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LIBERALIZING APEC TRADE IN SERVICES

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Liberalizing Services Trade in APEC: A General Equilibrium Analysis with Imperfect Competition

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Abstract

This paper presents a general equilibrium investigation of services trade liberalization in APEC using a global multi-country, multi-sector applied general equilibrium model with an imperfectly competitive service sector. Reducing the service sector's nontariff barriers is modeled by eliminating the possibility for oligopolistic firms to price-discriminate between client countries within APEC and lowering the fixed costs of the firms doing service exporting business. The results suggest that services trade liberalization almost systematically reinforces existing trade balances. The increase in demand for intermediate services tends to reinforce rather than counteract the role of primary factors in determining sectoral comparative advantage. Tariff liberalization in the region has a contrasting effect on trade and welfare compared to services liberalization. The Western APEC members received the greatest welfare gains from services trade liberalization, while the developing economies which start out with the highest levels of tariff protection gained more if only tariffs were eliminated.

J.E.L Classification: C68, D58, F11, F12, F15

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I. Introduction

I-1. Services trade

Services are an important sector in every economy, comprising 50 to 80 percent of GDP in most of them. Since they are collectively the largest segment of almost all economies, it is not surprising that they also constitute a major intermediate input to production in other sectors. Services are also playing an increasingly important role in international trade. While services were once considered nontradable, international trade in services is one of the fastest growing components of world trade and now comprises some 25 percent of the total. With its dominant and integral role in national economies and rapidly growing role in the world economy, we can expect that reducing the barriers to trade in services will have a notable impact on other sectors, and that the protection environment in other sectors will affect trade in services.

This study explores some potential effects of liberalizing trade in services among APEC members by using Computable General Equilibrium (CGE) simulations of liberalization in an imperfectly competitive services sector. Imperfect competition is a useful framework for considering barriers to trade in services. These barriers include the costs of documentation for meeting foreign regulations, certification, and government procurement requirements, obtaining foreign market information, and maintaining distribution networks. Such barriers reduce the options for consumers to seek different sources of supply and increase opportunities for monopolistic pricing. In this study, services barriers are portrayed as fixed costs of exporting. When the need for spending on these fixed costs is reduced by trade liberalization, economic welfare is bound to improve. However, the results also reveal an important structural story about the impact on other sectors. The rest of this section gives

a general description of the basic framework, the next section describes the CGE model in more detail, and the final two sections present a description of simulations and results.

I-2. Approach

It should be noted at the outset that data on trade in services suffers from many weaknesses. The compilation of national balance of payments accounts reveals that a fair amount of services trade may go unrecorded, and that countries categorize the components of services trade in different ways. Indeed, some of the apparent acceleration in services trade may derive from recently improved statistical coverage. Similarly, barriers to trade in services are also difficult to measure. While affected by local taxes and subsidies applied to goods, market access for services is especially influenced by regulations, quotas, technical standards, certification requirements, distribution networks, and government procurement rules. In the wake of the Uruguay Round, Hoekman (1996) made an initial attempt to benchmark the relative degrees of protection of services markets in a number of countries, using the extent of commitments under the General Agreement on Trade in Services (GATS) agreement. Using these measures to develop tariff equivalents, Brown, Deardorff, Fox, and Stern (1996) implemented a pioneering exercise in the global simulation of services trade liberalization. Their model also includes imperfect competition in all sectors except agriculture.

One important feature of international trade in many services is the difficulty in selling in foreign markets without a local presence in those markets, such as with banking and insurance. This gives rise to the strong association between services trade and foreign direct investment (FDI). Investment in services is now estimated to constitute one half to two thirds of the inward FDI for many countries (Hoekman, 1996; OAS, 1997). Therefore, services trade is quite sensitive to barriers to FDI. Petri (1997) explores the impact of this type of trade barrier in APEC using a global model with foreign ownership of subsidiaries in the home economy. The foreign subsidiaries have production technologies distinct from their domestic competitors, but they also face a specific tax that reduces the profitability of

FDI.

In the current study, the various nontariff barriers (NTBs) affecting services are assumed to give the service suppliers from a given country a different degree of monopoly power in each national market, including their own. Thus NTBs allow the imperfectly competitive service sector to price discriminate across country markets. As is traditional in CGE models with imperfect competition, this sector is modeled with fixed costs which cause average costs to be above marginal costs and allow for increasing returns to scale. Barriers to trade in services are also modeled as fixed costs. Thus to be able to export, firms must make fixed expenditures on capital and labor in order to gather market information and meet regulations and other requirements. Of course we do not know what fixed costs are in services, nor what share may be attributed to exporting. But in the spirit of counterfactual simulation, we make various assumptions and test the impact of trade liberalization under different possible scenarios.

II. The model

II-1. Overview of the model

The world economy consists of 10 regions, each with 11 production sectors. All the APEC members in the model are either an individual country or an aggregated region. The 10 regions are: (1) United States, (2) Canada, (3) Japan, (4) China, (5) Mexico/Chile, (6) Australia/New Zealand, (7) Korean, Singapore, Hong Kong and Taiwan as a region, (8) Southeast Asia, (9) European Union, and (10) the Rest of World which includes all countries not elsewhere classified. The 11 production sectors are: (1) agriculture, (2) energy, (3) textile and paper, (4) petroleum chemical products, (5) metals, (6) transport industries, (7) other manufacturing, (8) non traded services, (9) trade and transportation, (10) other government service and (11) other private service. Except for the other private service sector, all other sectors of production are perfectly competitive. In these sectors, countries are linked by the

Armington system so that commodities are differentiated in demand by their geographical origin.

The focus of this study is non tariff barriers (NTBs) and its effects on trade among the APEC members. In most cases, NTBs raise the cost of doing export business for foreign firms and prevent domestic consumers from cross-border arbitraging. To capture these, the service sector is modeled as a noncompetitive sector in which firms have price-discrimination opportunities across national markets. This model structure was first developed by Mercenier (1995) in a study of European Union's move to a single market. Based on Mercenier (1995), the formal description of the model is as follows.

II-2. The households and final demand

Final demand decisions in each country are assumed to be made by a single representative household[1]. Besides the consumption decision, the representative household also makes a saving/investment decision. However, the static property of the model prevents savings to be endogenously determined and hence the saving rate is fixed in the model.

