Trade and displacement in manufacturing

Trade sensitivity is linked to job loss, but does not affect the duration of unemployment or the probability of the loss of health insurance; it is only weakly associated with subsequent earnings

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Workers who lose their jobs because of plant shutdowns or partial closings typically experience higher unemployment and greater wage losses than others whose employers do not go out of business or cut operations.

Dislocated workers are out of work, on average, an additional 8 weeks in the year their positions are terminated, and 4 weeks in the following calendar year. In addition, their wages remain lower: some 5 years later, their wages are at least 12 percent below those of their counterparts whose employers do not go out of business.[1] Labor dislocation also leads to the loss of employer-provided health insurance for some workers, particularly those who subsequently have difficulty obtaining stable employment.[2]

Spurred by policy concerns and recent improvements in the availability of data on dislocated workers, economic research into the consequences of labor market displacement has proliferated.[3] However, none of the previous studies has directly investigated the relationship between economic dislocation and the trade sensitivity of a worker's industry. This gap in research is all the more surprising due to continuing controversy over the effects of measures liberalizing international trade.

Furthermore, support offered under the terms of the Federal Trade Adjustment Assistance Act to displaced workers is based on a belief that these workers suffer more serious problems if job loss stems from import competition than if it results from other factors. But dislocated workers in trade sensitive industries could have higher rates of job loss without experiencing greater adjustment difficulties than other displaced workers. In other words, although general assistance for displaced workers might be justified, a specific need has not yet been established for a categorical program assisting those whose job loss results from international trade.

This article examines the relationship between the trade sensitivity of a worker's industry and the probabilities and consequences of job displacement. Displacement data are obtained from the 1988 Displaced Worker Supplement to the Current Population Survey (CPS).[4]

To anticipate our results, we found a statistically significant positive association between trade sensitivity and the likelihood of job loss. But we detected little evidence to suggest that trade sensitivity affects the duration of unemployment or the probability of the loss of health insurance. In addition, we found only a meager indication of a link between subsequent earnings and trade sensitivity.

Previous research

The limited previous research does not conclusively indicate whether trade sensitivity is related to the probabilities or outcomes of displacement. Using data from the 1984 Displaced Worker

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Supplement, Douglas Kruse uncovered some evidence that the increase in the import share of a worker's predisplacement industry is positively associated with the duration of subsequent unemployment.[5] He also found that wage losses for workers reemployed at the survey date were lower for those displaced from industries in which imports were little changed over time than for those who lost work in industries with larger increases in imports; however, this effect is not statistically significant.[6]

Robert Bednarzik examined employment changes in trade-sensitive industries and demonstrated that workers in industries with high import penetration rates are more likely than employees in export sensitive industries to have characteristics associated with longer spells of unemployment following job loss. They are disproportionately women, blacks, and older and less educated workers.[7] He also reported that average earnings were lower in job-gaining industries sensitive to foreign trade than in job losing industries sensitive to foreign trade during the 1982–87 interval.

Finally, Robert C. Shelburne and Bednarzik have indicated that import and export-sensitive industries are more likely to be geographically concentrated than those that are not trade sensitive.[8] They argue that, because of this, job losses in these industries will have more of an impact on local employment rates and make it more difficult for displaced workers to adjust to the loss of work.

None of these studies directly examines the relationship between trade sensitivity and displacement rates. In addition, only limited information is provided on post-placement outcomes. The analysis that follows provides a first step toward filling this gap in our knowledge.

Data

The primary data for this research are from the January 1988 Displaced Worker Survey. We also use separate trade data on export and import penetration, and on the value of exports, imports, and product shipments for all three-digit Standard Industrial Classification manufacturing industries and a few four-digit classifications.[9] The trade data were used to calculate import and export penetration rates for the three-digit census manufacturing codes (used in the CPS) for each year between 1982 and 1986 (with data from 1987 used to substitute for some missing values during earlier years, as discussed below); the penetration rates were then merged with the Displaced Worker Survey data covering a roughly similar interval.

The Displaced Worker Survey has been conducted biennially since 1984 as a supplement to the January CPS. All workers aged 20 and older are asked whether they lost or left a job within the 5 years before the survey date "because of a plant closing, an employer going out of business, a layoff from which [the individual] was not recalled, or other similar reasons." Those who respond that they lost work under these circumstances are asked a series of questions about the experience, including the reason for the job loss, the period of joblessness that followed, the year in which displacement occurred, previous and current industry affiliations, and information on wages and health insurance in the predisplacement job and at the survey date.

Because our trade data are available only for manufacturing industries, dislocated workers from nonmanufacturing industries and nondisplaced individuals employed outside manufacturing industries at the time of the January 1988 CPS interview date were excluded from the sample. Workers who reported losing their jobs due to the failure of a self-employed business or for seasonal or "other" reasons also were excluded from the displaced worker count because the meaning of displacement is not clear for those individuals. The analysis was further restricted to respondents between the ages of 25 and 60 at the survey date. Younger workers were left out because they change jobs frequently, making displacement less traumatic and less meaningful for them. Older workers were excluded because their labor market experience after losing a job may be influenced by the retirement decision.

