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TRADE LIBERALIZATION AND EMPLOYMENT LINKAGES IN THE PACIFIC BASIN

HIRO LEE
DAVID ROLAND-HOLST

I. INTRODUCTION

THE Asian Pacific is the most dynamic region of the world economy. In the past three decades, this region has achieved growth rates that were considerably higher than those elsewhere. First, Japan experienced an unprecedented period of economic growth in the post–World War II era, and then became a technological leader in the global market. The Asian NIEs (newly industrialized economies of the Republic of Korea, Taiwan, Hong Kong, and Singapore) followed Japan in growing from labor-intensive manufacturing to large-scale industry with increasingly skill-intensive products such as consumer electronics. More recently, China and ASEAN-Four (Thailand, Malaysia, Indonesia, and the Philippines) have posted even more impressive growth rates than the Asian NIEs, rapidly increasing their manufacturing capacity and exports of labor-intensive products. Overall, the Pacific Asian share of world production has increased from less than 9 per cent in 1960 to 23 per cent in 1994. Altogether, these countries have significantly contributed to world economic growth and a dramatic expansion of international trade flows, becoming pacesetters for global economic development and models of efficient international specialization.

Unlike Western Europe or North America, the Asia-Pacific region has dramatically increased its intra-regional trade without region-wide free trade arrangements. Instead, the expansion of regional trade has been largely fueled by rapid East Asian growth and unilateral liberalization policies.[1] Asia-Pacific trade expansion has been associated with so-called "open regionalism," i.e., regional economic integration without discrimination against extra-regional economies [4] [8]. Indeed, during the 1993 summit in Seattle, the leaders of Asia-Pacific

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[1] Frankel [7] finds that an increase in intra-regional trade can be largely explained by rapid economic growth in East Asian countries.

Economic Cooperation (APEC) stressed the importance of multilateral liberalization and that regional integration should be non-discriminatory toward the rest of the world [24].[2] At the 1994 summit in Bogor, Indonesia, the APEC leaders agreed to achieve "full and open trade and investment in Asia Pacific no later than the year 2020."[3] With this timetable for liberalization, trade is likely to continue to be an engine of growth for most of the region's economies.[4]

The main objective of this paper is to assess the possible effects of the removal of tariffs and nontariff barriers (NTBs) on Pacific Basin economies, using a ten-country calibrated general equilibrium (CGE) model. The general equilibrium approach used in this paper reveals more extensive economic linkages than can be captured by other methods.[5] Our ten-country CGE model details ten production sectors in each country and determines sectoral trade flows between Pacific countries endogenously. With this empirical tool, the patterns of regional and domestic economic adjustment emerge in considerable detail, and one can discern the differences between aggregate efficiency gains and the trade-offs among domestic production activities, investments, and jobs. Beneath the smooth veneer of the aggregate social welfare function, structural adjustments take place which have non-negligible political implications. Thus, empirical work of this kind not only reveals the complexity of motives in negotiations, but can provide some guidelines for their conduct.

Trade expansion in the Asia-Pacific region implies that employment linkages between countries are likely to become extensive. Thus, one area of special emphasis is the labor market and employment adjustment. Employment shifts which result from trade are invariably at or near the center of the negotiating table, since the political sustainability of most policies can often be traced to their employment effects. In the current CGE model, we explicitly model sectoral employment in domestic production, the inter-sectoral domestic mobility of labor, and the labor services or employment embodied in trade between countries. This approach greatly elucidates the employment linkages between countries which are induced by trade.[6] Our general equilibrium results suggest that developing and labor-inten-

[2] APEC was established in 1989 with twelve member countries: Australia, Brunei, Canada, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore, Thailand, and the United States. China, Hong Kong, and Taiwan joined APEC in 1991, Mexico and Papua New Guinea in 1993, and Chile in 1994.

[3] "APEC Economic Leaders' Declaration of Common Resolve," Bogor, Indonesia, November 15, 1994, as quoted in Dutta [5].

[4] Elek [6] and Yamazawa [23] [24] summarize recent economic integration efforts in the Pacific and discuss the agenda for APEC, while Saxonhouse [18] indicates that new region-wide liberalization could lead to substantial trade creating effects in the region.

[5] An important exception is an OECD-World Bank collaboration to evaluate the global consequences of GATT-type agricultural liberalization [9]. For an example of more traditional, partial equilibrium trade share approaches to economic integration in Pacific Asia, see Kreinin and Plummer [11].

[6] The role of international capital mobility, which has been receiving increasing attention, will be evaluated using the Pacific CGE model in a separate study. Doner [3] and Urata [20] suggest that the acceleration of Japanese direct investment in Asia has intensified regional economic integration.

sive countries in the region would become increasingly reliant upon export linkages to developed and more capital-intensive countries to fuel domestic employment and broaden the basis for raising living standards. Conversely, high wage, high-tech export employment in the more advanced economies relies on the reciprocity of this expanding trade.

II. CGE MODELING OF PACIFIC ECONOMIES

In this section, we present an overview of the Pacific CGE model and the data sources. Our model is a ten-country, ten-sector economy-wide model which simulates price-directed resource allocation in commodity and factor markets. It maintains detailed information on sectoral prices, output, trade, consumption, and factor use in a consistent framework which also accounts for national aggregates such as household income, government budget, and employment. The model equations are presented in the Appendix. The present model differs from the mainstream of CGE specifications in three important ways. First, it is a detailed ten-country model, so domestic supply, demand, and bilateral trade for the ten countries (United States, Japan, China, Korea, Taiwan, Singapore, Malaysia, Thailand, Indonesia, and the Philippines) are fully endogenous at a ten-sector level of aggregation.[7] Trade between all ten countries is thus endogenous, while their individual trade flows with the rest of the world (ROW) are governed by export supply and import demand functions whose elasticities depend upon the size of each country in the non-Pacific market. The resulting 110 sets of ten-sector trade flows are then governed by an equal number of endogenous price systems.[8]

The extent of price adjustments, as well as the volume and pattern of trade creation and trade diversion, are important factors in determining the ultimate welfare effects of regional trade policy. A second important feature of the model is its differentiated product specification of the demand and supply for tradeable commodities. Domestic demand is a constant elasticity of substitution (CES) composite of goods differentiated by origin. For each product category,

$$D_i = \bar{A}_{D_i}\left[\sum_k ß_i^k (D_i^k)^{(\sigma_i - 1)/\sigma_i}\right]^{\sigma_i/(\sigma_i - 1)} \tag{1}$$

where k includes the ten Pacific countries and the ROW. D_i^k consist of domestic goods, imports from each regional trading partner, and imports from the ROW. σ_i are elasticities of substitution between D_i^k's, and $\bar{A}_{D_i}$ and $ß_i^k$ are intercept and share parameters. Similarly, domestic production is supplied to differentiated destinations (domestic market, exports to each trading partner, and exports to the ROW), which is specified as a constant elasticity of transformation (CET) composite:

[7] Australia, New Zealand, and Hong Kong have been omitted with reluctance because of data constraints, but will be included in future versions of the model. The ten sectors of the model are listed in Table I.

[8] There are $\sum_{i=1}^{r-1} i = 55$ sets of sectoral import and export flows, where r denotes the number of countries including the ROW.

$$S_i = \bar{A}_{S_i}\left[\sum_k \delta_i^k (S_i^k)^{(\tau_i+1)/\tau_i}\right]^{\tau_i/(\tau_i+1)}, \tag{2}$$

where τ_i are elasticities of transformation between S_i^k's, and $\bar{A}_{S_i}$ and δ_i^k are intercept and share parameters.[9]

Third, instead of assuming fixed economy-wide employment, we specify labor supply endogenously to capture the positive income effects of liberalization on aggregate employment. While patterns of sectoral adjustment are important in all multi-sectoral CGE models including ours, the flexible aggregate employment assumption is more plausible, particularly for China and ASEAN countries which have relatively large surplus labor. We assume that a representative consumer maximizes a Stone-Geary utility function over leisure and ten composite product categories. Labor supply then becomes an increasing function of the wage rate and a decreasing function of the marginal budget share for leisure.[10]

The Pacific CGE model has been calibrated to a ten-country 1985 social accounting matrix (SAM) constructed by the authors for this purpose.[11] The principal data source used to estimate the SAM was a ten-country, twenty-three-sector input-output table estimated by the Institute of Developing Economies (IDE).[12] Structural parameters of the model were obtained by calibration, direct estimation, or imputation from other sources. Calibrated values were computed for most share parameters, input-output coefficients, nominal ad valorem taxes, and tariffs from the SAM itself. Employment, capital stock, and direct foreign investment data were gathered from official publications where possible or otherwise estimated from the available data.[13] Elasticity parameters for the United States and Japan were obtained from a variety of published and unpublished sources, but for other regions where no firm empirical estimates were available, averages of U.S. and Japanese values were used.

The scope of the SAM and other data is too great to permit any detailed discussion here, but Table I summarizes some general structural information on domestic output, income, and trade for the ten countries. What emerges from these data are sketched portraits of countries at very different stages of development, whose trade

[9] Similar assumptions are used elsewhere in the CGE literature. See e.g., de Melo and Tarr [2].

[10] The labor supply function that is consistent with our consumption specification is given by

$$LS = \overline{LS}^{\max} - \left(\frac{\beta_0}{w}\right)\left[\frac{Y - \sum_{i=1}^{n} p_i\lambda_i}{1-\beta_0}\right], \quad \overline{LS}^{\max} = LS + C_0 - \lambda_0, \quad 0 \le \beta_0 < 1,$$

where β_0 is the marginal budget share for leisure, w is the wage rate, Y is disposable income, p_i are prices of composite goods, λ_i are subsistence minimum consumption levels (λ_0 is the corresponding level for leisure), and C_0 is the amount of leisure consumed. The elasticity of labor supply with respect to wage is

$$\varepsilon_{LW} = [(1-\beta_0)\overline{LS}^{\max}/LS] - 1.$$

[11] See Reinert and Roland-Holst [17] for applications of the SAM methodology to trade policy analysis.

[12] See Institute of Developing Economies [10]. National income and product accounts data for each country are used to balance the household, government, savings-investment, and the rest of the world accounts.

[13] For example, for China, Singapore, Malaysia, Thailand, and the Philippines, value-added shares and the economy-wide capital stock values are used to estimate sectoral capital stocks.