The households value products of competitive industries from different countries as imperfect substitutes (Armington, 1969), while they treat as specific each good produced by individual firms operating in the private service sector -- the non competitive sector, i.e., the preferences exhibit love for variety in the private service sector (the Dixit-Stiglitz specification, 1977). Thus, preferences can be represented by a two-level utility function:

$$U_r = U[u_1(\cdot), u_2(\cdot), u_3(\cdot), \ldots, u_J(\cdot)] \qquad (1)$$

where $u_i(\cdot)$ is the subutility derived from the consumption of product j and $U_r(\cdot)$ is the upper tier utility function that translates all sectoral subutility levels into an overall welfare level. For the consumption of a

[1] There exists the government as a final demander. The government's function is simplified to collect tax revenues and consume final goods. The government revenue is assumed to be fixed and the difference between the government revenues and government consumption is transferred to the households.

product produced from the competitive sector, the lower level utility function can be replaced by an Armington composite good which is the composition of consumption aggregates in terms of geographical origin. For the consumption of the noncompetitive sector's products, the lower level utility function is a combination of products of individual firms located in the ten regions. Limited by the data, as well as to simplify the model setup, we assume that each region acts as an aggregate demander and faces an aggregate subutility/Armingtonian function, i.e., classification of final demand as the households, the government, intermediate or investment demand only happens at the upper level, while at the lower level each economy acts as a single agent. Formally, the lower level problem in Eq. (1) can be represented by the following CES functions:

$$\begin{aligned} &Max\ \ CD_{jr} + GD_{jr} + IVD_{jr} + ID_{jr} = [\Sigma_{s\in W}\alpha_{jsr}M_{jsr}^{-\rho_j} + (1-\Sigma_{s\in W}\alpha_{jsr})D_{jr}^{-\rho_j}]^{-1/\rho_j} \\ &s.t.\ \ PC_{jr}(CD_{jr} + GD_{jr} + IVD_{jr} + ID_{jr}) \ \geq\ \Sigma_{s\in W}P_{jsr}M_{jsr} + P_{jrr}D_{jr}, \quad j \in CS \end{aligned} \tag{2}$$

$$\begin{aligned} &Max\ \ CD_{jr} + GD_{jr} + IVD_{jr} + ID_{jr} \\ &\qquad = [\Sigma_{s\in W}\alpha_{jsr}\Sigma_{f\in F_{js}}M_{fjsr}^{-\rho_j} + (1-\Sigma_{s\in W}\alpha_{jsr})\Sigma_{f\in F_{jr}}D_{fjr}^{-\rho_j}]^{-1/\rho_j} \\ &s.t.\ \ PC_{jr}(CD_{jr} + GD_{jr} + IVD_{jr} + ID_{jr}) \\ &\qquad \geq\ \Sigma_{s\in W}\Sigma_{f\in F_{js}}P_{fjsr}M_{fjsr} + \Sigma_{f\in F_{jr}}P_{fjrr}D_{fjr}, \quad j \in NC \end{aligned} \tag{3}$$

where j is sector/good index with *J* representing the set for sectors, *CS* representing the subset for the ten competitive sectors and *NC* the noncompetitive service sector; and s, r are region indices with *W* representing the set for the ten regions; f is the firm index with F_{jr} representing the set for firm in sector j and located in region r; M_{jsr} is imports by region r from region s for competitive sector's product j and M_{fjsr} is region r's demand for firm f's product and firm f is located in region s's noncompetitive sector; D_{jr}

is the demand for the product j produced at home region r and D_{fjr} is the demand for firm f's product and firm f is located in the home country; P_{jsr} is the price of good j faced by region r and imported from region s and P_{fjsr} is the price charged by firm f in region r's market and firm f is located in region s; CD_{jr}, GD_{jr}, IVD_{jr}, and ID_{jr} are, respectively, the household, the government, investment, and intermediate demand for the composite good j; PC_{jr} is the unit price for the composite good j. The consumer final demand for the composite, CD_{jr}, is derived from the upper level utility function of the households, the value of the government final demand for the composite; $PC_{jr} \cdot GD_{jr}$, is a fixed share of the government total revenues; the value of the investment demand, $PC_{jr} \cdot IVD_{jr}$, is a fixed share of total investment; while the intermediate demand, ID_{jr}, is determined by the production technologies of all sectors and will be defined later.

The total consumption of households and government, plus investment demand, spending at current prices are equal to national income, which is the sum of labor earnings and capital revenues. Also, the data are observed an initial imbalance of trade in each region. Thus, the value of total consumption and investment equal the national income plus (minus) the trade deficit (surplus), which, in fact, can be treated as earnings from (payments on) foreign capital/bond stocks (debt). Capital earnings of the each region includes domestic capital rentals and pure profits generated from the non competitive service sector. Labor and capital are perfectly mobile across sectors in each region but not internationally.

II-3. Firms in the noncompetitive sector

The model setup for firms in the competitive sectors is quite standard and hence the discussion focuses on firms in the non competitive service sector. The private service sector is assumed to have increasing returns to scale in production. The existence of economies of scale internal to firms operating in the private service sector makes perfect competition impossible in this sector. Following Mercenier

(1995), we assume that firms in the noncompetitive service sector behavior as an oligopolist. There is of course no general model of oligopoly. "The outcome of oligopoly competition depends on numerous details, especially the choice variables of firms (e.g., prices or outputs) and the nature of conjectures about other firms' responses" (Helpman and Krugman, pp85, 1993). Following a number of researchers, the traditional Cournot's assumption is adopted, i.e., assuming that oligopolistic firms choose outputs as their strategic variables taking other firms' outputs as given (the noncooperative behavior).

The existence of NTBs to trade allows firms to charge different f.o.b. prices to different customers in different national markets, i.e., markets are segmented and consumers are prevented from cross-border price arbitraging. In particular, firms have an incentive to offer low prices in markets in which their market shares, and therefore their incentive to restrict sales to support the price, are low (e.g., a foreign market), but to offer a high price in the market in which their market shares are high (e.g., the home market).

Formally, the increasing returns to scale production is modeled by assuming that, in addition to variable costs, individual firms face fixed primary factor costs. The variable costs are associated with the technology which is the same as that for the competitive sectors, i.e.,

$$x_{jr} = l_{jr}^{\beta_{ljr}} k_{jr}^{\beta_{kjr}} (\prod_{i \in J} ifd_{ijr}^{\beta_{ijr}}), \quad \in NC \tag{4}$$

where x_{jr} is the individual firm's output in sector j of region r, l_{jr} and k_{jr} are demand for labor and capital, respectively, ifd_{ijr} is intermediate demand for good i used in sector j, and $\beta_l + \beta_k + \sum_i \beta_i = 1$.

Assuming symmetry between the oligopoly firms operating within each region's noncompetitive sector (but different cross regions), the total output of the noncompetitive sector in region r is $X_{jr} = n_{jr} x_{jr}$, where n_{jr} is the number of firm in the noncompetitive sector j. The constant return to scale technology in

variable inputs defined in Eq. (3) implies that the unit variable cost, v_{jr}, (and hence the marginal cost) of the production is a function the factor rental prices plus intermediate input prices only, i.e., $v_{jr} = v_{jr}(w_r, r_r, PC_{1r}, ..., PC_{Jr})$, w_r, r_r are wage and capital rental rate, respectively.

