Employment in U.S. Agriculture and Related Industries

Introduction

NAFTA has likely had a small, positive effect on employment in U.S. agriculture. By opening the door to new export opportunities and allowing for the more efficient allocation of productive resources across economic sectors and geographic areas, NAFTA should increase opportunities for agricultural employment, as the United States enjoys a clear comparative advantage in many sectors within agriculture. At the same time, employment opportunities are narrowing in some agriculture-related industries in which the United States is less competitive, such as textiles and apparel. These structural changes generally predate NAFTA, but the accord reinforces these long-term trends.

Because U.S. agriculture is generally not labor-intensive, NAFTA's influence on employment in the sector has been relatively small to date. Over the long run, however, NAFTA may alter appreciably the composition and size of U.S. agricultural employment. This would especially be the case if Mexico further specializes in labor-intensive agricultural activities while the United States and Canada intensify their focus on capital-intensive ones. NAFTA-related flows of agricultural products are quite large in comparison to total U.S. agricultural trade, so the agreement is likely to play an important role in sharpening this process.

This section uses data from the Current Population Survey (CPS) to identify statistically significant changes in employment in agriculture and agriculture-related industries. These developments are placed in the context of other explanatory factors, as well as each sector's contribution to gross domestic product (GDP) and foreign trade, in order to draw inferences about NAFTA's effects on employment. The section also profiles agriculture-related certifications under two Federal programs for workers who are displaced by international trade: the Trade Adjustment Assistance (TAA) and NAFTA Transitional Adjustment Assistance (NAFTA-TAA) Programs. Finally, the section takes a closer look at the textile and apparel industries, whose economic restructuring is partially related to NAFTA.

Sectoral Employment Levels

Table E-1 lists CPS estimates of U.S. employment from 1989 to 2000 for agriculture and 10 manufacturing sectors related to agriculture: lumber and wood products, furniture and fixtures, farm machinery and equipment, food and kindred products, tobacco manufacturing, textile manufacturing, apparel and other finished textile products, paper and allied products, leather and leather products, and forestry and fisheries,. Asterisks in the table identify estimates that are statistically different from the corresponding estimate for 2000.

Agricultural Employment. According to CPS estimates, U.S. agricultural employment totaled 3,305,000 in 2000. Although this estimate is larger than the estimates for the pre-NAFTA period of 1989-93, the differences between the estimate for 2000 and the estimates for 1989-93 are not statistically significant. Thus, the CPS does not provide sufficient information to conclude that the level of agricultural employment in 2000 was any different from agricultural employment during the 5 years immediately prior to NAFTA.

However, several components of agricultural employment—livestock production, landscaping and horticultural services, and veterinary services—have demonstrated a statistically significant change since the implementation of CFTA and NAFTA (fig. E-1). This finding does not extend to crop production, whose estimated level of employment in 2000 was not statistically different from the corresponding estimates for 1989-99.

Employment in livestock production contracted from an average of 1,211,000 during 1989-93 to 993,000 in 2000, a decline of 18 percent. Although this reduction coincides with the two trade agreements, it is strongly associated with major developments in the livestock sector that are not the product of CFTA and NAFTA. The U.S. hog industry experienced substantial technological change and consolidation during the 1990's, while drought and poor ranging conditions have motivated a reduction of U.S. cattle inventories since 1996 (Gustafson, 2000; Mathews, et al., 1999).

Table E-1—Employed persons by selected industry, age 16 years and over

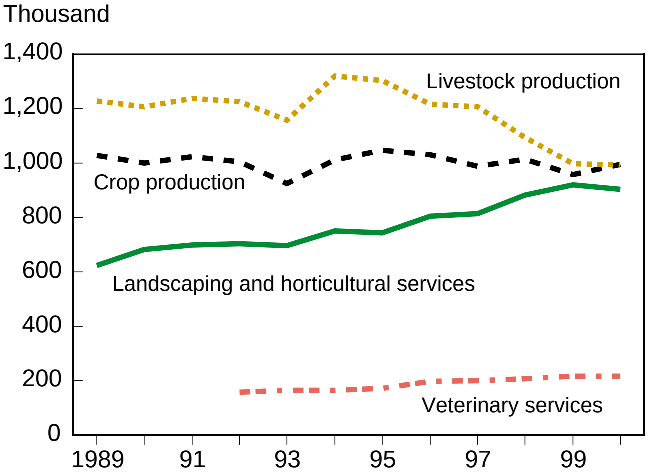
Industry	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
							Thousands					
Total	117,342 *	118,793 *	117,718 *	118,477 *	120,259 *	123,060 *	124,900 *	126,708 *	129,558 *	131,463 *	133,488 *	135,208
Agriculture	3,199	3,223	3,269	3,250	3,115	3,409	3,440	3,443	3,399	3,378	3,281	3,305
Agricultural production, crops	1,028	1,000	1,023	1,005	925	1,011	1,046	1,030	987	1,014	958	995
Agricultural production, livestock	1,228 *	1,207 *	1,236 *	1,225 *	1,158 *	1,319 *	1,304 *	1,217 *	1,206	1,094	998	993
Veterinary services	n.a.	n.a.	n.a.	156 *	165 *	164 *	170 *	198	199	206	215	217
Landscape and horticultural services	624 *	682 *	698 *	703 *	697 *	750 *	743 *	803	813	881	920	903
Agricultural services, n.e.c.	n.a.	334	312	162	170	165	177	196	n.a.	n.a.	n.a.	n.a.
Lumber and wood products, except furniture	792	789	721	689 *	712	732	816	795	820	863	824	784
Logging	151	156	143	138	140	145 *	169 *	158	154	133	126	123
Sawmills, planing mills, and millwork	426	418	367	338 *	352 *	386	411	403	413	442	429	421
Wood buildings and mobile homes	60	63	62	59 *	76	60 *	87	82	82	102	102	95
Miscellaneous wood products	156	152	149	154	144	141	150	153	170	186	168	145
Furniture and fixtures	664	694	631	608	634	662	645	661	661	675	661	645
Farm machinery and equipment	96	106	111	115	99	114	114	106	105	117	105	99
Food and kindred products	1,821 *	1,856	1,752	1,764	1,797 *	1,749	1,701	1,708	1,698	1,655	1,644	1,662
Meat products	456	482	473	489	482	475	442	461	470	439	475	456
Dairy products	208 *	177	144	158	156	161	142	125	122	124	144	153
Canned, frozen, and preserved fruits and vegetables	239	252 *	217	210	231	220	223	220	227	208	180	193
Grain mill products	147	142	145	138	141	141	144	145	154	161	148	157
Bakery products	233	239	226	206	233	240	235	219	224	230	228	232
Sugar and confectionary products	111	108	114	125	107	104	99	98	102	102	98	94
Beverage industries	219	242	230	204	220	203	211	232	208	192	193	197
Miscellaneous and not specified	209	213	202	236 *	228 *	204	207	208	191	199	179	181
Tobacco manufactures	54	47	59	52	54	50	53	49	59	52	46	48
Textile mill products	688 *	705 *	700 *	652 *	632 *	643 *	670 *	619 *	634	595	524	519
Knitting mills	127	114	113	105	133 *	108	112	97	101	97	86	86
Carpets and rugs	63	75	60	50	53	67	96	83	81	85	93	73
Yarn, thread, and fabric mills	427 *	446 *	452 *	416 *	372 *	403 *	398 *	364 *	365 *	329	271	294
Apparel and other finished textile products	1,172 *	1,108 *	1,073 *	1,053 *	1,033 *	1,009 *	1,011 *	954 *	945 *	825 *	733	708
Apparel and accessories, except knit	1,008 *	953 *	916 *	895 *	877 *	834 *	827 *	791 *	789 *	678 *	583	563
Miscellaneous fabricated textile products	164	154	157	157	157	175	185	163	156	147	150	145
Paper and allied products	749 *	737 *	740 *	733 *	723 *	703 *	723 *	668	683 *	683 *	640	595
Pulp, paper, and paperboard mills	349 *	332 *	328 *	314 *	292 *	293 *	299 *	275 *	265	251	233	221
Miscellaneous paper and pulp products	197	200	197	203	208	194	216	199	206	229	210	196
Paperboard containers and boxes	203	205	214	216	222	217	207	193	212	203	197	179
Leather and leather products	152 *	140 *	139 *	136 *	123	135 *	144 *	140 *	127 *	108	87	92
Footwear, except rubber and plastic	89 *	90 *	83 *	81 *	65 *	71 *	74 *	67 *	70 *	56	43	39
Forestry and fisheries	179	171	160	172	185	177	152	127	139	131	135	152
Forestry	98	89	81	93	102	112	71	68	71	67	72	84
Fishing, hunting, and trapping	81	82	79	80	83	65	81	60	68	64	63	68

