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3 Can Interindustry Wage Differentials Justify Strategic Trade Policy?

Lawrence F. Katz and Lawrence H. Summers

Industrial policies have been a major source of economic and political debate in the United States and other nations in recent years. Advocates of industrial policies assert that, since all public policies inevitably influence the composition of output and some industries are "better" for a national economy than others, it is appropriate for governments to manage their influence on the economy to promote such goals as growth and competitiveness. Industrial policy advocates often cite Japan as an example of a nation that has benefited from sound industrial policies. Critics of industrial policy have generally cited standard economic arguments against such policies, suggesting that, in competitive or nearly competitive markets, there are no gains to be had from altering the composition of output.

In tandem with political debates over industrial policy, a burgeoning academic literature on strategic trade policy, initiated by Brander and Spencer (1983, 1984) and surveyed in Krugman (1986) and Dixit (1987), has examined policy measures that can shift monopoly rents from one nation to another when product markets are imperfectly competitive.[1] A central focus in this literature has been on imperfections in product markets, especially

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markets with large learning curve effects. While this literature has yielded intriguing counterexamples to some widely believed propositions, we believe that its emphasis on product market imperfections as the potential rationale for industrial policies is somewhat misplaced.[2]

We suspect that deviations from competitive labor markets that give rise to significant interindustry wage differentials are at least equally important for industrial policy as product market imperfections are. Industrial policy advocates such as Robert Reich and Lester Thurow, who encourage subsidies for "high value added production," appear to be referring not to especially profitable industries but to industries that pay high wages. Certainly, the international pervasiveness of subsidies to steel industries is probably more easily understood on the basis of the very high-wage jobs they provide than on the basis of the profits earned by steel companies.

The observation that rents accruing to labor are much more significant than monopoly rents received by firms is a very general one. For the American nonfinancial corporate sector in 1987, employee compensation represented 82 percent of value added, while operating profits represented only 18 percent, with the bulk of the latter figure being the return to capital rather than monopoly rents. It follows that the labor rents associated with industry wage differentials of even 10 percent bulk very large when compared with plausible estimates of firms' monopoly rents.[3] In fact, Katz and Summers (1989) find that variations in labor rents across industries are at least two to three times as important as variations in the rents accruing to shareholders.

This paper explores both theoretically and empirically the implications of labor market imperfections for trade policies, focusing on the situation of the United States in the 1980s. We begin in section 3.1 by demonstrating that, contrary to competitive labor market theories, there are substantial differences between industries in the compensation received by workers with similar characteristics working under apparently similar conditions. The industrial wage structure is remarkably stable across time and space. While unions are a partial source of these wage differentials, wage differentials are large for nonunion workers and in settings like the American South, where union threats are not very important. The differentials appear to arise from the differential importance of motivating, retaining, and recruiting workers, as suggested by the efficiency wage theories surveyed in Katz (1986) and from the rent-sharing considerations considered in more detail in Katz and Summers (1989).

Section 3.2 considers theoretically the implications of noncompetitive wage differentials for trade and industrial policies. We find that interindustry wage differences provide a rationale for policies quite similar to those that have been advanced by industrial policy advocates. While it is difficult to justify subsidizing industries that achieve high value added per worker by relying on abnormally skilled workers or by using a great deal of capital or other inputs, there is a rationale for subsidizing industries that have high value added per

worker because of noncompetitive wage differentials. If firms hire labor to the point where its marginal product equals the wage, the marginal productivity of an additional worker is greater in sectors paying premium wages than in competitive wage sectors. In this case, policy measures that expand employment in high-wage sectors may be desirable. Of course, the basic thrust of this theoretical argument is not new. The role of factor market distortions in the design of optimal trade policies has played a prominent role in trade theory at least since the work of Hagen (1958) and Bhagwati and Ramaswami (1963). Furthermore, both stylized calculations and consideration of actual examples suggest that these effects may well be quantitatively important.

Section 3.3 combines data on industry wage premiums with data on trade flows to assess the importance of wage differentials for trade policies. We reach three primary conclusions. First, wage differentials cause the United States to reap extra gains from trade, at least within the manufacturing sector. Manufacturing exports in the United States come disproportionately from industries that pay premium wages, while manufacturing imports generally come from low-wage sectors. Second, exporting high-wage goods while importing lower-wage goods is a characteristic common to other developed countries. Third, despite concerns about undesirable changes in the structure of the U.S. economy, it does not appear (at least through 1984) that changing trade patterns have disproportionately hurt the high-wage portion of the U.S. manufacturing sector. Instead, increased import competition has had its greatest effect on employment in low-wage parts of the U.S. manufacturing sector.

Section 3.4 concludes the paper by offering a tentative assessment of the implications of our results for actual trade, industrial, and tax policies. Our general view is that policies directed at reducing imports are likely to have extremely adverse effects on economic welfare, whereas certain measures aimed at expanding employment in export sectors may increase welfare. Any economic case for activist policy must be tempered by a recognition that theoretically optimal policies are extremely unlikely to be implemented in practice.

3.1 The Importance of Interindustry Wage Differentials

Several recent studies have documented large and persistent wage differentials among industries, even after controlling for a wide variety of worker and job characteristics (Dickens and Katz 1987a, 1987b; Krueger and Summers 1987, 1988; and Murphy and Topel 1987).[4] The pattern of these differentials is remarkably parallel in looking at data for different countries and time periods and suggests that workers in some sectors earn substantial rents. This section summarizes the available evidence on the interindustry wage structure and discusses the consistency with the evidence of alternative models of wage determination. We conclude that competitive labor market

explanations stressing unmeasured labor quality and compensating differentials do not provide a plausible explanation for a substantial component of interindustry wage variations, even for nonunion workers. Instead, industry wage differentials largely reflect firms' differing needs to use high wages to motivate, retain, and recruit their workers and rent-sharing considerations.

3.1.1 The Magnitude of Interindustry Wage Differences

We analyze industry wage differences in the United States using cross-sectional data on individuals from the 1984 Current Population Surveys (CPS). All twelve CPS surveys from 1984 were combined to generate a sample large enough to estimate accurately wage differentials for detailed industry categories.[5] Our sample consists of nonagricultural employees sixteen years old or older and excludes workers employed in public administration. The earnings variable is usual weekly earnings divided by usual weekly hours.[6] The procedures utilized are described in Krueger and Summers (1988). In particular, we normalize the estimated wage differentials as deviations from the (employment-weighted) mean differential.

The first column in table 3.1 reports the proportionate difference in wages between the average worker in a two-digit census industry and the weighted average worker in all industries. The second column reports the normalized industry wage differences after controlling for education, age, occupation, gender, race, marital status, standard metropolitan statistical area, full-time work, and student status and allowing many of the coefficients to differ for males and females. Controlling for available worker characteristics has little effect on the rankings of different industries; the correlation of the industry wage differentials estimated with and without controls is 0.96. This finding suggests that comparisons of average industry wages over time and across countries may be useful since it is unlikely that controls would change one's inferences about the relative rankings of industries in the wage structure.

