

MANUFACTURING TRADE-RELATED EMPLOYMENT GROWTH: SELF-EMPLOYED AND WAGE AND SALARY EARNERS IN COMPARATIVE PERSPECTIVE

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ABSTRACT

Using input-output data for the 1987-1990 period, this study compares the total (direct and indirect) effects of changes in export and import levels on the employment trends of self-employed and wage and salary workers. Aggregate estimates reveal that self-employed and wage and salary workers suffered net trade-related employment losses in the 1987-1990 period. However, between 1987 and 1990, the self-employed experienced a more favorable shift in trade-related employment losses (-16.8 percent) than wage and salary workers (-10.8 percent). Total net manufacturing trade-related self-employment losses declined from -252.3 person-years in 1987 to -209.8 person-years in 1990. Corresponding estimates for wage and salary workers were -6,334.7 and -5,644.9 person-years respectively. The self-employed also experienced a greater percentage increase (25 percent) in positive net trade-related employment between 1987 and 1990 compared to wage and salary workers (23 percent). These findings suggest that given the economic structure during 1987-1990, changes in import and export levels — consistent with U.S. trade patterns in the 1987-1990 period are associated with relatively more favorable employment shifts among the self-employed than among wage and salary employees.

U.S. initiatives geared at trade liberalization such as the North American Free Trade Agreement and the Uruguay Round of the General Agreement on Trade and Tariffs have spawned a host of research studies on the impact of trade policies on various groups in the domestic economy. However, the effect of international trade on the self-employed

has been largely ignored, even though self-employment accounts for a significant proportion of the labor force — 13 percent in 1990. Following the halt in the decline in self-employment in the early 1970s, self-employment has exhibited remarkable growth. It increased almost twice as fast as wage and salary employment (12.1 percent versus 6.5 percent) during the 1972-76 period (Aronson 1991) and sustained a growth rate of 11 percent between 1983 and 1990. However, in comparison to large

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firms, the role of small firms on the international market has generally been limited in spite of their export potential. It is estimated that small- to medium-sized firms could potentially sell 51 percent of U.S. exports instead of their current share of 16 percent (Edmunds and Khoury 1986).

Using an input-output framework, this study explores the total effect of international trade on the employment trends of self-employed and wage and salary workers. Employment trends are measured by the percentage shift in trade-related employment between 1987 and 1990. Specifically, the study estimates the direct and indirect effects of hypothetical changes in sectoral export and import levels on self-employment and wage and salary employment in the 1987–1990 period. The percentage shift in net trade-related employment (between 1987 and 1990) is then estimated for both groups of workers. The study focuses on percentage shifts since wage and salary employment levels far exceed self-employment levels.

In addition to aggregate estimates for both wage and salary and self-employed workers, trade-related employment estimates are computed for the following categories of manufacturing industries: (1) industries that experienced an increase in positive net trade-related employment between 1987 and 1990; (2) industries that suffered a decline in positive net trade-related employment between 1987 and 1990; (3) industries that experienced an increase in negative net trade-related employment between 1987 and 1990; and (4) industries that experienced a decline in negative net trade-related employment between 1987 and 1990.

PROFITABILITY, EMPLOYMENT GROWTH, AND FIRM SIZE

The view that market share is the key to profitability is shared by several busi-

ness strategists, including Buzzell, Gale, Sultan (1975). Indeed, the findings of several empirical studies (Shepherd 1972, Gale 1972, Ravenscraft 1983, Mueller 1986) are consistent with this view. Shepherd attributes the observed positive relationship between market share and profitability to market power. Gale (1972) and Gale and Branch (1982), on the other hand, base their explanations on the cost and price advantages of large firms. A common feature of these explanations is the assumption that both small and large firms engage in similar types of activities within their respective industries. However, Porter (1979 and 1980) and Caves and Porter (1977) argue that this need not be the case given the potential for systematic differences in the strategies of large and small businesses with respect to such aspects as capital intensity, product promotion, and research and development. In effect, smaller firms following specialist strategies and protected by mobility barriers can diminish or reverse the profit advantage of larger firms especially where both are engaged in different activities within industries. To the extent that profits and employment growth are positively correlated, these specialist strategies and mobility advantages should translate into relatively greater employment growth among small firms. In fact, in recent empirical research based on Federal Trade Commission (FTC) Line of Business (LB) data,¹ Schmalensee (1985) and Scott and Pascoe (1986) find that market share explains relatively little of the variance in profit-

¹By disaggregating financial statistics to the "line of business" level, the FTC's LB data overcome data limitations that have restricted cross-sectional analysis of the relationship between industry structure and performance to either industry or firm level variables which aggregate quite different activities business within a single corporate financial statement. A "line of business" (LB) refers to a firm's operation in one of 261 manufacturing and 14 nonmanufacturing categories defined by the FTC. For each LB, information on pretax profit, advertising, research and development, assets, market share, diversification and vertical integration is reported.

ability. Scott and Pascoe (1986), relying on a different LB sample, also find instead significant firm-level effects (such as firm-level efficiencies based on differences in management skills) on profitability. Using 1975 FTC line of business data, Bradburd and Ross (1989) report that large lines of business have less of a profit advantage when their product mix differs from that of the average small line of business operating within the same industry. In a study of business strategies in small manufacturing firms, Davig (1986) reports that small firms tend to rank high in profit growth when they adopt strategies aimed at securing a niche in a relatively stable product or service market. Such strategies emphasize product quality, superior service, and lower prices within a limited range of products.