* = Difference between this estimate and the corresponding estimate for 2000 is statistically significant at the 95-percent confidence level. n.a. = not available, n.e.c. = not elsewhere classified.

Sources: Annual averages from household data in U.S. Department of Labor, Bureau of Labor Statistics (BLS), Employment and Earnings, various issues; supplemented with updates from BLS (1999) and from BLS directly.

Figure E-1

Employment in subsectors of U.S. agriculture, age 16 and over, 1989-2000



Source: Annual averages from household data in U.S. Department of Labor, Bureau of Labor Statistics (BLS), Employment and Earnings, various issues; supplemented with updates from BLS (1999) and from BLS directly. Series for veterinary services begins in 1992.

The U.S. Agricultural Censuses provide a glimpse of these developments. Between 1992 and 1997, the number of farms with live swine dropped from 191,347 to 109,754, while the U.S. inventory of hogs and pigs climbed from 57 million to 61 million head. Over the same period, the number of U.S. farms with cattle and calves declined from 1,074,349 to 1,046,863 (USDA/NASS, 1999: 30, 34).

Two agricultural subsectors have shown a substantial increase in employment. Employment in veterinary services climbed from an average of 161,000 in 1992 and 1993 to 217,000 in 2000, an increase of 35 percent. Meanwhile, employment in landscaping and horticultural services surged from an average of 660,000 during 1988-93 to 903,000 in 2000, an increase of 37 percent. To a small degree, freer trade in livestock and animal products may have boosted the demand for veterinary services. In general, however, these increases in employment reflect consumer preferences concerning gardening, landscaping, and pet ownership, rising U.S. incomes, and the strength of the U.S. economy.

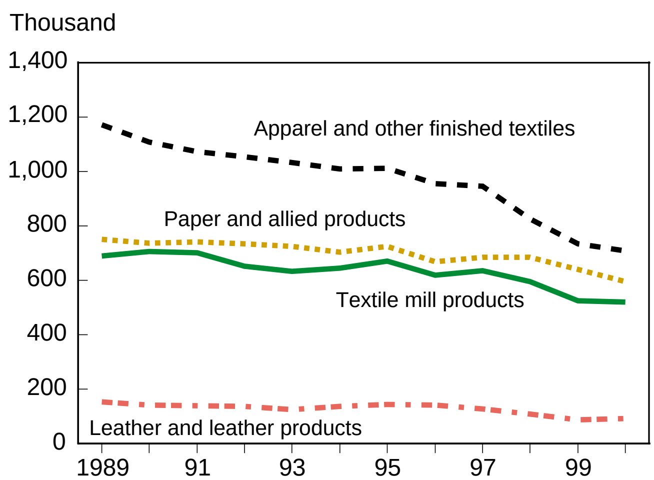
Manufacturing Related to Agriculture. Four agriculture-related manufacturing sectors—textile mill products, apparel and other finished textile products, paper and allied products, and leather and leather products—have exhibited a statistically significant decline in employment during the CFTA-NAFTA period (fig. E-2). None of the remaining agriculture-related industries showed a statistically significant change in employment.

U.S. textile and apparel employment peaked at 2.45 million in 1973. Since then, the two industries have experienced a sustained decline in employment—a trend that has continued under CFTA and NAFTA. Textile and apparel employment was estimated at 1.9 million in 1988 (the last year before CFTA), 1.7 million in 1993 (the last year before NAFTA), and 1.2 million in 2000. In recent years, the apparel industry has felt this contraction more sharply than the textile industry. Apparel employment dropped from an average of 1,104,000 during 1988-93 to 708,000 in 2000, a decrease of 36 percent. In contrast, textile employment fell from an average of 682,000 during 1988-93 to 519,000 in 2000, a decrease of 24 percent.

These reductions are part of a long-term process of economic restructuring within the two industries. Many activities that that can be performed at lower cost outside the United States have been relocated to other countries, and the remaining U.S. producers have made substantial gains in productivity. Of the 14 subsectors of the U.S. textile and apparel industries for which productivity data are reported, all but one experienced productivity gains over the 1990-99 period

Figure E-2

U.S. employment in selected agriculture-related industries, age 16 and over, 1989-2000



Source: Annual averages from household data in U.S. Department of Labor, Bureau of Labor Statistics (BLS), *Employment and Earnings*, various issues; supplemented with updates from BLS (1999) and from BLS directly.

(U.S. Department of Labor, Bureau of Labor Statistics, 2001).

NAFTA has played an important role in this process. Through strict rules of origin and the progressive elimination of trade barriers within North America, NAFTA has enabled Mexican and Canadian producers to expand their share of the U.S. market by a substantial margin. In terms of value, Mexico and Canada supplied 19 percent of U.S. textile and apparel imports in 1999, compared with just 9 percent in 1993. In terms of square-meter equivalents, Mexico and Canada have been the number-one and number-two exporters of textiles and apparel to the United States since 1998 (Green, 1999; U.S. Department of Commerce, Office of Textiles and Apparel, 2001).