Table 3.1 **Estimated Industry Log Wage Differentials—Full Year 1984 CPS**

Industry	(1) All without Controls	(2) All with Controls[a]	(3) All—Total Compensation with Controls[a]	(4) Nonunion with Controls[a]
Mining	.396	.268	.280	.273
Construction	.163	.113	.100	.068
Lumber	−.118	−.030	.007	.007
Furniture	−.120	−.035	−.014	.005
Stone, clay, & glass	.084	.070	.124	.066
Primary metals	.269	.169	.270	.166
Fabricated metals	.128	.077	.138	.082
Machinery excluding electrical	.299	.149	.186	.177

Table 3.1 (continued)

Industry	(1) All without Controls	(2) All with Controls[a]	(3) All—Total Compensation with Controls[a]	(4) Nonunion with Controls[a]
Electrical machinery	.177	.085	.114	.107
Transport equipment	.375	.211	.288	.194
Instruments	.247	.110	.139	.158
Miscellaneous manufacturing	−.102	−.062	−.041	−.015
Food	.039	.052	.105	.041
Tobacco	.248	.236	.424	.213
Textile	−.146	−.002	.010	.048
Apparel	−.358	−.153	−.149	−.111
Paper	.220	.168	.205	.149
Printing	.055	.033	.037	.034
Chemical	.343	.192	.237	.223
Petroleum	.490	.294	.543	.292
Rubber	.090	.101	.146	.132
Leather	−.294	−.134	−.113	−.090
Other transport	.245	.179	.208	.092
Communications	.385	.250	.373	.215
Public utilities	.349	.201	.278	.192
Wholesale trade	.108	.040	.018	.058
Eating & drinking	−.605	−.244	−.274	−.228
Other retail trade	−.267	−.139	−.169	−.138
Banking	.098	.048	.077	.066
Insurance	.101	.049	.053	.069
Private household	−.809	−.339	−.490	−.312
Business services	−.010	−.015	−.046	.004
Repair services	−.076	−.085	−.115	−.053
Personal services	−.384	−.180	−.219	−.161
Entertainment	−.211	−.130	−.151	−.144
Medical services	−.152	−.034	−.030	−.014
Hospitals	.096	.060	.064	.077
Welfare services	−.187	−.203	−.286	−.207
Education services	.078	−.078	−.099	−.105
Professional services	.271	.091	.052	.105
Sample size	135,595	135,595	135,595	106,599
Weighted adjusted SD of differentials[b]	.270	.144	.185	.141

Note: [a]Standard errors are not reported to save space. In all cases, the standard errors are between .004 and .020, except for tobacco, which has standard errors ranging from .039 to .049.

[a]Controls include education and its square; six age dummies; eight occupation dummies; female dummy; race dummy; standard metropolitan statistical area dummy; three region dummies; full-time work dummy; full- and part-time student dummies; interactions of the female dummy with marriage, education, education squared, and the six age dummies; and a constant. Each column was estimated from a separate cross-sectional regression.

[b]Weights are employment shares for the entire sample (union and nonunion).

The controls do substantially reduce the estimated interindustry dispersion of wages. The standard deviation of the estimated wage differentials falls from 27 percent without controls to 14 percent when controls are added. Almost all this decline is attributable to holding occupation and sex constant. Industry affiliation has a large effect on relative wages even allowing for observed differences in occupation, human capital variables, and demographic background. Industry differentials range from a high of 29 percent above the mean in petroleum to 34 percent below the mean in private household services. Durable goods manufacturing, mining, and chemicals industries pay wages well above those for workers in retail trade and service industries, all else constant. Substantial wage differentials are also apparent within the traded-goods (manufacturing) sector.

One possibility is that these differentials largely serve to offset differences in nonwage compensation. One nonwage aspect of compensation that we can control for using our data is fringe benefits. Fringe benefits account for as much as 50 percent of compensation in some industries. To adjust for variation in fringes across industries, we multiplied our CPS hourly wage data for each worker in the sample by the ratio of total labor costs to wages in the corresponding industry in 1984.[7] The third column of table 3.1 presents estimates of industry wage differentials with the dependent variable adjusted to reflect both wage and nonwage compensation.[8] The estimated standard deviation of industry differentials actually increases by more than one-fourth, from 14.4 to 18.5 percent. Thus, the consideration of fringe benefits reinforces, rather than reduces, industry compensation differences.

Discussions of industry wage differences frequently emphasize the importance of unions in wage setting. The inclusion of union membership and union coverage dummy variables in the specification reported in the second column of table 3.1, however, has little effect on the estimated industry differentials. The standard deviation of the differentials falls from 14.4 to 13.9 percent. Since unions are likely to have different effects on wages in industries with different product market structures and costs of strikes, a better approach is to assess the importance of industry differentials for a sample containing only nonunion workers.[9] Column 4 of table 3.1 presents these. The industry wage premia are quite substantial for nonunion workers. We also estimated differentials for the union workers in our sample and found the standard deviation of the differentials to be slightly larger for nonunion workers (14.1 as opposed to 13.3 percent). The correlation of the differentials for the union and nonunion samples is 0.80. There appears to be little difference in the process generating industry relative wages in the union and nonunion sectors. Further evidence that unions are not the primary factor accounting for wage differentials comes from Krueger and Summers's (1988) finding that the wage structure in the southern part of the United States looks very similar to that in the rest of the country, despite much lower rates of unionization.

3.1.2 Regularities in the Interindustry Wage Structure

Industry wage differences appear to be quite stable across time and space. Krueger and Summers (1987) examine evidence on the industry wage structure in the United States from 1900 to 1984. They find that the correlation between relative wages in nine major industries is 0.62 between 1900 and 1984 and 0.91 between 1970 and 1984. Krueger and Summers further document that the relative rankings of industry average wages in detailed manufacturing industries are also extremely stable over time. Figure 3.1 plots industry wage differentials for nineteen two-digit manufacturing industries estimated from the May 1974 CPS against analogous differentials estimated from the May 1984 CPS.[10] Despite widespread concern about the effect of trade on affected industries, the figure illustrates that the industry wage structure in manufacturing has been very stable over the last decade. Freeman and Katz (1987) study the effects of import competition on wages in U.S. manufacturing and find that a 10 percent decrease in industry revenues from increased import penetration reduces an industry's relative wage for production workers by only 0.5 percent.[11]

Industry wage patterns are remarkably similar among countries with diverse labor market institutions. Table 3.2 presents evidence on the remarkable similarity of relative wages in manufacturing among nine countries in 1983.

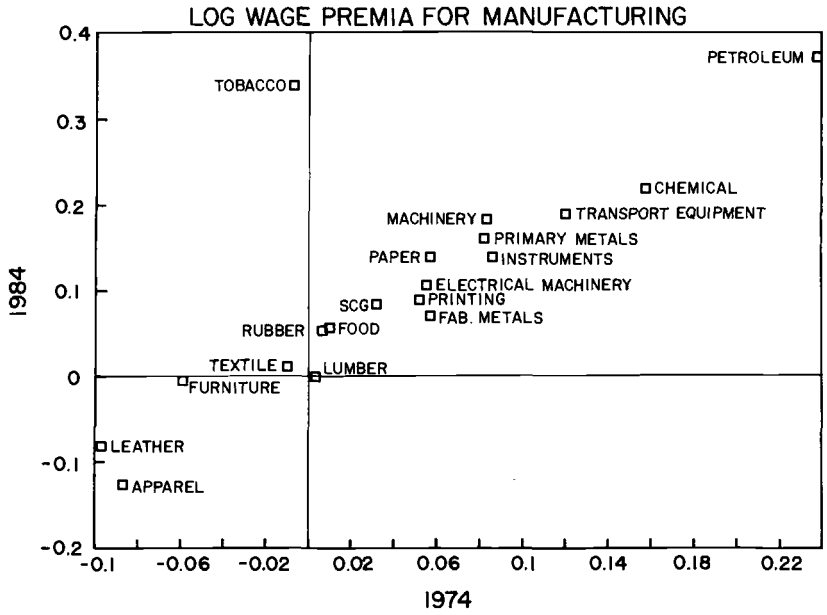

Fig. 3.1 U.S. wage structure: 1974 versus 1984

Table 3.2 **Correlations of Log Manufacturing Wages among Countries in 1983**

	Country								
	Australia (yr.)	Chile (yr.)	France (hr.)	Germany (hr.)	Japan (yr.)	Korea (hr.)	Sweden (yr.)	United Kingdom (yr.)	United States (hr.)
Australia	1.00	.66	.80	.81	.84	.67	.77	.78	.92
Chile		1.00	.60	.60	.69	.46	.67	.56	.67
France			1.00	.89	.80	.53	.64	.77	.85
Germany				1.00	.94	.62	.75	.93	.95
Japan					1.00	.59	.80	.95	.92
Korea						1.00	.68	.59	.66
Sweden							1.00	.79	.79
United Kingdom								1.00	.86
United States									1.00