Trade sensitivity measures

Five alternative measures of trade sensitivity were calculated:

- import penetration rates;
- export penetration rates;
- average trade penetration rates,
- changes in import penetration, and;
- changes in exports.

Import penetration is defined as the value of imports of a good into the United States divided by the domestic supply of the good (imports plus domestic product shipments). Similarly, export penetration is defined as the ratio of the value of exports for an industry to the value of U.S. product shipments for that industry.[10] Average trade penetration is the simple arithmetic mean of import and export penetration rates.[11] Finally, the change in import (export) penetration rates is defined as the percentage point difference between import (export) penetration rates in 1986 and their corresponding values in 1982.

Based on preliminary calculations, we grouped the first three of our sensitivity measures—im-

port, export, and average trade penetration rates—into four categories: less than 5 percent, 5 percent to 10 percent, 10 percent to 15 percent, and greater than 15 percent. Changes in rates of penetration also were grouped into categories. (See table 1 for the ranges established for the latter.)

Table 1. **Trade sensitivity and displacement rates**

Trade sensitivity measure/range	Displacement rate[1] (percent)	Number of industries	Proportion of total employment (percent)
Import penetration rate [2]:			
0–5 percent	13.4 (.31)	24	30.8
5–10 percent	14.1 (.33)	20	23.9
10–15 percent	20.4 (.76)	14	23.2
More than 15-percent	18.9 (.54)	16	22.1
Export penetration rate [3]:			
0–5 percent	16.8 (.25)	33	44.9
5–10 percent	13.8 (.31)	22	28.5
10–15 percent	16.6 (.70)	8	13.2
More than 15 percent	20.2 (1.31)	11	13.4
Average trade penetration rate [4]:			
0–5 percent	13.5 (.28)	24	32.4
5–10 percent	16.5 (.39)	22	22.8
10–15 percent	17.3 (.39)	15	32.5
More than 15-percent	21.2 (1.24)	13	12.4
Change in import penetration rate [5]:			
Less than 0 percentage points	20.5 (1.74)	5	4.5
0 to 2 percentage points	13.6 (.24)	30	38.1
2 to 4 percentage points	13.5 (.60)	13	14.6
4 to 6 percentage points	15.5 (.55)	9	16.1
More than 6 percentage points	21.8 (.64)	17	26.7
Change in export penetration rate [6]:			
Less than –2 percentage point	23.6 (.68)	17	21.7
–2 to –1 percentage points	16.5 (.83)	7	5.4
–1 to 0 percentage points	14.5 (.18)	32	45.9
More than 0 percentage points	13.8 (.45)	18	27.0

[1] Displacement rate is defined as the number of workers displaced from industries in the indicated penetration range during 1983-88 divided by the number of workers employed in these industries at the survey date (January 1988).

[2] Import penetration is imports divided by the sum of imports and domestic product shipments. Data are for the interval 1982-86/87.

[3] Export penetration is exports divided by domestic product shipments. Data are for the interval 1982-86/87.

[4] Average trade penetration is the arithmetic mean of the import and export penetration values.

[5] Change in import penetration is the percentage-point difference in 1986 imports and 1982 imports, each expressed as a percentage of imports plus domestic shipments.

[6] Change in export penetration is the percentage point difference in 1986 exports and 1982 exports, each expressed as a percentage of domestic shipments.

NOTE: Standard errors are indicated in parentheses.

Table 2 details trade sensitivity for each of the 74 industries in our sample. Nearly all 74 industries had increases in import penetration and a substantial majority had declines in export penetration during the 1982–86 period. Decreases in import penetration occurred in just five industries, while increases in export penetration were registered in only 18 industries.[12]

Several limitations of the trade data must be noted. First, as mentioned earlier, import, export, and product shipment data were available only for manufacturing industries. Second, data were not complete for several three-digit SIC manufacturing industries. The census three-digit industries used in the CPS often encompass more than one three-digit SIC code (for which the trade data were available) and in some cases include only some of the four-digit SIC industries that are a part of the three-digit SIC industry. As a result, trade or product shipment data were sometimes missing for one of the three-digit or four-digit SIC industries included under a single census industry code.

We approached the missing data problem as follows: When trade and/or product shipment data were unavailable for all of the SIC three-digit codes that are part of a census industry, the latter was excluded from the sample.[13] Absence of data for a single component industry resulted in that component being excluded in calculating the trade sensitivity of the census industry. For the few component industries for which trade data were available only for 1987 (and missing for 1982–86), we assumed that their import and export penetration rates were unchanged over the period; the 1987 values were assigned to each of the years 1982–86 in deriving the aggregate import and export penetration rates for the relevant three-digit census industry. The SIC industries with missing data for 1982–86 were excluded when calculating changes in import and export penetration for the three-digit census industry over the sample period.