In effect, where smaller businesses are able to exploit strategic niches in international markets, they may achieve a competitive edge over larger businesses resulting in more favorable trade-related employment trends. While a direct test of the Porter hypothesis is beyond the scope of this study, such a test may provide a possible explanation for trends in trade-related employment among the self-employed and wage and salary earners. It should however be noted that while successful export strategies by smaller firms can increase trade-related employment, higher trade-related employment levels do not necessarily imply the adoption of such strategies.

DESCRIPTION OF THE METHOD

This study uses input coefficients for the U.S. to estimate percentage shifts in net total (direct and indirect) trade-related employment (for self-employed and wage and salary earners) between 1987 and 1990. Input coefficients are obtained from the interindustry matrix (the "A" matrix) of U.S. input-output tables for 1987 and 1990. Such coefficients

describe the "commodity mix," or relative shares of commodities or inputs used by an industry to produce a unit of output. Entries in the row of the "A" matrix (derived from the "use table") represent each industry's use of the commodity named at the beginning of the row. The entries in a column represent the value of the commodities — raw materials, semifinished products, and services — used by the industry named at the head of the column. In effect, input coefficients represent each sector's "recipe" for production. As prices, technology, and a myriad of other factors change, so will the "recipe" used for production. For example, the desire to boost fuel efficiency and the advent of high-strength plastics have allowed the auto industry to change the recipe it uses for producing a car by increasingly substituting plastic for steel. Over the past decade, the portion of iron and steel used in the average U.S.-made automobile has fallen from 81 to 69 percent while the percentage of aluminum and plastic has risen from 6 to 11 percent (Larson, Ross, and Williams 1986).

The major contribution of input-output to economic analysis is that it facilitates measurement of both the direct and indirect repercussions of changes in final demand. For instance, the impact of a change in exports on domestic employment can be disaggregated into direct and indirect effects. The direct employment effects comprise the initial change in the labor inputs of the directly impacted firms as they respond to a change in exports. The indirect employment effects accrue from changes in the labor inputs of the whole network of related industries as *they* in turn react to changes in the demand for the products of the directly impacted firm. For example, an increase in U.S. auto exports will directly result in an increase in domestic production and employment in the auto industry. This will in turn stimulate an

increase in domestic steel production, which will also require more chemicals, more iron ore, more limestone, and more coal, thus generating secondary rounds of employment in these industries. Similarly, an increase in U.S. demand for Japanese autos will have a reverse effect on domestic output and employment.

Increases in imports are assumed to result from a shift in demand away from domestic products as opposed to increases in domestic demand which are filled by imports. (Increases in domestic demand do not necessarily reduce output and employment except in the sense that they reduce the level of employment and output that could have been achieved in the absence of imports.) It is important to note that the initial decline in employment caused by the adverse impact of shifts in demand may be offset by corresponding increases in exports in the long run. Increases in imports can generate domestic exports by increasing incomes in the foreign country. Correspondingly, under a system of flexible exchange rates, increased imports resulting in a depreciation of the foreign exchange value of the currency of the importing country may stimulate exports.

The Model

The balance equation in the input-output system states that for any sector, total output (X) is the sum of intermediate goods demand (AX) plus final demand (F) minus imports (M):

$$X = AX + (F - M) \quad [1]$$

or

$$X = (I - A)^{-1} (F - M) \quad [2]$$

where:

- X is an $n \times 1$ column vector of gross output
- A is an $n \times n$ square matrix of interindustry input coefficients where the elements of the A matrix (a_{ij}) indicate how much of the i th commodity

is used for the production of each unit of the j th commodity

- F is an $n \times 1$ vector of final demand including exports (EX) and consumption
- M is an $n \times 1$ column vector of sectoral import levels
- I is an identity matrix with ones in its principal diagonal and zeros everywhere else.

