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# Sectoral impacts of liberalising trade in services

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*This study analyses the possible sectoral effects of multilateral liberalisation of trade in services. The analytical framework is based on FTAP: a multi-regional, multi-sectoral computable general equilibrium model, which incorporates foreign direct investment (Hanslow, Phamduc and Verikios 1999). The model specifies five traded service sectors, and identifies firms by region and ownership to simulate the effects of removal of barriers to commercial presence, national treatment and market access. The study assesses the possible effects of the next round of multilateral negotiations on the further liberalisation of trade in these service sectors, identifying the relative importance of communication services and financial, insurance and business services.*

The Seattle World Trade Organisation (WTO) Ministerial Meeting ended without a decision on how to proceed with meeting issues. However, a review of the General Agreement on Trade in Services (GATS) is due to start no later than 2000 (WTO 1997). Thus, despite the temporary stall in negotiations on trade in goods, negotiations on liberalising trade in services will continue. Estimating the quantitative effects of multilateral trade liberalisation in services generally, and of specific sectors in particular, will therefore have practical relevance for further negotiations.

A number of studies have attempted to quantify the effects of liberalising services trade within a computable general equilibrium (CGE) framework – see Brown et al. (1995), Petri (1997), Hertel (1999) Markusen, Rutherford and Tarr (1999) and Dee and Hanslow (2000). Most of these are somewhat limited in their approach. Brown et al. (1995) model foreign portfolio, rather than direct, investment (FDI) in services, one of the key vehicles by which services are traded internationally. Petri (1997) does not liberalise cross-border trade in services, concentrating on trade in goods and FDI in services. Hertel (1999) does not liberalise foreign direct investment in services. Markusen, Rutherford and Tarr (1999) only model FDI in services which are used as intermediate inputs into production, not into final demand.

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Dee and Hanslow (2000) are comprehensive in their approach. They use new measures of barriers to services trade in a multi-regional, multi-sectoral CGE model of world trade and investment (FTAP – foreign direct investment trade analysis project). In FTAP, services are used as intermediate inputs and for final demand. Liberalisation of barriers to trade in services includes both FDI and cross-border supply. Dee and Hanslow find that complete liberalisation of barriers to trade in services leads to a gain for the world of around \$US136 billion (or 0.46 per cent of world real income). They also find that the largest gains in welfare are experienced by the regions with the highest protection rates. Conversely, economies with the least protected service sectors experience the smallest gains in welfare.

The existence of a single services sector in Dee and Hanslow (2000) restricts the focus of analysis to the regional effects of liberalising services trade. Since the GATS negotiations are based on a finer sectoral definition, a more disaggregated model is needed to evaluate potential offers. To date, the GATS negotiations have proceeded on a sector by sector basis and this is expected to continue with the GATS. This study attempts to address the limitation of a single service sector in Dee and Hanslow (2000), and is thus a natural extension of their work.

This study finds positive welfare effects for the world as a whole, from complete multilateral liberalisation of trade in both communication services, and finance, insurance and business services – referred to hereafter simply as financial services. A number of caveats are in order. First, the estimated benefits are conditioned by the quality of the database and all other inputs into the simulations, especially the limitations with respect to the calculation of impediments and modelling their removal. Second, impediments are not included in other service sectors; thus, second-best issues are not addressed in the experiments. Third, the results are illustrative, as the size of the liberalising service sectors in the experiments is not entirely based on original data.<sup>1</sup> As such, the current database could be considered a ‘prototype’ at this stage of development.

The paper is structured as follows: section one provides a brief description of the elements of FTAP theory and database that play a critical role in determining the results; section two discusses the main effects and results of liberalising trade in communication services and financial services; and section three provides a summary and directions for future research.

## 1 The FTAP model

FTAP is a multi-regional, multi-sectoral CGE model incorporating FDI, documented in Hanslow, Phamduc and Verikios (1999). It was developed from a modified version of GTAP (Hertel 1997), known as GTAPICM (Verikios and Hanslow 1999). The latter incorporates the standard GTAP model structure, with international capital mobility and capital accumulation, originally developed for the SALTER model by McDougall (1993). FTAP extends this framework to explicitly model FDI activities or more precisely,

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<sup>1</sup> With the upcoming release of the GTAP 5 database (Huff, McDougall and Walmsley 2000), accurate shares for the communication sector and finance, insurance and business services sector will be available for future work. In this study, these sectors are disaggregated from larger, more aggregated sectors in the GTAP 4 database (McDougall, Elberi and Truong 1998). Communications is assumed to comprise one-fifth of the (wholesale and retail) trade and transport sector, and finance, insurance and business is assumed to comprise three-quarters of the finance, insurance, business, recreational and other services sector.

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international capital movement. It closely follows the pioneering work of Petri (1997). In addition, it incorporates large-group monopolistic competition in all sectors, which follows similar treatments used by, among others, Francois, McDonald and Nordstrom (1995), Brown et al. (1995) and Markusen, Rutherford and Tarr (1999).

## Theoretical structure

The distinctive features of FTAP are its supply and demand structures. On the supply side, FTAP adds an ownership dimension to the GTAP supply structure, along with geographic and sectoral location. In the presence of foreign investment, a domestic firm and firms from other regions that have local investment, replace the single firm in a GTAP sector of a given region. Each domestic and foreign firm is modelled with a unique production structure, including independent demands for intermediate inputs and primary factors.

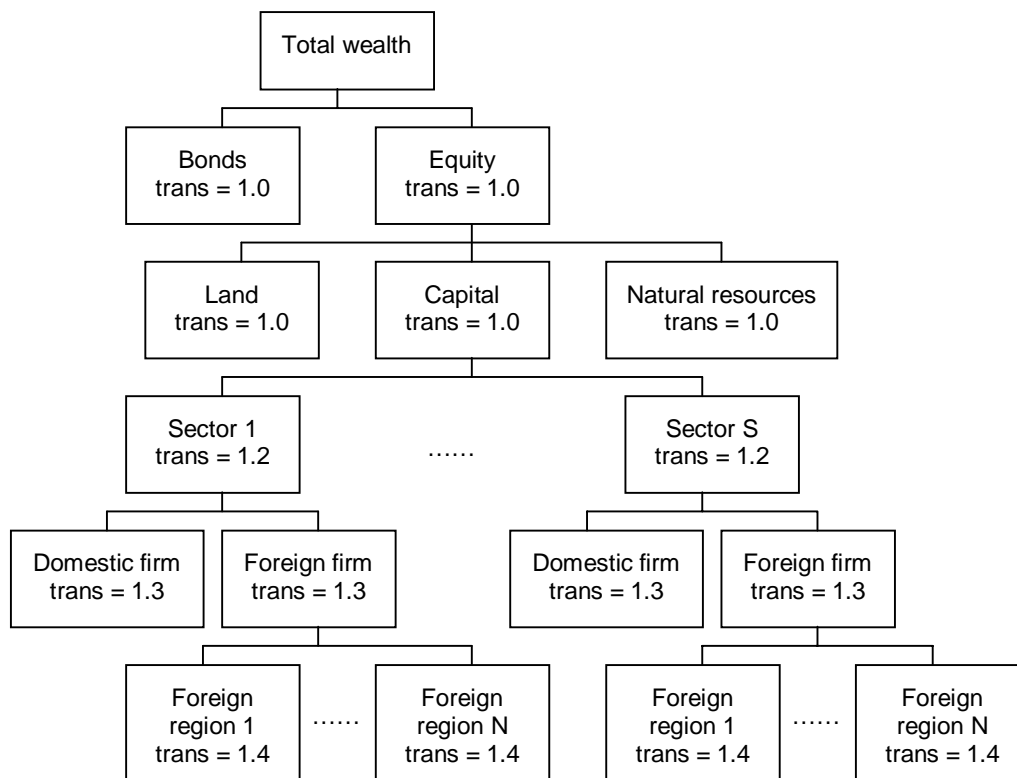
The firm's decision on the region in which to locate production is made through a constant elasticity of transformation (CET) nesting structure. The nesting structure identifies a number of choices for the owner of regional assets in reallocating assets among various sectors and locations, as shown in figure 1. At the top of the nesting, with given total wealth, the first choice is among holding bonds and equity in productive assets (which consists of land, natural resources and real physical capital), in order to maximize total returns. This is constrained by a transformation function with a CET elasticity of 1.<sup>2</sup> As land and natural resources are fixed in supply in each region, the choice is really between bonds and physical capital. The next choice of capital supply is among sectors with a CET elasticity of 1.2. The third choice is between allocating capital to domestic and foreign markets with a CET elasticity of 1.3. The last choice at the bottom of the nesting is among specific foreign locations, with a CET elasticity of 1.4. This nesting structure ensures progressive flexibility at the lower level of the decision-making process, which is crucial in generating sufficient capital mobility in model simulations. In addition, the regional capital stock can accumulate over time, and net bond holdings of each region can adjust to help finance the expansion of domestic and foreign capital by each region's investors. This allows FTAP to provide a long-term snapshot view of the impact of trade liberalization, ten years after it has occurred.