As part of a more integrated and more competitive textile and apparel sector within North America, U.S. producers are often the primary suppliers of intermediate textile and apparel products to their counterparts in Canada and Mexico. Between 1993 and 2000, U.S. textile and apparel exports to these two countries increased from $3.5 billion to $9.5 billion. Moreover, Canada and Mexico accounted for 87 percent of the total increase in U.S. textile exports and 52 percent of the total increase in U.S. apparel exports that occurred over this period. Thus, NAFTA may have facilitated the retention of U.S. jobs - particularly in the textile sector - that would have relocated to other parts of the world in the absence of the agreement.

In paper and allied products, employment dropped from an average of 736,000 during 1988-93 to 595,000 in 2000, a decrease of 56 percent. Nevertheless, U.S. exports in this sector to NAFTA countries have increased substantially. Between 1989-93 and 1994-99, exports to Canada climbed by 89 percent, and exports to Mexico increased 91 percent (table E-2). The increase in imports from Canada and Mexico has been far more modest, slightly exceeding the overall growth rate of the U.S. economy. Therefore, CFTA and NAFTA are likely to have slowed the decrease in employment in this sector.

Since 1989, the leather and leather products sector has experienced a marked increase in both total exports and total imports and a reduction in output. Total exports were 40 percent higher in 1994-99 than in 1989-93, while total imports grew by 43 percent. Meanwhile, the annual average of the industry's GDP declined by 6 percent between 1990-93 and 1994-99 (table E-2). In this setting, employment in the sector fell from an average of 138,000 during 1988-93 to 92,000 in 2000, a decrease of 33 percent. Overall, this change does not seem to be related to CFTA and NAFTA, as Canada and Mexico's combined share of U.S. leather product imports increased only slightly, from an average of 3 percent in 1989-93 to 5 percent in 1994-99.

Federal Assistance with Trade Adjustment

Trade-related industries are especially important to rural economies. Exports of goods -including agricultural, manufacturing, and mining products - make up about two-thirds of U.S. exports. Goods-producing industries currently account for 26 percent of nonmetro jobs but just 14 percent of metro jobs, making goods production disproportionately nonmetro. Increased growth in U.S. exports translates into greater employment growth and a lower unemployment rate in both metro and nonmetro areas.

However, industries and localities do not share equally in export-led growth, and some suffer adverse effects. Although layoffs from plant closings and downsizings constitute a small share of the nonmetro labor force, these developments can have a large impact on individual rural communities. In such instances, assistance is clearly warranted, not only to help displaced and dislocated workers, but also to help affected communities as they adapt economically and develop new sources of employment.

To assist with this process, the Federal Government operates the Trade Adjustment Assistance (TAA) and the NAFTA Transitional Adjustment Assistance (NAFTA-TAA) Programs. Both programs provide assistance to workers whose layoffs are determined by the U.S. Department of Labor (DOL) to have been caused by international trade. The NAFTA-TAA Program, which was established by the North American Free Trade Agreement Implementation Act of 1993, is virtually identical to the TAA Program. The main difference between the two programs is that NAFTA-TAA specifically provides assistance to workers "who lose their jobs or whose hours of work and wages are reduced as a result of trade with Canada or Mexico" (U.S. Department of Labor, 2001). FY

Table E-2—Employment, output, and foreign trade in agriculture and related industries: 1994-99 versus 1990-93

	Employment			GDP			Total exports		
	Avg. 1990-93	Avg. 1994-99	Percent Change	Avg. 1990-93	Avg. 1994-99	Percent Change	Avg. 1990-93	Avg. 1994-99	Percent Change
	---Thousand---			*---$ billions---*			*---$ billions---*		
Total	118,812	128,196	7.9	6,187.7	8,112.6	31.1	431.99	631.32	46.1
Agriculture plus food and kindred products:	5,007	5,084	1.6	180.1	203.6	13.0	42.30	54.67	29.2
Agriculture	3,214	3,392	5.5	76.7	82.1	6.9	23.53	27.93	18.7
Agricultural production, crops	988	1,008	2.0	n.a.	n.a.	n.a.	22.62	26.89	18.9
Agricultural production, livestock	1,207	1,190	-1.4	n.a.	n.a.	n.a.	0.91	1.04	14.7
Agriculture-related industries	5,993	5,617	-6.3	301.2	354.2	17.6	55.37	75.89	37.0
Food and kindred products	1,792	1,693	-5.6	103.4	121.6	17.6	18.77	26.74	42.5
Forestry and fisheries	172	144	-16.6	35.2	41.6	18.0	3.11	2.86	-8.2
Forestry	91	77	-15.8	n.a.	n.a.	n.a.	0.29	0.28	-0.5
Fishing, hunting, and trapping	81	67	-17.5	n.a.	n.a.	n.a.	2.82	2.57	-9.0
Lumber and wood products	728	808	11.1	32.6	41.5	27.0	6.89	7.03	2.0
Furniture and fixtures	642	661	3.0	16.4	22.0	34.1	2.40	3.36	40.3
Tobacco products	53	51	-3.0	12.7	15.9	25.2	4.60	4.95	7.6
Textile mill products	672	614	-8.6	24.0	25.4	5.8	4.35	6.62	52.2
Apparel and other textile products	1,067	840	-21.3	26.7	26.8	0.4	4.32	8.47	96.1
Paper and allied products	733	683	-6.8	45.5	55.1	21.1	9.44	13.87	46.9
Leather and leather products	134	124	-7.8	4.8	4.5	-5.6	1.48	1.99	33.7

	NAFTA exports			Total imports			NAFTA imports		
	Avg. 1990-93	Avg. 1994-99	Percent Change	Avg. 1990-93	Avg. 1994-99	Percent Change	Avg. 1990-93	Avg. 1994-99	Percent Change
	---$ billions---			*---$ billions---*			*---$ billions---*		
Total	125.75	206.60	64.3	523.93	835.21	59.4	132.18	241.11	82.4
Agriculture plus food and kindred products:	8.72	12.37	41.8	25.50	35.30	38.4	7.20	12.02	66.9
Agriculture	4.00	5.52	38.3	9.10	13.46	48.0	3.63	5.58	53.7
Agricultural production, crops	3.65	5.13	40.6	7.24	11.05	52.6	2.12	3.70	74.7
Agricultural production, livestock	0.34	0.39	13.7	1.86	2.42	29.8	1.51	1.88	24.3
Agriculture-related industries	14.48	23.58	62.8	92.64	139.52	50.6	23.08	41.99	81.9
Food and kindred products	4.73	6.85	44.8	16.40	21.83	33.2	3.57	6.44	80.3
Forestry and fisheries	0.42	0.55	30.9	5.51	7.69	39.4	1.14	1.29	12.8
Forestry	0.05	0.08	50.5	0.94	1.52	61.5	0.03	0.04	19.2
Fishing, hunting, and trapping	0.37	0.47	28.1	4.57	6.17	34.9	1.11	1.25	12.6
Lumber and wood products	1.49	1.85	24.6	6.63	13.04	96.6	4.71	9.66	105.4
Furniture and fixtures	1.59	2.12	33.3	5.52	10.19	84.6	1.98	4.27	116.3
Tobacco products	0.02	0.05	132.8	0.33	0.34	5.1	0.24	0.04	-81.9
Textile mill products	1.64	3.18	93.7	5.64	7.88	39.6	0.49	1.52	208.5
Apparel and other textile products	1.36	3.31	142.8	30.78	48.10	56.3	2.23	6.99	213.7
Paper and allied products	2.89	5.05	74.7	10.90	15.09	38.5	8.35	11.00	31.7
Leather and leather products	0.34	0.62	83.9	10.93	15.36	40.5	0.38	0.78	105.0

GDP figures for forestry and fisheries include some agricultural services as well.