Note: In the column headings, "yr." denotes yearly wages, and "hr." denotes hourly wages. Wages are for operatives, except for France, where the wage is the average wage of all workers. The data cover nineteen manufacturing industries. Data are available for only eighteen industries for Korea and Australia, seventeen industries for Germany, and fifteen industries for France. Each pairwise correlation uses the maximum number of industries possible.

Source: Industrial Statistics Yearbook, 1984, vol. 1 (New York: United Nations, Department of International Economic and Social Affairs, Statistical Office, 1986).

The use of a single occupational group (operatives) allows us to control for skill mix differences across countries. The cross-country correlations of relative wages are quite high, typically between 0.6 and 0.9. For example, the correlation between the relative wages of operatives in the United States and Japan is 0.95. We illustrate this similarity in the wage structures of the United States and Japan in figure 3.2. Krueger and Summers (1987) also find strong positive correlations in relative average industry wages among a larger group of countries. The stability in differentials across time periods and countries strongly suggests that these wage differences result from factors fundamental to the operation of industrial economies and are not the artifact of particular collective bargaining systems or government interventions in the labor market.

The industry wage structure also appears to be very similar for different types of workers. Dickens and Katz (1987b) find that interindustry wage differentials are highly correlated across occupations: in industries where one occupation is highly paid, all occupations tend to be highly paid. For example, they find that the correlation in industry average wages for managers and laborers is 0.83, even after controlling for worker characteristics. Furthermore, Krueger and Summers (1988) show that the pattern of differentials is quite similar for young and old workers and for workers with short and long job tenure.

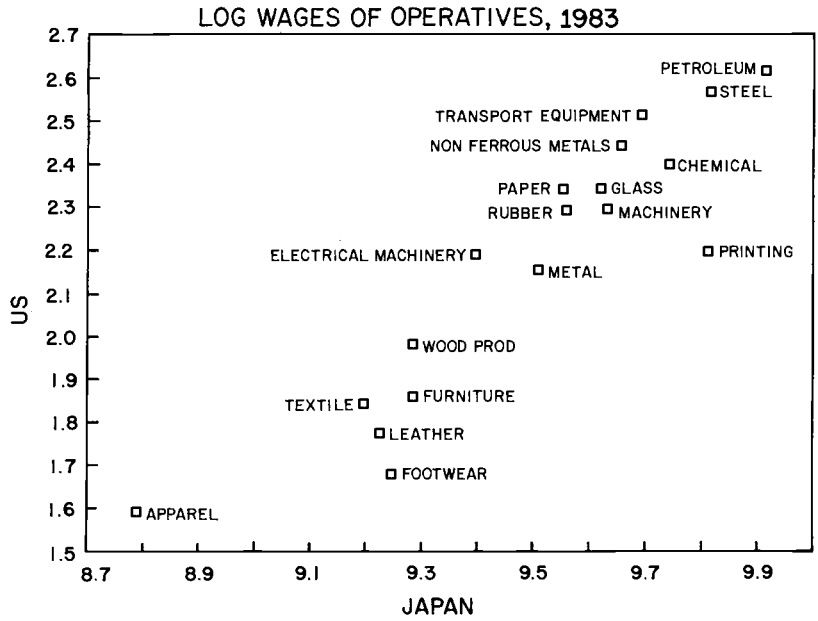

Fig. 3.2 Wage structure: United States versus Japan

3.1.3 The Characteristics of High- and Low-Wage Industries

The evidence summarized above indicates that there exists a pattern of wage differentials in which all workers in some industries are paid more than similar workers in other industries. This raises the question of what are the attributes of high- and low-wage industries. Dickens and Katz (1987a) review the literature on the relations among industry characteristics and industry wages. They find that, even after controlling for observed human capital, geographic, and demographic variables, both union and nonunion wages are positively correlated with capital intensity, measures of product market power and ability to pay, union density, average education level, and firm and establishment size. High-wage industries also have much lower quit rates than low-wage industries.

The characteristics of high-wage and low-wage industries in U.S. manufacturing are illustrated in figure 3.3. The tendency of capital intensive industries (and those with a low labor share) to pay high wages is apparent. The relation between research and development spending and wages is less clear cut. Unfortunately, as Dickens and Katz note, it is not possible to disentangle the independent effects of these factors on wages reliably.

3.1.4 Do Industry Wage Differentials Reflect Labor Rents?

The competitive labor market model offers two types of explanations for persistent interindustry wage differentials. These differentials may compensate

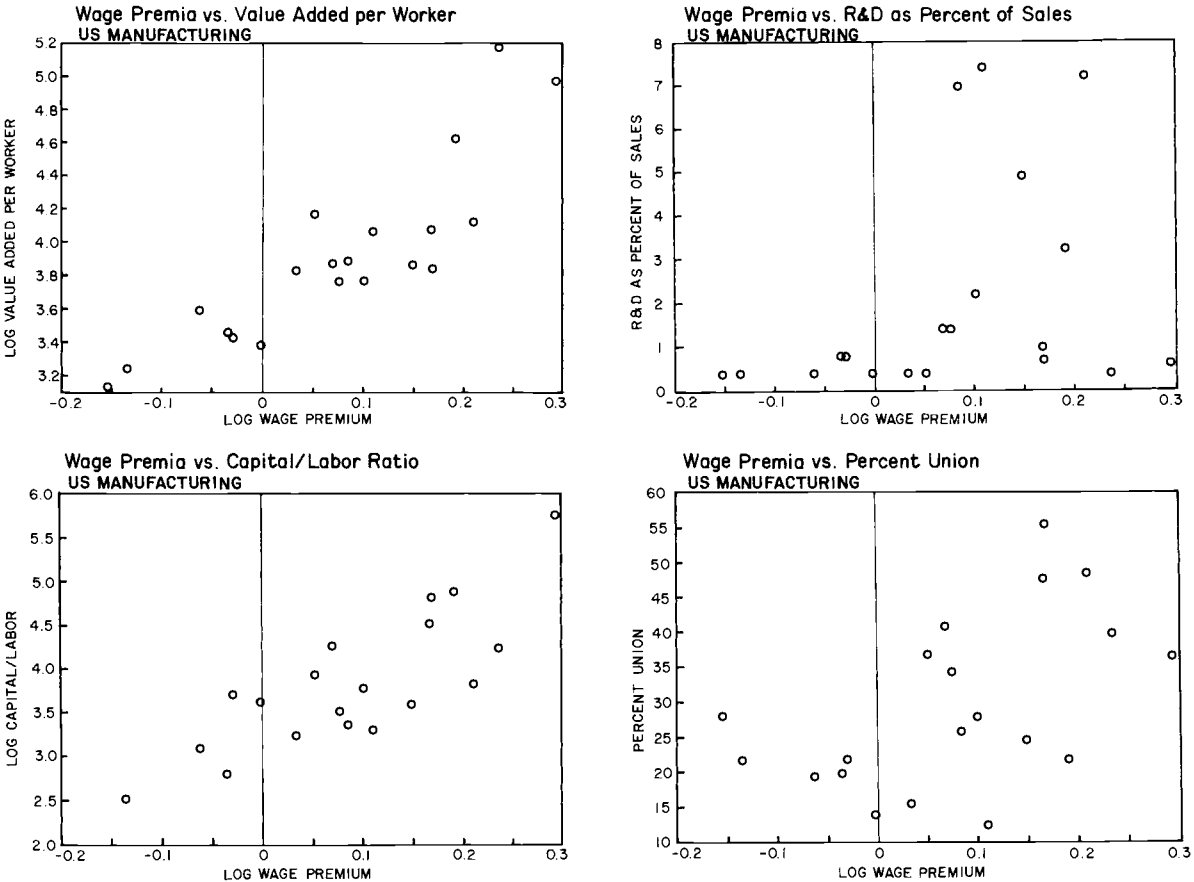
Wage Premia vs. Value Added per Worker
US MANUFACTURING
LOG VALUE ADDED PER WORKER
LOG WAGE PREMIUM
Wage Premia vs. R&D as Percent of Sales
US MANUFACTURING
R&D AS PERCENT OF SALES
LOG WAGE PREMIUM
Wage Premia vs. Capital/Labor Ratio
US MANUFACTURING
LOG CAPITAL/LABOR
LOG WAGE PREMIUM
Wage Premia vs. Percent Union
US MANUFACTURING
PERCENT UNION
LOG WAGE PREMIUM