Displacement rates and trade sensitivity

Displacement rates were calculated for each industry as the number of individuals reporting a job loss during the previous 5 years divided by the number of persons employed in that industry as of January 1988.[14] The displacement rates and corresponding values of the various trade sensitivity measures are detailed for all 74 industries in table 2.

Displacement rates vary widely across industries in each category of import and export penetration rates and across penetration measures.

Table 2. **Displacement rates and measures of trade sensitivity by three-digit census industry**

Industry	Census code	Displacement rate, 1983–88 (percent)	Import penetration, 1982–86 (percent)	Export penetration, 1982–86 (percent)	Average trade penetration, 1982–86 (percent)	Change in import penetration, (percentage point)	Change in export penetration, (percentage point)
Meat products	100	20.8	3.7	3.9	3.8	0.4	0.9
Dairy products	101	14.2	1.6	1.1	1.4	–.1	–.0
Canned and preserved fruits and vegetables	102	19.3	6.1	3.0	4.5	.9	–1.0
Grain mill products	110	19.4	.7	7.3	4.0	.3	–.4
Bakery products	111	14.0	1.1	.2	.7	.5	.0
Sugar and confectionery products	112	11.5	9.2	2.2	5.7	.7	.6
Beverage industries	120	15.6	6.8	1.1	4.0	.4	–.2
Miscellaneous food preparations	121	19.2	4.4	9.9	7.2	1.5	–1.4
Tobacco manufactures	130	14.1	1.1	9.5	5.3	–1.3	–.8
Knitting mills	132	9.6	1.4	1.2	1.3	1.3	–.5
Floor coverings, excluding hard surface	141	14.3	6.0	3.0	4.5	2.0	–2.1
Yarn, thread and fabric mills	142	17.6	8.3	3.8	6.1	3.9	1.0
Miscellaneous textile mill products	150	.0	9.5	8.0	8.7	2.4	.4
Apparel and accessories, excluding knit	151	23.9	24.1	1.8	13.0	12.1	–.1
Miscellaneous fabricated mill products	152	6.0	6.2	2.9	4.6	4.2	–.5
Pulp, paper and paperboard mills	160	5.5	13.5	9.1	11.3	2.0	–.3
Miscellaneous paper and pulp products	161	12.7	2.3	2.6	2.4	1.1	–.6
Paperboard containers and boxes	162	10.1	.3	0.9	.6	0.2	–.2
Newspaper publishing and printing	171	6.5	.3	0.1	.2	0.0	.0
Printing and publishing, except newspapers	172	8.7	1.6	1.8	1.7	0.8	–.6
Plastics, synthetics and resins	180	4.0	3.4	11.9	7.7	2.1	.1
Drugs	181	3.3	6.0	9.6	7.8	2.5	.7
Soaps and cosmetics	182	8.8	1.8	2.6	2.2	1.3	–.5
Paints, varnishes and 6 related products	190	8.3	.8	2.3	1.6	.9	–.5
Agricultural chemicals	191	10.1	6.9	21.5	14.2	1.8	.2
Industrial and miscellaneous chemicals	192	10.2	9.6	16.3	13.0	3.1	1.8
Petroleum refining	200	18.5	9.2	2.9	6.1	2.7	.1
Miscellaneous petroleum and coal products	201	.0	1.8	5.3	3.5	.9	–1.5
Tires and inner tubes	210	8.0	15.6	4.0	9.8	5.0	.5
Other rubber products and plastics, footwear, and belting	211	9.9	21.2	11.3	16.2	–.7	–.2
Miscellaneous plastic products	212	9.2	3.6	4.1	3.9	1.8	–.3
Leather tanning and finishing	220	58.5	19.6	18.7	19.2	4.0	4.2
Footwear, excluding rubber and plastics	221	59.4	51.8	3.0	27.4	24.4	1.2
Leather products, excluding footwear	222	17.7	43.7	4.4	24.0	18.4	–.6
Logging	230	15.9	.6	18.2	9.4	–.7	.2
Sawmills, planing mills, and millwork	231	18.9	13.9	4.8	9.4	2.0	–.3
Miscellaneous wood products	241	12.7	6.8	2.7	4.8	1.3	–.2
Furniture and fixtures	242	20.4	8.3	1.5	4.9	5.4	–.7
Glass and glass products	250	12.2	7.6	5.1	6.4	3.6	–1.3
Cement, concrete, gypsum and plaster products	251	15.6	2.5	0.4	1.4	1.7	–.3
Structural clay products	252	19.6	13.2	4.2	8.7	.9	2.4
Pottery and related products	261	13.0	36.8	10.6	23.7	10.4	–.1
Miscellaneous nonmetallic mineral and stone	262	5.9	7.6	7.0	7.3	3.3	–.8
Blast furnaces steel works, rolling and finishing mills	270	28.9	16.5	2.3	9.4	–.9	–2.0
Iron and steel foundries	271	25.5	2.4	1.2	1.8	.8	–1.1

Table 2. **Continued—Displacement rates and measures of trade sensitivity by three-digit census industry**

