.

Mode 4 thus refers to persons working abroad, but only to a very restricted category of persons. First of all it only covers suppliers of services. Second, it only covers the temporary movement of workers, as GATS excludes “natural persons seeking access to the employment market” and “measures regarding citizenship, residence or employment on a permanent basis”. In this context it is interesting to note that the terms “temporary” or “non-permanent” status in the host country are not specified in GATS. As a consequence, WTO Members have interpreted the notion "temporary" differently in their schedules of services commitments varying between durations of three months to five years. Last but not least, although both self-employed and employed service suppliers are covered by the agreement, it is not clear whether foreign workers employed by locally-owned firms fall under the definition of Mode 4 under GATS or not. Albeit there seems to be some room for interpretation, the currently preferred conservative approach suggests that foreign workers employed by locally-owned firms are not covered by GATS.

The problem encountered by anyone wishing to do empirical work on Mode 4 is that countries do not collect separate statistical information on foreign service providers falling under the GATS definition. So far the literature has used Balance of Payment (BOP) statistics on "compensation of employees" and "workers' remittances" to measure the value of Mode 4 flows. These indicators have the advantage to be available for many countries and to guarantee a certain level of comparability across countries. Yet, each of the two indicators has significant limitations when it comes to measuring Mode 4 movements.[3]

"Compensation of employees" comprises "wages, salaries, and other benefits, in cash or in kind, and includes those of border, seasonal, and other non-resident workers". This indicator is not restricted to service providers as it covers workers employed in any economic sector are covered by this measure. Besides, the indicator only includes workers staying abroad for less than one year, including border workers, while Mode 4 covers employment of up to five years depending on the country considered.

"Workers' remittances" refer to current transfers of migrant workers who are employed in a foreign economy in which they are residents.[4] Also this measure relates to foreign workers employed in any economic sector, not specifically the service sector. Remittances, besides, represent only the portion of workers' compensation saved and sent back to the home country, which leads to an underestimation of the actual value of the workers' activity. Another important drawback of this measure is, that remittances also cover transfers made by permanent migrants, which are excluded under Mode 4.

In this paper we want to analyse whether Mode 4 flows between two countries affect other trade flows between the same countries. We therefore need information on Mode 4 flows at a bilateral level. Balance of payment information on compensation of employees and/or workers' remittances is scarcely available at the bilateral level. This is another reason why we need to find another Mode 4 measure for the purpose of this paper.

Labour, migration, and census statistics of selected countries often provide a higher level of detail on the employment of foreign workers than BOP statistics. In some instances, they only contain the total number of foreign workers in services, mainly employees, and their distribution among various economic sectors. Others specifically identify foreign employment in services on a temporary basis. In some cases, it is also possible to gather information regarding the number of temporary foreign workers by economic activity and/or occupation, and their estimated average earnings, which makes it possible to estimate the value of a country's Mode 4 trade in services.[5]

We use in this paper national statistics from the US and the UK to compute the measure for Mode 4 flows (M4proxy) used in our regressions. The data do not allow us to distinguish between employees in domestically owned firms and those in foreign owned firms. Both types of employees are therefore included in our measure, although this does not correspond to the strict definition of Mode 4 under GATS. Data used refer to the year 2000.[6]

Our measure for the United States is based on information on H-1B visa, provided by the Immigration National Service (INS). The H-1B visa for "Professional workers in specialty occupation", such as computer specialists or fashion models from foreign countries, is explicitly mentioned in the US schedules of GATS commitments within Mode 4. H-1B Visas are, initially, granted for a period of up to three years, but can be extended only once for an additional three years. The data used in our regression exclusively use information on H-1B visas granted for initial employment.

[3] See WTO (2004) for a more detailed description.

[4] In the context of BOP statistics a person is considered as resident when he or she stays for a year or more.

[5] This method was first suggested in Karsenty (2003).

[6] Data refer to fiscal year 2000 (1 October 1999 to 30 September 2000) for the United States.

The INS statistics give information on the origin of H1-B visa-holders, the distribution of H-1B visa-holders across occupations and on the average compensation earned by H1-B visa holders in these occupations.[7] Although these data may present some limitations, they allow us to estimate the value of the services provided by H1-B visa holders from 146 different countries of origin. In 2000 by far the largest number of H1-B visa was given to Indian citizens: 60757 visas which corresponds to an estimated value of services provided of around $ 2.9 billion. China was with 12333 visas the second largest sender of service providers with a corresponding value of services provided of $ 592 millions. At the other end of the spectrum we find Dominica, Rwanda and Samoa with one H1-B visa each corresponding to a value of Mode4 flows of over 30,000 $. The average value of Mode 4 flows for our sample is 47 million $ when China and India are included. The average is 20 million $ when China and India are excluded.[8] The median value of Mode 4 imports is 3.8 million $, corresponding to the value of imports from Algeria.

Table 1: The value of bilateral Mode 4 flows to US from selected partner countries: compensation of employees and M4proxy compared.

	Compensation of Employees (million US$)	M4proxy (million US$)	Ratio (units)
Mexico	6164	71	0.01
Canada	232	281	1.21
EU	142	610	4.29
Japan	64	128	2.00
Australia	6	56	9.26
South Africa	5	52	10.48
Venezuela	5	45	9.01

A comparison with BOP statistics allows us to get a better feeling for the variable we work with in our regressions and to understand how it compares to measures presented so far in descriptive literature. US BOP statistics contain information only for a very restricted number of sending countries. Table 1 gives information for the sending countries for which information on both indicators, compensation of employees and our Mode 4 proxy, is available.[9] The Table shows that the values for bilateral Mode 4 flows differ significantly depending on which measure is used. In fact the ratio between M4proxy and BOP-compensation ranges from 0.01 to 10.48. By far the largest share of compensation of employees goes to Mexico. Mexicans were the main beneficiaries of short-term employment visa giving access to mainly low-skilled occupations in agriculture and services (private households, hotels and restaurants).[10] These short-term employment visa do not form part of the United States' concessions under GATS. It is thus correct not to include these visa in a Mode 4 measure, as is the case in M4proxy.

[7] In 2000, some 136,800 new petitions were approved for initial employment, mainly in computer-related occupations. The second largest group was electrical/electronics sector workers, industrial engineers, and architects, followed by specialized administrative occupations, such as accountants and specialist auditors in related services industries.