TABLE I

ECONOMIC AND TRADE STRUCTURES OF TEN PACIFIC COUNTRIES

	Sectoral Economic Structure (% Shares)							Imports from Country of Origin as % of Total Imports										Exports to Destination as % of Total Exports									
	S	VA	D	M	E	tm	NTB	usa	jpn	chn	kor	twn	sgp	mys	tha	idn	phl	row	usa	jpn	chn	kor	twn	sgp	mys	tha	idn	phl	row
A. U.S.A.																													
1. AgForFish	2.6	1.7	2.5	2.8	6.2	2.2	8.3	2	1	0	1	0	1	1	3	0	91	24	3	6	5	0	0	0	1	0	60
2. PetMining	5.5	4.0	5.9	10.3	4.5	0.5	0.0	0	1	0	0	1	0	0	7	0	91	16	0	5	2	2	0	0	0	2	73
3. FoodProc	4.6	2.3	4.5	4.9	5.2	3.4	0.0	4	1	1	2	0	1	3	1	2	85	16	1	3	1	1	1	1	0	0	77
4. Textiles	1.6	0.9	1.8	10.9	1.5	14.6	41.0	4	6	13	14	1	1	1	1	1	58	4	2	2	1	0	1	0	0	2	88
5. OthNonDur	6.8	5.1	6.7	8.1	10.8	2.2	0.0	6	1	1	6	0	0	0	1	0	85	11	4	3	3	1	1	1	1	0	76
6. Metals	3.2	2.2	3.4	6.4	3.2	3.2	0.0	18	1	4	4	0	0	0	0	0	72	23	2	4	2	1	1	1	2	0	64
7. Machinery	5.8	5.1	5.9	20.0	21.6	4.9	0.0	35	0	4	7	4	2	0	0	1	47	7	2	2	2	2	2	0	1	0	82
8. TranspEqp	5.0	3.4	5.2	13.5	15.3	3.2	11.3	35	0	0	1	0	0	0	0	0	64	6	1	1	0	1	0	0	0	0	91
9. OthDurable	2.9	2.7	3.0	7.6	6.1	6.4	0.0	21	2	4	8	1	0	0	0	0	65	7	2	2	1	1	0	0	0	0	86
10. Services	62.1	72.7	61.1	15.4	25.7	0.0	0.0	8	1	1	1	0	0	0	1	1	88	6	1	1	2	0	0	0	0	0	89
All sectors	100	100	100	100	100	3.5	5.1	17	1	3	4	1	1	0	1	1	72	9	2	2	2	1	1	0	1	0	82
B. Japan																													
1. AgForFish	2.5	3.0	3.1	10.2	0.2	4.8	76.8	29	10	2	3	0	5	1	2	2	45	70	1	9	5	1	1	1	0	7	5
2. PetMining	2.6	0.6	4.8	38.9	0.8	4.0	7.0	3	3	1	0	2	4	0	14	0	74	6	1	13	2	0	0	1	1	1	74
3. FoodProc	5.3	2.7	5.9	7.0	0.6	16.2	7.7	27	5	5	9	0	1	3	0	1	48	54	4	2	9	2	2	3	1	2	21
4. Textiles	2.1	1.4	2.2	3.8	2.5	6.8	11.8	3	20	20	8	0	0	1	0	0	48	20	4	8	3	3	1	1	1	1	58
5. OthNonDur	7.0	4.8	7.4	7.0	6.2	3.0	0.0	30	2	2	4	1	2	3	2	1	53	16	11	9	6	2	2	2	3	1	49
6. Metals	6.6	3.7	6.8	5.9	9.6	1.6	0.0	19	2	4	2	0	2	1	3	3	65	26	19	6	4	2	3	3	3	0	34
7. Machinery	9.4	7.1	8.0	4.6	32.1	2.9	0.0	54	0	6	5	2	1	1	0	0	30	39	8	5	3	2	1	1	1	0	39
8. TranspEqp	5.6	3.4	4.3	1.7	25.0	4.2	0.0	70	0	0	0	0	0	0	0	0	29	46	5	1	1	0	1	1	1	0	45
9. OthDurable	3.6	2.8	3.6	3.5	5.9	4.1	0.0	25	3	8	9	1	0	1	0	0	54	54	5	5	3	2	1	1	2	0	27
10. Services	50.4	70.7	54.0	17.3	16.9	0.0	16.1	14	6	1	1	0	1	0	1	1	75	16	3	2	1	1	1	1	1	0	75
All sectors	100	100	100	100	100	3.8	15.7	16	4	3	2	1	3	1	6	1	63	34	7	4	3	1	1	1	1	0	47

TABLE I (Continued)

	Sectoral Economic Structure (% Shares)							Imports from Country of Origin as % of Total Imports										Exports to Destination as % of Total Exports									
	S	VA	D	M	E	tm	NTB	usa	jpn	chn	kor	twn	sgp	mys	tha	idn	phl	row	usa	jpn	chn	kor	twn	sgp	mys	tha	idn	phl	row
C. China																														
1. AgForFish	18.8	35.6	18.5	3.5	13.5	17.2	0.0	26	0		0	0	0	2	1	0	0	69	2	33		0	0	1	2	1	4	0	57
2. PetMining	4.5	4.3	4.0	0.9	13.5	13.6	0.0	2	2		0	0	1	0	0	0	1	95	11	37		0	0	30	0	1	0	1	20
3. FoodProc	7.1	3.1	6.6	9.5	8.7	27.9	0.0	11	4		0	0	2	2	10	2	2	67	5	15		0	0	2	4	1	1	1	71
4. Textiles	8.3	4.3	7.4	5.7	19.8	40.2	0.0	4	8		0	10	0	0	0	0	0	78	26	15		0	0	1	0	0	0	0	56
5. OthNonDur	8.7	5.4	9.1	16.2	6.3	23.9	0.3	15	19		0	5	1	1	1	2	0	55	12	13		0	0	2	1	1	2	2	67
6. Metals	5.6	3.3	6.7	13.5	2.5	12.4	0.0	2	40		0	0	0	0	0	0	0	57	24	21		0	0	2	2	1	1	2	48
7. Machinery	8.3	5.8	9.0	31.5	5.7	27.3	0.2	11	46		0	1	0	0	0	0	0	42	6	1		0	0	1	0	0	1	4	87
8. TranspEqp	2.3	1.5	2.7	6.7	0.8	30.6	9.3	10	54		0	0	0	0	0	0	0	35	2	0		0	0	1	1	0	2	3	91
9. OthDurable	6.4	4.8	6.1	5.2	7.7	41.1	0.0	13	29		0	3	0	0	1	0	0	54	21	6		0	0	1	1	0	0	0	71
10. Services	30.0	31.8	29.9	7.2	21.5	4.2	0.8	17	23		0	1	0	0	0	2	0	57	8	26		0	0	4	0	0	0	1	59
All sectors	100	100	100	100	100	22.6	0.8	10	32		0	2	0	0	1	1	0	53	13	21		0	0	6	1	1	1	1	57
D. Korea																														
1. AgForFish	8.0	14.5	8.7	8.8	2.1	15.7	11.6	41	1	0		1	0	12	3	1	0	39	5	50	0		1	0	1	0	0	1	42
2. PetMining	5.3	2.3	8.7	23.2	3.5	7.3	0.3	7	3	0		1	1	7	0	7	0	73	6	52	0		0	1	0	0	0	1	40
3. FoodProc	9.2	2.4	9.4	4.3	1.9	26.7	5.0	39	3	0		1	1	4	2	2	2	44	29	61	0		1	0	1	0	0	2	6
4. Textiles	7.8	4.2	4.7	4.8	24.4	21.6	0.1	9	40	0		6	0	0	0	0	0	44	48	12	0		0	1	0	0	0	0	37
5. OthNonDur	8.8	5.3	8.6	13.5	9.3	28.7	0.4	25	33	0		1	2	1	0	1	0	38	16	8	0		2	0	1	2	2	1	67
6. Metals	6.8	3.1	6.4	8.1	11.5	16.6	0.1	15	46	0		2	0	0	0	0	1	35	32	12	0		1	1	2	1	1	0	49
7. Machinery	6.9	4.3	7.1	18.7	15.5	17.3	2.0	23	49	0		1	1	0	0	0	0	26	59	9	0		1	1	2	0	1	1	26
8. TranspEqp	3.3	2.0	2.6	4.8	7.4	12.6	7.5	34	35	0		1	1	1	0	0	0	28	3	0	0		0	2	0	0	0	0	94
9. OthDurable	4.1	2.9	3.6	3.5	6.9	27.0	0.7	24	52	0		2	0	0	0	0	0	22	51	17	0		0	2	1	0	0	0	29
10. Services	39.8	59.1	40.1	10.3	17.4	0.2	2.7	26	16	0		1	0	1	0	1	0	55	12	7	0		0	0	0	0	0	0	81
All sectors	100	100	100	100	100	14.1	2.4	20	25	0		1	1	3	0	2	0	46	33	13	0		1	1	1	1	1	1	50

TABLE I (Continued)

	Sectoral Economic Structure (% Shares)							Imports from Country of Origin as % of Total Imports										Exports to Destination as % of Total Exports									
	S	VA	D	M	E	tm	NTB	usa	jpn	chn	kor	twn	sgp	mys	tha	idn	phl	row	usa	jpn	chn	kor	twn	sgp	mys	tha	idn	phl	row
E. Taiwan																													
1. AgForFish	5.0	6.6	6.3	8.0	1.7	6.9	10.9	47	1	0	0		0	9	1	2	1	39	12	67	0	6		4	3	0	0	1	8
2. PetMining	4.1	3.8	7.5	17.4	2.2	9.7	0.3	5	1	0	0		2	2	0	5	0	85	11	9	0	9		9	0	0	2	5	55
3. FoodProc	7.9	2.7	7.8	8.3	4.4	30.2	3.5	20	12	0	0		1	0	5	1	0	59	21	49	0	1		1	1	0	0	0	26
4. Textiles	9.3	6.5	5.9	2.7	18.9	16.1	0.1	5	27	0	4		0	1	0	0	0	63	60	6	3	1		2	1	1	0	0	26
5. OthNonDur	11.4	7.8	12.2	14.5	10.3	14.6	0.3	24	22	0	2		2	2	1	2	0	45	58	11	10	1		1	1	1	3	0	14
6. Metals	7.5	4.2	8.0	8.7	5.5	19.2	0.2	10	42	0	1		0	0	0	0	1	45	63	11	1	3		2	2	4	1	0	11
7. Machinery	9.1	5.7	6.5	16.0	23.4	16.0	1.3	22	51	0	1		2	1	0	0	0	23	64	5	1	1		2	1	1	1	0	25
8. TranspEqp	3.0	1.9	2.6	3.1	3.8	53.6	4.7	14	54	0	0		0	0	0	0	0	32	33	1	0	0		0	1	0	1	0	62
9. OthDurable	8.2	6.1	4.7	3.9	19.2	20.9	0.4	17	41	0	0		0	0	1	0	0	41	37	6	1	0		1	1	0	0	0	53
10. Services	34.4	54.6	38.7	17.3	10.7	0.1	2.8	20	8	0	0		0	0	0	1	0	70	19	7	1	1		1	0	0	0	0	71
All sectors	100	100	100	100	100	12.5	2.1	18	22	0	1		1	2	1	2	0	54	47	9	2	1		2	1	1	1	0	35
F. Singapore																													
1. AgForFish	0.6	0.7	1.2	4.5	0.3	0.1	9.7	6	1	13	0	7		18	13	1	1	40	51	4	0	7	4		13	0	0	4	18
2. PetMining	20.1	5.4	19.3	29.0	37.5	2.8	0.5	3	0	17	0	1		11	0	9	0	58	4	13	0	1	1		17	5	4	0	54
3. FoodProc	2.5	1.6	3.2	6.0	2.4	0.1	5.4	9	3	8	0	2		32	3	2	0	41	13	6	4	3	1		9	2	1	1	61
4. Textiles	1.5	1.9	2.4	7.0	2.3	0.9	0.9	2	16	8	9	18		11	4	3	0	28	76	1	0	0	0		3	0	0	1	18
5. OthNonDur	5.5	4.9	5.8	7.6	5.9	0.1	3.6	14	16	3	1	3		11	2	7	0	45	14	11	6	4	5		13	5	12	1	28
6. Metals	2.6	2.2	4.2	5.3	2.1	0.0	0.0	9	39	1	3	4		3	1	4	0	36	12	10	4	2	2		26	7	13	0	24
7. Machinery	12.0	10.2	10.3	17.3	22.7	0.0	2.5	27	31	0	1	3		10	2	1	1	23	62	4	1	1	2		9	2	3	0	17
8. TranspEqp	2.3	3.9	3.9	4.0	1.6	3.1	4.8	36	23	0	5	1		1	0	0	0	35	41	2	1	3	0		28	0	22	0	3
9. OthDurable	2.7	2.5	4.0	6.5	2.4	0.5	0.0	13	26	2	3	7		5	1	2	0	41	42	8	2	1	1		17	2	5	0	23
10. Services	50.1	66.7	45.7	12.9	22.8	0.0	0.0	9	8	11	0	1		9	0	7	1	53	1	1	0	0	0		0	0	0	0	96
All sectors	100	100	100	100	100	1.2	1.9	12	13	9	1	3		11	1	5	0	45	21	7	1	1	1		11	3	4	0	51