Industry	Census code	Displacement rate, 1983–88 (percent)	Import penetration, 1982–86 (percent)	Export penetration, 1982–86 (percent)	Average trade penetration, 1982–86 (percent)	Change in import penetration, (percentage point)	Change in export penetration, (percentage point)
Primary aluminum industries	272	8.7	9.8	4.4	7.1	5.4	–1.8
Other primary metals	280	19.2	21.0	7.1	14.0	6.4	–.5
Cutlery, hand tools, and other hardware	281	21.0	10.3	6.3	8.3	4.2	–1.6
Fabricated structural metal products	282	27.0	1.3	3.0	2.2	.9	–3.2
Screw machine products	290	16.7	15.8	4.5	10.1	3.2	–.8
Metal forgings and stamping	291	15.6	1.8	6.7	4.3	.5	–.4
Ordnance	292	4.4	4.7	16.8	10.8	2.5	–3.0
Miscellaneous fabricated metal products	300	26.6	6.6	5.0	5.8	1.5	2.1
Engines and turbines	310	26.5	8.4	22.7	15.5	3.9	–8.9
Farm machinery and equipment	311	29.6	13.0	14.2	13.6	6.9	–5.1
Construction and material handling machinery	312	58.9	10.7	31.7	21.2	9.7	–23.0
Metal working machinery	320	23.4	14.5	10.4	12.5	6.6	–3.7
Office and accounting machines	321	8.0	14.3	14.9	14.6	11.5	–3.0
Machinery, excluding electrical	331	22.0	13.5	16.1	14.8	6.1	–4.4
Household appliances	340	17.0	12.9	6.1	9.5	6.7	–2.2
Radio, TV, and communication equipment	341	13.3	19.9	8.0	14.0	5.2	–1.0
Electrical machinery, equipment, and supplies	342	17.2	14.9	14.4	14.7	6.0	–.6
Motor vehicles and motor vehicles equipment	351	16.2	23.0	9.5	16.2	5.8	.5
Aircraft and parts	352	9.4	7.1	6.7	6.9	1.0	2.9
Ship and boat building and repairing	360	27.9	4.0	9.8	7.0	2.2	–40.9
Railroad locomotives and equipment	361	51.2	12.0	20.2	16.1	14.7	3.0
Guided missiles, space vehicles, and parts	362	7.0	1.1	5.6	3.4	.9	–4.0
Cycles and miscellaneous transportation equipment	370	39.5	11.7	6.5	9.1	1.0	–0.5
Scientific and controlling instruments	371	16.3	8.4	20.2	14.3	5.0	–1.1
Optical and health services supplies	372	15.9	11.4	14.3	12.8	3.9	1.3
Photographic equipment and supplies	380	4.9	17.3	15.2	16.3	9.6	–.8
Watches, clocks and clockwork-operated devices	381	70.7	55.4	9.0	32.2	12.2	–5.0
Toys, amusements, and sporting goods	390	15.0	34.4	9.4	21.9	16.3	–2.6
Miscellaneous manufacturing industries	391	14.0	30.5	9.2	19.9	11.2	.4

(See table 2.) All industries with displacement rates greater than 50 percent have import rates greater than 10 percent. The highest displacement rates are 71 percent for watches, clocks, and clockwork operated devices, and, each with 59 percent, footwear, except rubber and plastic; construction and material handling machinery; and leather tanning and finishing. The third highest displacement rate is 51 percent for railroad locomotives and equipment.

All the industries with displacement rates greater than 50 percent, except leather tanning and finishing, also are characterized by large increases—greater than 6 percentage points between 1982 and 1986—in imports. In addition, 3 of the 5 industries with displacement rates greater than 50 percent also have high export penetration rates (the exceptions are watches, clocks, and clockwork-operated devices, and footwear).

Although industries with high displacement rates generally are trade sensitive, the reverse often is not the case. For example, photographic equipment and supplies, which is a high import penetration industry, has a displacement rate of less than 5 percent and ordnance, a high export penetration industry, has a displacement rate of only 4 percent. Conversely, displacement rates exceed 20 percent for a number of industries with low export and import rates (meat products; iron

and steel foundries; and fabricated structural metal products).

We next provide evidence on the relationship between trade sensitivity and displacement probabilities.[15] (See table 1.) Displacements appear to be more frequent in industries with high imports and average trade penetration rates.[16] Interestingly, displacements are fairly uncommon in industries with rapid export growth. As a result, sectors that are relatively open to foreign trade have greater instability in employment, except when exports are increasing strongly over time. A possible explanation is that trade-sensitive industries experience international, as well as domestic (demand and supply), shocks but that increasing rates of export penetration allow firms to adjust employment levels through attrition, rather than by laying off workers.

