

The Uruguay Round of Trade Negotiations: Industrial and Geographic Effects in the United States

History records many international trade negotiations, some trivial and some impressive, but no others so comprehensive as the Uruguay Round. As the negotiations peaked, on December 15, 1993, in Geneva, Switzerland, more countries—117 in all—reached a consensus on more issues than in any previous negotiation. Among other things, the Uruguay Round participants agreed to liberalize trade in agricultural products, to reduce tariffs on industrial products by an average of more than one-third, and to establish a World Trade Organization both to facilitate the implementation of multilateral trade agreements and to serve as a forum for future negotiations.¹

The chief purpose of such trade agreements is to improve living standards. As trade barriers come down, countries will be stimulated to channel more of their resources into the activities they carry on relatively most efficiently in the world economy. Total exports, investment, and income will increase.

While this general outcome is widely expected from the Uruguay Round agreements, accurately quantifying their economic impact is a formidable undertaking, given their breadth and the number of countries involved. Evaluating the negotiated reductions in barriers against trade in services (such as accounting or legal services) is especially difficult. Those barriers are not readily measurable, and internationally comparable data on services imports are not available.

Fewer difficulties are encountered in appraising the agreements to liberalize trade in goods, and some fairly sophisticated estimates have been published of the effects of these agreements on world trade and income. Among the most recent and comprehensive are estimates by the Secretariat of the General Agreement on Tariffs and Trade. These estimates suggest that the agreements might raise annual world income by as much as \$510 billion, measured in 1990 U.S. dollars, by the year 2005. Of this \$510 billion, roughly \$120 billion would accrue to the United States (GATT 1994, p. 34).

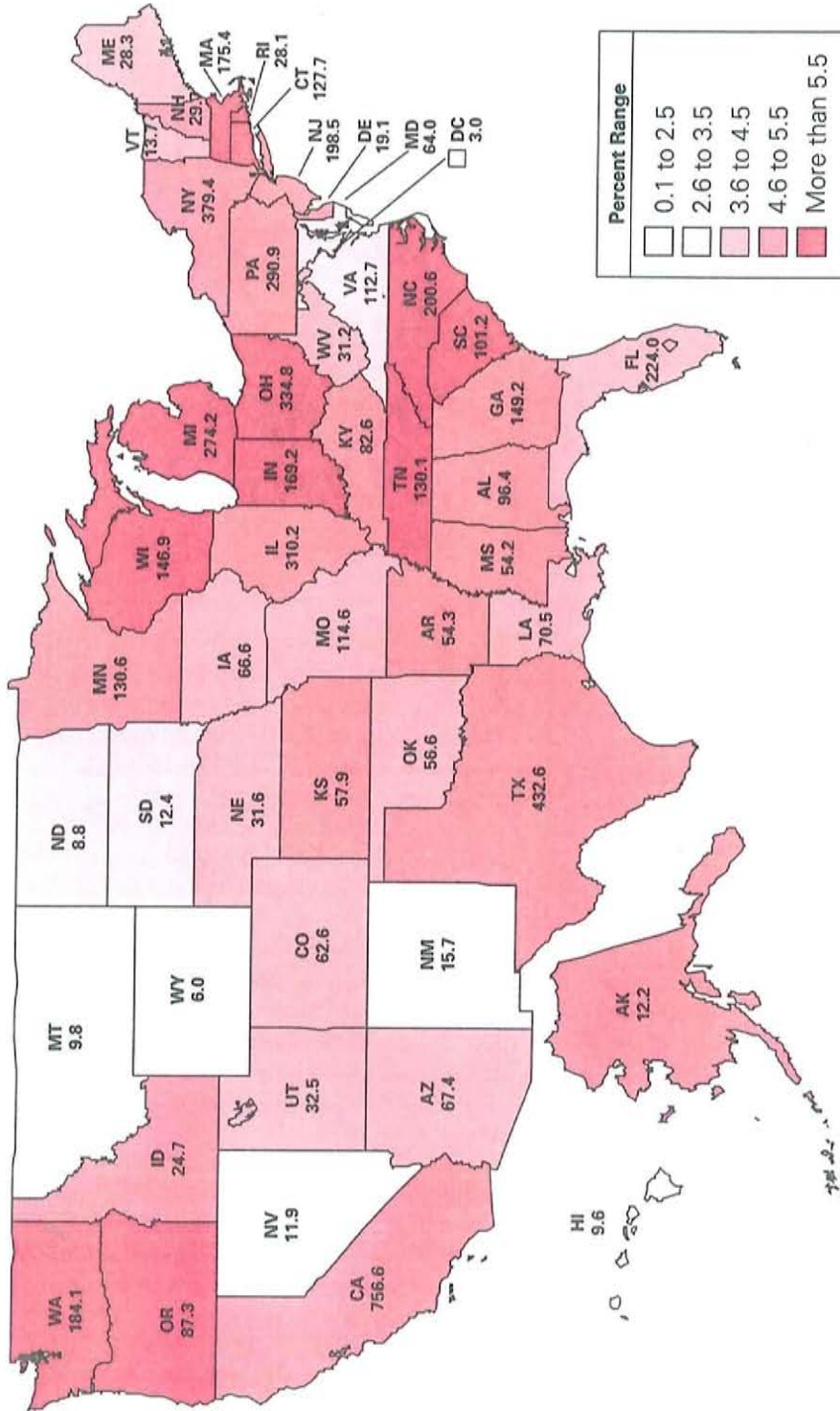
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Figure 1