Sources: For employment, U.S. Department of Labor, Bureau of Labor Statistics; for GDP, U.S. Department of Commerce, Bureau of Economic Analysis; for trade, U.S. Bureau of the Census.

2001 appropriations included $342.4 million for TAA and $64 million for NAFTA-TAA.[1]

The goal of both programs is to assist individuals in acquiring the skills necessary for obtaining suitable reemployment. Assistance includes retraining, income support while in training, and job search and relocation allowances. A worker group at a plant or a portion of a plant must be certified by DOL in order for workers in that group to be individually eligible to receive benefits. A petition seeking certification may be filed by three or more workers, their union, or by a company official on the workers' behalf. Community-based organizations also are allowed to submit petitions for assistance under the NAFTA-TAA Program.

Assistance to Nonmetro Areas. Nonmetro counties account for a disproportionately high number of certifications in both programs, compared with the size of the U.S. population and work force in those counties and the number of establishments there (Hamrick, MacDonald, and Meyer, 2000).[2] Between January 1994 and September 1999, DOL certified 6,282 worker groups for assistance under the TAA Program (table E-3). Of the 5,071 certifications that can be clearly linked to a particular county, 40 percent correspond to nonmetro counties. Similar analysis of NAFTA-TAA certifications between January 1994 and January 1999 indicates that about 40 percent of the worker groups certified for assistance were from nonmetro counties (table E-4). In contrast, nonmetro counties account for about 20 percent of the U.S. population, labor force, and number of establishments. The main reason for certification under the NAFTA-TAA Program was that production at the affected companies had shifted to Mexico.

[1] Two other trade assistance programs are not discussed in this report: (1) technical assistance to employers through the Trade Adjustment Assistance Program (see the U.S. Department of Commerce's web site, *http://www.doc.gov*, and look under Economic Development Administration), and (2) the North American Development Bank, *http://www.nadbank.org*. For more information on TAA and NAFTA-TAA, see the web site of the U.S. Department of Labor's Employment and Training Administration, *http://www.doleta.gov*.

[2] A few researchers have mistakenly interpreted the estimated number of affected workers listed in the certification records of the TAA and NAFTA-TAA programs as a measure of the jobs lost due to international trade. These estimates actually are an indication from DOL to State governments of the maximum number of workers associated with each certification who might require assistance through the programs. For this reason, we focus instead on the number of certifications and their distribution by State, economic sector, and metro-nonmetro category.

Apparel and finished textile products is by far the industry with the largest number of certifications under both the TAA and NAFTA-TAA Programs. Worker groups at nonmetro apparel establishments accounted for 43 percent of non-metro TAA certifications, as well as 39 percent of all NAFTA-TAA certifications. Furthermore, about one-third of all nonmetro apparel establishments received worker-group certification under the two programs. The textile industry also had a sizable number of certifications in nonmetro areas, 126 under the TAA Program and 26 under the NAFTA-TAA Program.

Looking at the number of certifications by county, we see that the great majority of nonmetro counties in the Southeast United States had at least one certification during 1994-98 under either the TAA or the NAFTA-TAA Program (fig. E-3). Many of these counties had 4 or more certifications, mostly at textile or apparel plants. In Alabama, North Carolina, and South Carolina, almost all the certifications in nonmetro counties occurred in textiles or apparel, and a large number of nonmetro certifications in Tennessee also took place in apparel.

Two other regions with high concentrations of nonmetro certifications were the Pacific Northwest and the North Atlantic States. In the Pacific Northwest, nonmetro certifications occurred primarily in lumber and wood products (excluding furniture), while in the North Atlantic region, they covered a more diverse set of manufacturing industries, including textiles and apparel, leather and leather products, paper products, metal products, machinery, and electrical and electronic equipment.

Two smaller areas with substantial concentrations of nonmetro certifications were New Mexico/Texas and Kansas. Many certifications in these areas pertained to mining or other extractive industries, although Texas also featured a large number of apparel certifications. In these areas, the vast majority of mining and mining-related certifications took place under the TAA Program and not under the NAFTA-TAA Program, so it is unlikely that the economic developments associated with these certifications are closely related to NAFTA.

Two nonmetro counties with very large numbers of certifications deserve mention. First, Schuylkill County, Pennsylvania had 36 certifications during 1994-98. Almost all of these certifications occurred in textiles or apparel. Second, Williams County, North Dakota, located in the Williston Basin Oil Field, had

Table E-3—Trade adjustment assistance program certifications, January 1994 - September 1999
The apparel industry had the most certifications

Industry	Nonmetro Certifications	Nonmetro Rate[1]	Metro Certifications	Metro Rate[1]	Total U.S. Certifications[2]	Total U.S. Rate[1]
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Agriculture, forestry, and fishing	7	0.03	5	0.01	12	0.01
Mining	376	3.30	613	4.56	1,435	5.78
Manufacturing-total	1,855	2.23	3,091	1.04	4,758	1.25
Food and kindred products	13	0.22	57	0.37	70	0.33
Tobacco products	0	0.00	1	0.92	1	0.74
Textile mill products	126	6.44	175	3.94	301	4.70
Apparel and other textile products	965	27.20	1,007	4.86	1,986	8.18
Lumber and wood products, except furniture	141	0.68	46	0.27	191	0.51
Furniture and fixtures	24	1.00	32	0.34	56	0.47
Paper and allied products	24	2.24	49	0.89	73	1.11
Printing, publishing, and allied industries	8	0.08	19	0.04	27	0.04
Chemicals and allied products	15	0.80	82	0.78	97	0.78
Petroleum refining and related products	10	2.24	15	0.90	25	1.18
Rubber and miscellaneous plastics products	25	0.81	69	0.51	93	0.56
Leather and leather products	98	19.92	127	8.78	227	11.71
Stone, clay, glass, and concrete products	16	0.32	77	0.66	118	0.71
Primary metal industries	34	2.58	91	1.68	125	1.86
Fabricated metal products	38	0.67	106	0.34	144	0.39
Industrial and commercial machinery, and computer equipment	42	0.39	213	0.46	290	0.51
Electronic and other electrical equipment	151	7.02	302	2.01	479	2.79
Transportation equipment	51	1.81	104	1.14	158	1.33
Measuring, analyzing, controlling instruments	35	3.34	107	1.03	143	1.25
Miscellaneous manufacturing industries	39	1.43	115	0.73	154	0.84
Service sector and construction	16	0.00	28	0.00	77	0.00
Total	2,254	0.17	3,447	0.06	6,282	0.09

[1]TAA certifications as a percentage of all establishments.
[2]Total U.S. includes certifications in nonmetro and metro counties, and also certifications for worker groups at companies whose location was listed as "all locations," at companies certified in Puerto Rico, and at companies in cities that could not be identified as metro or nonmetro. Consequently, U.S. totals may exceed the sum of the nonmetro and metro categories.