The Leontief inverse $(I - A)^{-1}$ estimates the direct and indirect or total input requirements per unit change in final demand. Total sectoral labor inputs required to satisfy the change in export (N_x) and import (N_m) levels between 1987 and 1990 are estimated by equations [3] and [4] respectively. To approximate trends in U.S. trade patterns, sectoral exports (imports) are assumed to change by a margin equal to the shift in sectoral export (import) levels between 1987 and 1990.

$$N_x = L_t(I - A_t)^{-1}(\Delta EX) \quad [3]$$

$$N_m = L_t(I - A_t)^{-1}(\Delta M) \quad [4]$$

where:

- A_t is a $n \times n$ matrix of inter-industry input coefficients in year "t"
- ΔEX is a $n \times n$ diagonal matrix of sectoral exports whose elements represent the change in exports levels between 1987 and 1990
- ΔM is a $n \times n$ diagonal matrix of sectoral imports whose elements represent the change in import levels between 1987 and 1990
- N_x is a $2 \times n$ vector of total trade-related employment effects due to a change in sectoral exports; the rows of this vector represent the two labor categories: the self-employed and wage and salary workers
- N_m is a $2 \times n$ vector of total trade-related employment effects due to a change in sectoral imports; the rows correspond to the labor categories described above
- L_t is a $2 \times n$ vector of labor output coef-

ficients whose elements show the number of self-employed and wage and salary workers required to produce a unit of output in sector "n" during year "t."

Net total trade-related employment for each reference year (NT_t) is computed as:

$$NT_t = N_x - N_m \quad [5]$$

where the subscript in NT_t represents the reference year. Subtracting the 1987 net total trade-related employment estimates (NT_{87}) from corresponding estimates for 1990 (NT_{90}) yields the change in net trade-related employment between the two years (ΔNT):

$$\Delta NT = NT_{90} - NT_{87} \quad [6]$$

The change in net total trade-related employment levels between 1987 and 1990 is then expressed as a percentage.

Limitations and Assumptions of the Model

While the model takes into account the direct and indirect employment effects of changes in net employment, the impact of trade on real income through changes in prices and wages is not captured. The estimates provided reflect the increase or decrease in demand for workers resulting from a change in imports and exports. They do not reveal the final change in equilibrium employment which is determined by labor supply and other factors affecting labor demands. Since it is conceivable that there may be insufficient workers with the requisite skills to fill the positions created by trade, the estimates should be interpreted as "employment opportunities" rather than employment per se.

Input-output analysis also assumes a given technology with no substitution possibilities; hence, changes in exports and imports are assumed to have a proportionate impact on employment opportunities. The latter assumption may not hold if the periods of analysis are

characterized by extremely large price and wage fluctuations. This qualification is important since market reactions through changes in wages and prices are not incorporated in the model. However, the use of input-output tables for short-to medium-term analysis has been justified on the grounds that technical coefficients are stable over long periods (Blair and Wyckoff 1989). The use of input-output tables consistent with the period of study ensures that the technical coefficients reflect the actual production techniques.

DATA SOURCES

The input-output (I-O) model is based on the Office of Employment Projection's (OEP) 1987 and 1990 228-sector input-output tables which cover a total of 115 manufacturing and 80 service-producing industries in the U.S. The OEP (which is a branch of the Bureau of Labor Statistics) routinely uses I-O analysis to make projections about future employment trends in the U.S. Output measures are based on producer's value and include both primary and secondary products and services. Both the 1990 and 1987 tables are expressed in 1987 dollars. The tables provide information on interindustry technical coefficients and final demands including exports and imports. The major contribution of input-output analysis to this study is that by facilitating measurements of the total (both direct and indirect) repercussions of changes in demand, it captures trade-related employment effects stemming from both intermediate and final production. In effect, this approach properly accounts for gains and losses related to the production of intermediate goods.

Input-output data were supplemented by wage and salary and self-employment data obtained from the Office of Employment Projections. This information was used to estimate employment

output ratios by dividing both sectoral wage and salary and self-employment statistics by the total output of the corresponding sector. Employment-output ratios in turn formed the basis for calculating trade-related employment. Self-employed workers in this data set include both incorporated and unincorporated businesses. Multiple job holders who are also self-employed are classified according to their primary job to avoid double counting.

RESULTS

The impact of hypothetical shifts in exports and imports on self-employment and wage and salary employment is presented below. Note that the computed trade-related employment estimates are measured in person-years of employment (Clements 1988). At the aggregate level, both the self-employed and wage and salary earners suffered net trade-related employment losses in 1987 through 1990. However, the percentage shift in self-employment losses between 1987 and 1990 (-16.8 percent) was more favorable than the corresponding shift for wage and salary workers (-10.8 percent). Total net trade-related self-employment losses fell from -252.3 to -209.8 person-years between 1987 and 1990, while trade-related wage and salary employment losses declined from -6,334.7 to -5,644.9 person-years during the same period. Sectoral trade-related employment shifts, disaggregated by industry category, are provided below. As expected, trade-related self-employment levels were significantly lower than for wage and salary workers, and hence, the percentage shifts tended to occur from a much smaller base.