TABLE I (Continued)

	Sectoral Economic Structure (% Shares)							Imports from Country of Origin as % of Total Imports									Exports to Destination as % of Total Exports									
	S	VA	D	M	E	tm	NTB	usa	jpn	chn	kor	twn	sgp	mys	tha	idn	phl	row	usa	jpn	chn	kor	twn	sgp	mys	tha	idn	phl	row
G. Malaysia																													
1. AgForFish	9.1	11.7	7.7	5.0	11.0	9.9	0.8	7	1	13	1	3	1		30	3	0	41	6	41	3	16	9	4		0	1	1	19
2. PetMining	12.5	13.0	8.5	13.0	30.6	10.3	0.1	0	0	0	0	0	55		0	1	0	44	1	48	0	13	2	17		9	0	2	8
3. FoodProc	13.2	5.9	11.8	8.1	8.0	12.8	1.4	11	3	9	0	2	4		15	2	0	54	15	8	2	3	0	21		1	0	1	49
4. Textiles	1.5	1.7	1.3	3.5	3.0	31.5	0.0	6	18	6	7	14	4		4	2	0	37	44	4	0	1	1	18		1	0	4	26
5. OthNonDur	9.5	7.3	7.5	9.5	16.3	14.2	0.1	14	16	2	1	3	11		4	3	0	46	3	9	3	1	2	6		1	0	2	73
6. Metals	3.1	1.2	3.7	8.4	5.4	13.4	0.6	5	39	1	6	3	9		0	0	0	37	1	20	0	1	1	4		0	0	2	71
7. Machinery	4.2	5.6	6.5	25.9	15.5	19.4	1.1	27	26	0	3	2	11		1	0	4	27	57	2	0	1	2	15		0	0	3	19
8. TranspEqp	2.9	1.4	4.4	7.1	0.4	25.2	13.3	5	58	0	0	1	8		0	0	0	27	9	0	0	18	0	14		0	0	16	43
9. OthDurable	2.0	1.7	2.4	4.3	1.2	26.8	2.4	9	26	2	2	8	15		1	0	0	36	25	4	0	0	0	30		0	0	2	39
10. Services	42.0	50.6	46.1	15.2	8.7	4.6	2.5	8	7	0	0	1	1		1	1	2	80	12	14	1	3	2	18		1	0	1	48
All sectors	100	100	100	100	100	14.6	1.9	12	19	2	2	2	15		3	1	1	43	14	24	1	7	3	13		3	0	2	33
H. Thailand																													
1. AgForFish	10.5	14.9	10.3	4.2	8.2	28.2	6.1	9	0	6	0	0	0	1		0	0	83	14	22	4	10	3	6	23		1	0	18
2. PetMining	5.4	3.8	8.4	16.5	1.8	13.6	4.8	1	0	2	0	0	16	17		0	0	63	61	6	0	4	8	4	2		4	6	5
3. FoodProc	13.9	8.1	11.1	5.0	29.1	24.8	2.9	19	8	5	0	1	3	3		2	1	59	16	9	4	1	2	1	6		1	0	60
4. Textiles	8.5	6.3	7.5	4.8	12.5	32.4	0.2	3	23	4	10	15	0	1		1	0	44	25	3	1	0	0	3	1		0	0	67
5. OthNonDur	4.8	3.9	5.0	16.9	8.8	21.5	2.2	11	22	2	3	3	4	2		1	1	52	6	36	6	1	3	4	7		0	0	36
6. Metals	2.0	1.1	2.4	11.1	4.6	15.7	1.3	4	46	0	4	7	3	0		0	0	36	17	15	3	1	1	2	1		0	0	60
7. Machinery	2.2	1.9	2.6	22.9	5.8	20.3	1.9	15	42	0	1	3	5	1		0	1	32	41	10	0	1	0	15	5		0	1	27
8. TranspEqp	2.7	1.5	3.3	4.6	0.2	32.5	14.9	2	58	0	1	1	0	0		0	0	39	0	7	0	7	0	0	7		7	0	73
9. OthDurable	3.2	2.9	2.9	3.6	5.3	30.4	1.3	10	23	2	1	3	3	0		0	0	59	17	12	3	0	1	2	1		0	0	64
10. Services	46.7	55.6	46.5	10.6	23.6	4.1	1.5	24	17	2	1	2	2	1		1	1	51	2	1	0	0	0	0	1		0	0	96
All sectors	100	100	100	100	100	18.6	3.0	9	23	2	2	3	6	5		0	0	51	15	10	2	1	1	3	5		0	0	61

TABLE I (Continued)

	Sectoral Economic Structure (% Shares)							Imports from Country of Origin as % of Total Imports										Exports to Destination as % of Total Exports									
	S	VA	D	M	E	tm	NTB	usa	jpn	chn	kor	twn	sgp	mys	tha	idn	phl	row	usa	jpn	chn	kor	twn	sgp	mys	tha	idn	phl	row
I. Indonesia																													
1. AgForFish	14.6	22.6	15.0	4.5	6.9	9.8	13.1	23	0	23	0	0	0	3	1		0	50	29	17	1	2	2	0	1	0		0	48
2. PetMining	16.5	20.0	8.9	8.7	68.9	5.1	2.5	3	1	0	0	1	26	0	0		0	68	23	59	0	5	2	4	0	0		0	7
3. FoodProc	12.3	4.2	13.0	2.1	1.6	20.2	17.5	15	5	8	0	1	3	0	7		0	61	28	12	8	6	3	4	6	2		2	29
4. Textiles	2.1	1.1	1.9	1.1	2.5	35.3	2.4	12	39	6	14	8	2	0	3		0	17	47	2	0	1	0	5	1	0		2	42
5. OthNonDur	4.8	3.7	5.3	16.3	6.8	17.2	9.3	13	19	1	3	4	7	0	0		1	51	14	13	12	2	5	6	3	1		1	43
6. Metals	1.7	1.2	2.2	10.9	2.7	16.5	8.3	11	44	1	4	2	4	0	0		0	34	6	62	4	2	0	9	0	0		1	16
7. Machinery	1.4	0.7	2.6	24.0	0.6	27.2	15.3	18	28	0	2	3	5	0	0		0	43	20	0	4	0	0	36	3	0		24	13
8. TranspEqp	3.2	2.3	4.1	10.8	0.2	25.9	18.7	13	24	0	0	1	5	0	0		0	56	0	0	0	0	0	0	0	0		9	91
9. OthDurable	1.5	0.9	1.7	3.2	0.3	30.4	13.1	14	50	2	1	3	5	0	0		0	24	5	13	0	0	0	38	0	0		2	42
10. Services	42.0	43.3	45.5	18.4	9.5	5.0	1.7	7	5	0	0	0	0	0	0		0	86	18	20	3	1	2	9	1	0		1	43
All sectors	100	100	100	100	100	16.2	10.0	12	20	2	1	2	6	0	0		0	56	22	47	1	4	2	5	1	0		1	17
J. Philippines																													
1. AgForFish	17.3	26.0	18.8	4.4	6.2	38.2	3.9	19	15	8	5	2	1	7	1	2		40	13	69	1	1	3	1	0	0	0		12
2. PetMining	6.5	2.7	7.9	17.8	3.8	26.5	10.8	22	2	3	1	3	0	8	1	4		57	3	61	2	5	2	10	0	2	0		16
3. FoodProc	17.6	10.6	18.0	7.5	10.6	42.0	3.8	20	13	7	6	2	2	8	0	3		37	50	7	3	3	1	0	0	0	0		35
4. Textiles	2.4	1.6	0.7	11.6	7.3	40.1	0.3	21	13	6	6	3	2	8	1	4		36	64	2	0	0	0	0	0	0	0		34
5. OthNonDur	5.5	3.3	5.1	14.2	4.3	39.2	8.5	20	14	8	6	3	2	7	1	3		38	38	24	5	0	3	0	2	4	4		20
6. Metals	3.0	1.3	2.3	4.5	7.9	25.2	1.3	21	14	7	6	3	1	8	1	3		37	2	46	3	4	5	0	1	0	0		40
7. Machinery	2.4	1.2	0.5	22.8	12.9	34.4	9.0	20	14	8	6	3	2	8	1	3		36	56	1	0	1	1	4	15	2	0		22
8. TranspEqp	1.0	1.2	1.1	2.0	0.6	40.1	12.1	22	14	6	5	2	0	9	0	4		38	0	22	0	7	0	0	0	0	0		72
9. OthDurable	1.2	0.8	1.0	1.3	1.8	47.0	4.3	22	16	8	5	0	0	6	0	2		42	41	3	3	0	0	0	0	0	0		52
10. Services	43.0	51.3	44.6	13.9	44.6	7.3	1.9	6	2	4	0	0	0	1	0	1		85	15	7	0	0	1	0	1	0	0		74
All sectors	100	100	100	100	100	26.0	6.3	17	8	6	3	2	1	6	1	3		53	28	15	1	1	1	1	3	1	0		49

Sources: [10] [19] and authors' calculations.

Notes: 1. S = output, VA = value added, D = composite demand, M = imports, E = exports, tm = average nominal tariff rates, and NTB = ad valorem equivalents of nontariff barriers. U.S. NTB on TranspEqp is applied to Japanese imports only.

2. AgForFish = agriculture, forestry, and fishery. PetMining = petroleum and mining. FoodProc = food processing. OthNonDur = other non-durable goods. TranspEqp = transport equipment. OthDurable = other durable goods.

patterns are richly textured along the lines of comparative advantage and regional location and a complex network of linkages between external demand and domestic income, output, and employment. For example, the United States and Japan most closely resemble an archetype of modern industrial economies, with small agricultural sectors, over half of output and almost three-quarters of their income (value added) in tertiary activities. The United States, a country geographically linked to the world's three largest trading regions (East Asia, Europe, and the Americas) is the least dependent upon intra-Pacific trade. By contrast, Indonesia, the Philippines, and Malaysia are still very reliant on primary industries for domestic employment and income, and they are embedded most deeply in the regional trade matrix, with the highest levels of combined Pacific import and export dependence.