Source: Calculated by ERS using data from Employment and Training Administration, U.S. Department of Labor, and from Enhanced County Business Patterns data, 1996.

25 certifications, all in mining or related industries and all under the TAA Program.

Recent NAFTA-TAA Certifications. An examination of NAFTA-TAA certifications for all counties (metro and nonmetro) during 1998-2000 provides additional insights into the distribution of recent certifications by State and by industry. Hardly any NAFTA-TAA certifications have occurred in agricultural production and services. This is largely due to the nature of the program, which provides assistance to employees rather than employers and business owners. Of the 1,188 certifications issued between 1998 and 2000, only six were in agriculture (table E-5). Of the six certifications in agriculture, four were in crop production, one was in livestock production, and one was in agricultural services. Table E-6 summarizes these certifications, as well as those in the related industry of food processing.

Far more certifications during 1998-2000 were issued in manufacturing industries related to agriculture. A total of 546 certifications were issued in the agriculture-related sectors identified in table E-5, and another 13 were issued in cases involving agriculture-related firms in other sectors. About three-fourths of the agriculture-related certifications occurred in two sectors: apparel and other finished textile products (340 certifications), and lumber and wood products (71 certifications). Several States had more than 20 certifications in these two sectors. In apparel, the States are Georgia (30), North Carolina (54), Pennsylvania (27), Tennessee (32), Texas (52), and Virginia (23). In lumber and wood products, Oregon had 35 certifications.

Table E-4—Trade adjustment assistance program certifications, January 1994 - September 1999
Nonmetro areas led metro areas in apparel certifications

Industry	Nonmetro Certifications	Nonmetro Rate[1]	Metro Certifications	Metro Rate[1]	Total U.S. Certifications[2]	Total U.S. Rate[1]
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Agriculture, forestry, and fishing	9	0.04	10	0.01	19	0.02
Mining	16	0.14	17	0.13	58	0.23
Manufacturing-total	658	0.79	995	0.33	1,663	0.44
Food and kindred products	4	0.07	25	0.16	29	0.14
Tobacco products	0	0.00	0	0.00	0	0.00
Textile mill products	26	1.33	44	0.99	69	1.08
Apparel and other textile products	270	7.61	259	1.25	531	2.19
Lumber and wood products, except furniture	100	0.48	30	0.18	134	0.36
Furniture and fixtures	6	0.25	16	0.17	22	0.18
Paper and allied products	17	1.59	24	0.44	41	0.62
Printing, publishing, and allied industries	4	0.04	12	0.02	16	0.03
Chemicals and allied products	7	0.37	28	0.27	35	0.28
Petroleum refining and related products	1	0.22	1	0.06	2	0.09
Rubber and miscellaneous plastics products	15	0.48	38	0.28	53	0.32
Leather and leather products	26	5.28	28	1.94	55	2.84
Stone, clay, glass, and concrete products	8	0.16	27	0.23	35	0.21
Primary metal industries	8	0.61	28	0.52	36	0.54
Fabricated metal products	22	0.39	68	0.22	91	0.25
Industrial and commercial machinery, and computer equipment	19	0.18	60	0.13	79	0.14
Electronic and other electrical equipment	78	3.63	164	1.09	244	1.42
Transportation equipment	27	0.96	52	0.57	79	0.66
Measuring, analyzing, controlling instruments	14	1.33	57	0.55	72	0.63
Miscellaneous manufacturing industries	6	0.22	34	0.22	40	0.22
Service sector and construction	9	0.00	36	0.00	52	0.00
Total	692	0.05	1,058	0.02	1,792	0.03

[1] NAFTA-TAA certifications as a percentage of all establishments.
[2] Total U.S. includes certifications in nonmetro and metro counties, and also certifications for worker groups at companies whose location was listed as "all locations," "various locations," or "throughout the state," and at companies in cities that could not be identified as metro or nonmetro. Consequently, U.S. totals may exceed the sum of the nonmetro and metro categories.

Note: Many worker groups petition for and are certified under both the TAA and NAFTA-TAA Programs. Thus, the number of worker groups certified under these programs cannot be added together. Approximately 75 percent of the worker groups certified under the NAFTA-TAA Program also are certified under TAA.

Source: Calculated by ERS using data from Employment and Training Administration, U.S. Department of Labor, and from Enhanced County Business Patterns data, 1996.

Textiles and Apparel: A Closer Look

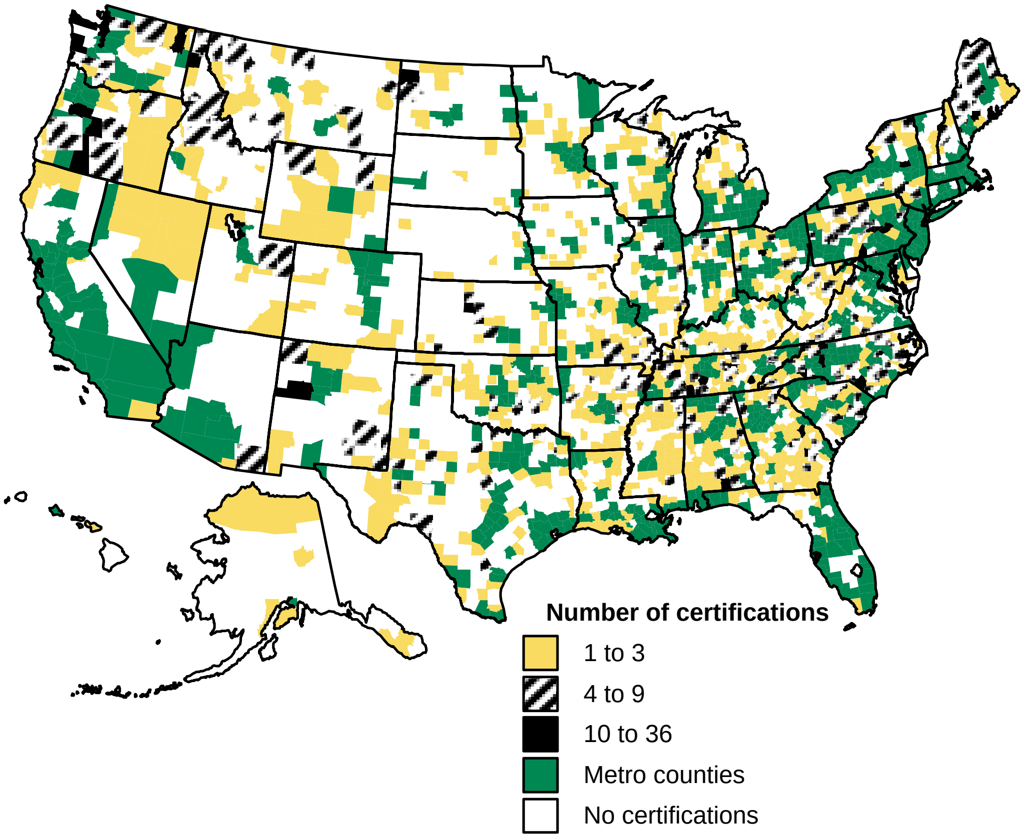
The U.S. textile and apparel industries have experienced a deep economic restructuring over the past several decades. Since the two industries are located disproportionately in nonmetro counties and are concentrated in the Southeast (fig. E-4), this process has had a profound impact on a number of rural communities, particularly in the Southeast. With NAFTA and the implementation of multilateral trade liberalization initiatives, these industries are likely to experience further restructuring. This means that many if not most dislocated textile and apparel workers who find a new job will likely do so in another industry or occupation.