The fixed costs are independent of the quantity of the output, so that the average cost is declining in output. The average costs of the production for an individual oligopoly firm can be defined as:

$$V_{js} = v_{js} + \frac{(w_s \bar{L}_{js} + r_s \bar{K}_{js})}{x_{js}}, \quad j \in NC,$$

where L and K are fixed inputs of labor and capital, respectively.

With Cournot's assumption, an oligopoly firm's price-discriminating strategy is to choose sales to each individual markets as its strategic variables to maximize profits, taking other firms' sales and prices to the same markets as given, i.e.:

$$Max_{<z_{jsr}>} \ \pi_{js} = \sum_{r \in W} P_{jsr} z_{jsr} - v_{js} x_{js} - w_s \bar{L}_{js} - r_s \bar{K}_{js}, \quad j \in NC,$$

where z_{jsr} is the quantity of the output sought to region r's consumer by region s' an individual firm, and $\sum_{r \in W} z_{jsr} = x_{js}$ (while region r's demand for the products produced by region s is $n_{js} z_{js} = n_{js} M_{jsr}$, and demand for the home products is $n_{jr} z_{jr} = n_{jr} D_{jr}$). The country-specific profit maximizing price has the Lerner formula:

$$\frac{P_{jsr} - v_{js}}{P_{jsr}} = -\frac{\partial P_{jsr}}{\partial z_{jsr}} \frac{z_{jsr}}{P_{jsr}}. \qquad (5)$$

where the right hand side of Eq. (5) is the inverse firm's perceived elasticity of demand for market r. The computation of these elasticities can be found in Mercenier (1995). These elasticities crucially depend on

the market shares of each individual firm (including its domestic market share and market share in each foreign country). When the number of firms in the service sector is fixed, the oligopoly firms may experience nonzero profits. Alternatively, the number of firms is endogenously determined by entry and exit up to the point at which profits are driven down to zero (Chamberlain's large group case, 1933).

As a firm's perceived elasticities of demand depend on its market share, Eq. (5) implies that if a firm's market share is low in a specific national market (and hence its perceived elasticity of demand in that market is low), it has to charge a lower price in that market. In contrast, if the firm's market share is high in a market, the firms' perceived elasticity of demand in that market is high and hence the price the firm charges in that market is higher. It is clear that, at least, for the service sector, firms have a higher market shares in their home market. Thus, Eq. (5) implies that oligopoly firms would charge a higher price in their domestic market and lower prices in the foreign markets. Consequently, for an import country, the domestic price would be higher than the import prices for the private service sector. Different from tariff barriers which usually raise prices for both domestic and imported goods, the non tariff barriers sometimes only raise the prices for domestic goods. However, as the barriers in the domestic market prevent more cheaper foreign goods from coming in, domestic consumers have to consume more expensive domestic good, instead of cheaper foreign goods. If the APEC can reduce non tariff barriers among the members, the opportunities for firms to price discriminate among different national markets would become smaller. This is the major task of the next section.

III. Description of the Policy Simulations

Three experiments are conducted by our study. In the first experiment, we remove all tariffs of APEC members imposed on their imports from other countries, including non-APEC countries. In addition, the self-restricted export taxes on textile are removed. The major consideration to conduct this experiment is that the smaller economies of the Asia-Pacific region benefit from a global based system

which does not condone selective discrimination. Also, members such as Japan and other emerging economic giants of East Asia benefit from a global economic order, for different reasons. East Asia is not a natural economic unit. Although the share of trade within East Asia has been expanding rapidly, East Asia's exports to and imports from the rest of the world will continue to increase. The economic impact of maintaining open trading links with the rest of world, especially Europe and North America is a source of resistance to any formal trading bloc in this area. For these reasons, the long-term pressures within APEC, especially from its East Asian members, are to work cooperatively for free trade in the global economy. Hence, in the first experiment, we conduct a non-discriminated simulation by eliminating all tariffs APEC members imposed on their imports from the world.

In the second experiment, in addition to tariff elimination of the first experiment, we integrate APEC's service market by assuming that oligopoly firms in the service sector switch from their initial price-discriminating strategy to a single pricing behavior within the APEC. Formally, the firm's perceived elasticity of demand in the integrated market becomes a weighted average of the price elasticities on each individual economy within the APEC:

$$E_{js\,APEC} = \sum_{r \in APEC} [E_{jsr} \frac{n_{j_s} z_{jsr}}{\sum_{r \in APEC} n_{j_s} z_{jsr}}], \quad s \in APEC,$$

where E_{jsAPEC} is the firm's perceived elasticity of demand in the integrated APEC market, E_{jsr} is elasticity of demand in each individual member's market and $n_j z_{jsr} / \sum n_j z_{jsr}$ is the share of each economy's demand in the total demand of APEC members.

This experiment can be rationalized as follows: Although tariffs within the service sector of the APEC economies are negligible, various non-tariff barriers exist such as government policies and security regulations. These barriers confer to firms the power to price discriminate between national markets.

The integration program is expected to restore cross-border arbitraging by suppressing all forms of NTBs. Firms would then be forced to charge a unique price within APEC. Modeling this is difficult because NTBs are essentially unobservable. The modeling strategy adopted, therefore, consists of treating these NTBs as latent variables, which underlie the existence of price discrimination opportunities for firms in the pre-integration equilibrium. Once this is recognized, it suffices to infer from the data set the price system consistent with the optimal price discrimination strategies of oligopolistic firms and to interpret these as resulting from the implicit structure of NTBs. The experiment then consists of forcing the individual firms to adopt single pricing within APEC market, price being determined from their average regional wide monopoly power and interpreting this behavioral change as the optimal strategic reaction to the disappearance of the never-explicitly modeled NTBs.

Together with integrating service market, in the experiment 2 we also reduce fixed costs by 10 percent for all firms operating in the service sector of the APEC members. Non-tariff barriers increase firm's difficulty to enter other members' market. Such difficulty is usually linked with high fixed costs for firms in the export business. Once market entry barriers are reduced, we should expect that firms operating in the service sector become more efficient and hence can reduce their fixed costs.

In the last experiment, we only simulate service sector market integration plus 10 percent fixed cost reduction. By doing so, we can isolate the effects of market integration in service sector from other sectoral policies. Service sector produces most intermediate inputs for other final production and is the largest sector in the model. This experiment can help us to evaluate the importance of liberalization of service sector on the economy as a whole.