Employment Related to Manufactured Exports for States: 1991

(Shading indicates export-related employment as a percentage of civilian employment. Numbers are export-related employment in thousands.)



Source: U.S. Bureau of the Census, Exports from Manufacturing Establishments: 1990 and 1991 (Washington, D.C.: 1994).

This article further examines the effects of the Uruguay Round agreements to liberalize trade in goods, focusing primarily on the United States. Following a very brief summary of the agreements, the article presents rough estimates of their impact on employment in manufacturing, both for the nation and for the individual states, and then examines how closely the estimated changes in employment correspond to the comparative advantages revealed by international trade patterns.

I. The Uruguay Round Agreements Liberalizing Trade in Goods: A Capsule Summary

Both tariff and nontariff barriers to trade are to be reduced as a result of the Uruguay Round. In general, the agreed liberalizations are to be completed by the year 2005.

For industrial products, the advanced countries committed to reduce their tariffs from an average level of 6.3 percent to 3.8 percent, and other countries also pledged noteworthy reductions. In addition, substantial decreases are to be made in nontariff barriers, which have proliferated in recent years. Prominent among these nontariff barriers are quantitative restrictions that place limits on the volume of goods—especially textiles and clothing—flowing from one country to another; these restrictions are to be relaxed considerably.

For agricultural products, the negotiators agreed, with some exceptions, to convert the substantial prevailing nontariff barriers into their tariff-equivalents, and then to lower all tariffs of advanced countries by an average of 36 percent and the tariffs of developing countries (except the least developed) by an average of 24 percent. In addition, measures were adopted to ensure that agricultural products will have access to importing countries at certain minimal levels, and significant reductions were agreed in both domestic and export subsidies.

II. Employment Effects

Many workers are engaged in the production of manufactures that the United States exports. Between 1981 and 1991 their number rose from about 4.8 million to 6.1 million, or from 4.7 percent to 5.1 percent of total civilian employment (U.S. Bureau of the Census 1983, p. 13; 1994, p. 19). As might be expected, the

comparable percentage for the individual states varies widely (Figure 1).

As part of a major study of the impact of the Uruguay Round agreements, the U.S. International Trade Commission has estimated the long-term employment consequences of those agreements for the U.S. economy (U.S. ITC 1994). The estimates were presented as ranges and for sectors, or industry groups, that are defined differently from the industry groups in the Standard Industrial Classification (SIC). Our analysis converts those ranges into more specific estimates for manufacturing sectors as defined in the SIC, and also extends the estimates below the national level to the individual states.

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To convert the Commission's ranges into more specific estimates, we used the midpoints of those ranges. Concordances supplied by the Commission and the Census Bureau were used to allocate the sectors defined by the Commission to 2-digit SIC categories.² Employment changes from the Uruguay Round agreements were computed for each SIC category as the weighted (by employment) average of the percentage changes (estimated by the Commission) for the sectors allocated to the category. These percentage changes by SIC category were then assumed to apply to the individual states as well as to the nation, on the assumption that at the margin each state experienced the same intensity of foreign competition in each category.

¹ For a fuller discussion of the Uruguay Round agreements, see Norman S. Fieleke, "The Uruguay Round of Trade Negotiations: An Overview," *New England Economic Review*, May/June 1995, pp. 3–14.