[8] China and India are due to their size clear outliers in this sample. In the regressions we control for population size to ensure that the Mode4proxy does not capture overall population size instead of movements of service providers.

[9] The sum of "compensation of employees" and "workers' remittances" has also been used to measure Mode 4 flows. This paper focuses on bilateral M4-flows to the United States and the UK. As the UK does not provide separate data for workers' remittances, we cannot use this variable for our analysis.

[10] Access to the US labour market has been facilitated for Mexicans by NAFTA.

Our regressions for FDI include data for the UK because bilateral FDI data for the US are only available for a very limited number of partner countries. The bilateral Mode 4 data for the UK have been constructed according to a similar method in the case of the US. Although data on the number of foreigners working in the United Kingdom are available, estimated in 2002 at 1.4 million individuals, it is very difficult to determine exactly what proportion of these would be covered by the Mode 4 definition. In 2000, the United Kingdom granted some 64,500 new work permits and first permissions for up to five years to non-EU workers.[11] One third of them covered short-term employment of less than one year. The majority of the permits which may fall under the definition of Mode 4 were granted to workers in computer-related, management, and business services industries. Estimates of M4proxy show that in 2000, services imports through the movement of this non-EU temporary workforce amounted to nearly $2.5 billion, equivalent to 0.2 per cent of the UK's GDP.

Data allow us to compare bilateral levels of BOP-compensation and M4proxy to the UK from 11 sending countries. The discrepancies between the two measures are even more striking than in the case of the US. For India M4proxy reports a value that is 118 times the one reported in BOP-compensation statistics. Besides several important sending countries of service suppliers under M4proxy receive no compensation of employees according to BOP-statistics.

Table 2: The value of bilateral Mode 4 flows to the UK from selected partner countries: compensation of employees and M4proxy compared.

	Compensation of Employees (million US$)	M4proxy (million US$)	Ratio (units)
Australia	23	191	8
Canada	14	93	7
China	0	68	
India	5	545	118
Japan	2	131	71
Malaysia	0	41	
Philippines	0	223	
Poland	3	28	10
Russia	0	49	
South Africa	12	188	16
USA	228	652	3

The measure for Mode 4 flows we use in our regressions thus differs significantly from indicators used so far in the literature describing the size and direction of Mode 4 flows. Our measure has the advantage to be closer to the definition of Mode 4 under GATS and to be available at the bilateral level for a number of countries. Nevertheless our variable M4proxy should not be considered to be a precise measure for Mode 4 flows. It has been pointed out that M4proxy includes foreign service providers working in local companies. These workers should not be included according to the conservative interpretation of Mode 4 under GATS. Besides our variable uses only data on a limited number of temporary work permits. It cannot be excluded that the countries included in our analysis, i.e. US and UK, emit other types of work permits that would fall under the definition of GATS but on which information is not readily available.

[11] It should be noted though that self-employed temporary workers are not included in this category of work permits. Work permit extensions, which are granted for an additional five years, or requests for changing employers have been excluded from our measure.

III. LINKS BETWEEN MODE 4 FLOWS AND OTHER TRADE FLOWS

A. THE RELATIONSHIP BETWEEN MODE 4 AND MERCHANDISE TRADE

There are various channels through which the stay of people in a foreign country, both permanently and temporarily, may enhance merchandise trade flows:

(i) *Preference effect:* The presence of migrants increases the demand for foreign products. Migrants prefer goods they were used to consuming at home. Some of these products might be very difficult to find abroad, and they will import them from their country of origin.

(ii) *Information effect:* Migrants possess knowledge about their country of origin that makes it easier for them to acquire information about profitable international trading opportunities and helps to reduce informal barriers to trade. In other words, migrants can help to reduce demand and supply *matching costs*. For example, since migrants know consumer preferences in their country of origin, they can inform exporters in the destination country about whether their product could be successfully marketed or whether it needs to be adapted to importers' preferences. Also migrants can help reducing *network search costs*. Migrants have better connections with the local business network. They can help producers of consumer goods to find better distributors, assemblers to find the best component suppliers and investors to find joint-venture partners.

(iii) *Contract enforcement effect:* Migrants facilitate a stronger enforcement of international contracts. International transactions are traditionally based on confidence, as delivery and payment may occur at different places. Since migrants have a better knowledge of local business law and practices, uncertainties connected with transactions are reduced.

Overall, the information and enforcement effect suggest a positive impact of cross-border movement of people on both imports and exports, whereas the preference effect only affects imports.

A link between immigration, imports, and exports has been found by a number of studies that have used a gravity equation[12] to analyse bilateral trade patterns. Most studies on the impact of labour mobility on trade flows base their empirical analysis on an augmented form of the traditional gravity model, where the effect of migration on trade flows is captured by adding a measure of the migrant stock to the conventional variables (GDP, distance, border, common language). All studies find a positive effect of migration on trade. Estimates of the impact of a 10 per cent increase in migrant population on exports range from 0.13 per cent to 2.5 per cent. The effect on imports range between 0.1 per cent and 3.1 per cent (see Table IB2.1 for an overview). Another recent study, using cross-province variation in international trade and immigration patterns for Canada, shows that the average new immigrant expands exports to his/her native country by 312 dollars per annum and expands imports by 944 dollars (Wagner, Head and Ries, 2002).

[12] A "gravity equation" seeks to explain observed relationships in terms of particular characteristics of trading partners, such as income levels, geographical proximity, historical, linguistic or cultural ties, and so on.

Table 3: The impact of migration on trade, principal studies

Authors	Sample countries and period	Export elasticity	Import elasticity
Gould (1994)	US and 47 trade partners: 1970-86	0.02	0.01
Head and Ries (1998)	Canada and 136 partners: 1980-92	0.1	0.31
Dunlevy and Hutchinson (1999,2001)	US and 17 partners: 1870-1910	0.08	0.29
Girma and Yu (2000)	UK and 48 partners: 1981-1993	0.16[a]	0.1[a]
Combes et al. (2002)	95 French departments: 1993	0.25	0.14
Rauch and Trinidade (2002)	63 Nations: 1980, 1990	0.21[b]	0.21[b]
Wagner, Head and Ries (2002)	5 Canada provinces and 160 partners: 1992-1995	0.08, 0.01	0.25, 0.09

[a] Trade with non-Commonwealth countries.
[b] Computed by Wagner et al. (2002) for homogeneous goods. Trade elasticity for differentiated goods is 0.47
Source: Wagner et al. (2002).