Fig. 3.3

for nonpecuniary differences in job attributes, or they may reflect differences in unmeasured labor quality. If compensating differentials and unobserved ability adequately explain the bulk of measured industry wage differences, then the presence of large industry wage differentials should not be an important consideration in the evaluation of trade policies.

Interindustry wage differences do not appear to be easily explained by compensating differentials, for several reasons. First, Krueger and Summers (1988) find that the inclusion of controls for observable differences in working conditions tends to increase rather than decrease estimates of the extent of interindustry wage variation. Furthermore, the estimates in table 3.1 indicate that the consideration of fringe benefits leads to substantially larger estimates of industry compensation differences. Thus, the consideration of observed nonwage compensation exacerbates the industry differentials.

Second, the strong correlation in interindustry wage differences across occupations is also difficult to explain through equalizing differences since it is unlikely that whenever working conditions are poor for production workers they are also poor for managers, secretaries, and salesmen. Third, Pencavel (1970) and many others have shown that there is a strong negative correlation between industry wage differentials and quit rates. Furthermore, Holzer, Katz, and Krueger (1988) find that high-wage industries attract a greater number of job applicants per opening than do low-wage industries. These findings strongly suggest that workers in high-wage industries earn rents.

An alternative competitive explanation of these wage differences is that they largely reflect differences in workers' productive abilities that are not captured by the variables available in individual level data sets. While it is almost certain that unobserved quality differences account for much of the variation in the wages that workers with similar observed characteristics receive, this does not necessarily imply that differences in the average wage paid in different industries are the result of differences in the average level of unobserved ability. Four types of evidence suggest that it is unlikely that a large part of measured interindustry wage differences can be accounted for by unmeasured ability.

First, Krueger and Summers (1988) find that, after controlling for sex and occupation, controlling for other skill variables such as education and experience has only a very small effect on the dispersion of industry wages. This is because there are only minor differences in educational attainment and in experience across industries after controlling for differences in occupational composition. Given the absence of a high degree of industrial sorting on the basis of observed labor quality proxies, a high degree of sorting on unobserved characteristics would be surprising.

Second, Krueger and Summers (1988) present longitudinal evidence that when individual workers move between industries, either because of displacement or because of normal labor market processes, their wages change by amounts similar to the industry differentials estimated in cross-sectional

regressions.[12] This finding casts some doubt on the hypothesis that measured interindustry wage differences are largely attributable to unobserved productive ability.

Third, much evidence indicates that more profitable industries—those with more monopoly power and those where labor's share is smaller—pay higher wages. These regularities hold in different times and places and explain a sizable fraction of interindustry wage variation. There is no obvious reason why these product market characteristics should be strongly correlated with unmeasured ability.

Fourth, the strong similarity in wage differences for different types of workers is also problematic for the unmeasured ability view. Why should industry technologies almost always have such strong skill complementarities that those requiring unusually good operatives require unusually good managers and clerical workers? Furthermore, industry differences in observed quality measures for different occupational groups do not appear to be nearly as strongly correlated as do their industry wage differentials. Dickens and Katz (1988) find that industry average education levels are only weakly positively correlated for many occupations and are negatively correlated for some groups.

Our reading of the evidence is that it is difficult to account convincingly for the industry wage structure on the basis of unobserved ability differences or equalizing differences. Instead, it appears that workers in high-wage industries earn rents.

3.1.5 Alternative Explanations for Labor Market Rents

The natural economic approach to explaining why firms in high-wage industries fail to cut wages in the absence of any legal compulsion is to isolate reasons why reducing wages would be unprofitable for a firm. This is the approach taken in the large and growing efficiency wage literature. This literature, surveyed from a theoretical perspective in Stiglitz (1987) and from an empirical perspective in Katz (1986), has put forth a number of possible explanations for firms' failure to cut wages in the face of an excess supply of labor and their willingness to confer rents on incumbent workers.

A first explanation, emphasized by Shapiro and Stiglitz (1984) in the context of unemployment and Bulow and Summers (1986) in the context of wage differentials, emphasizes the firms' need to deter their workers from shirking. Conferring rents on them, which will be forfeited if they are caught shirking, may be an efficient alternative to more extensive monitoring costs. This theory may rationalize the observation that capital intensive firms and those offering more job autonomy pay higher wages because the cost of shirking is higher in these firms. Krueger (1987) provides some supporting evidence by documenting that fast food firms appear to trade off wages and monitoring effort.

A second explanation revolves around firms' desire to avoid turnover because of fixed hiring and training costs. This explanation, elegantly modeled by Stiglitz (1985), is consistent with the observation that wage premia appear to be somewhat larger for experienced than for inexperienced workers. It is also supported by frequent references to the need to monitor turnover in personnel books. A third related explanation for firms' willingness to confer rents involves adverse selection considerations (Weiss 1980). If more able workers have higher reservation wages than their less able counterparts, firms that reduce wages may find that the average ability of their work force declines so rapidly that unit labor costs increase. This explanation is consistent with the complaints of some managers that the "wrong" workers quit in good times.

While each of these explanations can be formalized, they appear insufficient to account fully for the observed pattern of wage differentials. A striking feature of this pattern is the similarity in industry wage patterns for different occupational groups. It is difficult to see why industries with an especially great need to motivate and retain operatives should also have an especially great need to motivate and retain clerical workers. The similarity of wage patterns in different occupations, along with the observation that monopoly power appears to influence wages, suggests that firms for which production interferences are especially costly may pay abnormally high wages even in nonunion settings.

This type of behavior can be justified on the grounds of "gift exchange" theories of the type advanced by Akerlof (1984). In these models, a worker's effort depends on his or her perception of how fairly he or she is being treated. Perceived fairness in turn depends on how profitable the firm is. A related argument might hold that firms pay high wages to "buy the peace," avoiding unions or collective visible shirking of the kind that Mathewson (1969) and Mars (1982) find in many industrial settings. The "peace" may be worth more to some firms than to others. A final explanation invokes expense preference behavior on the part of managers, who may feel more loyalty to employees than to shareholders, particularly at low levels. If the efficiency effects of wage increases described in previous paragraphs are important, it may not be very costly for firms to raise wages.