Industries with Increasing Net Positive Employment

Table 1 reveals that positive net trade-related employment for wage and salary workers increased from 923.72 person-years in 1987 to 1,136.29 person-years in

1990. This represents a 23 percent shift, which is less than the corresponding shift of 25 percent for self-employed workers (see Table 2). Positive net trade-related self-employment levels increased from 67.85 to 84.57 person-years between 1987 and 1990. With few exceptions, self-employed individuals and wage and salary earners experienced their highest levels of trade-related employment in similar industries. For both groups of workers, petroleum refining, luggage, handbags and leather products, and rubber products industries were associated with the most favorable trade-related employment trends. On the other hand, industries such as household audio and video equipment, jewelry, silverware, platedware, and electrical equipment and supplies provided more unique trade-related employment opportunities for the self-employed than for wage and salary earners. The reverse was true for the small arms and ammunition industry.

Industries with Decreasing Net Positive Employment

Within industries experiencing decreases in their net positive employment, shifts in trade-related employment were more pronounced for wage and salary employees (-23.3 percent) than for the self-employed (-17.5 percent). Thus, compared to the self-employed, wage and salary workers in this industry category experienced a sharper decline in trade-related employment (see Tables 3 and 4). Between 1987 and 1990, the metalworking machinery industry experienced the greatest percentage decline in positive net trade-related self-employment (-54 percent). For wage and salary workers, the electrical equipment and supplies industry (-84 percent) and industries producing storage batteries and engine electrical parts (-84 percent) were associated with the greatest percentage shifts in trade-

Table 1
MANUFACTURING TRADE-RELATED WAGE AND SALARY EMPLOYMENT TRENDS:
INCREASING POSITIVE INDUSTRIES

Industry	1987	1990	Change	Percent
Petroleum refining	86.4	177.3	90.900	105.21
Rubber products, plastic hose, and footwear	229.7	285.0	55.300	24.07
Luggage, handbags and leather products	150.0	172.0	22.000	14.67
Footwear, except rubber and plastic	201.0	219.1	18.060	8.99
Pulp, paper, and paperboard mills	216.1	228.5	12.370	5.72
Motor vehicle parts and accessories	6.0	14.2	8.200	136.67
Medical instruments and supplies	15.3	17.1	1.800	11.76
Preserved fruits and vegetables	7.0	8.4	1.400	20.00
Telephone and telegraph apparatus	4.9	5.6	0.700	14.29
Aircraft	2.8	3.6	0.800	28.57
Boat building and repairing	0.5	1.00	0.440	97.78
Miscellaneous textile goods	3.3	3.6	0.300	9.09
Dairy products	0.6	0.8	0.225	37.50
Ammunition and ordnance, except small arms	0.1	0.2	0.080	57.14
Total	923.7	1,136.3	212.575	23.01

Table 2
TRADE-RELATED SELF-EMPLOYMENT TRENDS IN MANUFACTURING:
INCREASING POSITIVE INDUSTRIES

Industry	1987	1990	Change	Percent
Petroleum refining	6.5	14.1	7.55	116.15
Luggage, handbags, and leather products	21.0	23.9	2.90	13.81
Footwear, except rubber and plastic	8.2	10.7	2.46	30.00
Rubber products, plastic hose, and footwear	7.7	9.4	1.73	22.56
Pulp, paper, and paperboard mills	16.9	17.9	1.00	5.92
Motor vehicle parts and accessories	0.3	0.6	0.33	122.22
Medical instruments and supplies	0.6	0.8	0.15	25.00
Household audio and video equipment	1.1	1.2	0.14	12.73
Glass and glass products	1.9	2.0	0.10	5.26
Boat building and repair	0.0	0.1	0.08	296.30
Dairy products	0.3	0.3	0.07	28.00
Jewelry, silverware, and plated ware	1.9	2.0	0.06	3.09
Preserved fruits and vegetables	1.0	1.0	0.05	5.10
Aircraft	0.1	0.1	0.03	30.00
Electrical equipment and supplies	0.0	0.0	0.02	68.97
Telephone and telegraph apparatus	0.2	0.2	0.02	13.33
Office and miscellaneous furniture and fixtures	0.2	0.3	0.02	8.51
Total	67.9	84.6	16.72	24.64

related employment between 1987 and 1990. It is interesting to note that several industries which experienced an increase in positive trade-related self-employment also suffered a decline in positive trade-related wage and salary employment. Such industries include those producing household audio and video equipment, glass and glass products and jewelry, silverware, and plated silverware. The favorable performance

of the self-employed in the latter industries may reflect a competitive advantage they have over their wage and salary counterparts.