IV. Results

IV-1.Welfare

Reducing tariffs and barriers to trade in services are under discussion by APEC members as

integral parts of meeting their overall goals on liberalizing trade and investment among them. In this study, liberalization of services trade is discussed in the context of tariff reduction, while they are simulated separately and jointly. Since a major objective of trade liberalization is improvement in economic efficiency, we begin with discussion of welfare effects. Then, to illuminate issues of structural change, we follow with sectoral results as represented by either changes in trade flows or changes in output. In all experiments, country or regional trade balances remain fixed, but the partner and sectoral composition may change.

It should be noted at the outset that the tariff removal experiment was not intended as a portrait of APEC tariff liberalization since it starts from pre-Uruguay Round tariffs and since APEC members have not committed to eliminating tariffs. Rather, the experiment was intended to provide a comparator and to allow the simulation of services liberalization both with and without the presence of other tariff distortions. So in table 1 we see the regional welfare gains associated with the removal of tariffs in APEC economies, tariff removal combined with services liberalization, and services liberalization alone, with all original tariffs in place. As can be expected, the greatest welfare gains from tariff removal take place in economies starting out with the highest levels of tariff protection, namely the developing and newly industrialized economies of east and southeast Asia.

In contrast, the regional structure of welfare gains practically reverses when services alone are liberalized. As will be seen below, the large western economies have an apparent comparative advantage in services. Therefore, they gain relatively more from reduction in services barriers, and in fact they gain more from services liberalization alone than they do from tariff removal alone. Of course this depends on the size of the experiment, so as a benchmark we note that the sources of gain between tariffs and services are about equal for the U.S. when services fixed costs are reduced by five percent.

While in the case of tariffs, most gains arise from economies reducing their own protection, with services, APEC economies gain extra dividends from liberalization abroad. Services trade barriers

are modeled as forcing suppliers to spend more on their own capital and labor in order to obtain essential foreign market information and to comply with foreign restrictions, thus increasing total fixed costs regardless of the (positive) amount exported. The reduction of services barriers is simulated by reducing fixed cost and forcing firms within APEC to move to a single-price strategy in the APEC market. Since, in these experiments, we hold profits fixed at the base level, allowing the number of firms to vary, and since price discrimination across foreign partners is eliminated, this reduction in costs leads to a reduction in the price of services for domestic consumers.

IV-2.Sensitivity

The choice of reducing services fixed costs by the same percentage amount across all regions in APEC derives from the base structure of services trade. Using the degree of services protection estimated by Hoeckman (1996), the APEC model regions can be classified as relatively more or less open regarding services trade. The base data on the direction of services trade indicate a similar structure across partners for all regions. All regions exported the most services to the more open economies and lesser shares to the economies more closed regarding services. Alternative structures of the services liberalization experiment were tried, such as using substantially smaller fixed cost reductions for the economies with the largest services sectors, but the results were not inconsistent with those presented here.

Another important variation on these experiments involves testing different levels of substitution elasticities. When the substitution elasticity on the imperfectly competitive services sector is reduced, welfare gains from services liberalization are increased, as theory would predict. Lower degrees of substitutability across different suppliers of the noncompetitive good increase the opportunities for monopolistic price discrimination and thus increase the gains from reducing barriers that generate price

discrimination.[2] Also, sectoral trade results are attenuated but structurally similar, and there is little impact on the tariff removal scenario compared to the high elasticity case. The three original experiments were also repeated with double the values on Armington elasticities for the competitive sectors. Again, this increases welfare gains, accentuates structural trade results and does not reverse them. The results shown here represent the conservative cases for the competitive sectors.

IV-3. Structural effects

Considering sectoral adjustments as seen through changes in net exports, the first thing to note in experiment 1 is the strong impact on tradable services of removing tariffs on all other sectors.[3] In the tariff removal experiment, the U.S. surplus in services expands notably while the deficits in the other western APEC economies are reduced. The biggest decline in net exports is in the EU, which does not participate in the tariff removal. China expands its surplus and southeast Asia reduces its deficits. However, the industrialized east Asian economies increase their deficits. These changes are best understood in the context of trade shifts in other sectors.

The elimination of all tariffs in the model leads to trade patterns that capitalize more on comparative advantage, absent the consideration of nontariff barriers. In the U.S., a higher surplus in services and agriculture is accompanied by a notable drop in its deficit in transport equipment. These shifts are balanced (under the constraint of fixed trade deficits) by higher trade deficits in the textile and the other manufacturing sectors.[4] The Asian economies expand net exports in sectors such as textiles, energy (southeast Asia), or other manufactures (newly industrialized economies), while expanding deficits in transport equipment and chemicals. What may be more noteworthy and in greater contrast to

[2] In the model calibration, reducing the Armington elasticity for services also increases fixed costs in the sector.

[3] The service sector bears negligible tariffs in most regions.

[4] Note that changes in trade balances can often be more volatile than changes in single-direction trade flows, which are the more frequently reported outcome.

services liberalization are the cases where sectoral trade balances move in a countervailing direction, or opposite of that indicated by the base data.

In addition to the large drop in the U.S. transport equipment deficit mentioned above, there are notable declines in trade surpluses for energy and metals in Australia/New Zealand, textile/paper and transport equipment in Canada, and chemicals in the U.S. as well as many other smaller reductions in net balances. Almost none of these countervailing trade shifts is replicated in the case of services liberalization. In experiment 3, trade balance changes are smaller than in the case of tariffs. The surpluses and deficits of the base data are almost always reinforced or left virtually unchanged.

When services alone are liberalized, the main impact on other sectors is through their use of services as an intermediate input. As mentioned earlier, services are the single most important intermediate input in the base input-output data. Also, as table 3 shows, the demand for intermediate services expands dramatically when their trade barriers are reduced. The critical feature here, as pointed out by Burgess (1990), is whether intermediate services counteract or reinforce other sources of comparative advantage. Figure 1 examines this issue from the point of view of primary factor intensities. Drawn from the base data, they indicate that across the APEC economies (expect for Canada and Australia/New Zealand), services is a capital intensive sector and is generally used most intensively in other capital intensive industries. This indicates that intermediate services largely reinforce primary factor intensity as a source of comparative advantage. Thus the liberalization of services trade largely reinforces existing sectoral trade balances. Of course there may be many measurement issues regarding the base data, but these results indicate the role that factor intensities may have in services liberalization.

Under tariff removal, all relative prices are directly affected and there is more scope for productive resources to shift across sectors. In experiment 2, services liberalization is combined with tariff removal. However, the role of services liberalization in reinforcing existing trade balances is

sustained, with previously noted reductions in trade balances due to tariff removal counteracted partly by services liberalization.

Of course sectoral net trade balances are not independent policy objectives, and structural issues are deeply connected to changes in domestic demand as well. For those interested in sectoral issues, total output is the more relevant bottom line (see table 4). Nevertheless, the changes in net exports are good indicators of the sectors with the greatest increases in output resulting from tariff removal. In the case of services liberalization, the figures showing which sectors use the most services as intermediates is the best indicator of sectors growing more than average. Since both experiments involve removal of trade barriers, rationalization of resources, and welfare increases, the vast majority of sectors experience some growth in output. In the instances of declines, they are negligible.