On the demand side, FTAP maintains GTAP's structure of imperfect substitution between domestic and imported varieties of each good. It redefines the domestic variety as a composite of all domestically located firms' production, whether domestic or foreign-owned. Similarly, it redefines the variety imported from a foreign region as a composite good of the varieties produced by all locally based firms in that region, whether domestic or foreign-owned. The demand for each type of firm-specific composite is determined at the regional level first, and then the agents of each region make their own individual choices between the domestic and imported composites of each good. The demand structure is represented by a constant elasticity of substitution (CES) nesting, shown in figure 2.

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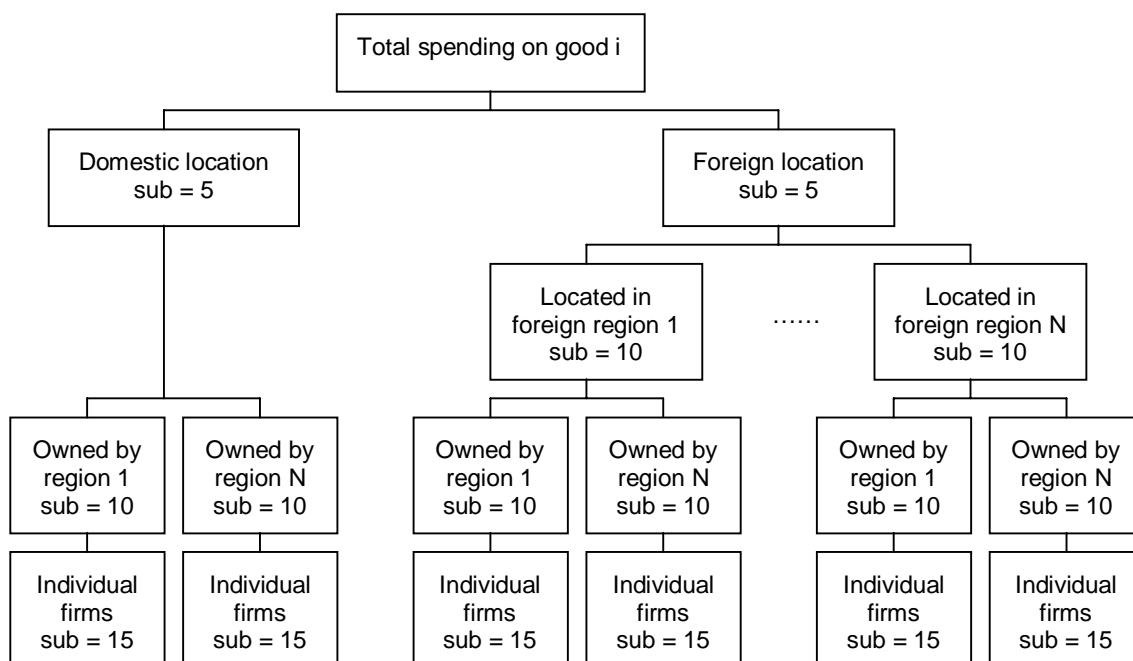
<sup>2</sup> This means that a one per cent increase in the price of bonds will lead to a one per cent increase in bond holdings, all other things being equal.

Figure 1 CET nesting of wealth supply in a home region



Source: Adapted from Figure 2.3 of Hanslow, Phamduc and Verikios (1999).

Figure 2 CES nesting of the demand for firm-specific products in a host region



Source: Adapted from Figure 2.2 of Hanslow, Phamduc and Verikios (1999).

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At the top two nodes of the nesting the choice is among locations. The total spending of a region on a given good is a CES composite of domestically produced and imported composites. The third node of the nesting is concerned with the choice among different types of firm ownership. At the bottom of the nesting, the variety produced by each firm ownership type in the domestic or a foreign region, is a CES composite of all the varieties of individual firms within that group.<sup>3</sup> Thus, the model structure recognises firm-level product differentiation associated with large-group monopolistic competition (Francois, McDonald and Nordstrom 1995). With firm-level product differentiation, agents benefit from having more firms to choose among, because it is more likely that they can find a product or service to suit their particular needs. This increased choice is modelled as a productivity improvement (and therefore benefit) whenever the output of a particular firm type expands. Following the initial implementation of FTAP in Dee and Hanslow (2000), the first two choices have been parameterised using values 5 and 10, while the third and fourth choices have used the parameters of 10 and 15, respectively.

## Model database

To support the theoretical structure in FTAP, and to simulate the removal of all barriers to trade in services, the database must contain information on:

- gross international capital flows;
- gross FDI stocks by region and sector;
- returns to FDI by region and sector; and
- impediments to the operation and establishment of domestic and foreign-owned firms producing services.

FDI stocks are estimated from APEC (1995), United Nations (1999) and a wide range of publications by various international organisations as well as individual countries (see Verikios and Zhang 2000). These sources provide information on total inward and outward FDI stocks by region and broad sectors. This information is used to generate a consistent database of bilateral FDI stocks by region and sector using a number of RAS procedures. The resulting inward and outward FDI stocks by region and sector, are consistent with the three-sector database used in Dee and Hanslow (2000), and are summarised in tables 1 and 2. The rates of return to FDI are obtained from accounting information in the Worldscope Global Equity Database (Disclosure 1999). Returns to FDI are derived by multiplying FDI stocks by corresponding rates of return.