Estimates obtained on the basis of dynamic models also support the prediction of a positive and significant effect of immigration on trade. One study shows that *over time*, a 10 per cent increase of immigrants to the United States will increase United States' exports to the country of origin by 4.7 per cent and United States imports from the country of origin by 8.3 per cent (Gould as reported in Rauch 2001). Similar estimates for Canada show that a 10 per cent increase in immigrants from a given country increases Canadian exports to that country by 1.3 per cent and imports from the country by 3.3 per cent (Head and Ries, 1998). For the United Kingdom, an increase of 10 per cent of migrants from a non-Commonwealth country has been estimated to increase UK exports (imports) to those countries by 5 per cent (1 per cent) in the long-run, while the effect is found to be insignificant for migrants from Commonwealth countries (Girma and Yu, 2002).

Of particular importance is the study conducted by Rauch and Trindade (2002) that represents the only attempt to estimate separately the role of migration in reducing information barriers and that in facilitating international contract enforcement. The paper argues that the presence of a Chinese network reduces information barriers. The authors proxy the network by the product of percentage of Chinese population in the two trading partners, and estimate a gravity equation for both homogeneous (reference price goods) and differentiated goods. They find that the importance of the Chinese network for bilateral trade is greater in the case of differentiated goods[13]. This is coherent with the assumption that information barriers are likely to be higher for differentiated goods as it is more difficult to have information about their characteristics. The paper concludes that the impact of Chinese network on the reference price goods represents the informal contract enforcement effect, while its marginal higher impact on the differentiated goods represents the information effect of the network.

It is worth noting that, although not very robust, there appears to be some evidence of a stronger link between movement of people and imports than between the movement of people and exports. The fact that information and enforcement effects affect both imports and exports, while the preference effect only affects imports might justify this finding. If this is the case, migration flows could be expected to be linked to a deterioration of the balance of payments.

Regarding temporary movement of people, theoretical considerations suggest that the impact of Mode 4 mobility on trade may be different from that estimated by the literature on migration discussed so far. As far as imports are concerned, a worker moving abroad temporarily might have a higher propensity than a permanent migrant to import from his country of origin, as he or she has probably

[13] Raising the Chinese network variable from zero to its sample mean value increases trade volumes by 6.2% (178%) and 1% (128%) for differentiated and reference price goods, respectively, in those countries whose share of Chinese population is less (more) than 1 per cent.

not yet adapted to local products (stronger preference effect). As regards exports, on the one hand a worker who temporarily works abroad might not stay long enough to acquire the appropriate knowledge of the local market (destination market) to set up new trade links (weaker information effect). On the other hand, (if he stays long enough) on his return to his home country, he might begin to import a product that he has discovered during his stay abroad. Or, short stay abroad might be needed to establish links with foreign distributors and importers (stronger information effect). Overall, the final effect of Mode 4 mobility on exports may theoretically be higher or lower than that of migration. The question requires empirical analysis.

Existing studies on the impact of labour mobility on merchandise trade flows have measured labour mobility using data on migration (i.e. the total of permanent and temporary movement of people). Since Mode 4 only refers to temporary movements of persons providing a service, these studies can only provide a rough indication of the impact of Mode 4 mobility on trade. They fail to capture both the "temporary" nature of this type of labour mobility and the fact that it relates only to movements of workers who provide a "service".

B. THE RELATIONSHIP BETWEEN MODE 4 AND OTHER MODES OF PROVIDING A SERVICE

Liberalization of Mode 4 is likely to affect services trade under other modes. The impact will depend on whether Mode 4 is a substitute or a complement for other modes of supply of a service, or if it is simply the only mode available to deliver the service. There are circumstances where a service can be provided under several modes. For example, a law firm can assist a foreign client by offering consultancy on-line (Mode 1), or it may request its client to travel for an appointment to the firm's headquarters (Mode 2). Alternatively, the firm may decide to open a partnership abroad (Mode 3), or it may temporarily send a lawyer abroad (Mode 4). In these cases, liberalization of trade under Mode 4 may be expected, other things being equal, to have a negative impact on trade under other modes. Trade under Mode 4 may replace trade under other modes, unless the other modes for supplying a service are also liberalized.

There are other circumstances when the physical presence of the service supplier is necessary to provide the service. The supply of restoration, repair, construction, most health and social services (e.g. midwives or nurses) are all examples where there is a need for proximity between the supplier and the consumer to supply the services. To the extent that the consumer is immobile, in these cases, there is not a clear direct relationship between Mode 4 and other modes to provide a service.

On the other hand, there are circumstances where temporary movement of people may actually complement trade in services under other modes. In these cases, a positive relationship between liberalization of temporary movement of persons who provide a service abroad and services trade under other modes can be expected. For example, direct preliminary contacts with a client might be needed for a lawyer to acquire credibility and establish a permanent business link which can eventually lead to other advisory work provided on-line (Mode 1) or can attract new clients to travel abroad to consult that lawyer (Mode 2)[14]. Also, liberalization of Mode 4 facilitates offshore outsourcing by allowing firms to send people to familiarize with their service suppliers and manage outsourced operations. The service will then be supplied on line (Mode 1).

Similarly, it is plausible to expect complementarities between temporary movement of persons who provide a service and commercial presence abroad (Mode 3). First, direct contacts established with clients in a foreign country via Mode 4 may provide the incentive to set up an affiliate there, or previous direct relationships with executive managers of a foreign company may be a prerequisite for decisions on acquisitions or mergers. Second, a company that has an affiliate abroad may need to send workers there (intra-firm transfer) to standardise the management, to spread the know-how, or to

[14] The business visitor category in many WTO Members' schedules envisages precisely this type of movement.

provide some temporary assistance. Third, a local company may sign a construction contract with a foreign company, involving movement of workers (Mode 4), including unskilled workers, and the establishment of a commercial presence (Mode 3). Fourth, market access barriers to the movement of natural persons, such as visa conditions requiring that a commercial presence is established, can render Mode 3 and 4 complements. Insofar as liberalization of Mode 4 increases temporary movement of persons who move to provide a service, it may also enhance trade under Mode 3 and *vice versa*.