3.1.6 Conclusions

The evidence in this section suggests that industry wage differentials for similar workers are substantial. It appears that these wage differentials largely reflect rents earned by workers in high-wage industries. No doubt, industry wage differences result from a number of sources. Fortunately, as we argue in the next section, the implications of noncompetitive wage differentials for trade policies are similar for a variety of underlying causes of the differentials as long as firms choose employment levels on their labor demand curves.

3.2 Wage Differentials and Trade Policies

The basic argument linking labor market imperfections and trade policies has long been recognized by trade theorists (see, e.g., Bhagwati and Srinivasan 1983; and Magee 1976). It has been echoed, though in a less clear fashion, in the American debate over industrial policies. If competitive forces do not equalize wages in different sectors, and if firms operate on their labor demand curves, then the marginal product of labor in different sectors will not be equated, resulting in allocative inefficiencies. Policies that raise employment in high-wage sectors at the expense of employment in low-wage sectors will therefore increase allocative efficiency. This line of argument captures the thrust of industrial policy arguments suggesting that countries can raise their workers' standards of living by encouraging the growth of "high value added industries."

We begin by demonstrating that the interaction of trade policies with wage differentials has welfare consequences that are likely to be more important than the profit-shifting effects that have been the focus of recent discussions of strategic trade policy. Then we examine arguments against subsidies to employment in high-wage sectors based on rent-seeking and equity considerations. We conclude that on economic grounds there is a reasonably strong welfare argument for measures that promote production in high-wage industries, though any policy judgment must depend on an assessment of how skillfully the government would manage its interventions.

3.2.1 Wage Differentials in a Closed Economy

For simplicity, consider a stylized economy with two sectors.[13] Following the terminology of Doeringer and Piore (1971), we label these sectors "secondary" and "primary." As we discuss below, the primary sector pays higher wages and offers workers more responsible jobs than the secondary sector. Secondary-sector output, taken as the numeraire, is given by $Y^n = w_0 L^n$. The secondary-sector labor market is competitive, so workers employed in the secondary sector receive a wage equal to their marginal product, w_0. Primary-sector output is given by the constant returns to scale production function $Y^p = F(K^p, L^p)$. The demand for primary-sector output is a decreasing function of its price, $p = p(Y^p)$, $p' < 0$. We assume that the wage differential, d, in the primary sector is a nondecreasing function of employment, $d = d(L^p)$, $d' \geq 0$.[14] It may depend positively on the level of employment because workers' ability to extract rents is increased when the demand for labor increases or because the cost of leaving a high-wage job is reduced when there are more high-wage jobs in the economy.

Assume initially that the economy is closed and that the capital stock is fixed. Firms in the primary- and secondary-sector product markets are assumed to act competitively. Then the first-order condition,

$$p(Y^p)F_L(K^p, L^p) = w_0(1 + d), \tag{1}$$

determines the level of primary-sector employment. This level of primary-sector employment is inefficiently low. As figure 3.4 illustrates, a subsidy to employment in the primary sector at a rate just sufficient to offset the wage differential $(1/[1 + d])$ would permit the economy to attain the first-best allocation of labor.[15] Note that such a subsidy increases efficiency, even though it may lead to a widening of interindustry wage differentials. We return below to the question of whether it represents a Pareto improvement.

So far we have maintained the assumption of perfect competition in product markets and the assumption that the capital stock in each industry is fixed. Relaxing these assumptions tends to strengthen the case for policies directed at expanding the primary sector. If firms in the primary sector have market power, this is another reason apart from wage premia why the social marginal product of labor in the primary sector exceeds the social marginal product of labor in the secondary sector. Put more straightforwardly, there is an efficiency case for subsidizing the variable inputs of a monopolist.

Allowing for variable capital input strengthens the case for subsidies to high-wage industries. If wage differentials do not depend on the capital intensity of the primary sector, then the appropriate policy instrument in the presence of noncompetitive wage differentials is a wage subsidy. If wage differentials are an increasing function of capital intensity, as some rent-sharing theories would suggest, then there is a case for capital investment subsidies to offset the "tax" levied by labor on capital investments.

How substantial are the potential gains from public policies directed at offsetting the effects of interindustry wage differentials? One way of answering this question is by comparing the efficiency costs of interindustry wage differentials with other distortions that have received more attention

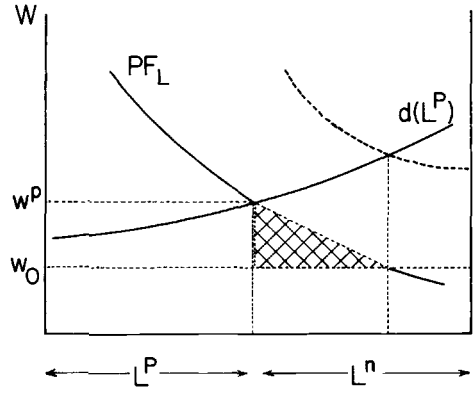

Fig. 3.4 Subsidies and economic efficiency

from economists. Section 3.1 showed that the standard deviation of nonunion industry compensation differences, after correcting for measured ability differences, was about 18 percent. About 15 percent of private-sector American workers are covered by trade union agreements, and it is generally estimated that their compensation is about 20 percent above that of other workers. If this were the only source of wage inequality, the standard deviation of wages would be approximately 7 percent. This suggests that the allocative inefficiency attributable to industry wage effects is at least comparable to the efficiency costs arising from union wage differentials.

A different standard of comparison is the distortionary consequence of taxation. Assuming that labor's share in output is about three-quarters—a 20 percent difference in labor costs between two sectors—will affect the product mix in the same way as a 60 percent capital income tax or a 15 percent sales tax. The former figure is more than what is at stake in the much-discussed distortion between corporate capital and owner-occupied housing. Much smaller differentials in effective tax rates played a prominent role in the recent U.S. tax reform debate. Discussions of sales taxes invariably treat differences of only a few percentage points in the rates on included and excluded items as a serious problem.

Interindustry wage differences appear to cause allocative distortions greater than those resulting from trade unions or the corporate income tax. A different way of demonstrating their importance is by evaluating the marginal social product of capital in the primary sector in their presence. The value of output measured at preintervention prices in our stylized economy is given by

$$Y = pF(K^p, L^p) + w_0 L^n, \tag{2}$$

where $L^n + L^p = L$ and L is the fixed stock of labor in the economy. Differentiating (2) with respect to K^p, the primary-sector capital stock, and then using both the first-order condition (1) and the assumption that the primary-sector production function displays constant returns to scale, we obtain the result

$$dY/dK^p = r\{1 + [\alpha d/(1 - \alpha)(1 + d)]\} \tag{3}$$

where Y represents the total value of national income, r is the return received by the suppliers of capital, and α represents labor's share in the primary sector. Taking labor's share to be three-quarters and the wage differential to be 20 percent, this implies that the marginal product of additional capital in the primary sector is inflated by half because of the preexisting wage differential. This suggests that substantial gains may be achievable by targeting investment incentives toward high-wage sectors.