Industries with Increasing Net Negative Employment

Industries with increasing net negative trends in employment experienced the most unfavorable trends in trade-related employment dislocations. Compared to wage and salary workers, employment

Table 3
TRADE-RELATED WAGE AND SALARY EMPLOYMENT TRENDS IN MANUFACTURING:
DECREASING POSITIVE INDUSTRIES

Industry	1987	1990	Change	Percent
Meat products	184.4	167.0	-17.40	-9.44
Industrial machinery	79.8	37.0	-42.80	-53.63
Apparel	51.3	44.8	-6.50	-12.67
Agricultural chemicals	44.1	27.3	-16.80	-38.10
Household audio and video equipment	32.2	31.0	-1.20	-3.73
Glass and glass products	23.4	19.3	-4.15	-17.74
Grain mill products, and fats and oils	21.7	18.7	-3.00	-13.82
Jewelry, silverware, and plated silverware	18.2	17.0	-1.20	-6.59
Household furniture	23.0	12.0	-11.00	-47.83
Household appliances	17.0	13.6	-3.40	-20.00
Toys and sporting goods	15.6	12.3	-3.30	-21.15
Stone, clay, and miscellaneous mineral products	14.6	13.3	-1.30	-8.90
Office and accounting machines	16.0	10.3	-5.70	-35.63
Motor vehicles and car bodies	12.2	9.6	-2.60	-21.31
Metal working machinery	12.6	6.0	-6.60	-52.38
Photographic equipment and supplies	7.4	7.0	-0.40	-5.41
Search and navigation equipment	6.7	3.4	-3.30	-49.25
X-ray and other electromedical apparatus	4.7	4.4	-0.30	-6.38
Office and miscellaneous furniture and fixtures	4.0	3.8	-0.20	-5.00
Ship building and repairing	3.5	3.0	-0.50	-14.29
Alcoholic beverages	2.6	1.9	-0.70	-26.92
Mining and oil field machinery	2.5	1.8	-0.70	-28.00
Electrical equipment and supplies	8.3	1.3	-7.00	-84.34
Storage batteries and engine electrical parts	1.6	0.3	-1.35	-84.38
Veneer and plywood	0.8	0.6	-0.20	-25.00
Partitions and fixtures	0.1	0.0	-0.01	-20.00
Total	608.3	466.6	-141.61	-23.28

Table 4
TRADE-RELATED SELF-EMPLOYMENT TRENDS IN MANUFACTURING:
DECREASING POSITIVE INDUSTRIES

Industry	1987	1990	Change	Percent
Office and accounting machines	0.5	0.3	-0.210	-42.86
Meat products	85.8	73.3	-12.500	-14.57
Grain mill products and fats and oils	4.6	3.3	-1.300	-28.51
Industrial machinery	3.6	1.8	-1.830	-50.55
Agricultural chemicals	3.0	1.8	-1.220	-41.08
Apparel	1.7	1.7	-0.030	-1.76
Household furniture	1.4	0.8	-0.550	-40.74
Toys and sporting goods	1.1	1.0	-0.030	-2.80
Stone, clay, and miscellaneous mineral products	0.9	0.8	-0.100	-11.11
Household appliances	0.6	0.5	-0.114	-18.57
Motor vehicles and car bodies	0.5	0.4	-0.120	-23.08
Metalworking machinery	0.5	0.2	-0.270	-54.00
Photographic equipment and supplies	0.3	0.3	0.001	0.31
X-ray and other electromedical apparatus	0.2	0.2	-0.012	-6.42
Search and navigation equipment	0.2	0.1	-0.100	-43.48
Miscellaneous textile goods	0.2	0.2	0.009	5.59
Veneer and plywood	0.1	0.1	-0.023	-22.33
Ship building and repair	0.1	0.1	-0.006	-7.06
Mining and oil field machinery	0.1	0.0	-0.018	-28.13
Storage batteries and engine electrical parts	0.1	0.0	-0.060	-100.00
Total	105.3	86.8	-18.483	-17.55

trends were less favorable for the self-employed. Net trade-related employment losses for firms with wage and salary employees were 14.6 percent higher in 1990 than in 1987 (see Table 5). However, the corresponding shift for the self-employed was 16.2 percent (see Table 6). Electric lighting and wiring equipment, and computer equipment accounted for the largest percentage increases in trade-dislocations for both self-employed and wage and salary workers.