The experience of the IT industry in India indicates that Mode 4 is associated with both more inward and more outward foreign investment. During the 90s there has been a large flow of Indian professionals to the US, the bulk represented by IT specialists. Over the same period, (i) multinationals and non-resident Indian investment in the Indian IT industry has raised, and (ii) the share of US-based non-resident Indians collaborations in India's IT sector has reached a significant 40 per cent. Many Indian IT professional who have worked in the US have been determinant in influencing US multinationals to set up activities in India. On the other hand, the large flow of knowledge and technology spillovers, including associated with Mode 4 exports, have facilitated the development of the IT industry in India. Subsequently, Indian IT companies, such as Wipro and Infosys, have established subsidiaries abroad or partnership, thus engaging in Mode 3 exports (Rupa Chanda, 2003).

Overall, theoretical considerations suggest that the relationship between trade in services under Mode 4 and under other modes is ambiguous. The impact of liberalization of Mode 4 on trade in services under other modes is likely to differ across sectors and economic activities, and it will depend on whether substitution or complementary effects dominate. Whether the overall impact of liberalization of Mode 4 on trade under the other modes is positive or negative is therefore a question that requires an empirical investigation.

IV. MEASURING THE IMPACT OF MODE 4 ON TRADE FLOWS

Bilateral data on Mode 4 flows are available for the U.S. with 146 partner countries and the UK with 11 partner countries. Because of this imbalance in the data we focus our analysis of Mode 4 and merchandise trade flows on the US only. For the U.S., bilateral FDI data are however only available for a very restricted number of partner countries. We therefore include the UK in the analysis of services trade in order to reach an acceptable sample size.

A. MODE 4 AND MERCHANDISE TRADE

As we intend to explain bilateral trade between the US and partner countries, we follow the approach typically taken in gravity equations. In its standard form, the gravity model explains bilateral trade flows as a function of the trading partners' market size and their bilateral barriers to trade. Market size is commonly measured by GDP. Trade barriers are commonly measured by geographic distance, indicators of whether either or both trading partners are an island, landlocked or share a common border speak a common language. Implicit is the assumption that transport costs increase with distance, are higher of islands and landlocked countries and lower for neighbouring countries. The dummy for common language is intended to capture information costs.[15] GDP per capita has traditionally also been included as an explanatory variable for international trade. This variable tends to perform well in gravity regressions and has been interpreted in recent literature as an indicator for country characteristics like the quality of institutions and infrastructure.

[15] Tariff barriers should also be taken into account. We intend to do so in a revised version of this paper.

Our focus is on the impact of Mode 4 flows on trade. We argue that the movement of natural persons to provide a service abroad may affect bilateral trade both because it affects the demand for imports (preference effect) and it reduces overall trade costs (information and enforcement effect). Using the new measure of Mode 4 trade described in Section II, we estimate a gravity model augmented for a measure of Mode 4. The equation we estimate is the following:

(1) $\ln M_j = a_0 + a_1 \ln Y_j + a_2 \ln d_j + a_3\ border + a_4\ eng + a_5\ island + a_6\ landlock + a_7\ rem_j + a_8 \ln M4_j + a_9 \ln y_j + \varepsilon_j$

where M_j denotes US imports (or exports) from (to) country j, Y denotes GDP in PPP, d distance, *border* and *eng* are dummy variables that assume value of one if the partner country shares a border with the US and speaks a common language (English, in this case) respectively and zero otherwise, *island* [16]and *landlocked* also represent dummy variables. They are equal to one if country j is an island or is a landlocked country respectively, and zero otherwise. *M4* is the bilateral flow of service providers temporary moving abroad. Finally, *rem* denotes remoteness[17], y is the GDP per capita and ε is the error term.

As we expect that this impact may take place with a lag, we use imports for the year 2001 as the dependent variable. Bilateral trade in goods data were taken from the United Nations COMTRADE database (current US dollars). Data for GDP and GDP per capita for the year 2001 were taken from the World Bank's World Development Indicators (WDI), using the Purchasing Power Parity (PPP) valuation. The variable "distance" measures the "Great Circle Distance" between partner countries' capitals. The source of the data is the indexmundi country profile database (www.indexmundi.com). Mode 4 data refer to the year is 2000.

Table 4 shows our regression results. Partner countries' size (measured by GDP) and their distance to the US turn out to explain 68% of the variation of imports to the US. Both variables have the expected sign and are highly significant. Adding GDP per capita increases the R-square and confirms that the US also source more imports from wealthier countries. Adjacency does not perform well in our regression. The common language (English) is only significant at the 10 per cent level, but turns insignificant when dummies for landlocked countries and islands are included. As expected landlocked countries trade less, while islands trade more according to our regression results. Inclusion of these two geographical dummies lowers the significance of the distance variable to the 10 per cent level.

[16] The variable for Island takes the value of 1 in cases in which country j is an island and 0 otherwise (with the exception of Australia, UK, Ireland, Japan and New Zealand in which the value 0 was assigned).

[17] Recently, the literature on gravity models has showed that a theoretically founded gravity equation is based on a CES utility function where goods are differentiated by country of origin. The most important result provided by the theory is that bilateral trade depend on *relative* trade barriers. That is bilateral trade is a function of bilateral trade costs between trading partners relative to their respective average trade resistance to their trading partners (Anderson and van Wincoop, 2003). Remoteness is introduced in our gravity equation as a multilateral resistance term It is calculated as a GDP-weighted average of each country distance from all other countries.