3.2.2 Wage Differentials in a Small Open Economy

In the case of a small open economy, illustrated in figure 3.5, the relative price of primary-sector output is determined on international markets and is

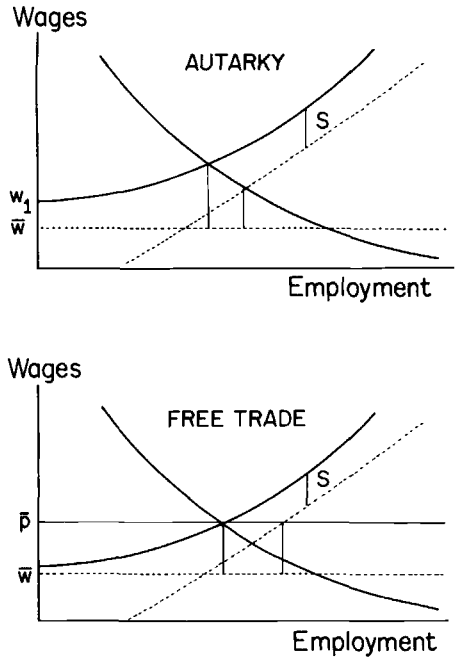

Fig. 3.5 Subsidies in closed and open economies

assumed to be unaffected by the domestic production mix. The demand function $p(Y^p)$ becomes perfectly elastic. This does not change the first-order condition (1) or the desirability of employment subsidies for the primary sector. Opening up the economy does, however, strengthen the case for large subsidies. In a closed economy, subsidies to the primary sector encounter diminishing returns as its output declines in value with increased production. This does not happen when the price of output is set on world markets and is insensitive to the level of domestic production.[16]

There is a further point to be made. As figure 3.5 illustrates, the marginal welfare gained per dollar of subsidy will be greater the greater is the world price of primary-sector output. As the world price of primary-sector output expands, and as domestic production therefore expands, the wage differential increases, raising the social gain to inducing further expansion of the primary sector. This observation resonates somewhat with discussions of industrial policy that claim that governments should support "sunrise" export industries rather than "sunset" import-competing industries.

We have focused on the desirability of employment or production subsidies for the high-wage sector. An obvious alternative is protection, through the exclusion of foreign competition. As illustrated in figure 3.6, protection has the virtue of expanding the primary sector but the disadvantage of raising the consumer price of the primary-sector good. It is clear from the figure that the former effect is first order while the latter effect is second order. It follows that

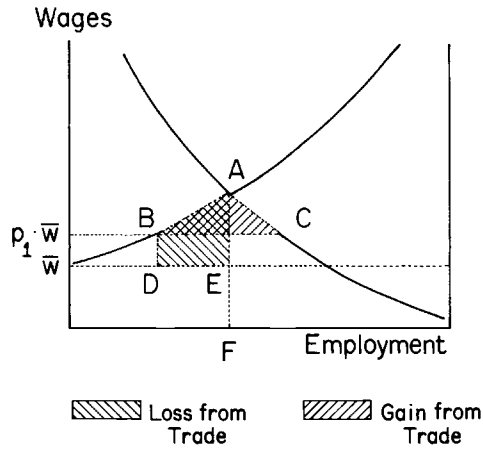

Fig. 3.6 The gains and losses from protection

at least small movements toward protection will be welfare enhancing, though they will be less desirable than primary-sector employment subsidies. This is an illustration of the general principle discussed by Bhagwati and Srinivasan (1983), that, in the presence of distortions, policies can be ranked, with instruments that most directly address distortions being preferred.

Discussions of activist trade policies typically stress the potential defect that they invite retaliation, which offsets any initial benefits. This argument does not apply when policy options are limited to subsidies directed at capturing labor market rents. In the model considered here, it is true that countries would prefer that their subsidies to primary-sector output not meet retaliation. In our model, however, subsidies that are retaliated against by similar subsidies are nonetheless likely to raise the welfare of both countries.[17] This is because they will drive the world economy to a situation such as subsidized first-best optimum, depicted in figure 3.4. Note further that subsidies beyond the point where the marginal product of labor in the primary sector and the marginal product of labor in the secondary sector are equated are inefficient in both open and closed economies.

3.2.3 Gauging the Importance of Labor Rents

Under most plausible estimates, the wage differential effects stressed here are of greater importance for trade policy than the product market monopoly rent-shifting effects discussed in recent work on strategic trade policy. The social return to increased investment in the presence of wage differentials can easily be as much as 50 percent greater than the private gain. The point may be illustrated more strongly by considering two recent studies of strategic trade policies—Baldwin and Krugman's (1987a, 1987b) study of European subsidies to Airbus Industrie for the development of the A300 jet and Dixit's (1988) study of trade in automobiles.

Baldwin and Krugman construct a simple simulation model incorporating both learning curve effects and strategic interactions in aircraft industry. Their data indicate that the subsidy had very substantial effects on the allocation of airplane production between the United States and Europe. It also reduced prices in the industry considerably. The Baldwin-Krugman analysis suggests that the subsidy program cost $1.47 billion in profits for the European airline industry and increased the consumer surplus of European customers by $1.43 billion, leading to only a negligible change in economic welfare. Their analysis takes no account of the rents gained by labor as it moved from lower-wage industries into the high-wage airplane industry, however. A policy analysis should not treat the rent component of the wage bill as a social cost of production but as a component of the social surplus generated by the industry.[18]

To estimate the "labor rent" effects of the Airbus program, we assumed alternatively that compensation in the entire product chain of airplanes was 25 percent higher than the economy average and that it was 25 percent higher in only the final stage of production—airline assembly. Combining these figures with Baldwin and Krugman's estimates of the diversion of sales toward the Airbus consortium and information on labor's share in airplane production permits a rough estimate of the labor rent–shifting effect of the Airbus subsidy of the A300.

The results in table 3.3 indicate that, once labor rent considerations are recognized, the overall assessment of the Airbus program for European welfare turns from marginally negative to strongly positive. Even in the less favorable case, the subsidy generates a welfare gain representing about half its cost. The estimated gain would be far greater, recognizing the high level of unemployment in Europe, if we assumed that some of those hired by Airbus would otherwise have been unemployed.

A similar conclusion is suggested by Dixit's recent study of the automobile industry. He finds that allowing for labor rents in the American automobile industry dramatically alters the results of his analysis based on imperfect competition in the product market. Policies promoting domestic production that appear undesirable without taking account of labor market imperfections yield large gains once the existence of these imperfections is acknowledged.

More careful empirical analysis of more specific incidents is needed before firm judgments about the potential importance of labor rent shifting can be made. The examples here were selected by other authors because of potentially important product market imperfections. It would be valuable to examine industries, such as steel, that are noted for large labor market imperfections.

3.2.4 Some Possible Objections

Our analysis so far has assumed away rent-seeking behavior. At least two types of rent seeking need to be considered. First, it is possible that wage differentials generate wait unemployment of the sort envisioned by Harris and

Table 3.3 **Labor Market Rents and the Effects of the Airbus A300 Program on European Welfare**

	Scenario		
	(1) No Labor Rents	(2) 20% Labor Rents at Final Stage of Production[a]	(3) 20% Labor Rents at All Stages of Production[b]
Change in present discounted value of:			
Consumer surplus	1.43	1.43	1.43
Profits	−1.47	−1.47	−1.47
Labor rents	.00	.90	1.84
Net change in welfare	−.04	.86	1.80

Note: All figures are in billions of dollars. The computations assume a 5 percent discount rate and cumulative production of 398 units over a twenty-year product cycle.

Sources: Adapted from table 5 of Baldwin and Krugman (1987b). The changes in present discounted value of labor rents are based on the authors' own calculations. Information on employee compensation, value of shipments, and value added for the U.S. aircraft industry (SIC 3721) are from the 1985 Annual Survey of Manufactures (Bureau of Census, *Statistics for Industry Groups and Industries* [Washington, D.C.: U.S. Government Printing Office]).