² These allocations were inexact for some sectors which overlapped two or more SIC categories but which could not be separated into components with employment changes assignable to each category. In such cases the entire sector and its employment change were allocated to the SIC category that seemed clearly to contain the bulk of the sector's component commodities, except for miscellaneous manufacturing, for which no such judgment was feasible and which was therefore omitted from the study.

For the nation, the resulting estimated total impact on employment is remarkable, not for its enormity but for its triviality. For all manufacturing sectors combined, the Uruguay Round agreements are estimated to generate a loss of roughly 17,000 jobs, or one hundredth of 1 percent of total U.S. employment—and only over the long term. In other words, the aggregate employment impact of the agreements affecting manufacturing is likely to be approximately neutral, according to our computations based on the Commission's sector-by-sector study.³

Nonetheless, individual sectors could conceivably experience noteworthy impacts, with significant long-term employment gains or losses in some sectors offset by opposite changes in others. In that case, substantial frictional unemployment could occur in the short run as the labor force became redistributed. Similarly, individual states could be strongly affected.

As can be seen in Table 1, the percentage employment changes estimated for the various manufacturing sectors do indeed exceed that for the nation, but remain generally small, especially as long-term phenomena. Apparel and related products is the only sector for which a double-digit change—a loss of 10 percent—is estimated. Of the 18 sectors listed, 11 are expected to experience employment gains or losses of 0.5 percent or less. For 12 of the 18, the employment change is expected to be positive.

Nor should the estimated employment adjustments generated by the agreements prove burdensome for any state. The largest percentage gain among the states is nine hundredths of 1 percent, estimated for Delaware, while the largest loss is 22 hundredths of 1 percent, for Mississippi (Table 2). More detailed analysis indicates similarly diminutive changes in employment for manufacturing sectors within the states. For no state does the estimated change in any sector exceed three-tenths of 1 percent of the state's total employment.

III. U.S. Comparative Advantages and the Liberalization of Trade in Goods

The foregoing analysis suggests that the Uruguay Round liberalizations will not pose major adjustment problems for U.S. labor in manufacturing industries. But how do the estimated employment changes cor-

³ Note that the employment impact can differ appreciably from the income effect, which, as the introductory section indicated, is widely expected to be positive.

Table 1
*Long-Term Employment Changes
Estimated for U.S. Manufacturing Sectors
as Result of Uruguay Round Agreements*

SIC Code	Description	Percent Change in Employment
21	Tobacco Products	2.50
36	Electronic and Other Electrical Equipment and Components, except Computer Equipment	2.06
28	Chemicals and Allied Products	1.21
38	Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks	.88
37	Transportation Equipment	.77
35	Industrial and Commercial Machinery and Computer Equipment	.55
26/7	Paper and Allied Products; Printing, Publishing, and Allied Industries	.50
29	Petroleum Refining and Related Industries	.50
30	Rubber and Miscellaneous Plastics Products	.50
32	Stone, Clay, Glass, and Concrete Products	.50
20	Food and Kindred Products	.43
33	Primary Metal Industries	.07
22	Textile Mill Products	-.50
24	Lumber and Wood Products, except Furniture	-.50
25	Furniture and Fixtures	-.50
31	Leather and Leather Products	-.50
34	Fabricated Metal Products, except Machinery and Transportation Equipment	-.50
23	Apparel and Other Finished Products Made from Fabrics and Similar Materials	-10.00

Source: U.S. International Trade Commission, *Potential Impact on the U.S. Economy and Industries of the GATT Uruguay Round Agreements* (Washington, D.C.: June 1994); and author's computations.

respond with the competitive—or comparative—advantages of the United States? Are employment gains significant in sectors where the nation has a marked comparative advantage in international trade? A contrary finding would not by itself prove that the Uruguay Round will make the country worse off, but it would raise some doubts.