Correlations between industry displacement rates and each measure of trade sensitivity also were calculated across all 74 industries. Weighted by industry employment levels, the sample correlation coefficients are 0.314, 0.243, and 0.358 for import, export, and average trade penetration rates. For changes in import and export penetration rates, the correlation coefficients are 0.384 and −0.429. In all cases, the coefficients are significant at the 1-percent level. These results are consistent with those presented in table 1 and provide additional evidence of the association between displacement and trade sensitivity.[17]

Postdisplacement outcomes

Many workers suffer temporary or permanent adjustment problems following the loss of their jobs. In this section, we examine the relationship between trade sensitivity and the proportion of displaced workers experiencing some joblessness in the wake of the displacement event rather than moving directly into new jobs, the length of that jobless spell, the subsequent change in earnings for those who are reemployed at the survey date, and the proportion of reemployed workers who report the loss of health insurance.

Summary values of the outcome measures are reported in table 3. Fewer industries are cited in table 3 than in table 2. We include only those industries for which the Displaced Worker Survey contains 15 or more respondents for each outcome measure, providing a total of 17 industries.[18] For all the outcome measures examined in

Table 3. Postdisplacement outcomes by three-digit census industry

Industry	Industry code	Proportion having a jobless spell (percent)	Median duration of joblessness (weeks)	Mean duration of joblessness (weeks)	Median change in earnings (percent)	Mean change in earnings (percent)	Proportion losing health insurance (percent)
Meat products	100	96.7	8.0	21.6	−31.7	−26.5	34.6
Miscellaneous food preparations	121	94.7	19.5	24.8	−5.4	32.0	10.5
Yarn, thread, and fabric mills	142	96.4	12.0	20.2	−16.1	−17.2	29.2
Apparel and accessories, excluding knit	151	88.7	12.0	17.7	−4.4	−1.4	13.2
Printing and publishing, excluding newspapers	172	79.0	10.5	16.1	15.6	25.0	11.8
Sawmills, planing mills, and millwork	231	88.9	14.0	19.3	9.3	9.7	20.0
Furniture and fixtures	242	82.4	10.5	20.2	−2.0	−1.2	6.90
Blast furnaces, steel works, rolling and finishing mills	270	96.9	24.0	28.4	−30.4	−23.8	11.1
Fabricated structural metal products	282	93.8	8.0	13.9	−10.4	2.4	12.8
Miscellaneous fabricated metal products	300	100.0	16.0	19.4	−7.2	−16.5	6.3
Construction and material handling machinery	312	89.5	14.0	25.5	−12.4	−12.6	14.7
Metal working machinery	320	88.2	16.0	19.8	12.0	8.5	6.3
Machinery, excluding electrical	331	86.2	9.5	22.6	−.4	6.1	15.5
Radio, TV, and communications equipment	341	85.0	24.0	28.0	−9.0	.4	5.6
Electrical machinery, equipment, and supplies	342	88.0	10.0	20.2	−4.4	−2.3	.0
Motor vehicles, and motor vehicle equipment	351	89.9	24.0	24.9	−11.4	−16.9	14.3
Ship and boat building and repair	360	88.2	8.0	13.6	−23.8	−23.7	20.0

NOTE: Industries listed here have at least 15 displaced workers for each outcome variable, January 1988 Displaced Worker Survey.

this article we use actual, rather than weighted, data.

The table shows that the mean jobless duration is greater than 20 weeks (though the median values are often considerably smaller) and real earnings losses are the rule rather than the exception. Industries with large earnings losses include meat products, blast furnaces, steel works, rolling and finishing mills, and ship and boat building and repairing. Although the blast furnaces industry also is among the highest in duration of joblessness, there are few signs of an obvious connection between earnings losses and the extent of joblessness, at least at the industry level.

To examine the association between trade and postdisplacement experiences, we again classify industries by their degree of trade sensitivity. (See tables 4 and 5.) Table 4, which provides information on postdisplacement unemployment, supplies little evidence of a consistent relationship between trade sensitivity and adjustment problems following the loss of a job. The proportion of workers who experience some spell of unemployment (rather than getting another job immediately), does not vary greatly across import or export ranges and does not fluctuate with trade sensitivity in a consistent manner for any of the other penetration measures.

Much the same is true for the distribution of unemployment spells. Although there is some indication of a positive association between the average duration of joblessness and the level of import penetration when industries are grouped this way, increases in import penetration over time do not lengthen the duration of joblessness, nor do increases in export penetration shorten it. Instead, if anything, durations are longer (shorter) in industries with rapid (slow) growth of exports (imports).