Trade shares also reflect a combination of endowment differences and hierarchy in development. The most advanced economies generally rely upon the least advanced ones for primary products while exporting to the latter mostly manufactures. Pacific countries at intermediate development stages are woven into the fabric between the primary exporters and the United States and Japan, with bilateral trade patterns varying widely depending upon relative resource endowments and technological advancement.[14] For example, Korea's and Taiwan's imports from Japan are dominated by manufactured goods while their main exports to Japan are primary products and labor-intensive manufactures. Singapore has the same relationship with Japan, but is a net importer of primary goods and net exporter of manufactured goods vis-à-vis Malaysia, Thailand, and Indonesia. Overall, Taiwan, Malaysia, and Indonesia have heavy intra-regional export dependence and are embedded in the regional trade matrix. China had virtually no official trade with Korea and little trade with Taiwan as of 1985, but its trade with both countries has increased dramatically in the past several years.[15] U. S. trade with Japan and the NIEs is dictated by relative differences in factor endowments. Because of its relative abundance in land, the United States plays more of the role of an agricultural exporter and manufactures importer vis-à-vis these Asian trading partners.

Table I also lists the ad valorem average nominal tariff rates and ad valorem equivalents of nontariff barriers that were applied to the ten sectors in each country in 1985.[16] A few caveats apply to interpretation of these protection estimates and the results which are obtained by simulations entailing their removal. Although variation of protection across countries and sectors has remained relatively stable, actual tariff rates today are probably lower in most of these countries. On the other hand, each of the ten Pacific countries maintains some (and sometimes a considerable) degree of nontariff protection against imports and many of these have been

[14] Park [15] suggests that Pacific Asia could be divided into four groups of countries along a ladder of comparative advantage (the "flying geese" model of regional development): (1) Japan, (2) Asian NIEs, (3) Malaysia and Thailand, and (4) Indonesia and the Philippines. The flying geese development pattern was previously discussed by Akamatsu [1].

[15] China's intra-regional trade is underestimated because of the exclusion of Hong Kong, which has been its major trading partner.

[16] See e.g., Laird and Yeats [12], Nogues, et al. [14], and UNCTAD [19] for data on NTB coverages.

increasing over the same period. To some extent, the inclusion of both falling tariffs and rising nontariff barriers will offset each other.

III. TRADE AND EMPLOYMENT

In a world of ever more fluid capital markets, it is increasingly difficult to assess the gains from trade in terms of domestic value added or other aggregate national income figures. Returns to mobile factors of production may ultimately accrue to anyone in any country, regardless of where the production and income originate. Thus, when evaluating the domestic benefits to be derived from a country's trade orientation, it is important to appraise returns to relatively immobile factors, which represent more localized entitlement to gains from trade. The model described in the previous section allows one to identify employment changes not only where they occur, in a specific country and sector, but where they might originate in terms of demand.

To better understand multilateral employment linkages, recall that commodity or service trade corresponds to a flow of labor services from exporters to importers. These factor service flows, tied to each source of supply and demand, can be approximated with labor/output ratios as follows:

$$L_{Si}^{jk} = l_i^j S_i^{jk} \tag{3}$$

$$L_{Di}^{jk} = l_i^k D_i^{ik} \tag{4}$$

where l_i^j denotes sector i's labor/output ratio in country j, S_i^{jk} denotes country j's supply (exports) of commodity i to country k, and D_i^{jk} denotes country j's demand (imports) of commodity i from country k. L_{Si}^{jk} and L_{Di}^{jk} estimate employment embodied in sectoral exports and imports between trading partners in the multilateral trading system. In the next section, it will become evident that multilateral trade and employment linkages are not always congruent. The net employment effects of trade policy are difficult to infer from simple adjustments in trade patterns and almost impossible to intuit a priori.

Before discussing the simulation results, a simple bilateral example will illustrate the differences between the output and employment perspectives. Table II gives two different indices of net trade, one based on trade flows, the other on embodied labor services.[17] These are defined as

$$NE_i^{hf} = 100\,\frac{\sum_f \{S_i^{hf} - D_i^{hf}\}}{\sum_f \{S_i^{hf} - D_i^{hf}\}} \tag{5}$$

and

$$NLE_i^{hf} = 100\,\frac{\sum_f \{L_{Si}^{hf} - L_{Di}^{hf}\}}{\sum_f \{L_{Si}^{hf} + L_{Di}^{hf}\}} \tag{6}$$

[17] See Lee and Roland-Holst [13] for a more detailed discussion of this example.

TABLE II

NET EXPORT AND NET LABOR SERVICE EXPORT INDICES FOR JAPAN

A. Net export indices

(%)

		1965	1970	1975	1980	1985	1990
1	Agriculture, forestry, and fishery	–57	–57	–83	–82	–88	–94
2	Petroleum and mining	–98	–99	–98	–98	–98	–97
3	Food processing	–34	–51	–65	–68	–78	–89
4	Textiles	13	13	6	5	2	–36
5	Wood	–70	–89	–95	–95	–95	–98
6	Paper	–9	–7	–4	–22	–18	–17
7	Chemicals	3	13	27	0	–8	–8
8	Non-metal mineral	76	54	41	26	25	–18
9	Steel	81	86	97	89	80	47
10	Nonferrous metals	–38	–57	–50	–33	–47	–62
11	Metal products	91	92	77	83	74	44
12	Nonelec. machinery	28	26	48	62	72	58
13	Elec. machinery	80	72	65	66	77	60
14	Motor vehicles	80	89	91	96	96	84
15	Other transport equipment	73	58	76	49	61	31
16	Precision instrument	58	56	49	67	74	60
17	Other manufacturing	58	56	39	51	62	19
18	Services	19	–28	–20	16	–6	–8
	Trade weighted average	7	0	–5	–2	13	7
	(excl. petroleum and mining)	22	18	23	32	36	20

B. Net labor service export indices

(%)

		1965	1970	1975	1980	1985	1990
1	Agriculture, forestry, and fishery	1	–8	–60	–62	–69	–88
2	Petroleum and mining	–97	–99	–99	–99	–99	–99
3	Food processing	–39	–64	–85	–91	–93	–98
4	Textiles	–5	–22	–50	–64	–63	–89
5	Wood	–46	–83	–94	–97	–97	–99
6	Paper	–17	–32	–50	–73	–67	–77
7	Chemicals	–27	–36	–33	–66	–67	–81
8	Non-metal mineral	70	30	1	–26	–24	–71
9	Steel	66	60	87	30	4	–56
10	Nonferrous metals	–32	–65	–68	–61	–69	–88
11	Metal products	94	89	64	57	40	–29
12	Nonelec. machinery	45	20	27	29	45	–10
13	Elec. machinery	93	85	69	46	58	–1
14	Motor vehicles	91	92	88	88	84	30
15	Other transport equipment	80	62	75	8	44	–27
16	Precision instrument	81	66	41	34	45	–15
17	Other manufacturing	61	50	22	16	32	–30
18	Services	43	–12	–20	6	–22	–54
	Trade weighted average	16	–4	–15	–22	–9	–41

Source: See [13, Appendix].

where *h* denotes the home country and *f* the foreign trading partner. Equation 5 gives a time-series of estimates for net export indices for Japan's trade with the rest of the world. Equation 6 provides the corresponding indices of net labor service flows. The numbers presented in Table II clearly reveal the transition Japan made from being a relatively labor-intensive to a capital-intensive trader. In terms of the trade weighted economy-wide average, Japan has maintained a steady advantage in net commodity exports (excluding petroleum and mining) while shifting decisively to an embodied employment deficit, the latter of course corresponding to a net surplus in exports of capital services. These trends reveal two important but less publicized aspects of Japan's role in global trade. Over the last two decades, it has acted as a surrogate saver-investor-innovator for consumers around the world, while shifting its labor requirements overseas to become a leading creator of indirect employment.

Consider a case in point, Japan's trade with the ROW in 1990. Table II indicates positive net exports in eight out of eighteen sectors. At the same time, however, the high capital intensity of Japan's exports induces trade to create many more jobs for foreigners than for its own citizens. As shown in the bottom of the table, Japan's corresponding balances in net labor service exports are negative in all sectors but motor vehicles, and the overall deficit exceeds 40 per cent of total trade in embodied labor services. While Japan has benefited from its trade surplus, many of its trading partners have enjoyed substantial advantages in terms of human resource utilization and returns to relatively immobile factors of production. Given the endogenous growth externalities associated with trade-oriented employment creation, it is arguable that countries with surpluses embodied in their abundant and immobile factors may be the biggest benefactors from trade in the long run.

IV. TRADE LIBERALIZATION EXPERIMENTS

This section reports on the results of two trade-policy simulations with the Pacific CGE model. In the first experiment, it is assumed that a Pacific free trade area is created by the removal of all tariff and nontariff barriers (NTBs) governing bilateral trade between the ten Pacific countries (hereafter referred to as PAC-10). As column 7 of Table I shows, the ad valorem effect of NTBs in some Pacific countries exceeds its nominal tariff protection. In the face of evidence that the United States and Japan have actually substituted the latter for the former type of import protection in the 1980s, the agenda for trade liberalization has broadened in recent years to cover voluntary and involuntary quantity restrictions, administrative deterrence, and other institutional mechanisms which can distort the prices of tradeables. In the second experiment, it is assumed that the PAC-10 remove tariffs and NTBs on imports from all sources. This is more analogous to embedding the Pacific countries in a GATT-type regime of global liberalization, although ROW import barriers are not explicitly changed.

An important aspect of the present results is the interpretation of labor market adjustments. Employment is a central concern for policy makers, whether in the domestic sphere or in international trade negotiations. The issue usually arises in

two separable contexts, international migration and shifts in domestic production and factor use. While the first often arouses more direct public interest, the second is more significant and will be the focus of the analysis below. Worker mobility is relatively limited, but employment can be highly mobile as production activities shift across borders in search of resources and markets.

As implied in the previous section's discussion, employment linkages will be evaluated from a multi-faceted demand perspective. Domestic demand creates domestic employment in domestic production and foreign employment in the production of imports. Likewise, external demand creates domestic employment in production for export. This leads to two kinds of employment, direct domestic employment, and indirect domestic and foreign employment embodied in exports and imports respectively. In the interpretation below, particular attention will be given to trade in embodied labor services or multilateral employment linkages. As was demonstrated in Section 3, trends in trade and embodied employment flows may not be systematically correlated, and the two are best evaluated separately.

A final general note on the simulations concerns their comparative static nature. Trade liberalization sets economic forces into motion which can take a decade or more to achieve their full effect on the level and composition of international economic activity. A comparative static model like the present one does not account for some long-term phenomena such as population growth, capital accumulation, and resource depletion. Thus it is likely that these results underestimate the amplitude of some adjustments, particularly those where long-term investment and innovation are important. However, other results might be overestimated, particularly where resource sustainability could eventually play a significant role. Despite these limitations, a model of this type is more transparent for capturing short- and medium-term structural adjustments to the removal of sectoral trade distortions.

A. *Aggregate Results of PAC-10 Bilateral Tariff and NTB Removal*

Aggregate results for the two experiments are presented in Tables III and IV. The equivalent variation (EV) income measure in column 1 represents the aggregate change in real consumer purchasing power measured in 1985 billions of U.S. dollars. This can be contrasted with the real GDP measure which is price deflated aggregate value added. Table III shows that most of PAC-10 countries would benefit from liberalizing their bilateral tariffs. The region as a whole experiences a U.S.$17.5 billion rise in EV income, although this is very unevenly distributed in both absolute and percentage (of base GDP) terms. Real GDP rises by U.S.$18.2 billion, but Singapore and Taiwan actually experience a fall in real domestic output. This happens primarily because of increased import penetration, but overall employment rises in both countries as their trade orientation shifts to more labor-intensive exports (e.g., textiles) and non-tradeables. China, Malaysia, Thailand, and the Philippines experience real output increases of more than one per cent.