To illustrate the point, suppose that trade liberalizations were agreed only for goods that a country did not export. Foreign barriers limiting the demand for the country's exports were retained, while the coun-

Table 2
*Estimated Long-Term Employment
 Changes from Uruguay Round
 Agreements, by State*

Area	Percent Change in Employment
United States	-.01
Delaware	.09
Indiana	.08
Connecticut, New Hampshire	.07
Illinois, Minnesota, Ohio	.06
Colorado, Michigan, Nebraska, Wisconsin	.05
Arizona, Kansas, South Dakota	.04
Idaho, Iowa, Massachusetts, Rhode Island, Vermont	.03
Oregon, Washington	.02
Alaska, District of Columbia, Maryland	.01
Maine, Montana, Nevada, New Jersey, New Mexico, North Dakota, Oklahoma, Utah, West Virginia, Wyoming	0
Florida, Louisiana, Missouri	-.01
California, Texas, Virginia	-.02
Arkansas, Hawaii, Pennsylvania	-.03
New York	-.05
Kentucky	-.08
Georgia	-.11
North Carolina	-.13
South Carolina, Tennessee	-.14
Alabama	-.21
Mississippi	-.22

Source: U.S. Bureau of Economic Analysis (for underlying employment data); U.S. International Trade Commission, *Potential Impact on the U.S. Economy and Industries of the GATT Uruguay Round Agreements* (Washington, D.C.: June 1994); and author's computations.

try's own barriers to foreign goods were lowered, allowing its effective demand for them to increase. The country's increased demand for foreign goods might cause their price to rise relative to the price the country received for its exports. This worsening of the terms on which the country traded could well reduce its economic welfare.

Partly for this reason, trade representatives typically bargain vigorously during negotiations such as the Uruguay Round in order to secure reductions in foreign barriers that will fully compensate for any reductions they are offering in their own countries' barriers. They seek liberalizations in sectors where their nations possess comparative advantages.

In the following analysis, revealed comparative advantage is measured, as is customary, by the ratio of the nation's (or state's) net exports (exports minus

imports) in each commodity category to the sum of the nation's (or state's) exports and imports in that category.⁴ This ratio, or index, can take any value between -1 and 1. The larger the algebraic value for a category relative to the values for other categories, the greater the country's revealed comparative advantage (or the smaller its disadvantage) in that category. The magnitude of the ratio for a category has little significance in and of itself, apart from comparison with the ratio magnitudes for other categories. Of course, protectionist barriers somewhat distort the ratios, but not crucially.

As reported in Table 3, a ranking of the commodity categories, or sectors, according to these ratios indicates that tobacco products and chemicals and allied products are the manufacturing sectors in which the United States has the greatest comparative advantage, while leather and leather products and apparel and related products are the sectors of greatest comparative disadvantage.⁵ These rankings can and do change with underlying economic conditions, but marked changes are unlikely in the short run. Because the most recent and reliable export data for the states are for the period 1990-91, the ratios relate to those years. Moreover, the data available to the negotiators as they firmed up their bargaining positions probably were not much more recent.

Negotiators may bargain more strenuously on behalf of sectors that possess a comparative advantage if those sectors also exhibit rapid growth. Rapid growth and comparative advantage are closely associated in the United States, at least for the period 1987-92, as can be seen in Figure 2. The simple coefficient of correlation between revealed comparative advantage and percent change in value added for the manufacturing sectors is 0.81 and is highly significant statistically.

Instructive as the ratios in Table 3 are, they convey no information about the importance of the various sectors in the national economy. A related

⁴ Algebraically, the formula is

$$\frac{X_i - M_i}{X_i + M_i}$$

where X_i and M_i represent exports and imports of the i th commodity. Because data on imports are not available by state, imports were computed on the assumption that each sector within each state experienced the same intensity of import competition—that is, the same ratio of imports to shipments—as the corresponding sector within the nation. Shipments data were taken from U.S. Bureau of the Census, *Exports from Manufacturing Establishments: 1990 and 1991* (Washington, D.C.: 1994).

⁵ Tobacco's comparative advantage ratio probably is artificially raised by government support.

Table 3
U.S. Revealed Comparative Advantage, by Manufacturing Sector, 1990–1991

SIC Code	Description	Revealed Comparative Advantage Ratio
21	Tobacco Products	.942
28	Chemicals and Allied Products	.252
20	Food and Kindred Products	.074
24	Lumber and Wood Products, except Furniture	.066
38	Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks	.028
35	Industrial and Commercial Machinery and Computer Equipment	-.025
34	Fabricated Metal Products, except Machinery and Transportation Equipment	-.083
26/7	Paper and Allied Products; Printing, Publishing, and Allied Industries	-.095
22	Textile Mill Products	-.124
37	Transportation Equipment	-.130
36	Electronic and Other Electrical Equipment and Components, except Computer Equipment	-.209
30	Rubber and Miscellaneous Plastics Products	-.225
32	Stone, Clay, Glass, and Concrete Products	-.318
33	Primary Metal Industries	-.371
29	Petroleum Refining and Related Industries	-.398
25	Furniture and Fixtures	-.593
31	Leather and Leather Products	-.753
23	Apparel and Other Finished Products Made from Fabrics and Similar Materials	-.786