[a]The change in labor rents is computed as the change in the present discounted value of shipments for Airbus calculated from the Baldwin-Krugman simulation ($15.41 billion) times the ratio of employee compensation to value of shipments in the U.S. aircraft industry in 1985 (0.291) times the share of rents in employee compensation (0.20).

[b]The change in labor rents is computed in a manner analogous to that described in n. a above with the share of employee compensation in value added in the U.S. aircraft industry in 1985 (0.596) replacing the share of employee compensation in value of shipments

Todaro (1970). In the extreme case where the primary sector hires randomly each period from a pool of waiting applicants, $w^p(1 - u) = w^0$, where u is the unemployment rate in the primary sector. In this case, there is no gain to increasing primary-sector employment since, for each job created in the primary sector, $u/(1 - u)$ workers move from the low-wage sector into unemployment (Harberger 1971).[19] A more plausible formulation of wait unemployment would recognize that incumbent employees typically retain the rights to their jobs each period so that only new openings and those jobs where the incumbent worker has quit or been terminated are available to be allocated to the unemployed. Under this scenario, if workers have positive discount rates and enter the primary-sector queue to the point where the utility of being in the queue equals the utility of being employed in the low-wage sector, extra employment in the primary sector will generate less induced unemployment than in the initial case considered. Thus, a small subsidy to the primary sector will still be desirable.[20] Furthermore, if workers are able to queue for high-wage jobs from low-wage jobs, rent seeking through wait unemployment may not be an important problem.

The second type of rent-seeking behavior involves efforts to create wage differentials. Union organizing drives are an obvious example. If larger wage differentials lead to larger employment subsidies, such rent-seeking activity will be encouraged. In this case, subsidies to high-wage industries, while increasing efficiency ex post, may create large ex ante inefficiencies if they lead to more resources being devoted to trying to push up wages. We doubt that this point is of vast practical importance. Union organizing budgets and employer resistance expenditures are trivial compared to the rents earned by union workers. Taking 20 percent of the work force to be unionized and a 20 percent union compensation effect implies that 4 percent of wages, or about $75 billion a year, represents rents. Union organizing budgets in the United States certainly total far less than $1 billion. Furthermore, the evidence surveyed in the previous section suggests that most wage differentials do not arise from organizing activity.

A different line of argument against policies directed at subsidizing the primary sector stresses their antiegalitarian consequences. The essence of such policies is, after all, subsidizing workers who are receiving relatively high wages. The argument is more subtle, however, than it at first appears. Subsidies to the primary sector enlarge it, thereby raising the probability of secondary-sector workers being able to move into the primary sector. Bulow and Summers (1986) demonstrate that small subsidies to the primary sector are Pareto improvements relative to laissez faire in the special case where all workers are homogeneous, movements between sectors can be characterized by a Markov process, and efficiency wage considerations lead to constant lifetime utility differences between workers in the two sectors. More generally, efficiency-enhancing subsidies will not produce Pareto improvements, particularly if there are some secondary-sector workers who have no chance of getting primary-sector jobs because of their lack of skill. It is of course possible to argue that optimal subsidies should be given to improve the allocation of output, and then income redistribution measures should be used to offset any perverse distributional consequences.[21]

On balance, the arguments in this section suggest that there is a legitimate economic argument in support of policies directed at encouraging production in high-wage sectors of the economy. Even though such measures are likely to increase wage differentials, they nevertheless may increase economic welfare. Especially in nonunion contexts, it appears unlikely that rent-seeking losses will outweigh the gains achievable through increasing high-wage employment.

3.3 Wage Differentials and American Trade Policies

The belief that international competition is profoundly changing the economic landscape and leading to the deindustrialization of America is often expressed in debates over American industrial policy. The crude argument

that the United States is losing its manufacturing base to international competitors is often put forward as a justification for policies directed at limiting imports or spurring exports. In George Meany's picturesque phrase, "You cannot have a healthy economy based on everyone doing everyone else's laundry."

The claim that the United States might lose its ability to compete in all industries rests on confusion. As long as foreigners are unwilling to accumulate claims on American assets indefinitely, the United States must ultimately run a surplus. The interesting question for structural trade policy is therefore whether trade balance with a high level of both exports and imports or with a low level of both exports and imports is preferable.

To shed light on this issue, tables 3.4 and 3.5 present information on the characteristics of American manufacturing industries, distinguishing between "import" and "export" industries. We focus only on manufacturing because of data limitations regarding other sectors and because manufacturing accounts for the lion's share (about two-thirds) of American trade.[22] The data refer to three-digit census industries. The number of import or export workers in each industry is estimated as the product of the industry's total number of employees and the fraction of total industry shipments represented by imports or exports.

Table 3.4 lists the manufacturing industries with the highest import and export shares. Most of the export industries rely heavily on high technology, aircraft being a prominent example. The import industries are more mixed, ranging from footwear to office machines to motor vehicles. Particularly in the case of export industries, it is striking that durable and capital goods play an important role in merchandise trade.

Intraindustry trade is very important even at the three-digit level; the correlation between import and export shares was 0.06 in 1983. To highlight the differences between import and export workers, the first three columns of table 3.5 compare the average characteristics of the most import- and the most export-intensive industries with those of the entire manufacturing sector.

A clear pattern emerges from the table. Relative to the entire manufacturing sector, export industries look much more like the primary-sector firms described by Doeringer and Piore (1971), while import industries look much more like secondary-sector firms. Wages in export-intensive industries are 12 percent above average after adjusting for skill differences, while wages in import-intensive industries are 16 percent below average. Roughly similar differentials are observed for both union and nonunion workers. The widely cited examples of automobiles and steel, where very high-wage industries face substantial import penetration and are almost completely unable to export, appear to be atypical. The general pattern is that export-intensive industries are the ones with substantial wage premia.

Reflecting patterns of American comparative advantage, export-intensive industries in the United States also employ more skilled workers and do more

Table 3.4 **High Import Penetration and Export Supply Ratio Three-Digit Census Industries in U.S. Manufacturing, 1983**

CIC	Industry	Industries Employing Top 10% of Workers by Import Penetration Ratio[a] $M/(M + S)$	X/S	Log Wage Premium[b]	Employment (1,000s)
381	Watches, clocks, and watchcases	.511	.085	−.242	14.6
221	Footwear, except rubber	.511	.024	−.174	119.6
222	Leather products	.371	.041	−.166	49.7
391	Jewelry and miscellaneous manufacturing	.335	.084	−.120	278.6
261	Pottery	.332	.108	−.142	37.5
321	Office and accounting machines	.283	.148	.069	66.3
390	Toys, amusements, and sporting goods	.260	.113	−.095	96.4
151	Apparel and accessories	.214	.016	−.216	1,014.9
351	Motor vehicles	.204	.087	.174	658.6
		Industries Employing Top 10% of Workers by Export Supply Ratio[c]			
		X/S	$M/(M + S)$	Log Wage Premium[b]	Employment (1,000s)
352	Aircraft and aircraft parts	.438	.051	.153	527.0
312	Construction machinery	.318	.059	.110	346.7
322	Electronic computing equipment	.263	.115	.083	354.4
310	Engines and turbines	.252	.053	.227	95.6
371	Scientific instruments	.235	.111	.020	264.4
361	Railroad equipment	.208	.070	.194	25.0
191	Agricultural chemicals	.183	.055	.035	45.9
192	Industrial chemicals	.173	.081	.169	322.6

Source: NBER trade–immigration–labor market data set (available from the labor studies group of the National Bureau of Economic Research, Cambridge, Mass.); and Dickens-Katz (1987a) industry data set.