The employment effects of Pacific tariff liberalization are even more salutary than real GDP growth, with 13.5 million workers in new employment and percentage gains which exceed real GDP growth in every country but Japan. In part this is a result of the constraint on total capital stock (i.e., not a dynamic model) and

TABLE III

PAC-10 REGIONAL TARIFF AND NTB LIBERALIZATION

	EV Income (1)	Real GDP (2)	Total Emp. (3)	Total Imports (4)	Total Exports (5)	Pacific Imports (6)	Pacific Exports (7)	Import Emp. (8)	Export Emp. (9)
A. Absolute changes									
U.S.A.	6.5	5.4	312	9.0	7.9	9.3	8.2	494	80
Japan	5.5	6.4	15	10.6	11.5	10.0	10.4	3,513	114
China	3.1	4.0	9,636	2.2	3.3	3.1	2.5	22	3,477
Korea	0.0	0.7	170	2.1	2.8	2.1	2.4	104	151
Taiwan	0.8	–0.1	77	2.2	1.4	1.5	1.9	77	114
Singapore	0.2	0.0	8	0.9	0.7	0.5	0.9	98	12
Malaysia	0.7	0.4	299	1.1	0.8	1.0	1.1	89	190
Thailand	0.2	0.4	998	0.4	0.7	0.6	0.5	36	343
Indonesia	0.3	0.4	1,146	1.0	1.2	1.1	1.3	118	278
Philippines	0.1	0.4	852	0.5	0.8	0.5	0.6	46	339
Total	17.5	18.2	13,513	30.1	30.9	29.8	29.8	4,597	5,098
B. Percentage changes									
U.S.A.	0.2	0.1	0.3	2.3	3.1	8.4	17.8	3.2	2.8
Japan	0.4	0.5	0.0	7.1	5.9	18.3	9.9	31.6	4.0
China	1.0	1.4	1.9	5.2	10.8	15.4	19.0	1.6	18.1
Korea	0.0	0.7	1.8	7.1	9.2	13.0	16.1	10.5	14.0
Taiwan	1.5	–0.1	1.1	9.0	4.1	14.0	9.0	9.5	8.9
Singapore	1.4	–0.2	0.6	4.7	3.3	4.4	9.3	6.5	2.5
Malaysia	2.5	1.4	5.3	7.5	5.4	12.6	10.5	9.0	17.1
Thailand	0.6	1.1	4.8	4.5	7.1	13.3	13.7	8.9	15.9
Indonesia	0.4	0.5	1.8	7.8	5.7	20.1	7.5	15.1	7.3
Philippines	0.4	1.4	4.3	8.9	10.9	23.6	17.5	15.6	16.7
Wgt. ave.*	0.3	0.3	1.7	4.3	5.0	12.2	12.2	13.2	13.8

Note: Absolute figures in 1985 billions of U.S. dollars except total employment (column 3), employment embodied in imports (column 8), and employment embodied in exports (column 9), all of which are in thousands.

* Weighted average.

mobility, which limits growth to more labor-intensive expansion. China has the largest absolute employment gain (9.6 million), but in percentage terms the biggest job creators are Malaysia, Thailand, and the Philippines, exceeding 4 per cent of their labor forces.

Overall, imports and exports increase by an average of 4.3 and 5.0 per cent respectively (columns 4 and 5). Trade between the PAC-10 rises by 12.2 per cent (columns 6 and 7), indicating a significant amount of trade creation from the regional trade agreement. To see the effects of trade on employment linkages, columns 8 and 9 display the absolute and percentage changes in employment embodied in imports and exports. Clearly, the pattern of absolute job creation will depend upon the relative labor force size and labor intensity of each country, while percentage changes depend upon a combination of labor intensity (internationally for

TABLE IV

PAC-10 MULTILATERAL TARIFF AND NTB LIBERALIZATION

	EV Income (1)	Real GDP (2)	Total Emp. (3)	Total Imports (4)	Total Exports (5)	Pacific Imports (6)	Pacific Exports (7)	Import Emp. (8)	Export Emp. (9)
A. Absolute changes									
U.S.A.	11.3	5.1	187	20.5	14.2	14.0	6.0	1,051	148
Japan	7.8	13.6	68	21.3	27.0	8.8	13.8	4,088	314
China	6.8	6.8	14,137	5.9	6.0	2.7	2.7	177	5,184
Korea	0.6	1.3	211	3.7	4.4	2.0	2.4	186	192
Taiwan	0.7	1.0	159	3.1	3.4	1.4	2.5	120	172
Singapore	0.3	0.1	12	1.3	1.1	0.9	0.6	163	11
Malaysia	0.9	0.7	483	1.7	1.5	1.0	1.1	126	219
Thailand	0.8	0.8	1,131	1.3	1.3	0.5	0.5	82	404
Indonesia	0.3	1.1	2,754	1.6	2.4	0.7	1.9	143	596
Philippines	0.5	0.9	1,246	1.1	1.5	0.5	0.8	73	492
Total	30.1	31.4	20,388	61.5	62.9	32.5	32.5	6,208	7,732
B. Percentage changes									
U.S.A.	0.3	0.1	0.2	5.2	5.5	12.6	13.1	6.7	5.3
Japan	0.6	1.0	0.1	14.3	13.8	16.1	13.2	36.8	10.9
China	2.2	2.3	2.8	13.7	20.0	13.4	21.3	13.1	26.9
Korea	0.7	1.5	2.2	12.3	14.6	12.7	16.3	18.7	17.7
Taiwan	1.4	1.7	2.2	13.0	10.3	13.1	11.6	14.8	13.5
Singapore	1.8	0.3	0.9	6.8	5.5	7.9	6.7	10.8	2.3
Malaysia	3.0	2.3	8.6	11.5	9.8	11.8	10.2	12.7	19.7
Thailand	2.2	2.2	5.4	13.4	14.2	11.4	14.3	20.3	18.8
Indonesia	0.4	1.2	4.4	12.3	11.7	13.3	11.3	18.3	15.6
Philippines	1.6	2.9	6.3	21.0	21.2	19.7	22.6	24.8	24.3
Wgt. ave.*	0.5	0.5	2.6	8.7	10.2	13.3	13.3	17.9	20.9

Note: Absolute figures in 1985 billions of U.S. dollars except total employment (column 3), employment embodied in imports (column 8), and employment embodied in exports (column 9), all of which are in thousands.

* Weighted average.

imports, domestically for exports) and trade expansion. For the region as a whole, 4.6 million new jobs are embodied in regional import demand, while exports from the region generate 5.1 million new jobs. The difference is job creation from export links to the rest of the world, which is absent from the import total.

Most countries see increases in employment driven by both domestic and external demand, but imbalances between the two depend upon where the country is on the scale of relative labor intensity. The United States and Japan, for example, create many more jobs abroad than their trading partners create for them, but this is quite inevitable given their relatively capital-intensive domestic production. China is at the other extreme, with 3.4 million extra jobs embodied in its exports, but only 22,000 jobs embodied in its imports. Not surprisingly, the percentage changes in employment embodied in exports reflect significant export employment stimulus experienced by the labor-intensive economies, i.e., China (18.1 per cent), Malaysia

(17.1 per cent), Thailand (15.9 per cent), and the Philippines (16.7 per cent). Even relatively capital-intensive Korea experiences a sharp rise (14.0 per cent) in export employment because of textile market liberalization.

It is observed that trade is creating employment at a faster rate than is overall domestic production. Consider the United States, for example, for which total imports grow by 2.3 per cent while the foreign employment tied to its imports grows by 3.2 per cent. On the supply side, U.S. employment for export production grows 2.8 per cent generating 80,000 jobs. These account for about 26 per cent of the economy-wide job creation (312,000), which is significantly higher than the proportion of aggregate exports to gross output.

B. *Aggregate Results of PAC-10 Multilateral Tariff and NTB Removal*

The second experiment represents a scenario which might approximate more closely the progress of APEC toward free trade than the first scenario. This is because the APEC proposal to complete the trade liberalization process by 2020 will be largely nondiscriminatory. Table IV presents the results of an experiment where all the PAC-10 countries essentially become free traders, not only among themselves but with respect to the rest of the world. When the PAC-10 abolish all nominal tariffs and NTBs, the aggregate regional gains are about 70 per cent larger than those of the first experiment, including over 30 billion 1985 dollars of EV income and real GDP growth, and over 20 million new jobs in the region.[18] While the results across countries are not uniform, every country gains in aggregate income and job creation, with the latter exceeding the former in percentage terms in developing countries. In Malaysia, Thailand, and the Philippines, for example, aggregate employment gains exceed 5 per cent of the labor force. In the case of the United States, however, EV income gains exceed those of within-region liberalization, but its real GDP and employment gains (U.S.$5.1 billion and 187,000 jobs, respectively) fall short of those it would enjoy from the regional agreement (U.S.$5.4 billion and 312,000 jobs). This may be because the United States is similar to other non-Japanese OECD countries and benefits from preferential access to the Pacific market.

Compared with the first experiment, the increases in total imports and exports are significantly larger in this scenario. It is noteworthy that regional trade expands substantially more than overall trade even when the liberalization is nondiscriminatory. In percentage terms, the most significant aggregate adjustments are in trade-embodied employment. Imports into the region generate 17.9 per cent more jobs for the PAC-10 compared to the baseline, while exports employ 20.9 per cent more than in the status quo situation. Clearly, the existing system of import protection within the Pacific region is a serious impediment to economic efficiency and growth.

[18] Compare these figures to the dynamic estimates for GATT by Goldin, Knudsen, and van der Mensbrugghe [9]. With the present model, we do not remove rest-of-the-world tariffs, so it is likely that these results understate the potential gains from global liberalization even in a comparative static framework.

As is often the case with trade and trade theory, aggregate results tell only part of the story and can in many cases give misleading signals about the institutional feasibility of reform measures. In particular, efficiency gains which are realized for the world may not be conferred on the region, gains for the region may not be conferred upon all the member countries, and country gains are rarely distributed uniformly or even univalently across sectors and other domestic institutions. As was mentioned in Section I, this issue is central to the distinction between trade theory and trade policy practice. Generally speaking, both the sign of adjustments and their amplitude change (the latter increasing) with the transition to a more microeconomic perspective.

There are two paths in the decomposition of aggregate trade effects, between-country and within-country effects, and some discussion is devoted to each below. From the intercountry perspective, the aggregate domestic impact of trade policy is decomposed into an elaborate mosaic of bilateral relations, each with their own political, cultural, and geographic implications. Within a country, aggregate effects are decomposed across sectors and other more specialized economic institutions, and here arises the complex political economy of industry, labor, and domestic welfare policies. Each of the two perspectives gives rise to very different issues, but ultimately the two must be reconciled if trade policy is to be managed coherently.

C. *Regional Trade and Employment Linkages*

To see the intercountry implications of Pacific trade liberalization more clearly, Table V presents bilateral trade flows among each of the PAC-10 countries and the rest of the world. The figures given in the table are for the second experiment, changes in bilateral import and export flows resulting from PAC-10 tariff and NTB removal with respect to all imports. The rows of the table are exporting countries, the columns importing countries. Row and column sums of the table thus correspond to the aggregate country export and import changes, while the matrix details their bilateral composition. As the aggregate results indicate (Table IV), Japan experiences a sharp rise in both imports and exports, totaling U.S.$21.3 and U.S.$27.0 billion respectively.