Table 4: The effect of Mode 4 on US merchandise imports

log US imports								
	I	II	III	IV	V	VI	VII	VIII
log GDP	1.19*** (17.05)	1.03*** (14.50)	1.04*** (13.69)	1.09*** (13.25)	0.82*** (6.14)	0.83*** (6.75)	0.91*** (7.54)	.81*** (6.29)
log distance to US	-1.21*** (-4.59)	-0.55*** (-2.12)	-0.61** (-2.11)	-0.47* (-1.67)	-0.32 (-1.13)	-0.47* (-1.88)	-0.75*** (-3.00)	-0.77*** (-2.48)
log GDP per capita		0.66*** (5.21)	0.66*** (5.04)	0.54*** (4.24)	0.56*** (4.45)	0.54*** (4.35)		.72*** (5.45)
log corruption control							1.07*** (3.15)	
adjacency			1.00 (0.83)	1.22 (1.08)	1.40 (1.25)			0.87 (0.79)
English			0.51* (1.68)	0.36 (1.24)	0.12 (0.41)			-0.19 (-0.62)
landlocked				-0.93*** (-2.78)	-0.77** (-2.31)	-0.75** (-2.25)	-0.86** (-2.62)	-.059* (-1.81)
island				0.83** (2.10)	0.89** (2.27)	0.91** (2.36)	1.17*** (2.36)	.75** (1.97)
log Mode 4					0.28** (2.54)	0.30*** (2.78)	0.28** (2.56)	0.30*** (2.78)
log remoteness								2.27*** (3.23)
Number of observations	140	140	140	140	140	140	127	139
Adjusted R-square	0.68	0.73	0.73	0.76	0.77	0.77	0.77	.78

* significance at 10 per cent level; ** 5 per cent, ***1 per cent.

Our Mode 4 variable is significant and has the expected sign. According to regression VIII, a 10 per cent increase of Mode 4 flows into the US leads to a 3 per cent increase in US imports from the sending country. This result falls in the upper range of the effects found in migration studies (as reported in Table 3). Distance is significant and also the remoteness variable, both variables have the right signs, showing the importance of relative trade costs in determining bilateral trade flows. As shows regression VII, results are robust to replacing GDP per capita by a measure for corruption in the partner countries[18].

Table 5 shows the results for our regressions with US exports as the dependent variable. Our regressions have consistently a higher R-square than the regressions for imports. Distance remains throughout the exercise significant at the 1 per cent level. Mode 4 is significant at the five or one per cent level in all our specifications. US exports are however less sensitive to Mode 4 inflows than US imports: a ten per cent increase in Mode 4 inflows leads to an increase in exports to the relevant country of 1.8 to 2.7 per cent. The lower elasticity of exports compared to the one of imports corresponds to the findings in the migration literature mentioned earlier.

[18] The corruption control index is insignificant if GDP per capita is included in the regression. Both variables are highly correlated. The corruption control index is taken from Kaufmann et al. (2002).

Table 5: The effect of Mode 4 on US merchandise exports

log US exports								
	I	II	III	IV	V	VI	VII	VIII
log GDP	0.98*** (17.36)	0.82*** (14.80)	0.84*** (14.26)	0.83*** (12.87)	0.61*** (5.81)	0.62*** (6.19)	0.72*** (7.39)	0.61*** (6.37)
log distance to US	-1.69*** (-7.84)	-1.23*** (-6.01)	-1.13*** (-5.01)	-1.03*** (-4.66)	-0.90*** (-4.10)	-1.02*** (-5.16)	-1.21*** (-6.33)	-1.50*** (-6.55)
log GDP per capita		0.64*** (6.32)	0.64*** (6.30)	0.58*** (5.72)	0.60*** (5.96)	0.59*** (6.02)		0.75*** (7.69)
log corruption control							1.28*** (4.86)	
adjacency			0.67 (0.72)	0.82 (0.91)	0.97 (1.09)			0.17 (0.21)
English			0.54** (2.28)	0.48** (2.07)	0.28 (1.18)	0.33 (1.41)	0.21 (0.87)	-0.05 (-0.22)
landlocked				-0.76*** (-2.89)	-0.63** (-2.42)	-0.67*** (-2.66)	-0.82*** (-3.35)	-0.41* (-1.68)
island				0.16 (0.51)	0.21 (0.68)			-0.2 (-0.06)
log Mode 4					0.23** (2.62)	0.22** (2.53)	0.18** (2.10)	0.27*** (3.31)
Number of observations	142	142	142	142	142	142	142	141
Adjusted R-square	0.70	0.77	0.77	0.79	0.80	0.80	0.81	0.83

B. MODE 4 AND TRADE IN SERVICES

This Section analysis the impact of Mode 4 flows on other modes of services trade: cross-border supply (Mode 1), consumption abroad (Mode 2) and commercial presence (Mode 3). The figures for trade in services under Mode 1, Mode 2 and Mode 3 were taken from OECD in the case of the UK, and from the Bureau of Economic Analysis (BEA) in the case of the US. For Mode 3, we also use Foreign Affiliates Trade in Services statistics (FATS) for the United States in complement to BEA data.

Mode 1 data trade were calculated from bilateral Private Services Trade Flows by subtracting Tourism services (data source is the Balance of Payments' Statistics). Tourism Services are the figures for our estimation of Mode 2. We used two measures of Mode 3: (a) inward and outward FDI flows are taken from the BEA dataset as a measure of Mode 3 imports and exports, respectively, and (b) sales of services to foreign persons by United States multinational companies (MNCs) through their non-bank majority owned foreign affiliates (MOFAs) are taken from FATS as a measure of United States Mode 3 exports and sales to United States persons by foreign MNCs through their non-bank majority owned US affiliates (MOUSAs) are taken as a measure of United States Mode 3 imports. In order to control for the high volatility that characterises FDI flows[19], 3-year averages (1999-2001) are used for both measures.

[19] For a description of FDI estimation see "Foreign Direct Investment Statistics: How countries measure FDI"; IMF/OECD, 2001.

1. The role of Mode 4 on services trade through commercial presence abroad

In this subsection we look at the impact of Mode 4 on trade in services through a commercial presence abroad. We first focus on the impact of Mode 4 trade on FDI flows and then on its impact on sales of services by MNCs foreign affiliates. Both measures are imprecise measures for Mode 3 service trade. The former includes direct investment abroad other than to provide a service. The latter only includes services trade by multinational companies. Nevertheless, these two measures of Mode 3 can be seen to complement each other and provide useful insight on the empirical relationship between Mode 4 and Mode 3 trade in services. Moreover, the study of the relationship between Mode 4 and FDI flows is relevant per se as Mode 4 liberalization under GATS reflects a strong link with the wider objective of attracting foreign investment, as the highest number of commitments has been made for intra-corporate transferees.[20]

(a) ..... as measured by FDI

Mode 3 is commonly associated to foreign direct investment (FDI). The cross-country pattern of FDI is quite well approximated by the 'gravity' relationship. A gravity model is used to explain bilateral FDI by Loungani, Ashoka and Razin (2002). In this paper they explain FDI flows using standard gravity variables plus other variables proxying for institutional development, financial markets developments and "intangible capital". An augmented gravity model is also used by Wei (1997) who adds corruption and a tax index to the standard gravity variables[21].