Table 5 fails to provide evidence of an association between trade sensitivity and the distribution of changes in weekly earnings (between the lost job and the current job) or between trade sensitivity and changes in health insurance ben-

Table 4. **Trade sensitivity and postdisplacement joblessness**

[In percent]

Trade sensitivity measure/range	Percent of spells lasting				Median duration (weeks)	Mean duration (weeks)
	More than 0 weeks	13 or more weeks	26 or more weeks	52 or more weeks		
Import penetration rate:						
0–5 percent	88.2	40.8	27.5	10.3	12.0	19.7
5–10 percent	89.8	42.4	24.5	11.2	12.0	20.8
10–15 percent	88.9	43.2	29.5	17.3	12.0	22.2
More than 15 percent	89.2	50.0	31.9	13.4	16.0	23.4
Export penetation rate:						
0–5 percent	90.2	42.7	27.0	11.8	12.0	20.6
5–10 percent	87.1	49.3	32.7	13.8	18.0	24.3
10–15 percent	88.3	44.5	28.5	13.1	13.0	20.5
More than 15 percent	88.4	40.0	27.1	16.8	10.0	21.7
Average trade penetration rate:						
0–5 percent	86.5	37.7	24.9	9.5	10.0	19.3
5–10 percent	92.9	51.8	33.5	16.1	17.0	24.3
10–15 percent	87.5	40.6	25.6	12.8	12.0	20.1
More than 15 percent	90.9	51.8	34.3	16.8	17.5	24.5
Change in import penetration rate:						
Less than 0 percentage points	93.0	52.6	36.8	17.5	20.0	25.4
0–2 percentage points	88.9	43.0	27.4	11.5	12.0	20.8
2–4 percentage points	91.0	42.3	27.0	11.7	12.0	21.3
4–6 percentage points	88.2	45.6	30.9	13.2	14.0	21.9
More than 6 percentage points	88.0	43.4	27.7	14.6	12.0	21.5
Change in export penetration rate:						
Less than –2 percentage points	90.7	43.0	27.8	14.4	12.0	21.4
–2 to –1 percentage points	96.4	52.7	38.2	14.6	15.0	24.2
–1 to 0 percentage points	84.2	39.9	25.4	10.6	12.0	19.9
More than 0 percentage points	93.5	50.9	32.9	16.2	17.0	23.8

NOTE Postdisplacement joblessness refers to the duration of the first (completed) spell following the displacement event. Job duration is coded in complete weeks in the Displaced Worker Survey.

Table 5. **Trade sensitivity and changes in earnings and health insurance status**

Trade sensitivity measure/range	Percentage distribution of earnings change						Proportion losing health insurance benefits (percent)
	Loss of 20 percent or more	Loss of up to 20 percent	Gain of up to 20 percent	Gain of 20 percent or more	Median change in earnings	Mean change in earnings	
Import penetration rate:							
0–5 percent	44.7	17.2	15.7	22.5	–5.4	0.0	16.4
5–10 percent	45.9	23.5	15.8	14.8	–7.2	–6.0	12.7
10–15 percent	41.4	21.2	19.8	17.6	–4.6	–1.8	11.7
More than 15 percent	48.7	19.8	14.2	17.2	–11.2	–4.7	13.6
Export penetration rate:							
0–5 percent	45.3	18.1	16.3	20.3	–5.4	–0.4	20.3
5–10 percent	49.8	21.7	12.0	16.6	–12.5	–6.8	15.7
10–15 percent	40.9	20.4	19.7	19.0	–3.8	–3.1	9.5
More than 15 percent	40.7	24.5	20.7	14.2	–7.0	–4.3	15.5
Average trade penetration rate:							
0–5 percent	44.3	16.5	16.9	22.3	–4.3	–0.4	18.7
5–10 percent	50.5	21.4	12.5	15.6	–14.1	–6.9	19.2
10–15 percent	41.8	20.1	18.9	19.2	–5.4	–2.2	13.7
More than 15 percent	44.8	25.9	16.8	12.6	–10.2	–2.7	17.5
Change in import penetration rate:							
Less than 0 percentage point	59.7	15.8	8.8	15.8	–25.0	–22.2	12.3
0–2 percentage points	45.9	16.9	16.9	20.4	–5.4	.4	19.8
2–4 percentage points	44.1	25.2	14.4	16.2	–7.2	–4.9	19.8
4–6 percentage points	50.7	19.1	14.7	15.4	–10.5	–8.3	12.5
More than 6 percentage points	39.7	22.9	18.9	18.6	–5.4	.2	16.0
Change in export penetration rate:							
Less than –2 percentage points	45.0	23.4	15.1	16.5	–10.4	–5.0	17.9
–2 to –1 percentage points	43.6	25.5	10.9	20.0	–10.7	5.4	7.3
–1 to 0 percentage points	42.1	17.2	18.5	22.2	–2.0	.0	14.8
More than 0 percentage points	50.5	20.4	16.2	13.0	–11.4	–7.5	22.2

NOTE: Earnings changes refer to the difference in weekly wages (in 1988 dollars) between the job held in January 1988 and that held before displacement.

efits. Major swings in earnings, of 20 percent or more in either direction, and the loss of health benefits appear to be independent of the extent of trade penetration. Indeed, the only striking result is the seemingly perverse finding that average earnings losses are greatest when the change in imports is least.[19]

The above findings are industry based. Alternatively, we can look for an association between outcomes and trade sensitivity at the level of the individual worker, by examining the correlation between the trade sensitivity of a worker's industry in which the job loss occurred and the employee's subsequent labor market experience. Such correlations, which are provided in table 6, are broadly consistent with the descriptive results in tables 4 and 5.