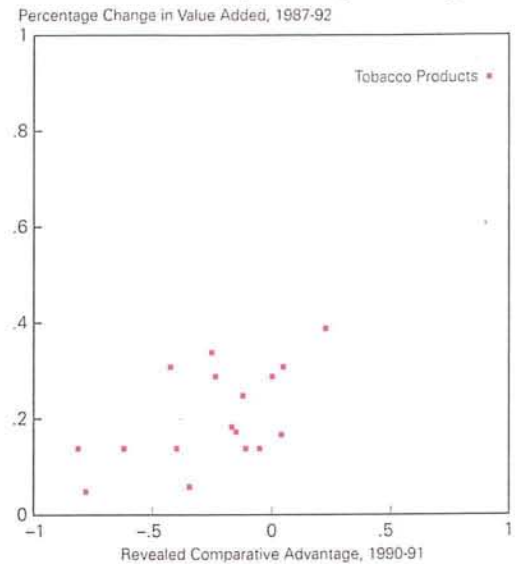
Source: Export data from U.S. Bureau of the Census, *Exports from Manufacturing Establishments: 1990 and 1991* (Washington, D.C.: 1994); Import data from U.S. Department of Commerce (downloaded from COMPRO April 10, 1995).

consideration is that, other things equal, trade negotiators are likely to bargain more vigorously on behalf of the larger sectors. One way of taking these considerations into account is to weight the ratio for each sector by the sector's share of total manufacturing employment, so that the ratio reflects the sector's importance in manufacturing employment as well as its comparative advantage.

The ranking of sectors by these weighted ratios, in Table 4, differs appreciably from the ranking in

Figure 2

Percentage Change in Value Added and Revealed Comparative Advantage for the United States, by Manufacturing Sector



Source: U.S. Bureau of the Census, *Exports from Manufacturing Establishments: 1990 and 1991* (Washington, D.C.: 1994); U.S. Department of Commerce (data downloaded from COMPRO April 10, 1995); staff, U.S. Bureau of the Census; and the author's computations.

Table 3. Chemicals and allied products and food and kindred products now occupy first and second places, with tobacco products fourth. A number of other noteworthy changes occur, although apparel and related products remains at the bottom of the list.

The question raised in the opening paragraph of this section can now be addressed with the aid of Tables 1 and 4. Rephrased to draw on those tables, the question becomes how the employment changes for the manufacturing sectors listed in Table 1 compare with the weighted ratios for those sectors in Table 4. Are the percentage employment gains from the negotiated liberalizations expected to be greater, or losses smaller, as weighted comparative advantage ratios rise in algebraic value? In particular, are substantial percentage employment gains estimated for sectors whose comparative advantage ratios are relatively high?⁶ If so, the agreed liberalizations would seem

⁶ Some analysts would prefer to compare the comparative advantage ratios with percentage changes in output rather than

Table 4
U.S. Revealed Comparative Advantage Weighted by Employment, by Manufacturing Sector, 1990–1991

SIC Code	Description	Revealed Comparative Advantage, Weighted by Employment
28	Chemicals and Allied Products	.013
20	Food and Kindred Products	.007
24	Lumber and Wood Products, except Furniture	.003
21	Tobacco Products	.002
38	Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks	.002
29	Petroleum Refining and Related Industries	-.003
35	Industrial and Commercial Machinery and Computer Equipment	-.003
22	Textile Mill Products	-.005
31	Leather and Leather Products	-.005
34	Fabricated Metal Products, except Machinery and Transportation Equipment	-.007
32	Stone, Clay, Glass, and Concrete Products	-.009
30	Rubber and Miscellaneous Plastics Products	-.011
26/7	Paper and Allied Products; Printing, Publishing, and Allied Industries	-.012
37	Transportation Equipment	-.013
33	Primary Metal Industries	-.015
25	Furniture and Fixtures	-.017
36	Electronic and Other Electrical Equipment and Components, except Computer Equipment	-.018
23	Apparel and Other Finished Products Made from Fabrics and Similar Materials	-.046

Source: Export and employment data from U.S. Bureau of the Census, *Exports from Manufacturing Establishments: 1990 and 1991* (Washington, D.C.: 1994). Import data from U.S. Department of Commerce (downloaded from COMPRO April 10, 1995).

to allow the nation to capitalize on its comparative advantages.