Industries with Decreasing Net Negative Employment

For both the self-employed and wage and salary workers, this category of in-

dustries accounted for the majority of trade-related employment losses. However, there were fewer dislocations in 1990 than in 1987. Net wage and salary employment losses totaled -6,822.2 and -6,042.2 person-years in 1987 and 1990 respectively (see Table 7). Corresponding losses for self-employed workers were -383 and -331.1 person-years (see Table 8). Thus, between 1987 and 1990, the percentage decline in trade-related employment losses was higher among the self-employed (-13.5 percent) than among wage and salary workers (-11.4 percent). The newspaper industry was associated with the greatest improve-

Table 5
TRADE-RELATED WAGE AND SALARY EMPLOYMENT TRENDS IN MANUFACTURING:
INCREASING NEGATIVE INDUSTRIES

Industry	1987	1990	Change	Percent
Blast furnaces and basic steel products	-486.2	-518.0	-31.800	6.54
Weaving, finishing, yarn, and thread mills	-233.6	-250.3	-16.700	7.15
Miscellaneous fabricated metal products	-114.3	-119.0	-4.700	4.11
Tires and inner tubes	-90.5	-102.8	-12.300	13.59
Nonferrous rolling and drawing	-23.2	-55.7	-32.500	140.09
Converted paper products, except containers	-25.9	-28.1	-2.200	8.49
Refrigeration and service industry machinery	-17.7	-24.2	-6.500	36.72
Computer equipment	-6.1	-27.7	-21.600	354.10
Construction machinery	-8.7	-9.7	-1.000	11.49
Soap, cleaners, and toilet goods	-7.3	-10.0	-2.700	36.99
Farm and garden machinery	-7.1	-7.3	-0.200	2.82
Manufactured products	-6.4	-7.3	-0.900	14.06
Electric lighting and wiring equipment	-1.9	-10.2	-8.300	436.84
Miscellaneous fabricated textile products	-3.2	-4.3	-1.100	34.38
Electrical industrial apparatus	-2.7	-4.2	-1.500	55.56
Miscellaneous primary and secondary metals	-1.4	-3.7	-2.300	164.29
Screw machine products, bolts, rivets	-1.1	-3.9	-2.800	254.55
Sugar and confectionery products	-2.1	-2.8	-0.700	33.33
Electric distribution equipment	-1.7	-2.5	-0.800	47.06
Books	-1.5	-2.1	-0.600	40.00
Paints and allied products	-1.1	-2.1	-1.000	90.91
Millwork and structural wood members	-1.0	-1.5	-0.460	44.23
Aircraft and missile engines	-0.8	-0.8	-0.020	2.47
Miscellaneous transportation equipment	-0.6	-0.8	-0.210	35.59
Broadcasting and communications equipment	-0.5	-0.6	0.130	27.66
Ophthalmic goods	-0.5	-0.5	-0.020	4.17
Carpets and rugs	-0.2	-0.4	-0.140	63.64
Tobacco products	-0.2	-0.3	-0.040	17.39
Blankbooks and bookbinding	-0.1	-0.3	-0.130	92.86
Miscellaneous publishing	-0.1	-0.2	-0.091	131.88
Small arms and small arms ammunition	-0.1	-0.1	-0.080	133.33
Greeting card publishing	-0.0	-0.0	-0.007	43.75
Total	-1,047.8	-1,201.3	-153.528	14.65



Table 6
TRADE-RELATED SELF-EMPLOYMENT TRENDS IN MANUFACTURING:
INCREASING NEGATIVE INDUSTRIES

Industry	1987	1990	Change	Percent
Blast furnaces and basic steel products	-20.7	-22.3	-1.600	7.73
Semiconductors and related devices	-4.5	-4.9	-0.400	8.89
Tires and inner tubes	-3.5	-3.9	-0.400	11.43
Miscellaneous electronic components	-2.9	-3.1	-0.200	6.90
Primary nonferrous metals	-2.5	-2.6	-0.100	4.00
Nonferrous rolling and drawing	-1.0	-2.6	-1.600	160.00
Wood containers and miscellaneous wood products	-1.5	-1.5	-0.030	2.00
Converted paper products, except containers	-1.3	-1.4	-0.100	7.69
Refrigeration and service industry machinery	-0.8	-1.2	-0.360	42.86
Manufactured products	-0.7	-0.9	-0.200	28.57
Soap, cleaners, and toilet goods	-0.5	-0.6	-0.140	28.00
Computer equipment	-0.2	-0.9	-0.660	330.00
Construction machinery	-0.3	-0.4	-0.100	33.33
Sugar and confectionery products	-0.3	-0.4	-0.040	12.12
Fabricated structural metal products	-0.3	-0.4	-0.020	6.06
Miscellaneous fabricated textile products	-0.2	-0.3	-0.060	30.00
Electric lighting and wiring equipment	-0.1	-0.4	-0.280	400.00
Books	-0.1	-0.2	-0.070	70.00
Miscellaneous primary and secondary metals	-0.1	-0.2	-0.130	185.71
Electrical industrial apparatus	-0.1	-0.1	-0.050	55.56
Millwork and structural wood members	-0.1	-0.1	-0.040	57.14
Paints and allied products	-0.1	-0.1	-0.060	100.00
Screw machine products, bolts, rivets	-0.0	-0.1	-0.080	200.00
Electrical distribution equipment	-0.1	-0.1	-0.030	50.00
Aircraft and missile engines	-0.0	-0.0	-0.002	5.71
Miscellaneous transportation equipment	-0.0	-0.0	-0.014	70.00
Broadcasting and communications equipment	-0.1	-0.0	-0.004	25.00
Blankbooks and bookbinding	-0.0	-0.0	-0.020	
Carpets and rugs	-0.0	-0.0	-0.010	100.00
Miscellaneous publishing	-0.0	-0.0	-0.013	
Total	-41.94	-48.85	-6.813	16.24

ment in net self-employment losses (-76 percent); the corresponding industry for wage and salary workers was nonferrous foundries (-71 percent).