The only correlation coefficient that is significant at conventional levels points to a positive relationship between the change in import penetration rates and the change in earnings between jobs held before and after employment loss. In other words, increased import penetration is associated with lower earnings reductions. This does not mean that increases in import competition cause higher earnings following job loss. Instead, it is more likely that workers in industries in which import penetration is growing have low absolute levels of earnings. Pay for workers leaving low-wage jobs is less likely to fall and is perhaps more likely to increase. Some support for this possibility is found in our data set: The simple correlation coefficient between individual earnings levels and the change in import penetration in the worker's industry is negative and significant at the 1-percent level ($r = -0.098$).[20]

Finally, no significant relationship exists between any of our penetration measures and the probability of having a spell of joblessness, or between trade sensitivity and the duration of joblessness or the likelihood of losing health insurance.

Our outcome measures are influenced by a wide variety of other variables, and it could be that the effects of trade sensitivity are masked by confounding factors that have not been accounted for in this descriptive framework. For example, although the level of imports or exports in an industry may affect labor demand in that industry, outcomes such as the duration of joblessness will be determined by the overall de-

Table 6. **Simple correlations between trade sensitivity and postdisplacement outcomes**

Trade sensitivity measure	Probability of positive jobless spell	Duration of joblessness	Change in earnings	Loss of health insurance benefits
Import penetration	0.036 [1](.269)	0.032 (0.351)	0.054 (.122)	0.008 .826
Export penetration	–.006 (.842)	.019 (.587)	–.038 (.274)	–.019 (.590)
Average trade penetration Penetration	.024 (.462)	.036 (.297)	.019 (.590)	–.020 (.569)
Change in import penetration	.017 (.601)	–.013 (.711)	.095 (.006)	.011 (.746)
Change in export penetration	.006 (.856)	.016 (.635)	.055 (.116)	–.015 (.659)
n	968	861	835	835

[1] P ($r \geq r_0$) when $\rho=0$, where r_0 is the observed sample value.

NOTE: Standard errors are indicated in parentheses.

mand for labor at the time of the job loss. Labor demand by the trade sensitive industry may be only a small part of that total. As a result, the magnitudes of the effect of trade sensitivity might be too small to be detected by our analysis. Nevertheless, this would suggest that other factors should receive the primary attention of policymakers interested in reducing the effects of labor displacement.

Conclusions

Trade sensitivity is significantly associated with the probability of job loss but not — it seems — with most outcomes following employment termination. We presented evidence suggesting that workers displaced from industries in which import penetration is increasing relatively rapidly have lower earnings losses than other displaced persons, but we found no evidence that the duration of joblessness is affected significantly by trade sensitivity. Nor did we find evidence that trade sensitivity is associated with the loss of health insurance.

Further research is needed before seeking changes in public policy. In particular, because all of our outcome measures, and the displacement rates, are determined by a variety of factors, the next step in the inquiry should involve a multivariate analysis that would measure the influence of trade sensitivity when numerous other variables that affect the probability of job loss and post-displacement outcomes are held constant. A careful *ceteris paribus* treatment corroborating the main findings presented in this article—that trade sensitivity is positively associated with displacement rates but is independent of or only weakly related to subsequent outcomes—would call into question policies that target special assistance to workers identified as losing jobs due to import competition. □

Footnotes

[1] Christopher J. Ruhm, "Are Workers Permanently Scarred by Job Displacements?" *American Economic Review*, March 1991, pp. 319–24.

[2] Frances W. Horvath, "The pulse of economic change: displaced workers of 1981–85," *Monthly Labor Review*, June 1987, pp. 3–12.

[3] Among the most recent examples are John T. Addison and McKinley L. Blackburn, "Advance Notice and Job Search: More on the Value of an Early Start," forthcoming in *Industrial Relations*; William J. Carrington and Asad Zamad, "Interindustry Variation in the Costs of Job Displacement," *Journal of Labor Economics*, April 1994, pp. 243–75; Louis Jacobson, Robert LaLonde, and Daniel Sullivan, *The Costs of Worker Dislocation* (Kalamazoo, MI, W.E. Upjohn Institute for Employment Research, 1993); Christopher J. Ruhm, "Advance Notice, Job Search, and Postdisplacement Earnings," *Journal of Labor Economics*, January 1994, pp. 1–28; Paul L. Swaim and Michael J. Podgursky, "Female Labor Supply Following Job Displacement: A Split-Population Model of Labor Force Participation and Job Search," in *Journal of Labor Economics*, October 1994, pp. 640–56.

[4] The Displaced Worker Survey is designed to identify a nationally representative sample of workers who lose their jobs by reason of plant closings or other permanent layoffs in the 5 years preceding the survey interview. The survey is funded by the Employment and Training Administration and is designed and operated by the Bureau of Labor Statistics. Six surveys have been conducted biennially since 1984; the first 5 were supplements to the January Current Population Survey and the most recent was administered as a supplement to the February 1994 Current Population Survey.