V. Conclusions

This paper describes a framework for modeling barriers to services trade as fixed costs and uses this framework to simulate the impact of trade liberalization. The removal of tariffs on all other sectors was found to have a notable impact on the structure of production and trade in the services sector. The APEC members showing the largest increase in net exports of services under this experiment were also the ones experiencing the greatest welfare gains and growth in services net exports under services trade liberalization. As tariff removal led to trade patterns more in line with comparative advantage, a number of the initial net trade balances were substantially reduced, indicating a movement countervailing to that producing the base trade balances. In contrast, services trade liberalization almost systematically reinforced existing trade balances, and maintained this role when simulated jointly with tariff removal. The relative use of capital and labor in services was found to be similar to that in sectors making the most use of services as an intermediate input. Therefore, the increase in demand for intermediate services under services liberalization tended to reinforce rather than counteract the role of

primary factors in determining sectoral comparative advantage.

The Western APEC members were among those receiving the greatest welfare gains from services trade liberalization. For the U.S., the welfare gains from reducing trade barriers in services has the potential to equal or exceed that from even complete APEC tariff removal.

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Tables

Table 1. Changes in welfare index in the simulations
(% deviation from the base year)

	EXP1[1]	EXP2[2]	EXP3[3]
USA	0.908	2.658	1.731
Canada	1.344	2.726	1.364
Mexico/Chile	1.408	1.917	0.555
Australia/New Zealand	2.983	4.111	1.111
Japan	2.845	4.511	1.627
NIC of East Asia[4]	7.866	8.926	0.971
China	7.392	7.241	-0.077
Southeast Asia	6.789	7.656	0.908
EU	0.186	1.311	1.118
ROW	0.495	1.367	0.864

1. Eliminating all tariffs of APEC countries imposed on their imports from the world;
2. EXP1 plus integrating service market in APEC and reducing fixed costs by 10 percent for firms operating in the service sector of the APEC countries;
3. Only integrating service market in APEC and reducing fixed costs by 10 percent;
4. Including Korea, Taiwan, Hong Kong and Singapore.

Table 2. Levels of sectoral net exports by countries, $1000 million

	BASE	EXP1	EXP2	EXP3
2.1 USA				
Private services	3.7473	18.0814	20.9632	6.4149
Agriculture	22.9362	51.0476	51.4247	23.0591
Energy	-42.3982	-39.2488	-39.5348	-42.7272
Textile and paper	-41.5251	-55.4163	-56.3681	-42.2793
Petrochemicals	12.3747	10.1849	9.8917	12.1278
Metals	-12.3527	-13.8129	-14.0751	-12.5908
Transport industries	-11.8235	-9.4033	-9.8830	-12.3126
Other manufacturing	-15.6546	-47.8873	-49.1360	-16.6287
2.2 Canada				
Private services	-10.3344	-9.1673	-9.2611	-10.4485
Agriculture	5.2372	7.7857	7.8210	5.2529
Energy	8.6312	8.9130	9.0480	8.7636
Textile and paper	10.6252	8.6332	8.7042	10.7258
Petrochemicals	-1.9828	-2.1375	-2.1346	-1.9778
Metals	2.5780	2.4181	2.4263	2.5882
Transport industries	6.3401	5.7526	5.8045	6.3993
Other manufacturing	-19.7889	-21.0098	-21.2330	-20.0071
2.3 Mexico/Chile				
Private services	-2.4678	-1.3283	-1.9997	-2.9368
Agriculture	0.2242	1.9806	2.0777	0.2807
Energy	7.8486	7.9337	8.0571	7.9426
Textile and paper	-1.8570	-1.9814	-1.9099	-1.8116
Petrochemicals	-5.8546	-5.7903	-5.7597	-5.8458
Metals	0.3381	0.0410	0.0965	0.3765
Transport industries	-4.3094	-5.4695	-5.4184	-4.2722
Other manufacturing	-8.0427	-10.2148	-10.1027	-7.9594

Table 2. Levels of sectoral net exports by countries -- continue, $1000 million

	BASE	EXP1	EXP2	EXP3
2.4 Australia/New Zealand				
Private services	-1.4349	-1.9617	-1.9548	-1.3753
Agriculture	15.8639	26.3621	26.6056	16.0099
Energy	11.1117	10.6739	10.7149	11.1487
Textile and paper	-3.4234	-6.2217	-6.2918	-3.4684
Petrochemicals	-3.2671	-4.4245	-4.4745	-3.3104
Metals	2.4498	1.9506	1.9416	2.4450
Transport industries	-6.3939	-8.4980	-8.5514	-6.4377
Other manufacturing	-13.0008	-15.3985	-15.4987	-13.0944
2.5 Japan				
Private services	-6.6360	-7.4482	-8.3538	-7.7293
Agriculture	-41.6624	-94.0601	-94.9412	-42.0585
Energy	-50.7555	-52.7186	-52.7973	-50.8284
Textile and paper	-14.7299	-14.9176	-15.0735	-14.8578
Petrochemicals	1.7243	5.4755	5.6134	1.8232
Metals	11.6275	14.2971	14.4174	11.7405
Transport industries	75.9006	84.2608	84.8935	76.5056
Other manufacturing	147.7895	187.0193	188.3319	148.8706
2.6 NIC of East Asia				
Private services	-6.2986	-6.8271	-6.7341	-6.3157
Agriculture	-13.9189	-25.1649	-25.4636	-14.0864
Energy	-23.4715	-25.0507	-25.2048	-23.6240
Textile and paper	30.8137	46.0744	46.4059	31.0731
Petrochemicals	-2.9875	-4.1544	-4.2533	-3.0551
Metals	-5.9598	-6.9587	-6.9854	-5.9792
Transport industries	-5.1732	-6.3115	-6.3056	-5.1660
Other manufacturing	13.9959	16.3803	16.4661	14.0883