As shown in tables 1 and 2, the database retains the same regional detail as in Dee and Hanslow (2000), but provides greater sectoral detail. It divides the world into 19 regions (where the rest of Cairns group comprises Argentina, Brazil, Colombia and Uruguay) and each regional economy into eight sectors, six of

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<sup>3</sup> The order of the first three choices on the demand side, among locations and then among locations, is the reverse of the order adopted by Petri (1997). The treatment assumes that from an Australian perspective, for example, a US multinational located in Australia is a closer substitute for an Australian-owned firm than it is for a US firm located in the United States. Petri's treatment assumes that US-owned firms are closer substitutes for each other than for Australian firms, irrespective of location. Section 1, p.3-4 in Dee and Hanslow (2000) explain the reasoning behind adopting a different approach to Petri (1997).

which are service sectors. The service sectors are construction (con), (wholesale and retail) trade and transport (tt\_), communication (cmn), finance, insurance and business services (fib), other services (osr) and dwellings (dwe).<sup>4</sup> Non-service sectors are aggregated into two more broadly defined primary (pri) and secondary (sec) sectors.

**Table 1 Outward FDI stocks by home region and sector (US\$ million), 1995**

<i>Region</i>	<i>pr<sup>a</sup></i>	<i>sec<sup>b</sup></i>	<i>con<sup>c</sup></i>	<i>tt_<sup>d</sup></i>	<i>cmn<sup>e</sup></i>	<i>fib<sup>f</sup></i>	<i>osr<sup>g</sup></i>	<i>Total</i>
Australia	10 303	6 634	548	1 294	518	6 463	2 316	28 076
New Zealand	696	1 473	83	573	49	879	333	4087
Japan	51 046	86 282	2 038	53 660	9 223	77 863	27 721	307 833
Korea	4 343	1 318	26	178	15	272	103	6 255
Indonesia	211	769	40	260	23	422	88	1 814
Malaysia	242	780	30	368	0	262	89	1 771
Philippines	0	144	12	77	5	98	361	698
Singapore	1731	3 851	171	1 174	100	1 801	683	9 512
Thailand	0	116	25	169	14	259	99	682
China	1234	128	48	114	3	37	37	1 602
Hong Kong	6281	13 730	260	1 741	193	3 419	3 524	29 147
Taiwan	96	5 073	0	318	0	984	297	6 768
Canada	13 191	33 364	0	5 794	0	7 312	7 523	67 184
USA	86 623	161 103	372	50 719	4 605	76 379	5 170	384 969
Mexico	177	433	21	261	14	153	73	1 131
Chile	0	172	7	50	4	77	29	339
Rest of Cairns	639	1 497	70	483	41	741	281	3 752
EU	142 648	235 475	4 154	76 691	8 181	157 482	29 487	654 118
Rest of world	53 117	97 917	4 685	32 268	2 752	49 476	18 763	258 979
Total	372 577	650 259	12 589	226 192	25 741	384 381	96 977	1 768 717

<sup>a</sup> Primary industries. <sup>b</sup> Secondary industries. <sup>c</sup> Construction. <sup>d</sup> Trade and transport. <sup>e</sup> Communication. <sup>f</sup> Finance, insurance and business services. <sup>g</sup> Other services.

The tables show the sources and destinations of FDI stocks in seven of the eight sectors in the database. The European Union (EU), the United States (US) and Japan are the main sources of FDI, accounting for 37, 22 and 17 per cent of total outward FDI stocks, respectively. Both the EU and the US are also the world's main destinations of FDI, receiving about the same amount of FDI as they invest abroad. Unlike the EU and the US, however, Japan's outward FDI far exceeds its inward FDI. It has 86 per cent of the world's total net outward FDI, making it the single most important FDI source country in the world. Among developing countries, Indonesia is the largest recipient, receiving 24 per cent of the world's total net inward FDI stocks. The next most important recipients after Indonesia are Mexico (9.3 per cent), China (6.8 per cent), Singapore (5.9 per cent) and Malaysia (5.4 per cent). Among the service sectors, the majority of FDI is received by financial services, which accounts for 21.7 per cent of total FDI stocks. The trade and transport sector also has a large share, 12.8 per cent, with communication constituting 1.5 per cent.

The FDI stocks and rates of return are used together to generate estimates of FDI rental flows. The resulting returns to FDI by region of origin are also consistent with the three-sector database used in Dee and Hanslow

<sup>4</sup> The dwellings sector has no FDI and is therefore not listed in tables 1 and 2.

(2000). The FDI rental flows are then used to split production in the updated GTAPICM database from the ‘imperfect capital mobility’ simulation in Verikios and Hanslow (1999), into domestic and foreign production in each region and sector.

**Table 2 Inward FDI stocks by host region and sector (US\$ million), 1995**

<i>Region</i>	<i>pr<sup>a</sup></i>	<i>sec<sup>b</sup></i>	<i>con<sup>c</sup></i>	<i>tt<sup>d</sup></i>	<i>cmn<sup>e</sup></i>	<i>fib<sup>f</sup></i>	<i>osr<sup>g</sup></i>	<i>Total</i>
Australia	14 280	13 266	531	12 402	0	21 681	5 071	67 231
New Zealand	1 711	3 150	79	208	0	3 528	481	9 157
Japan	0	16 172	100	5 309	285	1 543	4 297	27 706
Korea	0	4 143	62	214	0	947	1 826	7 191
Indonesia	74 300	5 093	208	516	55	0	417	80 588
Malaysia	6 752	7 068	589	1 500	0	3 058	284	19 251
Philippines	3 093	841	19	152	26	474	205	4 809
Singapore	0	11 676	329	2 972	0	13 675	58	28 710
Thailand	1 962	3 947	1 208	1 997	0	1 130	665	10 907
China	3 556	14 195	260	830	0	49	4 934	23 823
Hong Kong	12 768	5 616	331	3 536	941	9 437	540	33 169
Taiwan	0	11 801	12	553	0	0	1 217	13 583
Canada	5 666	47 391	4 139	7 564	0	20 378	2 757	87 895
USA	28 860	131 788	2 210	93 456	7 154	39 478	52 543	355 490
Mexico	5 746	10 824	87	6 288	201	7 932	500	31 577
Chile	9 375	961	50	898	102	1 526	385	13 297
Rest of Cairns	8 015	32 273	290	5 215	594	8 863	2 236	57 486
EU	150 480	224 415	0	60 117	13 873	198 848	4 624	652 358
Rest of world	46 013	105 642	2 084	22 465	2 511	51 836	13 937	244 488
Total	372 577	650 259	12 589	226 192	25 741	384 381	96 977	1 768 717

<sup>a</sup> Primary industries. <sup>b</sup> Secondary industries. <sup>c</sup> Construction. <sup>d</sup> Trade and transport. <sup>e</sup> Communication. <sup>f</sup> Finance, insurance and business services. <sup>g</sup> Other services.

The updated GTAPICM database does not contain barriers to trade and foreign investment in services. These have to be injected into the database separately. Tax equivalents of these barriers for banking and communication, are available from Productivity Commission (1999). The barriers to communication are injected directly into the corresponding sector, and the barriers to banking are assumed to be indicative of barriers in the delivery of insurance and business services, and are applied to the entire finance, insurance and business services sector. This is done using the technique described in Malcolm (1998), using the options described in section 4.2 of Hanslow et al. (2000).