Table 6 and 7 report the results of our regressions for FDI imports and exports. As we have only two reporting countries in our sample, the U.S. and the U.K., we include a UK dummy in our regressions. We also include in our regression and measure for country size (GDP), wealth (GDP per capita) and distance and a dummy for common language (English).[22] GDP, GDP per capita and distance have the expected sign, but distance is not significant. Inclusion of Mode 4 in regression V renders GDP insignificant. The two variables are highly correlated (0.86), but note that GDP never became insignificant in the regressions for merchandise trade. Regression VI runs the same regression as regression IV, but with Mode 4 instead of GDP. The regression results are very similar, but regression VI has a slightly higher R-square.

[20] See WTO, World Trade Report 2004.

[21] Other studies explaining bilateral FDI using a gravity model are those by Ekholm (1998) Shatz (2003).

[22] We also included a border dummy in our regressions, but it turned out to be always insignificant. The results of these regressions are not reported here.

Table 6: The effect of Mode 4 on FDI inflows

log FDI imports (US and UK)						
	I	II	III	IV	V	VI
log GDP	1.07*** (3.43)	0.93*** (4.12)	0.90*** (3.90)	0.90*** (3.89)	0.33 (0.88)	
UK	-3.23*** (-3.08)	-1.66** (-2.07)	-1.59* (-1.96)	-1.81** (-2.10)	-1.57* (-1.88)	-1.29 (-1.67)
log GDP per capita		2.66*** (5.66)	2.68*** (5.66)	2.52*** (4.92)	3.14*** (5.26)	3.40*** (6.66)
log distance			-0.38 (-0.82)	-0.37 (-0.81)	-0.45 (-1.01)	-0.52 (-1.19)
English				0.58 (0.80)	-0.44 (-0.50)	-0.85 (-1.11)
log Mode 4					0.80* (1.83)	1.11*** (4.37)
Number of observations	36	36	36	36	36	36
Adjusted R-square	0.27	0.62	0.62	0.62	0.64	0.64

In Table 7 we show the results of a regression with FDI outflows as the dependent variable and the same explanatory variables as before. Inclusion of Mode 4 flows (regression V) increases the R-square by 0.08 but again renders GDP insignificant. Excluding GDP even increases the R-square. Recent literature has stressed the role of corruption for FDI (Wei, 2000). We therefore include the corruption index in our regression to test whether the decisions of American and UK investors are influenced by corruption in potential destination countries. The variable is insignificant in our regression (VII) probably due to its high correlation with GDP per capita (0.83).[23] Corruption does indeed become significant when excluding GDP per capita from the regression, but the R-square goes down. Changing the specification of the regression has only small impacts on the results for Mode 4. This variable continues to have the expected positive sign and is significant at the one or five per cent level. The elasticity of FDI outflows with respect to Mode 4 is somewhat smaller than in the case of inflows which reflects the results we obtained for merchandise trade.

[23] The same problem occurs when including the wage gap between UK/US on the one hand and the partner countries on the other hand. Results of those regressions are not reported.

Table 7: The effect of Mode 4 on FDI outflows

log FDI outflows (U and UK)								
	I	II	III	IV	V	VI	VII	VIII
log GDP	0.51*** (2.87)	0.53*** (3.32)	0.56*** (3.42)	0.56*** (3.45)	-0.03 (-0.11)			
UK	-0.6 (-0.87)	-0.32 (-0.53)	-0.40 (-0.64)	-0.68 (-1.09)	-0.64 (-1.08)	-0.66 (-1.15)	-0.43 (-0.70)	-0.51 (-0.80)
log GDP per capita		1.11*** (3.85)	1.09*** (3.77)	0.95*** (3.22)	1.33*** (4.21)	1.31*** (4.58)	1.20* (1.83)	
log corruption control							0.29 (0.19)	2.70*** (3.81)
log distance			-0.35 (-0.94)	-0.31 (-0.86)	-0.43 (-1.23)	-0.43 (-1.25)	-0.53 (-1.44)	-0.52 (-1.37)
English				1.03* (1.72)	-0.02 (-0.02)	-0.02 (-0.04)	-0.17 (-0.25)	-0.04 (-0.06)
log Mode 4					0.71** (2.55)	0.68*** (4.51)	0.69*** (3.98)	0.61*** (3.52)
Number of observations	51	51	51	51	51	51	48	48
Adjusted R-square	0.11	0.31	0.31	0.33	0.41	0.42	0.40	0.37

To sum up, it is found that a 10 per cent increase in the temporary movement of people is correlated to a 8.0 (7.1) per cent higher inflows (outflows) of foreign direct investment (a proxy for trade in services under Mode 3). Lack of data makes it very difficult to establish a causality between Mode 4 and FDI flows and obtain robust results. The relationship between FDI and Mode 4 runs in two ways: larger temporary movement of persons leads to larger flows of FDI and *vice versa*. The large coefficient for the relationship between Mode 4 and Mode 3 also reflects the fact that at present the liberalization of Mode 4 is linked to a commercial presence abroad.

(b) .... as measured by sales by multinational companies

Tables 8 and 9 report the results of our regression for services trade through multinational companies. Like in the case of FDI, the gravity model appears to perform well. However, Mode 4 appears in general not to be significant. The correlation between our measure of Mode 4 and the GDP variable creates problems of multicollinearity, due to the lack of information in the sample (composed by only 28 observation). In order to get an estimation of the parameter for Mode 4, we drop the GDP variable. Column V of Table 8 reports the results of this regression for import of services through Mode 3: here Mode 4 appears to have a positive and significant effect. In other words, the more people move to the United States to provide a service, the more likely is that they would also provide the service through a commercial presence. Column VI of Table 9 reports the results for export of services though Mode 3. In this case, the parameter of Mode 4 takes a negative sign and is significant. This would imply that the more people move temporary to the United States to provide a service, the less likely is that United States would export those services though their commercial presence abroad.