While the nominal results are of interest, changing bilateral trade patterns are easier to discern in the percentage table. Although there are strong trade linkages among the PAC-10 countries, the percentage changes in trade volume differ considerably across different bilateral partners. For example, Thailand increases import demand from neighboring China by 18.9 per cent, but from its southern neighbor Malaysia by only 5.3 per cent. U.S. demands for Chinese, Korean, and Philippine goods increase by 17.0, 17.5, and 20.8 per cent respectively, but only 2.3 per cent more ROW goods come into the country. Singapore increases imports from China and the Philippines by 14.2 and 21.4 per cent, but from the United States by only 3.4 per cent.

From an export perspective, Chinese prospects improve substantially vis-à-vis Japan (25.8 per cent), Indonesia (22.6 per cent) and the Philippines (24.3 per cent),

TABLE V

CHANGES IN BILATERAL TRADE FLOWS RESULTING FROM PAC-10 GLOBAL TARIFF AND NTB REMOVAL

A. Millions of 1985 U.S. dollars

Origin	Destination USA	JPN	CHN	KOR	TWN	SGP	MYS	THA	IDN	PHL	ROW	Total
U.S.A.		3,975	395	680	443	76	121	60	161	137	8,192	14,240
Japan	8,451		2,102	1,025	800	195	407	313	401	87	13,261	27,041
China	641	1,660		0	0	251	41	34	53	67	3,255	6,003
Korea	1,720	546	0		25	27	28	22	24	35	1,959	4,386
Taiwan	1,818	384	121	49		38	35	25	28	18	932	3,449
Singapore	185	104	12	20	19		184	53	62	7	426	1,072
Malaysia	220	471	16	101	47	120		26	6	62	458	1,526
Thailand	166	170	36	30	25	20	59		7	6	807	1,325
Indonesia	386	1,181	30	79	47	114	15	5		33	486	2,376
Philippines	412	279	10	17	18	18	65	8	2		692	1,521
ROW	6,477	12,530	3,159	1,666	1,708	480	718	757	866	620		28,982
Total	20,474	21,301	5,880	3,667	3,132	1,340	1,674	1,305	1,608	1,072	30,466	91,920

B. Percentage

Origin	Destination USA	JPN	CHN	KOR	TWN	SGP	MYS	THA	IDN	PHL	ROW	Ave.
U.S.A.		16.5	8.8	11.3	10.1	3.4	7.1	6.8	10.1	15.9	3.9	5.5
Japan	12.5		14.9	14.2	15.7	7.3	15.2	14.3	16.2	22.3	14.4	13.8
China	17.0	25.8		0.0	0.0	14.2	15.9	18.9	22.6	24.3	19.0	20.0
Korea	17.5	13.9	0.0		15.0	10.7	10.6	14.6	12.9	23.0	12.9	14.6
Taiwan	11.4	12.2	15.8	12.8		7.0	11.2	10.2	10.8	18.5	7.9	10.3
Singapore	4.5	7.1	7.1	9.7	8.0		8.6	8.8	8.1	18.7	4.3	5.5
Malaysia	10.0	12.6	10.4	9.6	11.8	5.8		5.3	16.3	20.1	8.9	9.8
Thailand	11.7	17.6	15.7	24.4	19.5	8.5	12.8		19.9	21.4	14.2	14.2
Indonesia	8.6	12.4	10.1	10.6	12.3	11.1	11.9	12.1		23.2	13.7	11.7
Philippines	20.8	25.1	12.3	19.8	21.4	21.5	34.5	20.3	11.0		19.7	21.2
ROW	2.3	13.3	13.9	11.9	12.9	5.5	11.1	15.3	11.5	22.0		7.7
Average	5.2	14.3	13.7	12.3	13.0	6.8	11.5	13.4	12.3	21.0	6.6	

while its exports to Singapore and Malaysia rise by much smaller percentages.[19] Likewise, the Philippines increases exports to Malaysia by 34.5 per cent, but its exports to China and Indonesia rise by only 12.3 and 11.0 per cent respectively. Thus, bilateral trade linkages in the region, and the economic and political incentives which correspond to them, are quite asymmetric.

Table VI presents analogous results in terms of employment linkages. The rows represent thousands of jobs created abroad by export demand, the columns show the same units of domestic employment created by import demand. For completeness, we have also included domestic employment generated by domestic demand

[19] Since Chinese exports to Korea and Taiwan in 1985 were zero according to the official statistics [10], these values remained zero after the trade liberalization simulation.

TABLE VI

EMPLOYMENT CREATION RESULTING FROM PAC-10 GLOBAL TARIFF AND NTB REMOVAL

A. Thousands

Origin \ Destination	USA	JPN	CHN	KOR	TWN	SGP	MYS	THA	IDN	PHL	ROW	Total
U.S.A.	39	43	4	6	4	1	1	1	1	1	85	187
Japan	89	–246	24	15	10	3	5	3	5	1	159	68
China	198	2,452	8,954	0	0	114	37	35	97	34	2,217	14,137
Korea	72	47	0	19	1	1	1	1	1	1	68	211
Taiwan	65	62	4	4	–13	2	1	1	1	1	31	159
Singapore	10	0	0	0	0	1	2	0	1	0	–4	12
Malaysia	19	121	2	24	9	7	263	1	1	4	31	483
Thailand	34	160	8	35	8	8	34	727	2	1	114	1,131
Indonesia	107	250	6	15	12	12	5	1	2,158	6	182	2,754
Philippines	111	175	1	3	4	3	11	1	0	754	181	1,246
ROW	346	777	128	85	71	13	27	37	34	24	n.a.	1,541
Total	1,090	3,842	9,131	206	108	164	389	809	2,301	826	3,065	21,929

B. Percentage

Origin \ Destination	USA	JPN	CHN	KOR	TWN	SGP	MYS	THA	IDN	PHL	ROW	Ave.
U.S.A.	0.0	18.3	7.5	10.8	9.0	2.9	7.0	5.6	8.8	14.1	3.6	0.2
Japan	9.0	–0.4	13.9	13.7	13.6	6.6	13.9	12.4	16.3	21.3	11.4	0.1
China	15.4	45.3	1.8	0.0	0.0	14.4	15.8	26.9	23.9	26.8	20.4	2.8
Korea	20.9	26.6	0.0	0.2	14.6	12.6	11.1	17.5	14.2	24.3	12.9	2.2
Taiwan	12.1	28.7	16.3	16.5	–0.2	6.3	9.0	9.5	10.4	21.3	7.6	2.2
Singapore	6.4	2.1	6.8	10.1	7.3	0.1	6.3	4.6	8.0	19.1	–1.9	0.9
Malaysia	10.9	43.2	9.9	24.3	16.2	6.6	4.7	12.1	17.7	23.2	8.9	8.6
Thailand	12.2	44.5	11.9	27.3	18.2	9.0	11.0	3.5	19.3	29.9	13.2	5.4
Indonesia	10.9	30.6	8.9	19.6	15.3	9.4	11.2	11.1	3.5	23.8	11.4	4.4
Philippines	22.8	41.9	9.0	20.0	16.8	18.6	30.2	18.6	9.6	3.8	18.0	6.3
ROW	3.3	24.4	13.7	17.5	14.9	4.7	11.1	19.7	12.0	23.7	n.a.	n.a.

on the diagonal of the matrices of absolute and percentage changes. In percentage terms, the results on employment creation are more variegated than those on the trade flow changes. As has been observed in the aggregate results, developing countries gain more employment than developed countries, but the patterns of employment creation are quite complex. The United States and Japan create far more jobs for foreigners than conversely, but the disparity for Japan is much greater. While creating over 4 million jobs abroad with its import demand, Japan generates only 68,000 new jobs to meet demand from all sources. Job creation from domestic demand is actually negative, the result of import penetration in relatively labor-intensive sectors (Taiwan also experiences this). In net of domestic-demand job creation, China is a relatively extreme opposite, accruing 5.2 million jobs from exports and generating only 177,000 with its new import demand.

It is worth emphasizing at this point that all countries gain substantially from

these trade reforms. Although the absolute and percentage changes in trade flows and employment creation differ considerably across countries, all the PAC-10 countries experience trade expansion and employment gains in the aggregate and bilaterally. The bilateral picture is indeed more complex, but it is a positive scenario. An even more challenging policy situation arises as the results are decomposed within countries, revealing adjustments of output and employment for individual sectors.

D. *Domestic Structural Adjustment to Trade Liberalization*

To give some indication of more detailed effects, Table VII presents sectoral adjustments in output, demand, factor use, and trade for the PAC-10 resulting from multilateral tariff and NTB removal (experiment 2). Even the most casual inspection of these results makes clear how variegated the domestic adjustment experience is, both within and between countries. For example, even though the United States gains 187,000 jobs across its economy, 201,000 are lost in the textile sector (column 4). As many have predicted, Japan's agricultural sector shrinks by 13.8 per cent in real terms and sheds 639,000 jobs, but this and layoffs in petroleum and mining are more than offset by expansion in manufacturing and services. As one might expect, its vehicle sector expands robustly (14.6 per cent), driven largely by exports (26.7 per cent).

The liberalization of the textile trade has dramatic effects on Korea, Taiwan, Singapore, and the Philippines, each of which sees sharp expansion in textile production and strong resource pulls to this export sector. This example raises a more general point. The concept of a declining industry is often applied to older production infrastructure in mature economies, but these results indicate that the idea is a more relative one. In the contention for limited resources, sectors in growing economies must be competitive not only internationally but domestically. Changing trade regimes can put even newer activities on the defensive as other sectors contend for limited labor and capital to meet new export opportunities.

The sectoral results reported in Table VII must be interpreted with caution. It needs to be remembered that this model is calibrated to 1985 data which were set when revealed comparative advantages for exports in textiles for the Asian NIEs were considerably higher than what they are today.[20] Because large percentages of Asian NIE textile exports are to the United States (Table I), which has very high ad valorem equivalents of NTBs on textiles (41 per cent), the complete removal of trade barriers would cause a sharp increase in the production of textiles in the Asian NIEs. As labor is drawn from other sectors in these countries, the output levels of many of the other sectors fall. Since the comparative advantage of these countries has shifted since l985 from textiles to consumer electronics, machinery,

[20] The index of revealed comparative advantage for exports is defined as the ratio of a country's share in exports of a particular product to its share in total exports:

$$RCA_i = \frac{E_{ik}/\sum_k E_{ik}}{\sum_i E_{ik}/\sum_i \sum_k E_{ik}},$$

where E_{ik} are exports of commodity i to country k.