The GATS framework distinguishes four modes of service delivery – via commercial presence, cross border supply, consumption abroad, and the presence of natural persons. The FTAP model distinguishes barriers to establishment from barriers to ongoing operation. This is similar to the distinction between commercial presence and other modes of service delivery, since barriers to establishment and ongoing operation are components of barriers to commercial presence. As in Dee and Hanslow (2000), two types of barriers to service trade are injected into the model database: barriers to establishment and barriers to ongoing operation. The barriers to establishment are modelled as “taxes” on capital rentals. Barriers to ongoing operation are modelled in two forms: firstly, as “taxes” on output, thus raising the price of the good just like any typical output tax, and secondly, as “taxes” (of the same size) on exports of domestic or foreign-owned firms. This is because barriers to ongoing operation affect the both the output and exports of locally based

firms (either domestic or foreign owned), supplying via non-FDI modes. Barriers to establishment and ongoing operation are assumed give rise to “rents”. The (post-tax) value of these rents are assumed to flow to the owner of the firm that generates the rents, that is, they accrue to the home region.

**Table 3 Tax equivalents of post-Uruguay barriers to trade, output and capital (per cent)**

Region	Communication				Finance, insurance and business					
	Exports <sup>a</sup>	Output		Capital <sup>b</sup>		Exports <sup>a</sup>	Output		Capital <sup>b</sup>	
		Dom.	For.	Dom.	For.		Dom.	For.	Dom.	For.
Australia	1.6	0.0	0.0 <sup>c</sup>	1.4	1.4 <sup>c</sup>	11.0	0.0	2.2	0.0	43.0
New Zealand	1.9	0.0	0.0 <sup>c</sup>	1.3	1.3 <sup>c</sup>	9.0	0.0	2.2	0.0	8.5
Japan	5.3	0.0	0.0	1.8	1.8	9.4	10.0	13.0	0.0	5.1
Korea	1.8	2.5	4.9 <sup>c</sup>	4.8	9.2 <sup>c</sup>	10.1	15.0	19.0	0.0	81.0
Indonesia	4.7	41.0	82.1	86.0	163.0	7.6	5.4	16.4 <sup>c</sup>	0.0	81.0 <sup>c</sup>
Malaysia	4.1	5.5	11.0 <sup>c</sup>	3.6	15.0 <sup>c</sup>	7.8	6.7	25.0	42.0	97.0
Philippines	5.0	21.0	54.0	0.0	50.0	7.2	3.7	14.0	24.0	110.0
Singapore	3.4	0.8	0.8 <sup>c</sup>	5.4	8.1 <sup>c</sup>	10.1	8.2	21.0	0.0	63.0
Thailand	3.4	14.0	28.0 <sup>c</sup>	33.0	56.0 <sup>c</sup>	7.4	0.0	13.0	0.0	58.0
China	3.5	50.0	100.0 <sup>c</sup>	339.0	679.0 <sup>c</sup>	6.9	15.0	25.0	61.0	141.0
Hong Kong	18.0	0.6	0.6	3.2	3.2	11.0	2.7	4.9	0.0	6.4
Taiwan	3.1	1.3	2.1 <sup>c</sup>	5.8	9.3 <sup>c</sup>	9.4	8.6	14.8 <sup>c</sup>	0.0	49.0 <sup>c</sup>
Canada	2.9	0.8	2.3 <sup>c</sup>	1.9	6.7 <sup>c</sup>	7.0	0.0	2.8	0.0	13.0
USA	7.6	0.2	0.2	0.0	0.0	6.3	0.0	2.8	0.0	8.1
Mexico	8.7	5.4	11.0	1.8	7.8	5.0	0.0	2.9	0.0	22.0
Chile	3.4	1.3	1.3	1.0	1.0	9.0	7.7	11.3	39.0	57.0
Rest of Cairns	5.1	2.7	6.5	11.8	16.0	7.7	0.2	10.1	8.1	33.0
EU	8.8	0.3	0.7	3.6	4.6	5.4	0.0	2.8	0.0	12.0
Rest of world	6.2	16.0	33.0	114.0	215.0	7.0	0.0	13.0	6.4	52.0

Source: Productivity Commission (1999), Tables 2.6 and 2.8.

<sup>a</sup> Export taxes are trade weighted averages of the taxes on exports to particular destinations, where these are equal to the taxes on foreign-owned firm's output in that destination.

<sup>b</sup> The barriers to domestic and foreign capital taken from Productivity Commission (1999) have been adjusted by the region and sector specific output to capital ratio, in order to convert them from capital impediments rates as a proportion of output, to capital impediment rates as a proportion of capital.

<sup>c</sup> These impediment rates are on zero FDI stocks.

The database obtained is calibrated for 1995. All the procedures discussed above are fully documented in Verikios and Zhang (2000).

Table 3 lists the barriers to trade in communication and financial services, and it indicates that there are many barriers that are prohibitive – these are indicated by a “c” in table 3. One way to compare the relative size of the barriers is to calculate the share of the value of all barriers in each sector, to the total value of output in each sector, for the world. This share is around twice as large for communications compared with financial services, 5.7 per cent versus 2.8 per cent. Thus, communications has higher relative barriers to trade. This suggests that the relative effects of removing barriers to trade in communication could be roughly twice as large as removing barriers to trade in financial services, all other things being equal.



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## 2 The effects of liberalising trade in services

In this section, the FTAP model is used to analyse the effects of eliminating barriers to trade in communication services and financial services, in a post-Uruguay round environment. The experiments involve removing all barriers to trade in these sectors. The analysis is comparative static, so no information on the nature of the adjustment process is available. The simulation results are presented as the percentage changes from the base-year levels, indicating the possible response of economic agents to the proposed trade liberalisation ten years after it occurs.

In general, the overall result of liberalising trade in services can be explained in terms of capital reallocation effects and income effects. The former are a direct result of the changes in relative prices or returns in each sector, due to the removal of barriers to trade. The latter are derived mainly from any changes in the generation and redistribution of regional income and wealth after liberalisation. In the results reported, these reallocation and income effects cannot be easily disentangled from each other. To trace the effects of liberalisation, the main mechanisms and the expected effects on output and income of the three policy shocks will be outlined first. This allows the reader to keep in mind these separate influences when examining the combined results in detail. Further, the welfare effects are analysed using the GTAP welfare decomposition (Huff and Hertel 1996) modified to account for FDI capital flows.

### Main mechanisms

#### *The impact of removing barriers to establishment*

In order to clarify the main mechanisms, an example is used in which a barrier to trade in a particular service in one region, is removed. The sectoral effects of this removal can be characterised in terms of capital movements and output changes in response to initial changes in returns to FDI capital. The quantitative responses are conditioned by the elements of FTAP's structure discussed in section 1.

The barriers to establishment are modelled as "taxes" on domestic and foreign capital. They appear in the model as rents on top of normal returns to the capital owner. Therefore removal of the tax reduces the rental cost of capital to producers. Removing barriers to FDI in a sector makes this factor cheaper for producers to buy and increases demand for it. This increased demand must be satisfied by the regions providing this FDI, by reducing their allocation of capital to domestic firms (in the same, or other sectors), by reducing their allocation of capital to FDI in all sectors in other (non-liberalising) regions, or by increasing their bond holdings (borrowing). The magnitude of each response depends of the magnitude of the barrier removed, the structure of substitution shown in figure 2, and the parameters that support this structure.

The inflow of FDI in the liberalising region is likely to increase the total capital stock utilised in production (by all sectors), which leads to an expansion of output and income in the liberalising region. For non-liberalising regions the increased FDI is likely to reduce the total capital stock utilised in production (by all sectors), which leads to a contraction of output and income in the non-liberalising regions. However, the liberalising region will increase its total capital payments to foreign-owned firms located domestically, while the non-liberalising regions will be compensated by increased (capital) returns from their expanding FDI.