Table 8: The Effect of Mode 4 liberalization on imports of services through MNCs (Mode 3)

	Log Mode 3 imports (US) -average 1999-2001						
	I	II	III	IV	V	VI	VI
log GDP average	0.99*** (3.46)	.90*** (3.2)	.91*** (3.2)	0.65 (1.44)		1.16*** (3.77)	
log GDP per capita average	2.67*** (6.12)	2.46*** (5.56)	2.48*** (5.51)	2.67*** (5.14)	2.74*** (5.42)	1.43 (1.63)	
log corruption control						3.18* (1.75)	4.8*** (3.89)
log distance		-0.76 (-1.59)	-0.77 (-1.56)	-.072 (-1.42)	-0.77 (-1.51)	-0.50 (-095)	-1.05 (-1.65)
English			0.43 (0.60)				
log Mode 4				0.35 (0.76)	0.73** (2.75)		0.45 (1.5)
Number of observations	28	28	28	28	28	25	25
Adjusted R-square	0.6	0.62	0.61	0.60	0.59	0.67	0.48

***, **, * represent 1, 5 10 per cent significance level

Table 9: The Effect of Mode 4 liberalization on exports of services through MNCs (Mode 3)

	Log Mode 3 exports (US) -average 1999-2001					
	I	II	III	IV	V	VI
log GDP average	0.56*** (3.82)	0.52*** (3.67)	0.50*** (3.63)	0.73*** (3.55)	0.85*** (3.64)	1.00***
log GDP per capita average	1.15*** (5.53)	1.02*** (4.81)	1.04*** (5.08)	0.84*** (3.54)	0.93*** (1.78)	
log corruption control					0.20 (0.20)	1.73*** (3.31)
log distance		-0.44* (-1.86)	-0.41* (-1.77)	-0.43* (-1.90)	-0.23 (-0.89)	-0.35 (-1.35)
English			0.59 (1.66)	1.06*** (2.24)	1.09*** (2.03)	1.09*** (1.92)
log Mode 4				-0.36 (-1.49)	-0.36 (-1.38)	-0.57*** (-2.31)
Number of observations	28	28	28	28	25	25
Adjusted R-square	0.58	0.61	0.66	0.66	0.69	0.65

***, **, * represent 1, 5 10 per cent significance level

2. Mode 4 and the cross border supply of services

We use a gravity model approach also to model trade in services under Mode 1, e.g. a consultation from a lawyer located abroad obtained on-line. A positive effect of Mode 4 variable on Mode 1 imports implies that there is complementarity between these two modes to provide a service. This would be, for example, the case if a foreign lawyer travels to the UK to provide consultancy, and as a consequence of his increased credibility, English people request more consultancy on-line.

Table 8 and 9 reports the results of our regressions for imports and exports, respectively. It is important to notice the standard gravity variables measuring transport costs (distance and the common border dummy) are not significant in explaining Mode 1 imports. The result should not come as a surprise. Indeed Mode 1 trade takes place on line, therefore does not involve transport costs. GDP and GDP per capita explain nearly 80 per cent of the sample variations (adjusted R-square is o.79 in regression IV). However, when Mode 4 is introduces the adjusted R-square increase to 0.85 and Mode 4 appears to be positive and significant.

Table 10: The effect of Mode 4 liberalization on imports of services via Mode 1.

Log Mode 1 imports (US and UK)						
	I	II	III	IV	V	VI
log GDP	0.60*** (3.76)	0.68*** (7.03)	0.66*** (6.82)	0.65*** (6.97)	0.35*** (3.13)	0.41*** (3.94)
UK	-1.54*** (-3.64)	-1.29*** (-5.05)	-1.33*** (-5.20)	-1.27*** (-4.86)	-1.33*** (-6.09)	-1.38*** (-6.54)
log GDP per capita		1.13*** (7.83)	1.09*** (7.35)	1.07*** (7.25)	1.30*** (9.48)	1.28*** (10.31)
log distance			-0.22 (-1.29)	-0.05 (-0.22)	-0.14 (-0.75)	
border				0.87 (1.36)	0.54 (1.01)	
English				0.34 (1.34)	-0.27 (-1.01)	
log Mode 4					0.47*** (3.77)	0.41*** (4.11)
Number of observations	37	37	37	37	37	37
Adjusted R-square	0.35	0.77	0.77	0.79	0.85	0.84

Table 11: The effect of Mode 4 liberalization on exports of services via Mode 1.

log Mode 1 exports (US and UK)					
	I	II	III	IV	V
log GDP	0.59*** (4.39)	0.66*** (8.32)	0.65*** (8.04)	0.65*** (9.13)	0.46*** (5.04)
UK	-1.62*** (-4.55)	-1.41*** (-6.73)	-1.43*** (-6.72)	-1.26*** (-6.35)	-1.30*** (-7.25)
log GDP per capita		0.97*** (8.17)	0.95*** (7.69)	0.98*** (8.76)	1.12*** (9.99)
log distance			-0.10 (-0.71)	-0.22 (-1.35)	-0.17 (-1.13)
border				1.52*** (3.13)	1.31*** (2.98)
English				0.13 (0.69)	-0.25 (-1.12)
log Mode 4					0.29*** (2.84)
Number of observations	37	37	37	37	37
Adjusted R-square	0.45	0.81	0.81	0.86	0.88

3. Mode 4 and consumption abroad

The gravity model appears to perform well also to explain trade in services via Mode 2. Indeed, standard gravity equations (GDP, GDP per capita, language and border) explain 78 per cent of Mode 2 trade. Surprisingly distance does not appear to be a significant determinant of trade in services through consumption abroad. No significant relationship is found between services trade under Mode 2 and Mode 4, that is there is no evidence that supplying a service abroad increase the likelihood that consumers travel to the country of origin of the service suppliers to acquire the service.

Table 12: The effect of Mode 4 liberalization on imports of services via Mode 2

Log Mode 2 imports (US and UK)					
	I	II	III	IV	V
log GDP	0.56*** (3.62)	0.64*** (4.85)	0.63*** (4.66)	0.56*** (5.90)	0.55*** (4.14)
UK	-1.56*** (-3.84)	-1.47*** (-4.28)	-1.49*** (-4.30)	-1.32*** (-5.06)	-1.33*** (-4.95)
log GDP per capita		0.74*** (3.81)	0.71*** (3.51)	0.62*** (4.17)	0.62*** (3.66)
log distance			-0.16 (-0.71)	0.24 (-1.12)	0.24 (-1.08)
border				2.07*** (3.28)	2.06*** (3.15)
English				0.98*** (3.89)	0.96*** (2.93)
log Mode 4					0.01 (0.09)
Number of observations	35	35	35	35	35
Adjusted R-square	0.36	0.55	0.54	0.78	0.78

Table 13: The effect of Mode 4 liberalization on exports of services via Mode 2.