TABLE VII

SECTORAL RESULTS FOR PAC-10 GLOBAL TARIFF AND NTB REMOVAL

		S (1)	D (2)	Cons. (3)	L (4)	L (%) (5)	K (6)	M (7)	E (8)	LM (9)	LE (10)
U.S.A.	AgForFish	3.4	1.4	0.7	76	3.7	3.3	11.1	28.1	245	48
	PetMining	0.6	0.3	0.0	7	0.9	0.5	–1.1	3.8	4	1
	FoodProc	0.9	0.7	0.6	18	1.2	0.7	1.1	6.9	9	4
	Textiles	–11.4	–1.8	2.7	–201	–11.3	–11.7	38.8	–4.0	591	–2
	OthNonDur	0.2	–0.1	0.2	12	0.3	–0.1	–0.1	4.5	0	9
	Metals	–0.1	0.1	0.1	0	0.0	–0.4	2.2	2.4	13	2
	Machinery	0.2	0.5	0.9	15	0.3	–0.1	4.8	3.5	115	22
	TranspEqp	–0.1	0.6	0.8	0	0.0	–0.5	7.7	5.1	23	11
	OthDurable	–0.3	0.3	0.8	–6	–0.2	–0.6	5.8	2.8	75	7
	Services	0.2	0.1	0.1	267	0.3	–0.1	–2.3	4.1	–24	47
Japan	AgForFish	–13.3	0.1	2.4	–639	–13.8	–13.2	89.9	1.3	3,435	0
	PetMining	–2.3	0.5	2.1	–5	–2.6	–2.0	4.1	8.8	134	0
	FoodProc	0.5	1.1	2.3	5	0.3	0.9	13.2	11.5	43	1
	Textiles	0.7	1.2	1.6	4	0.6	1.2	19.0	10.6	70	6
	OthNonDur	2.8	2.0	0.6	31	2.6	3.3	–1.5	12.0	0	9
	Metals	5.6	4.7	0.6	72	5.4	6.1	–2.1	9.9	–3	13
	Machinery	4.8	3.0	1.2	170	4.6	5.2	0.2	10.1	0	86
	TranspEqp	14.8	9.1	4.3	153	14.6	15.3	0.6	26.7	0	85
	OthDurable	3.2	2.2	0.7	150	3.0	3.6	0.0	9.8	1	55
	Services	0.5	0.7	0.1	128	0.3	1.0	19.4	7.0	408	60
China	AgForFish	2.6	1.5	0.6	8,963	2.9	0.0	9.8	34.1	21	3,612
	PetMining	4.0	2.0	1.9	545	4.9	2.0	2.2	15.5	0	244
	FoodProc	2.4	2.0	1.8	220	3.6	0.7	17.7	16.9	8	59
	Textiles	3.6	3.0	3.2	571	4.8	1.8	32.4	21.2	28	290
	OthNonDur	0.5	1.7	2.6	255	1.7	–1.1	13.4	16.5	33	87
	Metals	0.6	1.0	1.7	177	2.3	–0.6	3.1	11.1	2	19
	Machinery	0.1	2.9	4.4	278	1.5	–1.3	14.9	14.9	47	94
	TranspEqp	–5.7	5.0	7.4	–201	–4.2	–6.9	34.2	16.9	20	14
	OthDurable	0.8	2.1	3.5	124	1.8	–1.0	31.9	12.5	25	50
	Services	2.5	1.7	1.6	3,205	3.0	0.2	–5.7	20.1	–7	714
Korea	AgForFish	–3.1	0.6	0.1	–60	–1.6	–3.3	34.6	21.3	109	31
	PetMining	–0.9	0.1	1.6	0	0.0	–1.8	2.0	5.3	3	1
	FoodProc	–0.2	1.0	0.8	2	0.5	–1.3	27.8	7.9	8	1
	Textiles	28.5	19.6	4.7	209	29.2	26.9	21.6	38.7	7	125
	OthNonDur	–0.3	3.9	3.3	2	0.4	–1.3	24.7	6.4	23	5
	Metals	0.5	1.2	3.1	4	1.4	–0.4	12.2	6.0	6	4
	Machinery	1.8	4.1	6.3	12	2.5	0.7	11.1	7.0	15	11
	TranspEqp	6.9	4.8	5.3	11	7.5	5.7	19.2	17.4	2	8
	OthDurable	–0.6	1.6	3.6	0	0.2	–1.6	19.1	4.2	9	2
	Services	0.2	0.2	–0.8	33	1.0	–0.8	3.2	2.4	4	5
Taiwan	AgForFish	0.5	1.9	1.1	22	1.0	–0.5	19.8	33.5	41	59
	PetMining	–5.2	–1.0	2.5	–6	–4.2	–5.6	4.1	–0.6	4	0
	FoodProc	0.3	2.5	2.8	4	0.9	–0.6	31.6	7.2	11	4
	Textiles	23.7	16.7	3.7	126	24.3	22.4	22.0	31.7	5	77
	OthNonDur	1.3	4.1	1.7	9	1.9	0.4	17.1	3.0	18	3
	Metals	–5.5	–1.5	3.0	–25	–5.0	–6.4	17.7	–1.2	9	–1
	Machinery	5.6	5.4	7.7	19	6.0	4.4	10.5	8.4	10	16
	TranspEqp	–6.5	5.1	12.1	–6	–6.2	–7.5	54.1	3.6	5	1
	OthDurable	3.5	2.9	4.6	16	3.9	2.4	17.7	6.3	6	14
	Services	–0.4	0.2	–0.7	0	0.0	–1.5	5.8	–1.2	11	–2

TABLE VII (Continued)

		S (1)	D (2)	Cons. (3)	L (4)	L (%) (5)	K (6)	M (7)	E (8)	LM (9)	LE (10)
Singa-	AgForFish	–6.3	1.2	2.3	–1	–6.1	–6.4	8.1	2.6	27	0
pore	PetMining	12.1	9.5	3.2	3	12.4	12.0	9.6	12.8	82	3
	FoodProc	1.6	2.0	4.0	1	1.8	1.5	4.5	5.1	2	1
	Textiles	21.4	8.5	4.2	12	21.5	21.0	7.6	28.1	5	9
	OthNonDur	–0.2	1.0	3.1	0	0.0	–0.3	4.5	2.2	4	1
	Metals	–3.2	0.0	2.2	–1	–3.1	–3.5	2.6	–2.5	1	0
	Machinery	2.5	3.4	5.5	6	2.7	2.3	4.5	3.1	8	5
	TranspEqp	–2.3	2.3	4.8	–1	–2.2	–2.5	10.9	5.2	1	1
	OthDurable	1.5	1.2	2.9	0	1.7	1.3	2.2	4.1	1	0
	Services	–1.0	0.7	0.3	–7	–0.8	–1.2	6.6	–4.8	33	–8
Malay-	AgForFish	11.2	2.5	1.3	298	16.9	9.9	10.5	31.5	67	169
sia	PetMining	0.3	2.1	2.9	2	4.5	–1.7	8.6	2.4	2	1
	FoodProc	2.5	3.3	2.5	9	6.9	0.5	13.2	7.6	7	2
	Textiles	8.5	7.4	7.5	13	12.3	5.6	18.7	18.9	4	10
	OthNonDur	3.0	2.8	3.8	19	7.0	0.6	10.1	7.5	7	9
	Metals	10.5	4.1	6.6	9	14.1	7.2	4.5	17.8	1	5
	Machinery	11.3	9.5	11.2	29	15.6	8.6	10.4	12.7	18	20
	TranspEqp	–8.6	7.5	15.5	–2	–5.4	–11.1	27.4	17.3	4	0
	OthDurable	–8.4	2.7	6.9	–3	–4.6	–10.3	19.7	–3.5	4	0
	Services	0.2	1.0	0.4	109	3.7	–2.5	9.6	3.0	12	5
Thai-	AgForFish	2.1	3.5	0.9	718	5.7	0.7	47.9	22.5	48	286
land	PetMining	–4.7	0.4	3.2	–1	–1.1	–5.7	7.8	4.5	6	0
	FoodProc	5.7	3.0	2.8	49	9.2	4.0	19.6	15.3	3	22
	Textiles	4.5	3.4	2.7	50	7.5	2.4	28.0	17.1	4	21
	OthNonDur	–1.0	1.8	4.9	8	1.9	–2.8	11.4	9.0	6	9
	Metals	7.2	2.8	5.7	15	9.8	4.7	3.8	17.7	0	9
	Machinery	4.1	6.0	8.7	6	7.1	2.0	8.8	11.0	5	4
	TranspEqp	–9.2	5.1	9.5	–4	–6.8	–11.1	46.3	10.9	4	0
	OthDurable	0.1	3.1	4.9	5	3.4	–1.5	24.5	7.9	3	3
	Services	2.0	1.2	0.8	284	4.7	–0.2	0.2	12.8	1	50
Indo-	AgForFish	–0.1	–0.7	–0.5	1,724	5.0	–1.3	24.2	18.0	103	395
nesia	PetMining	7.7	3.2	–0.1	99	14.2	7.3	2.5	11.2	0	43
	FoodProc	–0.9	–0.7	–0.8	59	3.5	–2.7	33.4	10.2	3	3
	Textiles	5.7	3.1	2.1	116	9.9	3.3	25.0	22.5	1	44
	OthNonDur	–2.4	–0.3	3.2	27	2.2	–4.0	12.7	10.1	10	25
	Metals	–7.3	–1.8	4.2	–8	–2.8	–8.7	8.8	1.8	2	1
	Machinery	–3.1	8.4	15.9	3	1.4	–4.7	14.0	18.1	12	3
	TranspEqp	–10.4	2.6	6.9	–46	–7.3	–12.9	40.3	10.8	11	1
	OthDurable	–6.2	0.3	2.9	–7	–1.9	–7.9	28.7	3.0	5	0
	Services	0.2	–0.4	–0.5	788	3.6	–2.7	–3.2	11.9	–3	81
Philip-	AgForFish	1.4	0.2	0.1	470	4.8	–1.4	47.2	39.2	21	172
pines	PetMining	–4.5	3.0	6.5	–1	–0.7	–6.6	21.9	9.6	9	1
	FoodProc	0.1	0.6	0.6	21	3.9	–2.3	36.5	6.9	3	3
	Textiles	30.6	17.5	8.8	166	33.5	25.5	22.3	49.5	4	103
	OthNonDur	–5.8	2.1	5.7	–13	–2.7	–8.6	35.4	5.0	11	3
	Metals	17.3	12.1	7.4	22	21.8	14.5	16.2	27.9	1	10
	Machinery	44.7	24.0	17.9	84	48.9	39.9	24.4	46.8	14	71
	TranspEqp	–7.5	4.3	5.9	–2	–4.6	–10.3	56.5	2.8	2	0
	OthDurable	0.9	3.9	7.5	4	4.4	–1.8	38.1	11.1	1	2
	Services	2.8	1.6	0.9	494	6.1	–0.2	4.3	12.0	6	128

Notes: 1. Definition of variables: S = output, D = composite demand, Cons. = consumption, L = employment, K = capital demand, M = imports, E = exports, LM = employment embodied in imports, and LE = employment embodied in exports.
2. Employment figures (columns 4, 9, and 10) in absolute changes (thousands); other figures are percentage changes.

metal products, and transportation equipment, quite different results are likely to emerge if data are calibrated to a more recent year.[21] Nevertheless, the present results suggest that even the most dynamic of Asian economies will realize the fullest gains of a more liberal regional trade regime only by greater innovation and infusions of external capital. In the absence of these factors, the domestic-resource rivalry in these countries could be fierce. Indeed, avoiding drastic structural adjustment may be another reason for the resistance to removal of protection.

The sectoral composition of liberalization effects holds more information about the real consequences and institutional feasibility of policies which would lead to these kinds of adjustment. As one would expect from a trade-driven adjustment process, sectoral imports and exports (columns 7 and 8) are making greater adjustments than domestic output. Even more dramatic are the changes in bilateral sectoral trade flows, and these often constitute the focal points of trade negotiation and, failing that, retaliation. Such a detailed analysis is outside the scope of the present study, but the separate bilateral and sectoral results make one thing very apparent: only detailed empirical work of this kind can clearly identify the practical incentives and impediments to more efficient international markets and fuller realization of the benefits of greater multilateral trade linkages.