DISCUSSION AND CONCLUSIONS

This study demonstrates that in at least three out of the four manufacturing industry categories analyzed, trade-related employment shifts between 1987 and 1990 were more favorable for the self-employed than for wage and salary workers. Trade-related employment shifts for self-employed workers were less favorable than corresponding shifts for wage and salary employees only among industries which suffered more

trade-related employment losses in 1990 than in 1987.

Since the estimated trade-related employment shifts reflect changes in the economic structure, including the sectoral employment and trade mix, the performance of self-employed individuals can only be attributed exclusively to "specialist" trade strategies if one were to assume that the structural changes were consistent with a conscious strategy by small firms to influence export and import shares. To the extent that firms can alter the economic structure (including the sectoral employment and trade mix), this is a plausible argument. Within the context of input-output analysis, the economic

Table 7
TRADE-RELATED WAGE AND SALARY EMPLOYMENT TRENDS IN MANUFACTURING:
DECREASING NEGATIVE INDUSTRIES

Industry	1987	1990	Change	Percent
Miscellaneous plastic products	-2513.0	-2354.4	158.600	-6.31
Industrial chemicals	-2123.9	-1728.5	395.400	-18.62
Plastic materials and synthetics	-1324.3	-1189.4	134.900	-10.19
Special industry machinery	-214.3	-179.4	34.900	-16.29
Semiconductors and related devices	-155.5	-147.3	8.200	-5.27
Miscellaneous electric components	-93.0	-90.7	2.300	-2.47
Aircraft and missile parts and components	-82.1	-68.2	13.900	-16.93
Logging	-58.7	-51.7	7.000	-11.93
Miscellaneous chemical products	-52.2	-51.4	0.800	-1.53
Measuring and controlling devices	-50.7	-44.9	5.800	-11.44
Primary nonferrous metals	-45.6	-45.1	0.500	-1.10
Drugs	-24.4	-22.6	1.800	-7.38
Miscellaneous petroleum and coal products	-22.5	-16.3	6.200	-27.56
Wood containers and miscellaneous wood products	-17.3	-17.2	0.100	-0.58
Sawmills and planing mills	-12.8	-8.6	4.200	-32.81
Fabricated structural metal products	-7.5	-7.3	0.200	-2.67
Material handling machinery and equipment	-6.2	-5.8	0.400	-6.45
Engines and turbines	-5.6	-3.8	1.800	-32.14
Plumbing and nonelectric heating	-2.8	-2.3	0.500	-17.86
Paperboard containers and boxes	-2.0	-1.3	0.700	-35.00
Cement, concrete, gypsum, and plaster products	-1.8	-1.5	0.300	-16.67
Periodicals	-1.4	-1.3	0.100	-7.14
Stampings, except automotive	-1.4	-0.8	0.580	-42.03
Automotive stampings	-1.2	-1.0	0.220	-18.49
Railroad equipment	-0.8	-0.6	0.215	-25.60
Miscellaneous food and kindred products	-0.5	-0.4	0.120	-22.22
Metal cans and shipping containers	-0.2	-0.2	0.020	-8.70
Knitting mills	-0.3	-0.1	0.150	-60.00
Nonferrous foundries	-0.2	-0.1	0.120	-70.59
Forgings	-0.1	-0.1	0.010	-14.29
Total	-6,822.3	-6,042.2	780.035	-11.43

structure is defined by the pattern of interindustry transactions (the "A" matrix or technical coefficients matrix), final demands (including the trade mix), and the sectoral employment mix. To improve international and/or domestic competitiveness, firms can alter the sectoral employment mix and the coefficients of the "A" matrix by downsizing, by substituting lower priced and more efficient inputs for more costly and less efficient inputs, or by switching from declining to expanding industries. Any of these decisions will influence the economic structure by altering the input mix (including labor) of firms. Similarly, the trade mix can be altered by an aggressive policy of export promotion,

competitive pricing and improved marketing and distribution techniques.

If the events described above indeed reflect the behavior of small firms, then it is conceivable that smaller firms may have experienced more favorable employment shifts through innovation and the adoption of trade specific strategies (Erdevig 1989).