Table 2. Levels of sectoral net exports by countries -- continue, $1000 million

	BASE	EXP1	EXP2	EXP3
2.7 China				
Private services	7.2710	13.3554	11.6165	5.9278
Agriculture	5.1735	12.4408	12.7113	5.3502
Energy	1.5083	2.7072	2.7906	1.5786
Textile and paper	20.2462	18.5446	19.1983	20.7268
Petrochemicals	-8.2310	-10.2157	-10.0791	-8.1218
Metals	-3.1386	-4.2358	-4.1584	-3.0771
Transport industries	-5.2875	-9.7644	-9.7399	-5.2695
Other manufacturing	-9.0121	-15.7981	-15.5106	-8.7864
2.8 Southeast Asia				
Private services	-4.8003	-0.4885	-0.7893	-4.8384
Agriculture	15.5061	14.2209	14.3488	15.6270
Energy	12.2100	14.0306	14.0184	12.1506
Textile and paper	19.4452	22.8130	23.0306	19.5996
Petrochemicals	-9.7275	-10.9194	-11.0024	-9.8378
Metals	-8.5116	-10.1272	-10.1552	-8.5509
Transport industries	-8.7996	-12.2005	-12.2348	-8.8411
Other manufacturing	-8.8061	-13.3560	-13.3479	-8.8401
2.9 EU				
Private services	35.0393	13.7423	15.8564	36.8427
Agriculture	-16.5356	-8.2178	-8.5131	-16.8753
Energy	-63.5860	-63.9632	-64.6501	-64.2244
Textile and paper	-25.4473	-25.6343	-26.1110	-25.8498
Petrochemicals	31.5481	35.3690	35.5532	31.7504
Metals	11.7439	14.0552	14.0079	11.7089
Transport industries	16.6733	19.0514	19.0343	16.6952
Other manufacturing	21.0021	29.4311	29.4633	21.0963

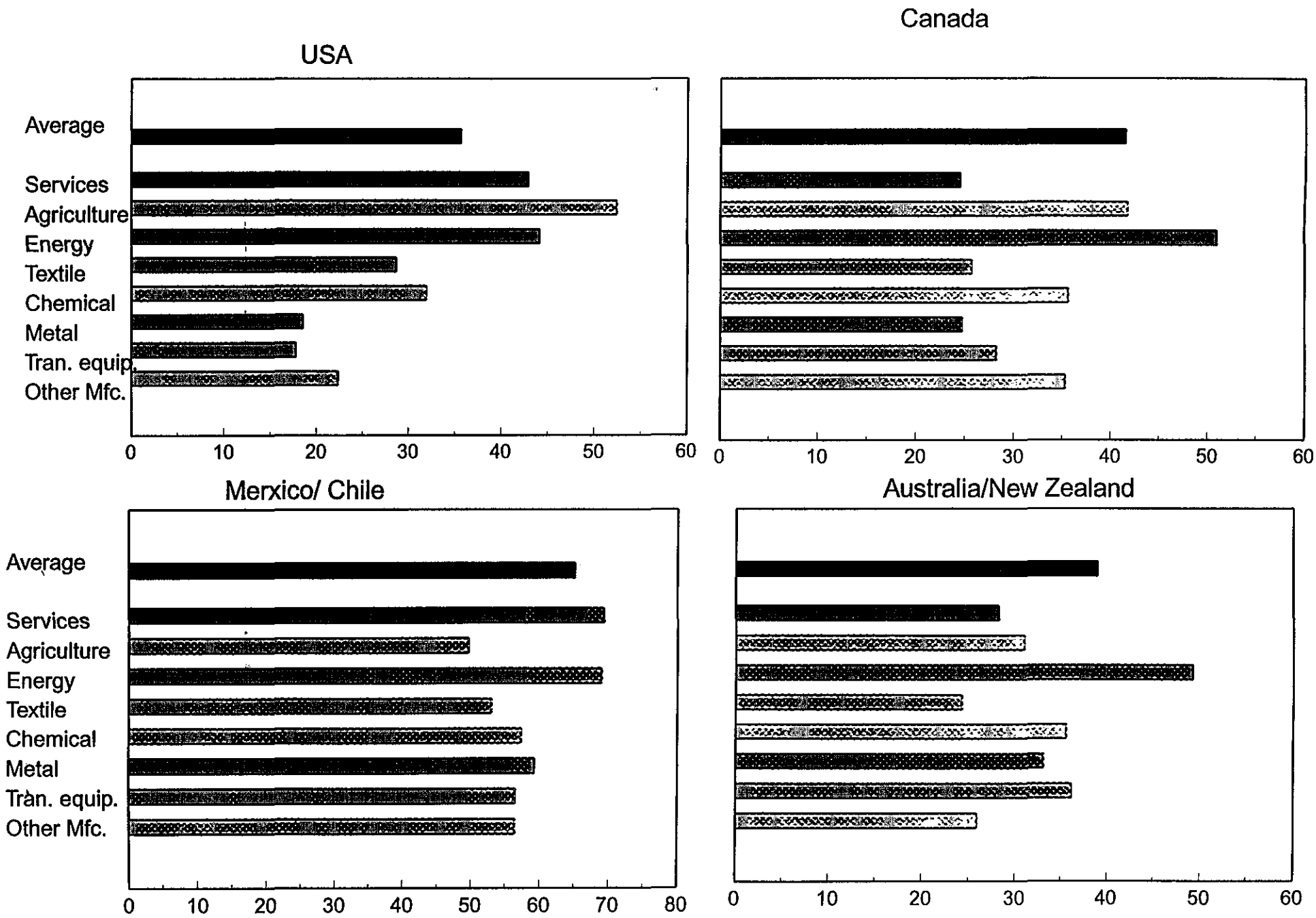
Table 3. Changes in demand for services as intermediate inputs
(% change from base year)