V. CONCLUSIONS

The Pacific Basin is the largest and fastest growing multilateral trading region of the world, and economic interdependence among countries in this region has grown tremendously in the past three decades. While the Asia-Pacific region is significantly increasing its share of world output and trade, its intra-regional trade is increasing even faster. Although Pacific trade is still impeded and distorted by tariff and nontariff barriers, the heads of APEC countries agreed at the Bogor summit in 1994 upon a timetable to liberalize trade and investment. Using a CGE model linking ten Asia-Pacific countries, we have estimated the impact of trade liberalization, giving particular attention to the adjustment which would occur in domestic labor markets.

Our results indicate that the region as a whole would gain significantly more when the PAC-10 countries remove tariff and nontariff barriers on all imports, compared with the case where they remove trade barriers only among themselves. This suggests that open regionalism would bring more benefits to the Asian Pacific economies than regional integration that discriminates against economies outside the region. Nondiscriminatory liberalization would create over 20 million new jobs in the region, but both the absolute and percentage changes differ considerably across countries. For example, employment gains are much larger for China and ASEAN countries than for the United States or Japan. Real GDP gains for the region can exceed U.S.$30 billion even in this comparative static framework. Again, developing countries in the region would undergo larger percentage increases in real output than developed countries.

[21] Nineteen eighty-five was the most recent year for which input-output tables were available for all ten Asia-Pacific countries.

An examination of bilateral trade and employment linkages reveals that the composition of regional demand and supply would shift significantly under more liberal Pacific trading rules. Although there are strong asymmetries in these linkages, multilateral cooperation to achieve a less distorted regional trade regime would lead to employment gains for every Pacific country. Whether these results suggest the existence of more complex self-interested strategies, including patterns of optimal tariff discrimination, is an open question. While they suggest the existence of a large set of cooperative and noncooperative bargaining solutions, most of the region's population would realize considerable gains if the simple rule of more liberal, undistorted trade were applied.

At the sectoral level, compositional effects are quite variegated, exhibiting large absolute and percentage variations. For smaller trading nations, output adjustments of more than 10 per cent are not unusual and sectoral imports and exports can change by much larger percentages. Even the United States experiences significant shifts in output and trade flows, particularly in textiles, but the negative employment effects in contracting sectors are outnumbered by gains elsewhere. Clearly, the system of import protection in place in the Pacific since 1985 has fostered significant distortions in the composition of domestic production and trade among the Asian Pacific economies.

At the next level of detail, beyond individual sectors, lies the complex network of bilateral commodity trade flows. Here, the adjustments are even more dramatic than those for the sectoral trade aggregates. Discussion of these detailed results is beyond the scope of the present study, however. The increasing amplitude of effects as one examines more and more detailed trade linkages reveals the importance of this type of focused empirical work for understanding two essential issues in modern trade theory. The first is the adjustment process which ensues from removing existing systems of protection, always more complex and ambiguous than would be presumed from aggregate welfare analysis. The second is the political economy of protection which has given rise to the barriers in the first place. This can be fully understood not by the naive application of aggregate rules-of-thumb, but with a more detailed analysis of the incidence of well crafted trade policy.

In light of the factor endowment patterns of the countries in this region, one major conclusion can be drawn from our results: Pacific trade liberalization will facilitate the emergence of a new reciprocal basis for multilateral gains from trade. Under an expanding system of liberal trade, capital-intensive and labor-intensive countries can work together to consolidate the basis for regional growth and prosperity. Specifically, developing countries offer new regional resources and a broad spectrum of investment opportunities to their industrialized partners, while the latter can contribute their financial capital and technology to accelerate the expansion of real output and employment in developing countries.

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APPENDIX

STRUCTURAL EQUATIONS FOR THE PACIFIC CGE MODEL

A. *Structural Equations*

Consumer behavior

$$C_i = LES_C\,(P_{Di},\ Y) = \gamma_i + \frac{\eta_i}{P_{Di}}\left(Y - \textstyle\sum_j P_{Dj}\gamma_j\right) \tag{A.1}$$

Production technology

$$Si = \min\{CES_S\,(L_{Di},\ K_{Di},\ \phi_i),\ V_{1i}/a_{1i,\ldots,}\ V_{ni}/a_{ni}\} \tag{A.2}$$

$$V_{ij} = a_{ij}S_j \tag{A.3}$$

Factor demands

$$LD_i/KD_i = \psi\,(w/r_{Di};\ \phi_i) \tag{A.4}$$

$$KD_i = KD_i^d + \sum_f KD_i^f \tag{A.5}$$

Factor supplies

$$LS = LES_L\ (w,\ Y) \tag{A.6}$$

$$KS_i = KS_i^{\,d} + \sum_f KS_i^f \tag{A.7}$$

Commodity demands, supplies, and allocation of traded goods

$$D_i = \bar{A}_{D_i}\left[\sum_k \beta_i^k\ (D_i^k)^{(\sigma_i-1)/\sigma_i}\right]^{\sigma_i/(\sigma_i-1)} \tag{A.8}$$

$$D_i^f/D_i^d = g_D(P_{Di}^f/P_{Di}^d;\ \sigma_i) \tag{A.9}$$

$$S_i = \bar{A}_{Si}\left[\sum_k \delta_i^k\,(S_i^k)^{(\tau_i+1)/\tau_i}\right]^{\tau_i/(\tau_i+1)} \tag{A.10}$$

$$S_i^f/S_i^d = g_S\,(P_{Si}^f/P_{Si}^d;\ \tau_i) \tag{A.11}$$

Composite domestic prices

$$P_{Di}D_i = \sum_k P_{Di}^k D_i^k \tag{A.12}$$

$$P_{Si}\,S_i = \sum_k P_{Si}^k S_i^k \tag{A.13}$$

Domestic market equilibrium

$$D_i = C_i + \textstyle\sum_{j=1}^n V_{ij} \tag{A.14}$$

$$D_i^d = S_i^d \tag{A.15}$$

$$LS = \sum_{i=1}^{n} LD_i \tag{A.16}$$

$$\sum_{i=1}^{n} KD_i^d = \sum_{i=1}^{n} KS_i^d \tag{A.17}$$

Income and government revenue

$$Y = (1 - t_L) \sum_{i=1}^{n} wLD_i + (1 - t_K) \sum_{i=1}^{n} r_{Di} KD_i + Y_G + e \sum_f \sum_i \theta_i^f \rho_i^f (1 + t_{Di}^f) PW_{Di}^f D_i^f \tag{A.18}$$

$$Y_G = t_L \sum_i wLD_i + t_K \sum_i r_{Di} KD_i + \sum_k \sum_i (t_{Di}^k P_{Di}^k D_i^k + t_{Si}^k P_{Si}^k S_i^k) \tag{A.19}$$

Balance of payments

$$B^f = \sum_i [PW_{Si}^f S_i^f - \{1 + \theta_i^f \rho_i^f (1 + t_{Di}^f)\} PW_{Di}^f D_i^f] \tag{A.20}$$

Foreign commodity prices

$$P_{Di}^f = (1 + t_{Di}^f) e PW_{Di}^f \tag{A.21}$$

$$P_{Si}^f = [1/(1 + t_{Si}^f)] e PW_{Si}^f \tag{A.22}$$

Foreign demand and supply functions

$$D_i^{h,ROW} = \bar{A}_{Mi} (PW_{Si}^{h,ROW})^{\zeta_i} \tag{A.23}$$

$$S_i^{h,ROW} = \bar{A}_{Ei} (PW_{Di}^{h,ROW})^{\zeta_i} \tag{A.24}$$

Trade flow and price equivalence

$$D_i^{h,f} = S_i^{f,h} \tag{A.25}$$

$$P_{Di}^{h,f} = P_{Si}^{f,h} \tag{A.26}$$

Numéraire

$$\sum_i \omega_i P_{Di}^d = 1 \tag{A.27}$$

B. *Variable and Parameter Definitions*

Price variables

- e = Exchange rates (domestic / foreign currency)
- $P_{Di}^{h,f}$ = Demand price by destination (h) and origin (f)
- $P_{Si}^{h,f}$ = Supply price by origin (h) and destination (f)
- P_{Di}^d = Domestic purchaser price of domestic goods
- P_{Di}^f = Domestic purchaser price of imports from region f (equivalent to $P_{Di}^{d,f}$)
- P_{Si}^d = Domestic producer price in the domestic market
- P_{Si}^f = Domestic producer price for exports to region f (equivalent to $P_{Si}^{d,f}$)
- P_{Di} = Purchaser price of composite domestic demand
- P_{Si} = Producer price of domestic output
- $PW_{Di}^{h,f}$ = World demand price by destination (h) and origin (f)
- $PW_{Si}^{h,f}$ = World supply price by origin (h) and destination (f)
- PW_{Di}^f = World price of imports from region f
- PW_{Si}^f = World price of exports to region f
- r_{Di} = Rental rate on capital
- w = Average wage rate

Quantity variables

- C_i = Personal consumption (C_0: leisure)
- $D_i^{h,f}$ = Demand by destination (h) and origin (f)
- D_i^d = Domestic demand for domestic goods

D_i^f = Domestic demand for imports from region f (equivalent to $D_i^{d,f}$)
D_i = Composite goods for domestic consumption
KD_i^d = Domestic demand for domestic capital
KD_i^f = Domestic demand for imported capital (inward direct foreign investment stock) from region f (exogenous)
KS_i^d = Domestic supply of domestic capital
KS_i^f = Outward direct foreign investment stock in region f (exogenous)
LD_i = Demand for labor
LS = Aggregate labor supply
$S_i^{h,f}$ = Supply by origin (h) and destination (f)
S_i^d = Domestic production for domestic use
S_i^f = Domestic production for export to region f (equivalent to $S_i^{d,f}$)
S_i = Gross domestic output
V_{ij} = Demand for intermediate good i in sector j

Nominal variables

B^f = Net foreign borrowing from region f (exogenous)
Y = Nominal domestic income
Y_G = Government income

Structural and policy parameters

a_{ij} = Intermediate use coefficients (Leontief technology)
γ_i = Subsistence consumption of good i
η_i = Marginal budget share for consumption of good i
ϕ_i = Elasticity of substitution between labor and capital in domestic production
σ_i = Elasticity of substitution between domestic and imported products
τ_i = Elasticity of transforniation between domestic and exported products
ζ_i = ROW import supply elasticity
ξ_i = ROW export demand elasticity
$\bar{A}_{Di}$ = Calibrated intercept parameter for composite product demand
$\bar{A}_{Si}$ = Calibrated intercept parameter for composite product supply
$\bar{A}_{Mi}$ = Calibrated intercept parameter for ROW import supply
$\bar{A}_{Ei}$ = Calibrated intercept parameter for ROW export demand
β_i^k = Base share parameter of demand by origin in the composite demand
δ_i^k = Base share parameter of supply by destination in the composite demand
θ_i^f = Share of quota rents accrued to foreigners
ρ_i^f = Ad valorem equivalent of nontariff barriers on imports from region f
t_{Di}^d = Indirect tax rate on domestic sector production
t_{Di}^f = Ad valorem tariff rate on imports from region f
t_K = Tax rate on capital income
t_L = Tax rate on labor income
t_{Si}^d = Producer tax or subsidy on domestic deliveries

t_{Si}^{f} = Tax or subsidy on exports to region f
ω_i = Domestic expenditure shares

Indices

i, j : sectors
k = {PAC-10 countries, ROW}
h = {PAC-10 countries}
d = domestic country
f = set of foreign subregions (nine regional partners and ROW)