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When barriers to domestic establishment in a region are removed, the factor becomes cheaper for domestic producers to buy and increases demand for it. This increased demand must be satisfied by the liberalising region by reducing its allocation of capital to foreign firms (FDI) in all sectors, by reducing its allocation of capital to domestic firms in other sectors, or by increasing bond holdings (borrowing). The total capital stock utilised by the liberalising region is likely to rise in this case.

The removal of barriers to (domestic or foreign) establishment causes a reallocation of capital across regions, improves the allocative efficiency of global production and increase welfare for the world as a whole. This will be a major contributor to the rise in real income in *all* regions. These changes in real income will change savings, which in turn changes the accumulation of private household wealth in each region. Any change in private household wealth will then lead to a change in the overall size of the capital stock owned by the region, and thereby increase the output of both domestically and foreign located firms owned by the region. Any increase in the capital stock utilised in a region is captured by the welfare decomposition as a gain associated with an increase in national capital endowments.

When barriers to both domestic and foreign establishment in a sector are removed, the liberalising region will experience an increase in both foreign and domestic production in this sector. This will be at the expense of other domestic sectors in the liberalising region, and all sectors in non liberalising regions. The total capital stock utilised (by all sectors) in the liberalising region is likely to increase (due to increased FDI), leading to a gain in welfare from increased capital endowments in the region.

### *The impact of removing barriers to ongoing operations*

Barriers to ongoing operations are modelled as “taxes” on the output of domestic and foreign producers. The removal of these “taxes” reduces the costs of production. Removing barriers to ongoing operations for foreign producers in a sector, reduces the price of the good and increases demand for it. This increased demand for the output of foreign producers in the liberalising region, must be satisfied by increased FDI in the liberalising region. This can be done by the non liberalising regions by reducing their allocation of capital to domestic firms in all sectors, by reducing their allocation of capital to FDI in all sectors in other (non-liberalising) regions, or by increasing their bond holdings (borrowing). Again, the magnitude of each response depends of the magnitude of the barrier removed, the structure of substitution shown in figure 2, and the parameters that support this structure.

The decline in output costs for foreign producers will also reduce the price of traded goods. With lower export prices, imports of the service sourced from the liberalising region, will increase in the non liberalising regions. The effect on domestic production of the service in the non liberalising regions will be greater, the greater the magnitude of the initial barrier and the greater the share of imports in domestic consumption. The higher the initial barrier and the higher the share of imports in domestic consumption, the greater will be the shift from domestically produced services to imports. In this case the quantity of imports will increase while domestic output will decrease.

The price impact of removing barriers to ongoing operation is expected to be greater than that of removing barriers to establishment because the former accounts for a larger contribution of output price than the latter. Removing barriers to ongoing operation for domestic producers in a sector reduces the price of the good and

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increases demand for it. This increased demand for the output of domestic producers in the liberalising region, must be satisfied by increased investment in the liberalising sector. This can be done by reducing their allocation of capital to domestic firms in other sectors, by reducing their allocation of capital to FDI in all sectors in non-liberalising regions, or by increasing their bond holdings (borrowing). The welfare impacts on the liberalising region will be determined, among others things, by the changes in the total endowment of capital, which would be expected to rise.

If barriers to domestic and foreign ongoing operations in a sector are removed simultaneously, the liberalising region will experience an increase in both foreign and domestic production in this sector. This will be at the expense of other domestic sectors in the liberalising region, and all sectors in non liberalising regions. The total capital stock utilised (by all sectors) in the liberalising region is likely to increase significantly (due to increased total FDI), leading to gain welfare from increased capital endowments in the region.

Barriers to ongoing operations are also modelled as “taxes” on exports, by both domestic and foreign producers in the exporting region. The removal of these barriers to ongoing operation reduces the price of exports. This fall in the price of exports causes a terms of trade loss for the liberalising region, so that the demand for imports in the non liberalising regions rises. This causes both domestic and foreign production of the sector in the liberalising region to expand. This is accommodated in the same way as the removal of barriers to domestic and foreign ongoing operations modelled as output “taxes”.

When barriers to both domestic and foreign establishment and ongoing operations are removed by a region for a particular sector, the general impact will be an expansion of both foreign and domestic capital in the sector in the liberalising region. Output in this sector will consequently expand as well. Capital allocation and output in the other sectors in the liberalising region, and in all sectors in the non liberalising regions will generally suffer a reduction capital usage and output.

## **Liberalising trade in communication services**

The projected effects on sectoral output of eliminating barriers to trade in communication services are presented in table 4. As expected, the regions with the highest relative barriers to trade in communication have the biggest expansion in communication output. These include, among others, China, Indonesia and the rest of the world. This is because the incentives to increase domestic and foreign investment, and output in these regions are much stronger than in other countries after liberalisation. The expansion of output in these regions is also driven by the increased demand of other regions that initially had lower barriers to trade in communication. This is because the removal of high barriers in foreign regions makes imports cheaper than locally produced communication services. As the demand for communication services shifts toward imports, domestic output declines in those regions. This includes countries such as Singapore, New Zealand, Australia, the European Union and Japan. However, communication output for the world is projected to increase by 0.7 per cent.

Table 4 **Projected effects on sectoral output of liberalising trade in communication services (per cent)**

<i>Region</i>	<i>pr<sup>a</sup></i>	<i>sec<sup>b</sup></i>	<i>con<sup>c</sup></i>	<i>tt<sup>d</sup></i>	<i>cmn<sup>e</sup></i>	<i>fib<sup>f</sup></i>	<i>osr<sup>g</sup></i>	<i>dwe</i>
Australia	0.38	0.33	-0.06	0.13	-2.86	0.06	0.12	-0.02
New Zealand	0.60	0.43	-0.07	0.15	-4.43	0.05	0.10	-0.05
Japan	0.16	0.29	-0.04	0.16	-2.52	0.04	0.05	-0.07
Korea	0.07	0.10	-0.06	0.12	-1.13	-0.04	-0.02	-0.04
Indonesia	-1.23	-4.37	-0.85	-1.47	34.08	-1.51	-1.12	0.59
Malaysia	0.03	-0.16	0.04	-0.24	2.32	-0.12	-0.11	-0.09
Philippines	-0.23	-0.67	-0.13	-0.30	7.16	-0.44	-0.21	0.12
Singapore	0.22	0.12	-0.55	0.07	-5.65	0.23	0.18	-0.72
Thailand	-0.10	-0.29	0.03	-0.36	6.68	-0.16	-0.37	0.01
China	-0.84	-1.70	1.00	-0.53	38.99	-0.87	-0.43	0.69
Hong Kong	0.05	-0.41	0.17	0.23	2.37	-0.11	-0.40	0.09
Taiwan	0.18	0.23	-0.05	-0.02	-1.40	-0.01	0.03	0.02
Canada	0.23	0.34	-0.12	0.03	-2.04	0.02	0.02	-0.05
USA	0.17	0.15	-0.09	0.01	-1.14	0.02	0.02	-0.02
Mexico	0.00	-0.02	-0.47	-0.12	1.28	-0.12	-0.18	-0.05
Chile	0.24	0.13	-0.19	0.06	-1.61	0.04	0.00	-0.02
Rest of Cairns	0.14	0.11	-0.22	0.10	-1.58	-0.01	-0.02	-0.05
EU	0.26	0.30	-0.03	0.05	-2.78	0.03	0.03	-0.07
Rest of world	-0.24	-0.73	0.28	-0.34	13.35	-0.29	-0.45	-0.20
World	-0.01	0.00	0.00	-0.01	0.70	0.00	-0.04	-0.05

<sup>a</sup> Primary industries. <sup>b</sup> Secondary industries. <sup>c</sup> Construction. <sup>d</sup> Trade and transport. <sup>e</sup> Communication. <sup>f</sup> Finance, insurance and business services. <sup>g</sup> Other services.