An alternative explanation for the more favorable shifts in trade-related self-employment during this period is based on the view by some analysts that self-employment moves in a counter cyclical fashion (see Bregger [1963] and Ray [1975]). Available data for the period 1948-1982 suggest that since the 1970s, nonagricultural self-employment

Table 8
TRADE-RELATED SELF-EMPLOYMENT TRENDS IN MANUFACTURING:
DECREASING NEGATIVE INDUSTRIES

Industry	1987	1990	Change	Percent
Industrial chemicals	-141.4	-114.0	27.400	-19.38
Miscellaneous plastic products	-99.6	-89.2	10.400	-10.44
Plastic materials and synthetics	-80.2	-72.3	7.900	-9.85
Logging	-19.1	-17.5	1.600	-8.38
Weaving, finishing, yarn, and thread mills	-14.0	-13.4	0.600	-4.29
Special industry machinery	-10.4	-8.7	1.700	-16.35
Miscellaneous fabricated metal products	-4.7	-4.6	0.100	-2.13
Aircraft and missile parts equipment	-3.1	-2.7	0.400	-12.90
Miscellaneous chemical products	-2.9	-2.7	0.200	-6.90
Sawmills and planing mills	-2.1	-1.5	0.600	-28.57
Drugs	-1.7	-1.6	0.130	-7.51
Measuring and controlling devices	-1.5	-1.4	0.130	-8.50
Miscellaneous petroleum and coal products	-1.4	-1.0	0.400	-28.57
Engines and turbines	-0.2	-0.1	0.060	-30.00
Plumbing and nonelectric heating equipment	-0.1	-0.1	0.040	-36.36
Cement, concrete, gypsum, and plaster products	-0.1	-0.1	0.030	-30.00
Miscellaneous food and kindred products	-0.1	-0.1	0.040	-40.00
Paperboard containers and boxes	-0.1	-0.1	0.037	-38.14
Stampings, except automotive	-0.1	-0.0	0.036	-51.43
Automotive stampings	-0.1	-0.0	0.014	-28.00
Newspapers	-0.1	-0.0	0.095	-76.00
Total	-383.0	-331.1	51.912	-13.55

has registered strong increases during recoveries and tended to stabilize or increase moderately during downturns. In effect, since 1970, nonagricultural self-employment has come out of each of the cyclical downturns somewhat earlier than its wage counterpart. One possible reason for this may be the intensity of the recessions. When persons who are self-employed on a part-time basis lose their primary wage and salary job due to an economic downturn, self-employment becomes their primary job. Alternatively, individuals may enter into self-employment upon the loss of a wage and salary job (Becker 1984). To the extent that these self-employed individuals are directly or indirectly engaged in international trade, their numbers will be reflected in the trade-related self-employment estimates. Indeed, the period of study (1987-1990) spanned an economic downturn which started after a peak in 1987 and culminated in a recession beginning in the second half of

1990 (*Economic Report of the President 1991*).

Overall, the findings tend to suggest that under certain conditions, changes in the level of exports and imports can result in more favorable manufacturing employment trends for the self-employed than for wage and salary workers. Even though manufacturing accounts for a relatively small share of total self-employment (only 4 percent in 1990), increased self-employment activity in manufacturing tends to spill over into other sectors of the economy due to interindustry linkages and the interdependent nature of the economy's production units.

RECOMMENDATIONS AND IMPLICATIONS FOR FUTURE RESEARCH

To the extent that increased trade-related self-employment is a desirable policy objective, the self-employed must be encouraged to engage in international trade where possible. Risk-averse small businesses can participate indirectly in exports by selling to large firms.

Direct export promotion, however, will require improved knowledge of international markets, the development of superior products, and a familiarity with the contractual arrangements necessary to ship, distribute, and support products in overseas markets successfully. In addition to minimizing domestic obstacles to trade, increased efforts (such as the Uruguay Round of the General Agreement on Trade and Tariffs and the North American Free Trade Agreement) aimed at liberalizing international trade by reducing tariff and nontariff barriers may provide expanded business opportunities for domestic self-employment particularly in the "increasing positive" manufacturing industries. It is important to note, however, that since Blacks and Hispanics are under-represented among the self-employed — accounting for only 4.5 percent and 5.1 percent respectively in 1990 — they will be less likely to benefit from trade liberalization (Silvestri 1991). On the other hand, the rapid increase in the number of self-employed females (715,000 compared to an increase of only 317,000 for men between 1983 and 1990 [Silvestri 1991]) makes women more likely to benefit from a policy of trade liberalization.

Further research aimed at identifying the demographic characteristics of trade-affected self-employed workers, not only in manufacturing but in the service industries (which employ nearly 40 percent of the self-employed), will be useful in predicting which groups of self-employed workers are most likely to benefit from, or bear the brunt of, a policy of trade liberalization. In addition, a micro-analysis of self-employed persons in manufacturing industries experiencing increases in positive net trade-related employment may yield rich insights into specific factors or strategies that explain their favorable trade-related employment trends and thus provide a model for others to follow.

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