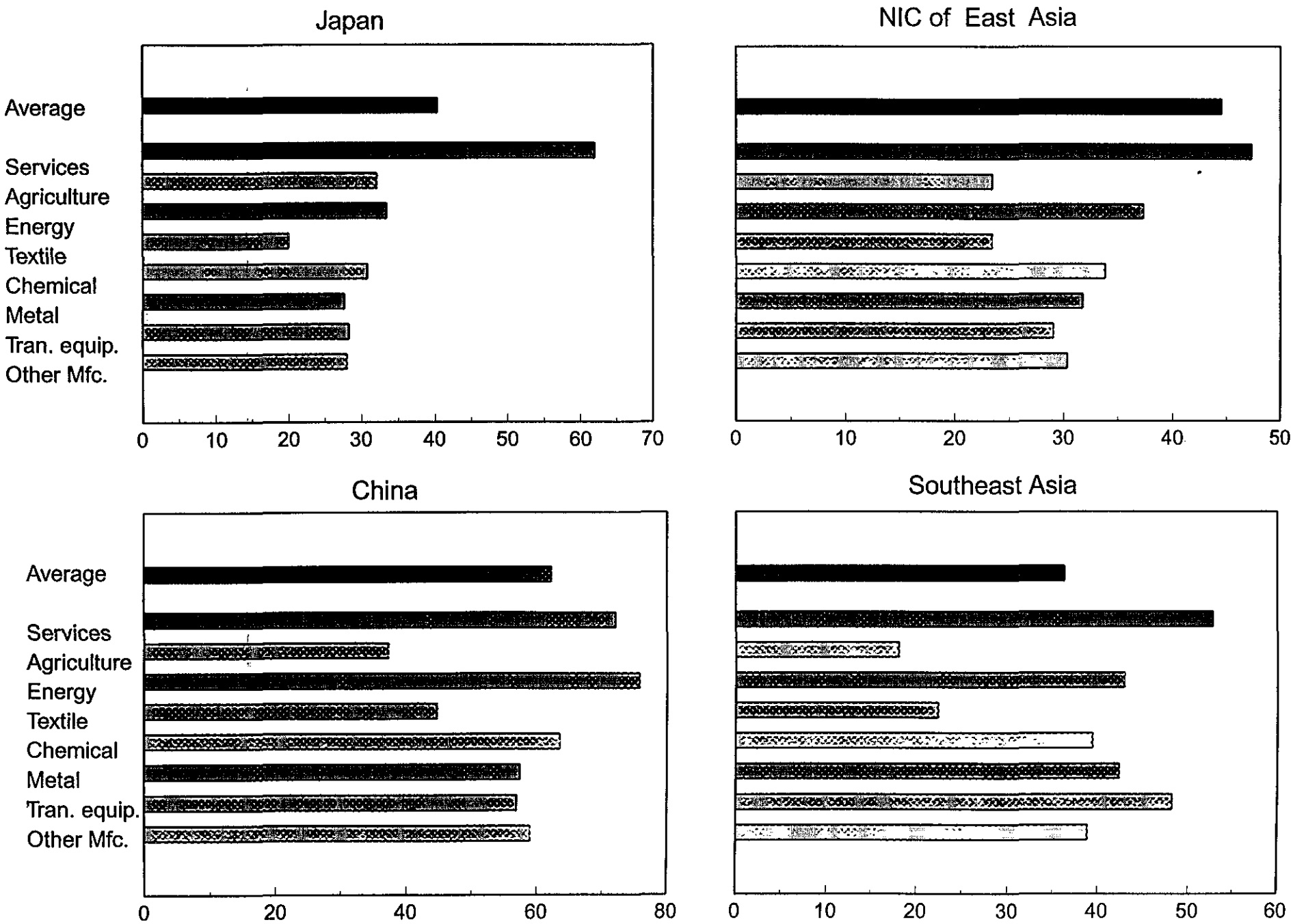
	EXP1	EXP2	EXP3
USA	1.73	3.23	3.28
Canada	3.46	5.71	3.55
Mexico/Chile	0.34	2.15	3.38
Australia/New Zealand	3.75	5.80	3.22
Japan	1.61	4.83	4.90
NIC of East Asia	4.59	6.34	2.81
China	8.96	10.71	3.27
Southeast Asia	11.25	16.41	4.44
EU	-0.29	0.22	1.48
ROW	-0.09	0.48	1.57

Table 4. Change in outputs from the base year (% change from base year)

	EXP1	EXP2	EXP3	EXP1	EXP2	EXP3
4.1 USA				**4.5 Japan**		
Private services	0.31	2.94	2.61	-0.98	1.48	2.45
Agriculture	6.78	8.25	1.39	-1.05	-0.04	1.02
Energy	2.14	3.17	1.01	0.18	1.95	1.78
Textile and paper	-1.20	-0.38	0.83	1.68	2.78	1.10
Petrochemicals	0.23	1.10	0.87	2.27	3.42	1.13
Metals	1.82	2.34	0.51	3.96	4.69	0.70
Transport industries	2.66	3.21	0.54	5.25	6.11	0.82
Other manufacturing	1.99	2.13	0.14	7.56	8.28	0.64
4.2 Canada				**4.6 NIC of East Asia**		
Private services	1.64	4.26	2.57	0.02	2.12	1.99
Agriculture	5.87	7.17	1.24	6.33	7.15	0.78
Energy	2.07	3.46	1.36	-0.33	0.01	0.38
Textile and paper	-0.51	0.63	1.14	23.91	24.93	0.86
Petrochemicals	0.46	1.76	1.29	6.10	6.77	0.66
Metals	1.79	2.56	0.75	5.03	5.54	0.50
Transport industries	1.04	2.06	1.01	2.58	3.18	0.57
Other manufacturing	1.77	2.15	0.38	9.41	9.90	0.45
4.3 Mexico/Chile				**4.7 China**		
Private services	-1.03	-0.82	0.78	18.97	17.41	-0.51
Agriculture	-0.74	-0.20	0.54	-5.00	-5.07	-0.07
Energy	5.23	6.37	0.83	10.61	11.46	0.62
Textile and paper	0.91	1.64	0.67	27.04	28.50	0.89
Petrochemicals	0.94	1.64	0.65	4.02	4.60	0.44
Metals	5.74	6.47	0.58	9.60	10.22	0.47
Transport industries	4.82	5.62	0.66	12.52	13.38	0.65
Other manufacturing	8.86	9.80	0.73	11.84	12.67	0.63
4.4 Austrial/New Zealand				**4.8 Southeast Asia**		
Private services	0.09	2.45	2.46	1.22	2.20	1.80
Agriculture	20.37	21.46	0.93	-1.73	-1.20	0.51
Energy	-1.83	-1.37	0.42	10.38	10.37	-0.24
Textile and paper	-2.40	-1.56	0.88	25.70	26.61	0.60
Petrochemicals	1.65	2.52	0.86	1.87	2.35	0.45
Metals	0.65	1.07	0.41	6.12	6.37	0.15
Transport industries	-3.36	-2.92	0.45	0.98	1.19	0.20
Other manufacturing	-1.44	-1.09	0.33	19.81	20.23	0.25