The impact of eliminating barriers to entry in communication on other sectors of each regional economy depends not only on the reallocation effects but also on the income effects. The reallocation effects include the effects on non-capital factor productivity as the total capital stock used in each region changes. For instance, as the regional supply of labour is fixed any increases in the capital stock utilised in a region will drive up the returns to labour. This will disadvantage labour intensive industries in that particular region. The effects on output of the non-liberalising sectors are generally explained by the changes in output in communications. That is, when liberalisation causes communication output to rise, this is generally accommodated by reductions in the output of the non-liberalising sectors, as resources shift from the former sector to the latter sector.

Table 5 shows the aggregate regional changes. These changes are measured in terms of real gross domestic product (GDP) and real national income – the income accruing to nationals. The equivalent variation (EV) is a measure of welfare changes incurred in terms of changes in real income. The first column of table 5 shows that most economies are projected to expand their real GDP as a result of liberalisation in communication. However, New Zealand, Indonesia, Singapore and the rest of the Cairns group are expected to have a decline in real GDP. In general, these economies have relatively low barriers to trade. When barriers are removed in other regions, these regions substitute domestic production of communication services with imports, as the relative price of imports falls markedly.

In terms of real income, the world as a whole is projected to be better off by about US\$13 billion (0.05 per cent), shown in the second and third columns of table 5. Most regions are expected to gain from

liberalisation in communication. The major winners are the rest of the world, China, Japan and Indonesia. Australia also gains by about US\$112 million. This is the projected gain in annual income, about ten years after the liberalisation has occurred and the associated resource adjustments have taken place. Seven countries and regions are expected to be worse off in terms of real income from the liberalisation in communication. They are the United States, the European Union, Hong Kong, Singapore, Mexico, Malaysia and Chile.

The measure of real income includes the income accruing to the residents of a region from their outward FDI net of the income repatriated overseas from inward FDI, plus the income from net bond holdings. The change in real income for each region can be decomposed into the contributing factors affecting welfare. All these factors are grouped in 10 categories. Their respective contributions to the change in regional real income and welfare are presented in table 6.

**Table 5** Projected effects on regional real income of liberalising barriers to trade in communication services

<i>Region</i>	<i>Real GDP</i>	<i>Real income</i>	<i>Equivalent Variation</i>
	%	%	\$USm
Australia	0.00	0.04	112
New Zealand	-0.01	0.03	16
Japan	0.03	0.04	1 612
Korea	0.02	0.02	89
Indonesia	-0.39	0.70	1 232
Malaysia	0.02	-0.02	-19
Philippines	0.12	0.69	436
Singapore	-0.14	-0.52	-313
Thailand	0.10	0.32	452
China	0.46	0.75	4 488
Hong Kong	1.10	-0.87	-880
Taiwan	0.05	0.07	189
Canada	0.00	0.01	39
USA	0.00	-0.02	-1 065
Mexico	0.01	-0.02	-59
Chile	0.01	-0.02	-10
Rest of Cairns	-0.01	0.02	215
EU	0.01	-0.01	-1 008
Rest of world	0.17	0.24	7 133
World		0.05	12 658

The row sums of table 6 equal the change in welfare or EV shown in the last column of table 5. The column sums of table 6, listed in the last row, shows the contribution of each factor to the change in world real income. The single most important contributor is the gain in allocative efficiency. It generates around US\$11 billion, which is about 87 per cent of the total increase in world real income. The world as a whole also gains from an increase in capital endowments and technical changes. The former is related to the rise in real

income and savings, while the latter is related to the output expansion.<sup>5</sup> These factors can be described as income generating factors.

Table 6 **Contributions to real income (EV) changes from liberalising trade in communication services (US\$ million)**

	<i>Contributions of changes in</i>										<i>EV</i>
	<i>Price invest.</i>	<i>Terms of trade</i>	<i>Bond income</i>	<i>Capital endow</i>	<i>Alloc. efficien.</i>	<i>Capital depr</i>	<i>MU inc<sup>a</sup> &amp; tech. change<sup>b</sup></i>	<i>Net FDI income</i>	<i>Capital imped.</i>	<i>Output imped.</i>	
Austral.	-115	165	86	-3	-12	-8	19	-11	-3	-5	112
N.Zeal.	-3	16	12	-5	-6	0	5	-1	-1	-1	16
Japan	610	177	-69	84	922	-227	280	62	-83	-143	1 612
Korea	-58	32	34	-2	75	2	18	-10	0	-1	89
Indon.	-23	279	950	-1 047	506	300	241	481	5	22	1 232
Malays.	18	-77	23	1	18	3	-5	-2	0	1	-19
Philipp.	-58	427	0	15	75	3	-8	-30	2	11	436
Singap.	0	-285	5	-149	82	53	-26	8	-1	0	-313
Thailan.	-83	360	-6	22	140	20	2	-2	0	0	452
China	-162	804	465	930	2 830	-24	-309	-46	0	0	4 488
H.Kong	-197	-1 733	-97	168	921	-10	45	30	5	-11	-880
Taiwan	148	-58	-3s2	52	65	-13	35	-8	0	0	189
Canada	131	-6	-65	-29	-16	-4	36	-9	1	1	39
USA	-602	-508	-251	-159	191	-32	114	373	-87	-105	-1 065
Mexico	47	-177	23	-5	50	7	-4	-14	4	10	-59
Chile	-18	3	8	4	1	-2	2	-10	0	1	-10
ROC	-243	354	128	-17	-63	16	23	-24	17	24	215
EU	376	-1 770	-363	-317	745	12	400	-114	38	-16	-1 008
R.Wrld	233	1 999	-857	1 262	4 553	419	-117	-671	103	211	7 133
World <sup>c</sup>	0	3	-5	803	11 077	515	267	0	0	0	12 658

<sup>a</sup> This shows the change in marginal utility from changes in real income. It correlates positively with real income. In general, these effects are either zero or quite small.

<sup>b</sup> As mentioned in section 1, FTAP incorporates large-group monopolistic competition in a way that captures the benefits of increased firms, and thus variety, as an improvement in output-augmenting technical change.

<sup>c</sup> Columns may not sum exactly due to rounding.

The other contributing factors are all related, in one way or another, to changes in various prices. Although these changes may influence individual countries, their net impact on world real income as a whole is zero. What constitutes a gain for some countries is a loss for other countries. These are just the income redistribution factors. Whether a policy change will benefit the world as a whole essentially depends on the income generating factors rather than income redistribution factors. Among the income generating factors, the effect of the policy change depends on whether the initial positive effect of allocative efficiency is strong enough to create new income so that it can trigger a rise in world capital endowment and a further expansion in total world output.

<sup>5</sup> FTAP incorporates firm-level product differentiation, so that agents benefit from having more firms to choose among, because it is more likely that they can find a product or service suited to their particular needs. The benefits from increased (decreased) variety (output) are captured as an improvement (reduction) in productivity.