NAFTA and the WTO's Agreement on Textiles and Clothing

Substantial progress has been made in the liberalization of world textile and apparel trade over the last decade and a half. At the regional level, the United States joined with Canada and Mexico to establish NAFTA, one of the largest free-trade areas in the world. At the multilateral level, the Uruguay Round of trade negotiations yielded the World Trade Organization's Agreement on Textiles and Clothing (ATC). Together, these reforms open the U.S. textile

Figure E-3

TAA and NAFTA-TAA certifications in nonmetro counties, 1994-98



Source: ERS calculations using data from the U.S. Department of Labor, Employment and Training Administration.

and apparel industries to greater competition, while enabling the sectors to increase their competitiveness by integrating more closely with the corresponding industries in Canada and Mexico.

As part of NAFTA, Canada, Mexico, and the United States are creating a duty-free, quota-free market for textiles and apparel. To qualify for this enhanced market access, items must be constructed from yarn and fiber produced by a NAFTA country, in accordance with the agreement's rules of origin. The last duties on qualifying textile and apparel trade between Canada and the United States were eliminated on January 1, 1998, following the 9-year transition period specified by CFTA. Similarly, more than 90 percent of qualifying U.S.-Mexico trade in textiles and apparel was duty-free as of January 1, 1999, and the two countries are proceeding to eliminate the remaining duties by January 1, 2003.

The ATC provides a definitive end to the quantitative restrictions that have governed international trade in textiles and apparel for over 30 years. Under the ATC, the quantitative restrictions established by the Multi-Fiber Arrangement (MFA) and earlier agreements are being eliminated gradually over the 10-year period that ends on January 1, 2005. This phase-out contains two parts: a four-stage process that eliminates the export restraints contained in previously negotiated bilateral agreements on products covered by the MFA, and accelerated quota growth for products still under restriction during the transition period. The ATC also deals with other non-MFA restraints related to textiles and clothing. With the elimination of these restrictions, tariffs will become the primary mechanism for trade protection in the textile and apparel industries.

NAFTA's Impact on U.S. Textile and Apparel Trade

NAFTA's direct impact on U.S. textile and apparel trade is difficult to quantify due to the lagged impact of changes in Mexican trade policy during the 1980's, the peso devaluation of December 1994, and structural changes in Asian textile production and trade. However, it is clear that Canada and Mexico's combined share of U.S. textile and apparel trade has

Table E-5—NAFTA-TAA certifications by State and selected two-digit SIC codes, 1998-2000

	Total	Agricultural production crops (01)	Agricultural production livestock (02)	Agricultural services (07)	Food and kindred products (20)	Textile mill products (22)	Apparel and other textile products (23)
United States	1,188	4	1	1	20	45	340
Alabama	27	0	0	0	0	2	20
Alaska	3	0	0	0	0	0	0
Arizona	20	0	0	0	1	1	3
Arkansas	19	0	0	0	0	0	4
California	70	1	0	0	0	0	15
Colorado	15	0	0	0	0	1	3
Connecticut	12	0	0	0	0	1	2
Delaware	0	0	0	0	0	0	0
District of Columbia	0	0	0	0	0	0	0
Florida	23	0	0	0	0	2	10
Georgia	47	0	0	0	0	6	30
Hawaii	0	0	0	0	0	0	0
Idaho	14	0	0	0	0	0	0
Illinois	24	0	0	0	1	0	1
Indiana	30	0	0	0	0	0	2
Iowa	9	1	0	0	0	0	1
Kansas	5	0	0	0	0	0	1
Kentucky	22	0	0	0	0	0	8
Louisiana	7	0	0	0	0	0	4
Maine	14	0	0	0	1	1	0
Maryland	2	0	0	0	0	0	0
Massachusetts	18	0	0	0	1	0	4
Michigan	46	0	0	0	3	2	2
Minnesota	16	0	1	0	1	0	1
Mississippi	4	0	0	0	0	0	2
Missouri	28	0	0	0	0	0	10
Montana	5	0	0	0	0	0	0
Nebraska	2	0	0	0	0	0	0
Nevada	4	0	0	0	0	0	0
New Hampshire	5	1	0	0	0	0	0
New Jersey	31	0	0	0	1	0	3
New Mexico	4	1	0	0	0	1	0
New York	57	0	0	0	1	3	9
North Carolina	112	0	0	0	2	10	54
North Dakota	0	0	0	0	0	0	0
Ohio	22	0	0	0	0	0	3
Oklahoma	4	0	0	0	0	0	0
Oregon	57	0	0	1	1	0	3
Pennsylvania	104	0	0	0	1	2	27
Puerto Rico	1	0	0	0	0	0	0
Rhode Island	0	0	0	0	0	0	0
South Carolina	30	0	0	0	0	3	19
South Dakota	4	0	0	0	0	0	0
Tennessee	59	0	0	0	1	3	32
Texas	125	0	0	0	2	3	52
Utah	6	0	0	0	0	0	2
Vermont	1	0	0	0	0	0	0
Virginia	31	0	0	0	1	3	23
Washington	33	0	0	0	1	3	3
West Virginia	1	0	0	0	0	0	1
Wisconsin	32	0	0	0	1	0	5
Wyoming	10	0	0	0	0	0	1

See notes at end of table.