Figure 1: Shares of Capital in Value Added




Japan
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NIC of East Asia
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China
Average
Services
Agriculture
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Textile
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Metal
Tran. equip.
Other Mfc.
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Southeast Asia
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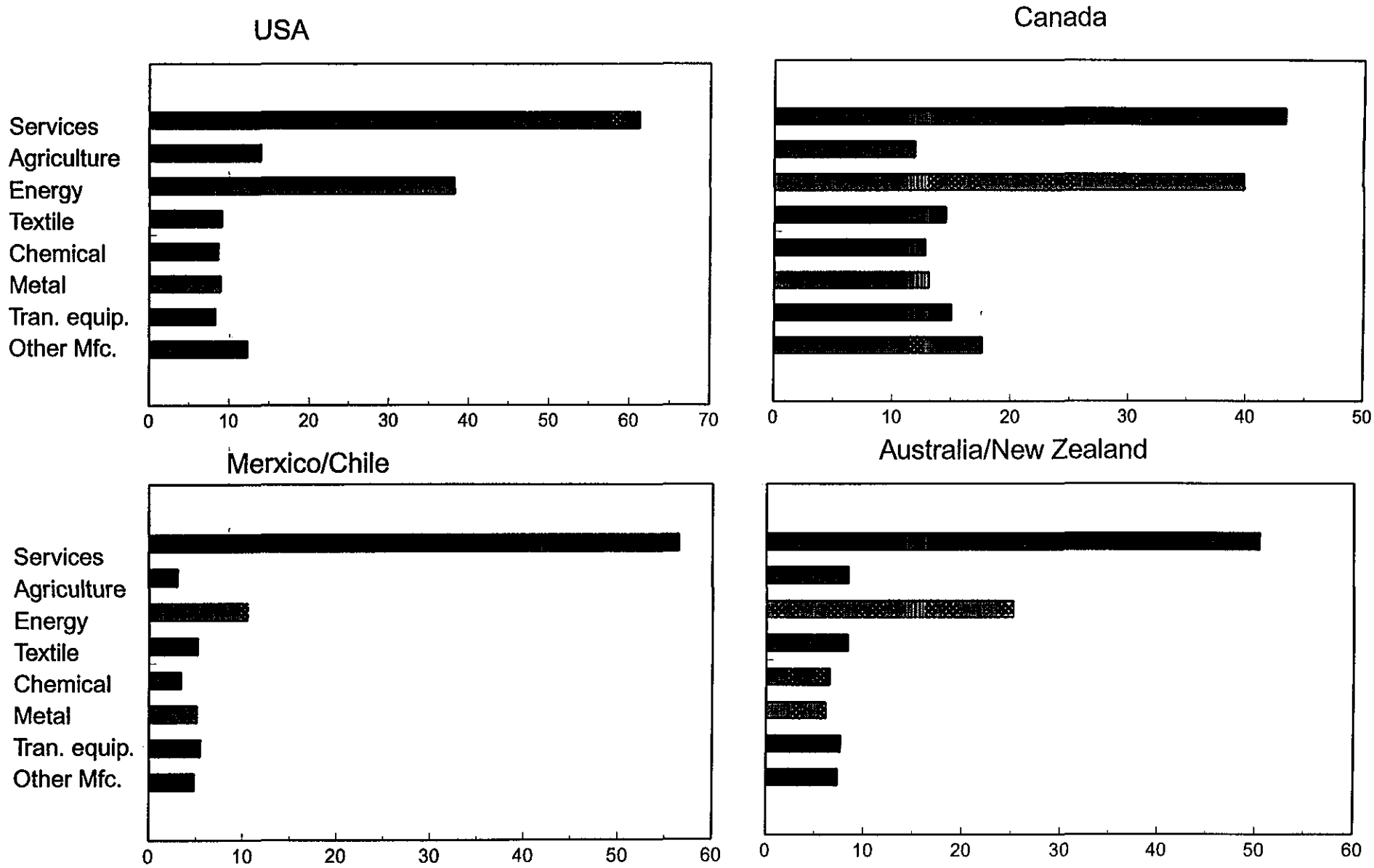
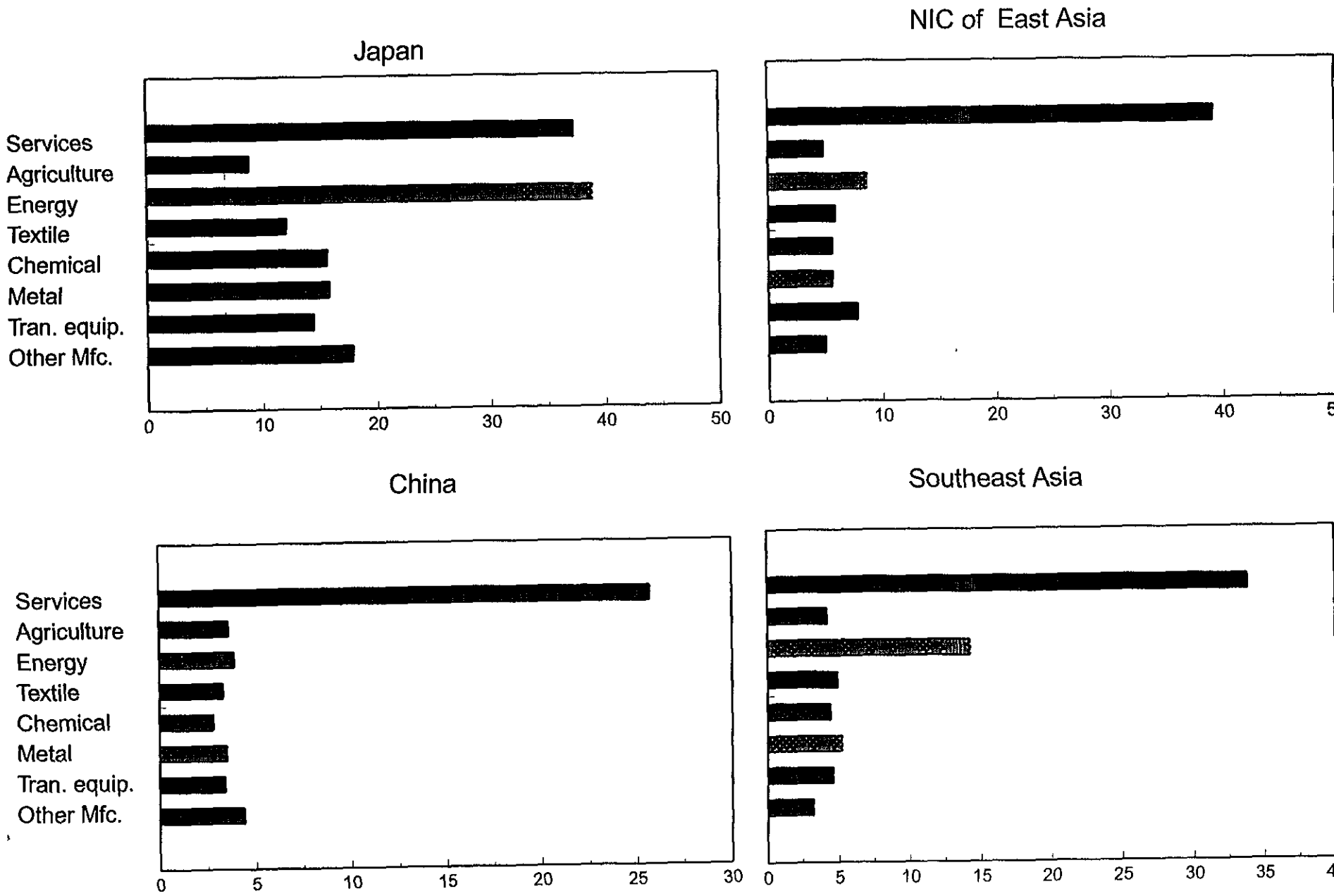
Figure 2: Shares of Services in Total Intermediate Inputs for Each Sector

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