[5] Douglas L. Kruse, "International Trade and the Labor Market Experience of Displaced Workers, *Industrial and Labor Relations Review*, April 1988, pp. 402–16.

[6] In a separate *ceteris paribus* study of this type, Paul T. Decker and Walter Corson, "International Trade and Worker Displacement: Evaluation of the Trade Adjustment Assistance Program," a paper prepared for the Canadian Economic Research Forum on Labor Market Adjustment, June 1993, have contrasted the labor market experiences of recipients of Trade Readjustment Assistance, under the Trade Adjustment Assistance program, with those of a broadly comparable sample of workers who have exhausted their unemployment insurance benefits. They report that recipients of trade readjustment assistance are less likely to be reemployed, have longer jobless spells, and earn less in the first 3 years after job loss than the reference group.

[7] Robert W. Bednarzik, "An analysis of U.S. industries sensitive to foreign trade, 1982–87," *Monthly Labor Review*, February 1993, pp. 15–31.

[8] Robert C. Shelburn and Robert W. Bednarzik, "Geographic concentration of trade-sensitive employment," *Monthly Labor Review*, June 1993, pp. 3–13.

[9] We are indebted to Robert W. Bednarzik of the Bureau of International Labor Affairs, U.S. Department of Labor, for providing us with the trade data used in this paper. These

data cover the interval 1979–87 and were supplied by the Department of Commerce, Industry Statistics Division, Office of Industry Assessment, which matched trade commodity and product shipment data with the closest appropriate four-digit 1972 SIC industry group. We use only the data from 1982 on.

[10] The difference in the denominators of the measures of import and export penetration follows the convention established in Bednarzik. See "An analysis of U.S. industries."

[11] We also experimented with the geometric mean of import and export penetration rates. The results were very similar to those obtained using the arithmetic mean.

[12] This pattern may reflect the rapidly appreciating value of the dollar during the early 1980's. See *Economic Report of the President: Transmitted to the Congress*, February 1992 (Washington, DC, U.S. Government Printing Office, 1992), table B–107, p. 420.

[13] The three excluded Census industries were dyeing and finishing textiles, except wool and knit goods; wood buildings and mobile homes; and electronic computing equipment. With these exclusions, the sample comprises 74 Census industries.

[14] There is some question about the appropriate denominator to use in calculating displacement rates. Ideally, the denominator should equal the number of workers employed at the time of job loss. To determine the 1983 displacement rate for industry *i* one would divide the number of individuals displaced from industry *i* in 1983 by the number of those employed in the same industry in the same year. Unfortunately, the January 1988 CPS/Displaced Worker Survey only provides data on the current employment status of those who have not lost their jobs at the survey date, while the displacement data pertain to the entire 5-year period ending with the survey date. As a result, we do not attempt to calculate displacement rates for individual years, and our estimates of displacement rates will be biased to the extent that the industry distribution of the nondisplaced changes over the survey period. Our estimated displacement rates should be interpreted as the proportion of workers losing at least one job during the survey period. If a worker loses more than one job, only the termination associated with the longest job is recorded in the Displaced Worker Survey.

[15] Displacement rates are calculated as the number of displaced workers terminated from industries in the penetration range divided by the number employed in these industries at the survey date. Current Population Survey sampling weights are used in these calculations (and for the associated standard errors) to obtain results that are nationally representative.

[16] We attempted to test the sensitivity of our results to changes in the distribution of employment across industries during the survey period by reestimating displacement rates with the age of dislocated workers now being measured at the time of job loss, while that of the nondisplaced continued to be measured at the survey date. The results using the latter procedure were broadly similar to those reported in the text.

[17] We also estimated multivariate regression equations corresponding to each trade sensitivity measure. The independent variables included, in addition to the relevant trade measure, industry employment growth, the personal characteristics of the worker, and the proportion of workers covered by collective bargaining agreements in the relevant industry. The coefficient estimates for the trade sensitivity covariate were of the same sign as those noted in the text and each was statistically significant at the 1-percent level. (A similar exercise was conducted for the separate calculations shown below in table 4, concerning the outcomes of displacement, and the results were again supportive of the simple correlation coefficients reported.)

[18] Because we use individual level data to calculate postdisplacment outcomes, results using fewer than 15 observations would be extremely imprecise.

[19] There also is some indication that high export rates are associated with a reduction in the variance of earnings changes (that is, fewer large gains or losses).

[20] We further note that although the association between individual earnings and degree of import penetration (as opposed to the change in import penetration) is negative in our data, the correlation coefficient fails to achieve significance at conventional levels. Some evidence of a statistically significant negative association between earnings and import penetration levels is, however, reported by David A. Macpherson and James B. Stewart, "The Effect of International Competition on Union and Nonunion Wages," *Industrial and Labor Relations Review*, April 1990, pp. 434–36; and Ann C. Orr and James E. Orr, "Job cuts are only one means firms use to counter imports," *Monthly Labor Review*, June 1984, pp. 39–41.