Continued--

Table E-5—NAFTA-TAA certifications by State and selected two-digit SIC codes, 1998-2000--Continued

	Lumber and wood products (24)	Furniture and fixtures (25)	Paper and allied products (26)	Leather and leather products (31)	Other agriculture-related certifications	All other certifications
United States	71	9	28	33	13	623
Alabama	0	0	1	0	0	4
Alaska	3	0	0	0	0	0
Arizona	0	0	0	1	2	12
Arkansas	1	1	0	0	2	11
California	1	1	2	2	0	48
Colorado	0	0	0	0	0	11
Connecticut	0	0	0	0	0	9
Delaware	0	0	0	0	0	0
District of Columbia	0	0	0	0	0	0
Florida	0	0	0	0	0	11
Georgia	0	0	1	0	0	10
Hawaii	0	0	0	0	0	0
Idaho	10	0	0	0	2	2
Illinois	3	1	1	0	0	17
Indiana	0	0	0	0	0	28
Iowa	0	0	0	0	0	7
Kansas	0	0	0	0	0	4
Kentucky	1	0	0	0	0	13
Louisiana	1	0	0	0	0	2
Maine	1	0	3	3	0	5
Maryland	0	0	0	0	0	2
Massachusetts	0	0	0	1	0	12
Michigan	1	1	1	2	0	34
Minnesota	1	0	1	0	0	11
Mississippi	0	0	0	0	0	2
Missouri	0	0	1	2	1	14
Montana	4	0	0	0	0	1
Nebraska	0	0	0	1	0	1
Nevada	0	0	0	0	0	4
New Hampshire	0	0	0	1	0	3
New Jersey	0	0	1	0	0	26
New Mexico	0	0	0	0	0	2
New York	1	0	3	2	0	38
North Carolina	0	1	1	1	1	42
North Dakota	0	0	0	0	0	0
Ohio	0	0	1	0	0	18
Oklahoma	0	0	0	0	0	4
Oregon	35	1	2	0	0	14
Pennsylvania	1	1	1	2	2	67
Puerto Rico	0	0	0	1	0	0
Rhode Island	0	0	0	0	0	0
South Carolina	0	0	1	0	1	6
South Dakota	0	0	1	0	0	3
Tennessee	0	0	0	1	1	21
Texas	0	2	2	10	1	53
Utah	0	0	0	0	0	4
Vermont	0	0	0	0	0	1
Virginia	0	0	0	0	0	4
Washington	6	0	2	0	0	18
West Virginia	0	0	0	0	0	0
Wisconsin	1	0	3	3	0	19
Wyoming	0	0	0	0	0	9

No certifications occurred in tobacco manufactures (21).

Source: U.S. Department of Labor, Employment and Training Administration.

Table E-6—NAFTA-TAA certifications in production agriculture and food processing, 1998-2000

Certifications in production agriculture

Year	Firm's location	Product(s)	SIC
2000	New Mexico	Tomatoes	0161
1999	New Hampshire	Greenhouse	0181
1998	California	Tomatoes	0161
	Iowa	Beans	0119
	Minnesota	Beef processing	0211
	Oregon	Seedings	0721

Certifications in food processing

Year	Firm's location	Product(s)	SIC
2000	Maine	Potato chips	2096
	Michigan	Cereal products	2033
	North Carolina	Pet treats	2047
	Tennessee	Stick candy	2064
	Texas	Beer	2083
1999	New Jersey	Ice cream products	2024
	Minnesota	Choline cloride (a B-complex vitamin used for animal nutrition)	2048
	Michigan	Beer	2082
	Michigan	Distilled spirits	2085
	North Carolina	Beer	2082
	Oregon	Beer	2082
	Pennsylvania	Potato chips	2096
	Texas	Beer	2082
	Virginia	Instant tea	2086
	Washington	Beer	2082
	Wisconsin	Beer	2082
1998	Arizona	Dry pasta	2099
	Illinois	Beef carcasses	2011
	Massachusetts	Canned fruit	2037
	New York	Packaging frozen fruits and vegetables	2037

Source: U.S. Department of Labor, Employment and Training Administration.

increased since the implementation of NAFTA, even as the total value of this trade has continued to rise (figs. 5, 6). In 2000, Canada and Mexico supplied 18 percent of U.S. textile and apparel imports, compared with 7 percent in 1993. With respect to exports, Canada and Mexico accounted for 51 percent of the U.S. total in 2000, compared with 34 percent in 1993.

U.S. textile and apparel imports consist largely of apparel items - 79 percent in 2000. Mexico supplied 14 percent of U.S. apparel imports in 2000, while the countries and territories of the Caribbean Basin Initiative (CBI) provided 16 percent.[3] Apparel production is a labor-intensive activity and generally can be carried out at lower cost outside the United States. With NAFTA and CBI, the United States has exported increasing amounts of apparel pieces, along with yarn and fabric, to Mexico and CBI participants, where they are assembled and returned to the United States as finished apparel products. As a result, the export-to-import ratio for U.S. textile and apparel trade is substantially larger for Mexico and CBI partners than for the world as a whole. In 2000, this ratio equaled 0.60 for Mexico, 0.51 for the CBI, and 0.20 for the entire world.

Looking Ahead

Through the 1990's, the U.S. textile and apparel industries have boosted their productivity at an average annual rate of about 4 percent, twice the rate for all non-durable manufactured goods industries. High productivity growth, coupled with the other changes discussed above, has led to declining employment in the two sectors. DOL's Bureau of Labor Statistics projects that employment in these industries will decline by an additional 20 percent over the 1998-2008 period as a result of productivity increases in textiles and import competition in apparel (Tomson, 2000). Continued output growth is projected for both industries over the 10-year period.

The implementation of the ATC is likely to result in the further restructuring of the two industries. Since 1990, a number of studies have suggested that removing the MFA quotas would result in a decline in either employment or output in the U.S. textile and apparel industries ranging from 10 to 25 percent. The projected impact of MFA quota removal varies depending on assumptions regarding reciprocal liberalization by the less developed countries and the elasticity of substitution between imported and domestic goods, among other factors.

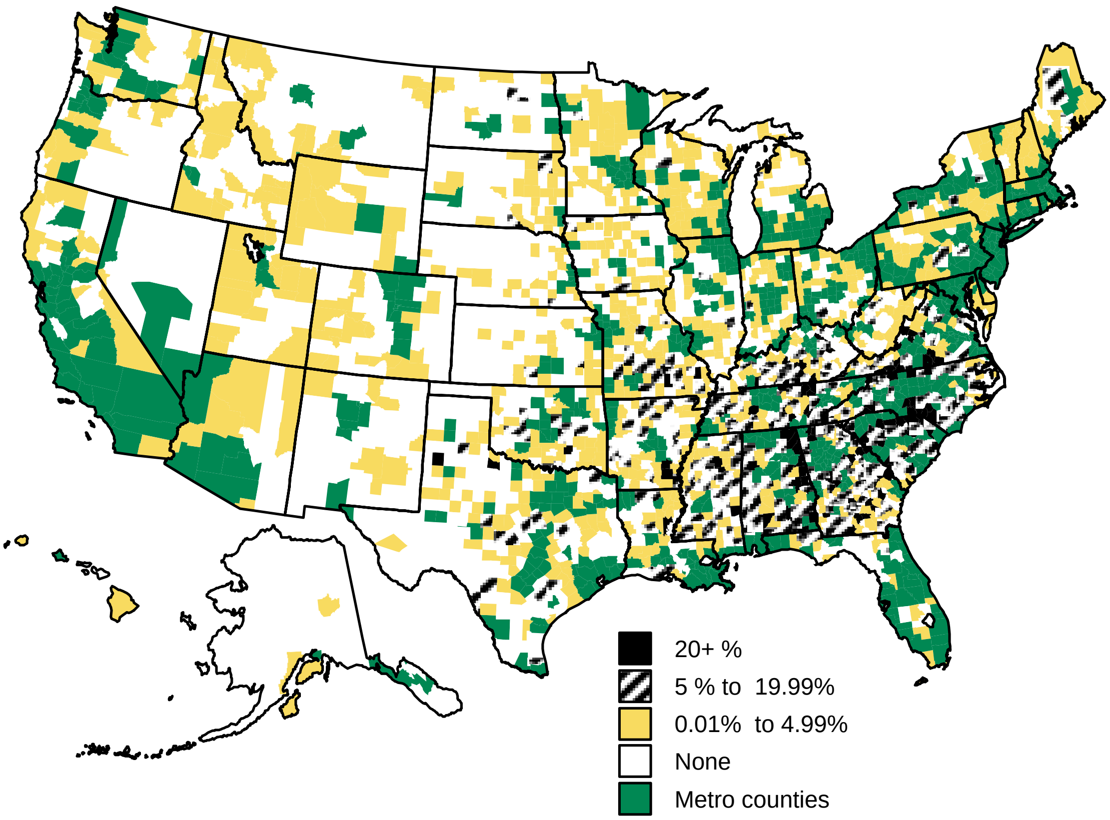
Using a static, computable general equilibrium (CGE) model of the world economy, Diao, MacDonald, Meyer, and Somwaru (2000) suggest that U.S. textile production could fall slightly under the provisions of the ATC. Mexico's production also falls under these circum-