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Unlike for the world as a whole, for individual regions redistribution factors could contribute significantly to determining the change in their real income. As shown in table 6, despite the positive contribution of allocative efficiency for most countries, some countries are still projected to lose from communication liberalisation. Two major factors seem to underlie losses - the deterioration in the terms of trade and falling capital endowments. The losses from adverse terms of trade effects in regions such as Hong Kong and the United States, can be explained largely by their unique trade barrier structure in communication. As shown in table 3, these regions face high barriers on their exports while having low or no barriers to establishment and ongoing operations. When the liberalisation occurs, the price of their exports tends to fall more sharply than that of their imports. The resultant worsening terms of trade contributes to a large proportion of the total losses in real income of these economies. The initial reallocation effect of trade liberalisation may be to reduce their real income.

On the other hand, most gaining regions benefit initially from large allocative efficiency gains through reallocation effects and improvements in their terms of trade. All these gains seem to have contributed to an initial rise in their real income. These initial gains are very important because they trigger an expansionary income effect on the economy through increased savings and wealth, which reinforces the initial gains in real income. It is this initial gain in real income that sets the gaining and losing regions apart.

## **Liberalising trade in finance, insurance and business services**

The projected effects on sectoral output of liberalising trade in financial services are reported in Table 7.<sup>6</sup> The pattern of effects of liberalising financial services are similar to those observed in liberalising communication services: those regions with high relative barriers in financial services experience the most rapid expansions in sectoral output. Unlike communication, however, financial services comprise a much higher proportion of output, around 14 per cent for the world as a whole compared with around three per cent for communication. Furthermore, financial services comprise a much higher share of total FDI stocks for the world as a whole compared with communication – 21.7 per cent versus 1.5 per cent. So, the removal of these barriers is expected to generate a greater expansion in output in most regions, and therefore welfare effects, all other things being equal.

The only regions that experience a fall in the output of financial services are Japan, Thailand and Mexico. This is mainly due to a shift in demand from domestic to imported services. This shift is caused by a large fall in barriers in foreign locations, relative to that of their domestic sectors. However, the increase in regional output far exceeds the fall in financial services in these regions. Most regional output would rise. World total output of financial services is expected to rise by about 0.14 per cent, which is also a much stronger response than that projected for communication.

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<sup>6</sup> This simulation does not include the removal of the domestic output impediment for Japan, listed in table 3. Removing this impediment rate further increases the size of the Japanese finance, insurance and business services sector, which is funded via a massive repatriation of FDI from other countries to Japan. This seems quite unrealistic as this sector is already quite large, making up around 15 per cent of total output in Japan. This strongly suggests that this impediment rate is too high relative to the other impediment rates for this sector. Alternatively, it could be that all other impediment rates for this sector are too low relative to this impediment rate. This important issue will be investigated further in future work.

Table 7 **Projected effects on sectoral output of liberalising trade in finance, insurance and business services (per cent)**

<i>Region</i>	<i>pr<sup>a</sup></i>	<i>sec<sup>b</sup></i>	<i>con<sup>c</sup></i>	<i>tt<sup>d</sup></i>	<i>cmn<sup>e</sup></i>	<i>fib<sup>f</sup></i>	<i>osr<sup>g</sup></i>	<i>dwe</i>
Australia	0.02	-0.05	0.13	0.01	0.01	0.08	0.06	0.01
New Zealand	0.06	-0.07	0.00	-0.01	-0.01	0.12	0.02	0.00
Japan	0.16	0.45	-0.09	0.16	0.16	-0.83	0.03	-0.06
Korea	-0.53	-2.24	0.08	-1.25	-1.25	11.45	-1.25	-0.19
Indonesia	-0.49	-2.85	-2.23	-1.37	-1.39	1.24	-1.20	-0.49
Malaysia	-0.12	-0.38	0.95	0.27	0.27	4.12	0.13	0.27
Philippines	-0.47	-1.14	0.00	-0.74	-0.73	8.87	-1.20	-0.16
Singapore	-2.43	-4.90	0.94	-3.90	-3.99	38.77	0.49	-0.48
Thailand	0.12	0.11	-0.12	0.29	0.28	-2.57	0.25	0.07
China	-0.48	-1.05	0.61	-0.45	-0.48	13.85	-0.33	1.69
Hong Kong	-0.09	-0.81	-0.07	0.06	-0.02	1.34	-0.16	-0.05
Taiwan	-0.07	-0.48	0.23	-0.22	-0.22	4.36	-0.25	0.19
Canada	0.05	-0.02	-0.03	-0.04	-0.04	0.19	-0.02	-0.02
USA	0.02	-0.04	-0.05	-0.04	-0.04	0.14	-0.03	-0.02
Mexico	0.03	0.05	-0.22	0.03	0.03	-0.17	0.03	0.01
Chile	-0.72	-1.51	0.41	-0.61	-0.60	6.26	-0.84	-0.19
Rest of Cairns	0.03	0.16	0.02	0.10	0.10	-0.20	0.09	-0.07
EU	0.05	0.00	-0.03	-0.06	-0.06	0.09	-0.03	-0.06
Rest of world	0.08	0.47	0.06	0.28	0.26	-2.09	0.19	-0.03
World	-0.01	-0.04	-0.02	-0.02	-0.02	0.14	-0.02	-0.02

<sup>a</sup> Primary industries. <sup>b</sup> Secondary industries. <sup>c</sup> Construction. <sup>d</sup> Trade and transport. <sup>e</sup> Communication. <sup>f</sup> Finance, insurance and business services. <sup>g</sup> Other services.

Table 7 also reveals that for a given region, output in most non-liberalising sectors falls as capital is reallocated from these sectors to the financial services sector. The increased returns to labour caused by increased capital accumulation in the liberalising sector, disadvantages all other sectors by driving up their factor costs. In regions where the financial services sector contracts, due to an increased reliance on imports, the returns to labour are lowered thus decreasing costs for other sectors and expanding output.

However, the overall impact of eliminating barriers to entry in financial services on other sectors of each economy, depends not only on the reallocation effects but also on the income effects. Table 8 shows the income changes in all the regional economies. Column one of table 8 reports that all economies are projected to experience an expansion in real GDP as a result of the liberalisation, except Indonesia whose real GDP falls by about 1.22 per cent.

Most regions gain in terms of real income as a result of liberalisation. The major winners are Singapore, Malaysia, Chile, China, Taiwan, Thailand and Korea. Australia is also projected to have a modest gain of US\$130 million or a real income gain of 0.04 per cent.



**Table 8 Projected effects on regional real income of liberalising trade in finance, insurance and business services**

<i>Region</i>	<i>Real GDP</i>	<i>Real income</i>	<i>Equivalent Variation</i>
	%	%	\$USm
Australia	0.05	0.04	130
New Zealand	0.03	0.02	10
Japan	0.00	0.02	1 025
Korea	0.05	0.20	801
Indonesia	-1.22	-0.02	-28
Malaysia	0.14	0.71	581
Philippines	0.08	-0.16	-98
Singapore	0.76	4.22	2 553
Thailand	0.03	0.23	334
China	0.17	0.34	2 024
Hong Kong	0.10	0.01	8
Taiwan	0.13	0.23	601
Canada	0.02	-0.01	-44
USA	0.00	-0.05	-3 245
Mexico	0.01	0.04	89
Chile	0.22	0.43	241
Rest of Cairns	0.04	0.03	283
EU	0.01	-0.05	-3 544
Rest of world	0.04	0.06	1 733
World		0.01	3 454

Five regions are expected to be worse off from the liberalisation in terms of real income: the Philippines, the United States, the European Union, Indonesia and Canada, with a total loss of around US\$7 billion. Overall, however, the gains outweigh the losses. The world as a whole is projected to be better off by about US\$3.5 billion or 0.01 per cent rise in real income.