Log Mode 2 exports (US and UK)					
	I	II	III	IV	V
log GDP	0.57*** (4.30)	0.65*** (6.43)	0.63*** (6.29)	0.59*** (7.22)	0.59*** (5.17)
UK	-1.60*** (-4.56)	-1.50*** (-5.67)	-1.54*** (-5.94)	-1.43*** (-6.38)	-1.43*** (-6.22)
log GDP per capita		0.76*** (5.05)	0.70*** (4.66)	0.64*** (5.07)	0.64*** (4.38)
log distance			-0.27 (-1.59)	-0.01 (-0.07)	-0.01 (-0.06)
border				1.33** (2.46)	1.34** (2.38)
English				0.62*** (2.86)	0.63** (2.22)
log Mode 4					0.01 (0.04)
Number of observations	35	35	35	35	35
Adjusted R-square	0.45	0.69	0.70	0.81	0.80

V. CONCLUSIONS

Mode 4 liberalization under the General Agreement on Trade in Services (GATS) refers to the liberalization of the temporary movement of people into a country for the purpose of providing a service. So far WTO Members have liberalized services trade under Mode 4 only to a very limited extent and the further liberalization is subject to current WTO negotiations. Developing countries, in particular, have shown interest in greater openness of Mode 4 trade.

Empirical evidence on Mode 4 trade is greatly restricted by limited data availability. Besides existing empirical work consists in simulations based on CGE models. No econometric analysis exists to our knowledge of the economic impact of Mode 4 liberalization. Simulations have so far focused on the direct welfare effects of Mode 4 liberalization generated by the price differences in the supply of services in autarky. This paper argues that Mode 4 trade in addition entails indirect welfare effects similar to those generated by migration. The empirical literature on the economic effects of migration has shown that migration increases trade flows between the home and the destination country of migrants. This paper shows that the temporary movement of service suppliers has similar effects.

The paper estimates the impact of liberalization of temporary movements of individual service suppliers on total merchandise trade and on trade in services. In particular, the paper looks at the impact of Mode 4 trade on trade in services under the other three modes: cross-border service supply (Mode 1), consumption abroad (Mode 2) and commercial presence abroad (Mode 3). Estimates are obtained using a gravity model of trade augmented for bilateral tariffs and a measure of temporary movements of service suppliers. Estimates of the size of a country's Mode 4 trade in services are based on specific information regarding the number of temporary foreign workers occupied in the service sector and their estimated average earnings, thus overcoming the limitations of traditional measures of Mode 4 based on remittances or compensation for employees. In order to obtain unbiased estimators, multilateral resistances for tariffs and remoteness are introduced in the gravity equation.

This study finds a positive and significant effect of temporary movements of service providers on merchandise trade. The results suggest that a 10 per cent increase in temporary movement of persons to provide services increases US imports by around 3 per cent and exports by a percentage between 1.8 to 2.7. Both figures fall in the upper range of the estimates relative to migration flows, and there appears not to be a significant difference between the impact of Mode 4 movement on exports and that on imports.

As far as the relationship between trade in services under Mode 4 and under other modes is concerned, it is found that a 10 per cent increase in the temporary movement of people increases services imports (exports) under Mode 1 by 4.7 (2.9) per cent, and it is correlated to a 8.0 (approximately 7) per cent higher inflows (outflows) of foreign direct investment (a proxy for trade in services under Mode 3).

VI. REFERENCES

Anderson, J.E. and van Wincoop, E. (2003) "Gravity with Gravitas: A Solution to the Border Puzzle", *American Economic Review*, 93, 1:170-192.

Combes P., M. Lafourcade and T. Mayer (2002) "Can Business and Social Networks Explain the Border Puzzle?" CEPR Discussion Paper 3750.

Dunlevy, J.A. and W.K. Hutchinson (2001) "The Pro-Trade Effect of Immigration on American Exports During Period 1870 to 1910" Working Paper 1-W25, Department of Economics University of Viderbilt.

Dunlevy, J.A. and W.K. Hutchinson (1999) "The Impact of Immigration on American Import Trade in the late Nineteenth and Early Twentieth Centuries" *The Journal of Economic History*, 59:1043-1062.

Girma S. and Z. Yu, (2002) "The Link between Immigration and Trade: Evidence from the United Kingdom" , Weltwirtschaftliches Archiv, 138(1):115-130.

Gould D.M., (1994) "Immigrant Links to Home Country: Empirical Implications for US bilateral trade flows", *The Review of Economics and Statistics*, 76(2):302-316.

Head K. and J. Ries, (1998) "Immigration and Trade: Econometric Evidence from Canada" *Canadian Journal of Economics*, 31:47-62.

Karsenty, Guy (2003), 'GATS, modes of supply, and the Manual on Statistics of International Trade in Services: the case of the movement of natural persons', paper presented at the ECE-Eurostat joint meeting on migration statistics, 28-30 April 2003.

Kaufman, D., A. Kraay and P. Zoido-Lobaton (2002), 'Governance matters II: Updated Indicators for 2000-01', World Bank Policy Research Working Paper 2772.

Rauch J.E. and Trinidade V. (2002) "Ethnic Chinese Networks in International Trade" *Review of Economics and Statistics*, 84:116-130.

Rodrik D. (2002) "Feasible Globalisation", NBER Working Paper, 9129.

Wagner, D., K. Head and J. C. Ries, (2002) "Immigration and the Trade of Provinces", *Scottish Journal of Political Economy*, 49: 507-525.

Wei, S.-J. (2000) "How Taxing Is Corruption on International Investors?", *The Review of Economics and Statistics* 82:1, 1-11.

Winters, A. and T.L. Walmsley, (2002)"Relaxing the Restrictions on the Temporary Movements of Natural Persons: A simulation Analysis", CEPR Discussion Paper 3719.

WTO (2004) *World Trade Report 2004*, Geneva: World Trade Organization.