As can be seen in Figure 3, the answer depends on the treatment given to the relatively extreme data for

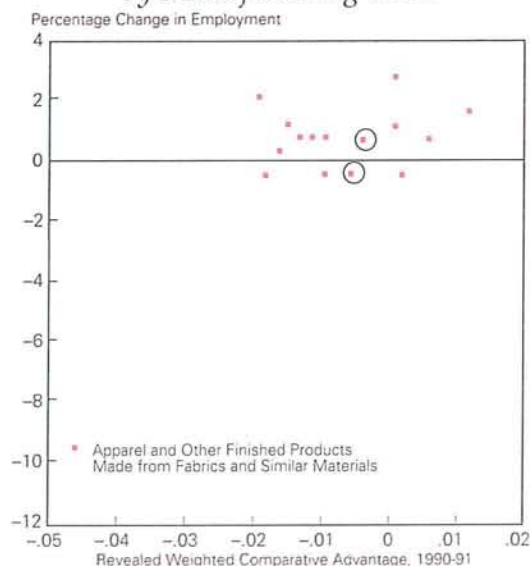
percentage changes in employment. Thus, it should be noted that the Commission's estimates for percentage changes in output rarely differ from those for employment and that the few differences are minor.

apparel and related products. If the data for that sector are included, the conclusion can be drawn that percentage employment gains do tend to rise with comparative advantage ratios; the simple coefficient of correlation between the two variables is 0.75, statistically significant at the 0.01 level. Such a conclusion fails to convey the pattern set by the data for the other 17 sectors, however. For them, the pattern is fairly random, and no statistically significant correlation exists between the percentage changes in employment estimated for them and their weighted comparative advantage ratios.

A similarly random pattern holds for each of the 50 states. As reported in Table 5, for 14 of the states a statistically significant positive correlation does exist between estimated percentage changes in employ-

Figure 3

Long-Term Percentage Change in Employment Due to the Uruguay Round and Revealed Comparative Advantage Weighted by Employment for the United States, by Manufacturing Sector



Note: Each of the circled points represents two observations.

Source: U.S. Bureau of the Census, *Exports from Manufacturing Establishments: 1990 and 1991* (Washington, D.C.: 1994); U.S. Department of Commerce (data downloaded from COMPRO April 10, 1995); U.S. International Trade Commission, *Potential Impact on the U.S. Economy and Industries of the GATT Uruguay Round Agreements* (Washington, D.C.: June 1994); and the author's computations.

Table 5
*Coefficients of Correlation between
 Weighted Revealed Comparative Advantage
 and Estimated Long-Term Percentage
 Changes in Employment from Uruguay
 Round Agreements*

Area	Number of Sectors	Correlation Coefficient	T-Statistic
United States	18	.75	4.56*
Alabama	15	.91	8.00*
Georgia	14	.88	6.28*
New York	15	.82	5.16*
South Carolina	14	.77	4.14*
Tennessee	16	.71	3.81*
Florida	15	.71	3.63*
Mississippi	13	.69	3.15*
Pennsylvania	17	.68	3.58*
Kentucky	14	.68	3.20*
West Virginia	10	.67	2.53*
New Jersey	16	.64	3.13*
California	15	.63	2.94*
North Carolina	17	.61	3.01*
Hawaii	3	.61	.77
Delaware	6	.58	1.43
Massachusetts	15	.56	2.45*
Virginia	13	.53	2.08
Idaho	7	.51	1.31
Texas	15	.43	1.74
Louisiana	12	.42	1.45
Wyoming	3	.28	.30
Arkansas	16	.25	.97
Rhode Island	10	.24	.69
Washington	13	.21	.71
Missouri	15	.19	.69
Colorado	11	.18	.55
Nevada	7	.16	.37
Maryland	13	.16	.53
Maine	10	.15	.42
Oregon	13	.13	.45
Utah	14	.11	.40
Oklahoma	15	.11	.39
Illinois	15	.10	.38
Connecticut	15	.10	.36
South Dakota	6	.07	.14
Ohio	15	.01	.05
Michigan	15	-.01	-.03
Minnesota	13	-.04	-.15
Indiana	13	-.05	-.15
Arizona	11	-.07	-.21
Wisconsin	16	-.09	-.33
Montana	4	-.09	-.13
Iowa	12	-.09	-.29
Alaska	3	-.13	-.13
Kansas	9	-.14	-.36
New Hampshire	12	-.17	-.55
Nebraska	13	-.18	-.61
Vermont	10	-.21	-.62
North Dakota	3	-.53	-.62
New Mexico	4	-.66	-1.23