The decomposition of the factors contributing to the change in real income is presented in table 9. As in table 6, the row sum of table 9 gives the changes in welfare shown in the last column of table 8. The column sum of table 8, listed in the last row, shows the contribution of each factor to the changes in world real income. As expected, the single most important contributing factor is the gain in allocative efficiency due to reallocation effects, which is equal to around US\$4 billion. This is more than the net gain in the world real income. This is because there are net losses from changes in the world capital endowment (stock) and output-augmenting technical changes. Liberalising financial services causes a contraction in the world stock of capital. This result should be heavily qualified. It appears to be largely driven by the huge reduction in total capital utilisation in Indonesia, as it attempts to increase FDI in foreign regions, mainly in financial services. This is inefficient as evidenced by the loss in allocative efficiency in Indonesia. Indonesia's relatively high foreign capital and output barriers rates on financial services (163 and 83 per cent respectively) are prohibitive. Prohibitive barriers have not been modelled correctly in this study. If the removal of this barrier was modelled correctly, it is likely that this effect would be reversed for Indonesia (and the world).

Table 9 **Contributions to real income (EV) changes from liberalising trade in finance, insurance and business services (US\$ million)**

Region	Contributions of changes in										EV change.
	Price invest.	Terms of trade	Bond income	Capital endow	Alloc. efficien.	Capital depr	MU inc /Tech. change.	Net FDI income	Capital impeded.	Output impeded.	
Austral.	-138	-20	134	89	84	-15	13	-628	527	85	130
N.Zeal.	-4	-16	15	7	10	0	1	-34	12	19	10
Japan	722	952	-132	-389	56	-530	433	2 596	-1 315	-1 368	1 025
Korea	-72	422	83	-20	580	122	-318	-66	24	45	801
Indon.	-23	151	1 292	-1 694	-421	457	-345	595	-18	-21	-28
Malays.	22	367	44	70	54	-2	8	-251	122	148	581
Philipp.	-69	-76	-1	34	35	10	-12	-83	38	24	-98
Singap.	2	1 556	252	-26	717	112	-179	-1 518	424	1 212	2 553
Thailan.	-98	413	-20	14	36	-7	0	-46	34	10	334
China	-190	204	731	626	832	12	-169	-32	4	5	2 024
H.Kong	-234	136	-29	8	113	2	-14	138	-59	-52	8
Taiwan	176	214	-78	212	158	-39	-21	65	-41	-48	601
Canada	155	-163	-142	43	56	-3	4	-304	169	140	-44
USA	-726	-2 358	-553	-212	373	93	-40	2 256	-1 070	-1 009	-3 245
Mexico	55	-23	29	14	18	-2	4	-155	117	31	89
Chile	-22	69	20	49	107	14	-15	-110	72	55	241
ROC	-293	196	16	291	25	48	86	-558	258	212	283
EU	441	-3 695	-747	-260	704	137	0	-13	-24	-85	-3 544
R.Wrld	300	1 680	-919	407	510	-75	360	-1 852	726	595	1 733
World <sup>c</sup>	2	11	-4	-735	4 049	336	-203	0	0	0	3 454

<sup>c</sup> Columns may not sum exactly due to rounding.

At the regional level, the losses in capital endowments may not be compensated by efficiency gains, which lead to a net loss in real income for some regions. One of the main sources for the fall in capital endowments is the removal of some high barriers on domestic capital and output. As already discussed, these policy shocks generate two main reallocation effects: a rise in domestic capital and a fall in outward FDI in the liberalising sector on the one hand, and a fall in domestic capital and a rise in inward FDI in non-liberalising sectors. The former can cause a fall in real income because it reduces FDI, while the latter leads to a rise in real income because it increases FDI. The impact on capital endowment depends on the net inflow of capital. If the inflow of FDI more than offsets the fall in domestic capital, the capital endowment in the region will rise, also increasing output and income. This can further trigger an income effect, which increases savings, wealth and productive capacity.

At the regional level, the effects on real income of the redistribution factors are equally important. For instance, adverse terms of trade effects are probably the most important factor that contributes to the loss in real income in the United States and the European Union. Other factors such as changes in net FDI income, net capital rents and net output rents also contribute to large variations in the real income of some developed countries. However, each country and region gains or loses due to the interaction of a unique set of factors. There does not seem to be a consistent patterns emerging from table 9, applicable to all regions, rather, the net effects shown in table 9 result from the interaction of the effects discussed earlier.

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The net gain to the world from liberalising communications is greater than the net gain from liberalising financial services. One reason for this is that the share of the value of the tax equivalents of the barriers to output is around twice as large for communications compared with financial services, 5.7 per cent versus 2.8 per cent. Thus, communications has higher relative barriers to trade and this leads to greater gains when they are removed.

The total gain to the world from liberalising both sectors is around \$US16 billion. This result can be reconciled with Dee and Hanslow's gain of \$US 136 billion for liberalising all services. The communications and financial services sectors comprise around one-third of total world production of services. Thus, all other things being equal, the gains from liberalising one-third of the world's production of services would reduce gains by around one-third or \$US46 billion. The remaining difference (around \$US74 billion) is most likely due to the nature of the disaggregated database used, and the way in which the barriers and their removal are modelled in this study. With six separate service sectors there are zero FDI stocks in many regions and sectors, and some of these regions have the highest barriers. For example, China has a very high foreign capital barrier rate for communication services but no foreign investment in communication, indicating a prohibition on FDI in this sector. The removal of this barrier does not confer any benefits from inward FDI in the results presented here, as the model is not informed about the expansion of FDI in this sector. In Dee and Hanslow (2000), China's gain from services trade liberalisation comprises around two-thirds of the gain for the world as a whole (\$US91 billion). This difference alone probably accounts for most of the remaining differences in the estimated gains. Improved estimates will be obtained by modelling the impacts of liberalisation differently.

### 3 Concluding remarks

This paper presents a quantitative analysis of the possible effects on the world and regional economies of liberalising trade in two key services sectors: communication services and financial services. The study is intended to contribute to the analysis of services trade liberalisation within the WTO framework.

The results presented here depend on the structure of the model and the reliability of the database. As the model and the database are still in the early stages of development, the results of the model simulations presented in this paper should be interpreted as illustrative and used to identify further research effort, rather than for policy analysis. For instance, the output shares used to disaggregate the communications and financial services sectors are not based on original data. In future work, these shares will be drawn from the regional input-output tables in the GTAP 5 database that will have the necessary sectoral detail for services. Other problems relate to the way the liberalisation is simulated in the model. One significant example is the fact that not all countries have inward FDI in all their service sectors. The reason for this could simply be that high barriers prohibit any foreign investment. This results in many zeros in the FDI stock database. When the barriers are removed in a simulation, these zero FDI sectors and regions will not be able to respond. As a result, the projected responses to the liberalisation in foreign commercial presence by the model may be underestimated. To rectify this problem, the removal of these barriers needs to be simulated using a different approach. This will also be explored in future work.

Another area of future work is to simulate sectoral trade-off strategies. With the limitations discussed above, the current model needs to be further developed to provide a firm basis for formulating trade-off strategies

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and evaluating potential offers in GATS negotiations. Addressing these limitations in future work will allow such trade-offs and potential offers to be evaluated.

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