[3] The CBI was started in the 1980s to allow quota-free access for selected countries in Central America and the Caribbean for products produced with U.S. fabric. Currently, 24 countries and territories participate in the CBI: Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, British Virgin Islands, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Montserrat, Netherlands Antilles, Nicaragua, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago.

Figure E-4

Textile and apparel: Jobs in textile and apparel manufacturing as percentage of all jobs in county, 1996

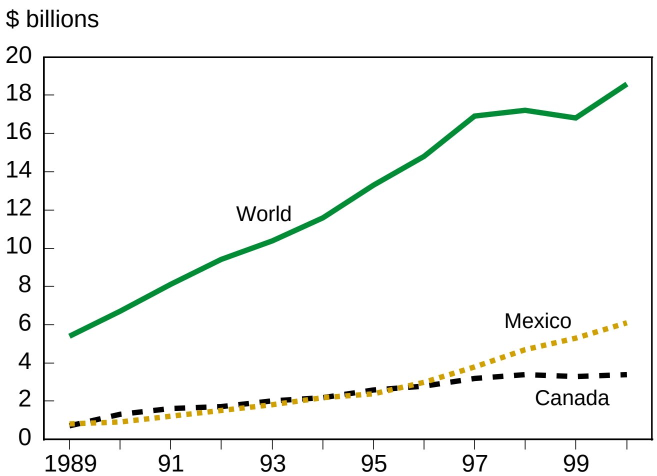
Southeastern counties are most dependent on textile and apparel manufacturing



Source: ERS calculations using County Business Patterns data.

Figure E-5

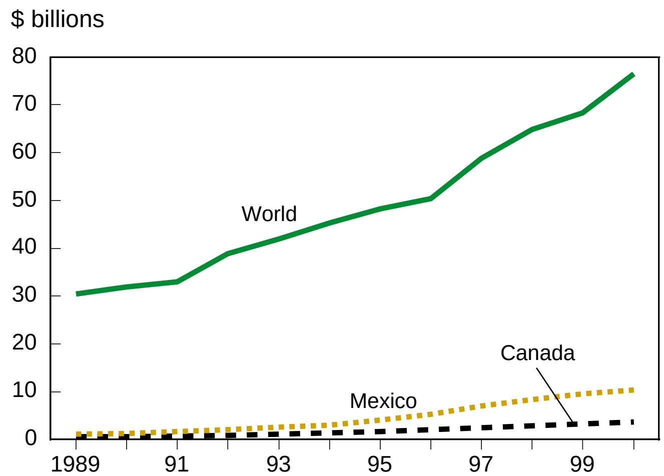
U.S. textile and apparel exports, 1989-2000



Source: Office of Textiles and Apparel, U.S. Department of Commerce.

Figure E-6

U.S. textile and apparel imports, 1989-2000



Source: Office of Textiles and Apparel, U.S. Department of Commerce.

stances—Asian exporters gain export share once global liberalization reduces the preference that countries such as Mexico currently receive under regional trade agreements. Clothing production in Southeast Asia is estimated 10 percent higher and production in China is estimated 12 percent higher. Mexico is the only developing country where clothing production falls in this simulation. Production changes for both the United States and the rest of North America estimated in this simulation are less than 1 percent.

The simulation mentioned above assumes that China is a member of the WTO, but the exact date of China's WTO accession is still under negotiation. According to the U.S. International Trade Commission (ITC), China's accession will have little net effect on the U.S. textile and apparel industries. Compared with a non-accession scenario, the main effects of accession would be to increase the share of U.S. imports from China and to reduce the share from other countries, particularly less developed countries in Asia. The ITC indicates that China's accession would reduce U.S. clothing output by about 1 percent and U.S. textile output by about 0.5 percent. An analysis of how these production changes might affect employment - using an input-output model at the DOL - suggests that additional U.S. job losses from including China in the WTO could total 6,100 jobs in the apparel industry and 2,100 in the textile industry. These reductions are small compared with the changes that occurred during the last half of the 1990's.

Conclusion

By increasing export opportunities and improving economic efficiency, NAFTA has likely had a small, positive influence on U.S. employment in agriculture and in manufacturing industries related to agriculture. However, only a few of these sectors have experienced substantial changes in their employment levels since NAFTA's implementation, and many of these changes are driven by factors other than the agreement. Employment in crop production has changed relatively little, while employment in livestock production has decreased, reflecting technological change and consolidation in the hog industry and drought and poor ranging conditions in the cattle industry. Employment in landscaping and horticultural services and in veterinary services increased substantially during the 1990's, but this growth is most likely due to factors other than NAFTA, such as consumer preferences and the strength of the U.S. economy.

Two manufacturing sectors related to agriculture - textiles and apparel - have experienced a decline in employment that is connected to NAFTA. This reduction reflects a long-term process of economic restructuring that was well underway prior to the agreement. Still, by fostering the development of a more integrated textile and apparel industry within North America, the agreement has been accompanied by expanded textile and apparel trade among the NAFTA countries, increased productivity in the U.S. textile and apparel sectors, and further reductions in U.S. textile and apparel employment. To assist workers who are displaced by international trade, the Federal Government operates the NAFTA Transitional Adjustment Assistance (NAFTA-TAA) and the Trade Adjustment Assistance (TAA) Programs. Such assistance should prove to be particularly important in the near future as the U.S. textile and apparel industries adapt to the more liberalized trading environment created by NAFTA and the World Trade Organization's Agreement on Textiles and Clothing.

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