*Significant at 0.05 level.

ment for the various manufacturing sectors and the weighted comparative advantages of those sectors; but in every case, just as for the nation, this outcome is attributable to extreme data for the apparel and related products sector. Once that "outlying" sector is excluded, no relationship seems to exist between expected percentage changes in employment and weighted comparative advantage in any of the states.⁷

This fairly random pattern suggests that foreign negotiators generally avoided granting relatively sizable trade liberalizations in sectors where the United States has a comparative advantage, and that U.S. negotiators generally avoided granting sizable liberalizations in sectors where the United States is at a

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comparative disadvantage. That such discretion should be exercised in the bargaining is not surprising, but both the United States and its trading partners might well have reaped greater gains in trade and income if the liberalizations had afforded more opportunity for both sides to capitalize on their comparative advantages.

Of course, our analysis might have yielded a different conclusion if data had been available to allow the inclusion of nonmanufacturing, as well as manufacturing, sectors, and if data had been available at a more disaggregated, or detailed, level. Also, the long-term percentage changes in employment estimated to result from the Uruguay Round agreements are necessarily rather speculative in nature. On the other hand, it is well known that relatively little liberalization was agreed for a number of nonmanufacturing sectors in which the United States has substantial comparative advantages, including financial services, basic telecommunications, and audiovisual services, and this fact lends additional support to our conclusion.

⁷ Note, however, that for a number of states data were available for only a few sectors, sharply limiting the number of observations on which to base this conclusion.

IV. Conclusion

Even allowing for a wide margin of error, our analysis suggests that the Uruguay Round agreements will have only a negligible impact upon employment in nearly every U.S. manufacturing sector, in every state, and in the country as a whole. Thus, in general, U.S. manufacturing industries and their employees will probably be spared from difficult adjustments.

This finding accords with another: The agreed trade liberalizations (as represented by the sectoral

employment changes likely to result) seem to bear little relationship to the nation's revealed comparative advantages (weighted by employment). By and large, both the United States and its trading partners apparently resisted granting sizable trade liberalizations in sectors where the other possessed a marked comparative advantage. If so, both parties will be impeded from further specializing in the sectors of their greatest comparative advantage, and while world income will be stimulated by the agreements, it will grow by less than if both parties had been more forthcoming.

References

- Fieleke, Norman S. 1995. "The Uruguay Round of Trade Negotiations: An Overview." *New England Economic Review*, May/June, pp. 3-14.
- General Agreement on Tariffs and Trade. 1994. *The Results of the Uruguay Round of Multilateral Trade Negotiations*. Geneva: General Agreement on Tariffs and Trade, November.
- U.S. Bureau of the Census. 1983. *Origin of Exports of Manufactured Products*. Washington, D.C.: U.S. Bureau of the Census.
- _____. 1994. *Exports from Manufacturing Establishments: 1990 and 1991*. Washington, D.C.: U.S. Bureau of the Census.
- _____. 1995. Concordance between the Harmonized Tariff Schedule at the 10-Digit Level and the Standard Industrial Classification at the 4-Digit Level. Downloaded from COMPRO, January.
- U.S. Bureau of Economic Analysis. 1994. *Total Full-Time and Part-Time Employment by Industry (SA25) 1969-1993* (diskette). Washington, D.C.: U.S. Bureau of Economic Analysis, August.
- U.S. International Trade Commission. 1994. *Potential Impact on the U.S. Economy and Industries of the GATT Uruguay Round Agreements*. Investigation No. 332-353, Washington, D.C.: U.S. International Trade Commission, Publications 2790 and 2791, June.
- _____. 1994. Concordance between Aggregated Industries Used in *Potential Impact on the U.S. Economy and Selected Industries of the GATT Uruguay Round Agreements* and USITC Producer Groups. Washington, D.C.: U.S. International Trade Commission.
- _____. 1994. Concordance between USITC Producer Groups and the Harmonized Tariff Schedule at the 10-Digit Level (diskette). Washington, D.C.: U.S. International Trade Commission.