[a]The employment weights used in calculations for the top 10 percent import workers are actual employment for the top eight industries and 67,200 for motor vehicles.

[b]Log wage premiums are calculated from separate regressions on union and nonunion samples from the full year 1983 CPS. The log wage premium for an industry equals $\{[(UD + 0.192) \cdot UCOV] + NUD \cdot (1 - UCOV)\}$, where UD is the estimated industry wage premium for union workers, NUD is the premium for nonunion workers, UCOV is the fraction of workers in the industry covered by union agreements, and 0.192 is the estimated union-nonunion wage differential for the full-year 1983 CPS from Katz (1986).

[c]The employment weights used in calculations for the top 10 percent export workers are actual employment for the top seven industries and 185,800 for industrial chemicals.

Table 3.5 **Characteristics of Typical Import and Export Workers in U.S. Manufacturing Industries, 1983**

	(1) Typical Manufacturing Worker	(2) Top 10% Imports	(3) Top 10% Exports	(4) Typical Import Worker	(5) Typical Export Worker
Average hourly wage for production workers	8.88 (1.93)	6.03	10.37	8.36	9.60
Log wage premium for all workers	.00 (.115)	−.163	.116	−.022	.054
Log wage premium for nonunion workers	.00 (.10)	−.135	.128	−.015	.059
Log wage premium for union workers	.00 (.12)	−.214	.071	−.051	.035
Percentage female	33.7 (18.5)	68.5	24.8	40.3	28.2
Percentage immigrants	8.1 (4.3)	17.0	6.6	10.0	7.3
Percentage black	10.3 (3.6)	12.3	7.1	10.7	8.7
Percentage unionized	29.8 (13.9)	27.4	28.0	30.1	29.7
Research and development expenditures as a percentage of sales	2.9 (3.5)	1.1	8.7	3.1	5.5
Percentage production workers	68.2 (13.1)	79.8	52.1	70.9	62.4
Average years of schooling	13.1 (.8)	12.0	14.1	12.9	13.5
Value added per worker (thousands of dollars)	50.5 (22.6)	28.8	59.3	45.4	54.2
$M/(M + S)$ (in percentages)	9.7 (8.2)	27.0	7.8	18.5	10.0
X/S (in percentages)	9.0 (9.2)	4.4	30.6	9.0	18.5

Note: Columns 1, 2, and 3 are three-digit census industry averages weighted by industry employment. Import and export rankings are based on 1983 trade data. Columns 2 and 3 present average characteristics of the top 10 percent of workers by industry $M/(M + S)$ and X/S respectively. Column 4 presents three-digit census industries weighted by industry employment times M/S. Column 5 presents three-digit census industries weighted by industry employment times X/S. The numbers in parentheses are standard deviations.

Sources: Dickens-Katz 1983 industry data set described in Dickens and Katz (1987a); and NBER trade–immigration–labor market industry data set.

research and development than import-intensive industries. Export-intensive industries devote 8.7 percent of sales to research and development, compared to 1.1 percent for import-intensive industries. The average worker in export-intensive industry has fourteen years of schooling, compared with 12 years for the average worker in import-intensive industry. Import-intensive industries also disproportionately employ women, blacks, and immigrants,

whereas export industries employ these workers to less than the average extent.

The comparisons in columns 4 and 5 of the characteristics of the industries employing typical export and import workers suggest all the same qualitative conclusions as the more extreme comparisons of export- and import-intensive industries. Industry differences are attenuated because, in many cases, export- and import-intensive industries coincide as a result of the importance of intraindustry trade. Nonetheless, the wage differential between the typical worker in import- and export-intensive industry is about 8 percent.

These results suggest that, for the United States, policies that succeed in promoting trade and increasing the volume of both exports and imports will tend to raise welfare by moving workers from lower- to higher-wage industries. The gains are potentially significant. For example, the estimates here suggest that eliminating a manufacturing trade deficit of $150 billion by raising exports rather than by reducing imports would increase labor rents by at least $12 billion. If export-intensive industries were expanded relative to import-intensive industries, the gains could be up to three times as great.

3.3.1 International Comparisons

We have already documented that the wage structure is very similar in all countries. It follows that there is no way in which all countries can disproportionately export goods produced with high-wage labor. A reasonable conjecture is that one concomitant of increased economic development is increased comparative advantage in the production of primary-sector goods. To examine this possibility, table 3.6 presents evidence on the American wage premium of import- and export-intensive industries for a number of countries along with information on the American wage premium associated with the industries employing typical export and import workers.

The data provide initial support for our conjecture about patterns of economic development. Korea imports goods produced by high-wage industries and exports goods produced by low-wage industries. This is not simply a consequence of their abundance of low-skilled labor. The wage premia used in these comparisons are estimated controlling for measured labor quality, and the evidence cited in section 3.1 above suggests that they do not primarily reflect unobserved aspects of skill. Most of the developed countries appear to export relatively high-wage premium goods while importing relatively low-wage goods. It is interesting that the difference in wage premiums between high- and low-net-export industries is particularly pronounced in Germany and Japan.

The observation that specialization in high-wage industries is correlated with per-capita income might be taken as evidence in favor of policies encouraging the growth of these industries. Such an inference would be premature, however. It seems plausible that improved technology, management, or worker skills would lead countries to shift toward capital intensive industries requiring investment in job-specific human capital and highly

Table 3.6 **U.S. Log Wage Premia of Typical Import and Export Workers in Manufacturing in Nine Countries, 1983**

Country	(1) Typical Manufacturing Worker[a]	(2) Typical Import Worker[b]	(3) Typical Export Worker[c]	(4) Top 10% Net Export Worker	(5) Bottom 10% Net Export Worker
Australia	.006	.019	.063	.132	.034
Chile	−.024	−.000	.017	.013	.055
France	.016	.037	.053	.110	.020
Germany	.045	.021	.051	.145	−.106
Japan	.002	−.012	.030	.134	−.113
South Korea	−.039	.020	−.089	−.216	.077
Sweden	.030	.001	.035	.053	−.045
United Kingdom	.014	.013	.027	.082	−.128
United States	.000	−.004	.033	.051	−.170

Note: This table utilizes data from eighteen ISIC manufacturing industries: 321, 322, 323, 324, 331, 332, 341, 342, 351, 355, 361, 362, 371, 372, 381, 382, 383, 384.

Sources: Trade flow data on an ISIC basis were provided by Robert Stern of the University of Michigan. The U.S. industry log wage premium variable aggregates using employment weights the variable described in n. b below of table 4 from three-digit census industries to ISIC industries. Employment data are from *Industrial Statistics Yearbook, 1984*, vol. 1 (New York: United Nations, Department of International Economic and Social Affairs, Statistical Office, 1986).

[a]Three-digit ISIC U.S. industry log wage premia weighted by each country's industry employment.

[b]Three-digit ISIC U.S. industry log wage premia weighted by each country's industry employment times *M/S*.

[c]Three-digit ISIC U.S. industry log wage premia weighted by each country's industry employment times *X/S*.

motivated workers. Moving workers from low- to high-wage industries is likely to lead to increases in static allocative efficiency. Whether it would lead to increases in rates of growth is more problematic.

3.3.2 Trends in American Trade

Discussions of American competitiveness have differed on whether the changing trade patterns of recent years are simply the consequence of aberrant exchange rate movements brought about by macroeconomic policies and speculative forces or are instead the result of long-term structural deterioration. A central issue in the deindustrialization debate is whether the United States has suffered particularly severe competitive losses in "good industries," variously defined as those that emphasize technology or have high value added per worker. The analysis in the preceding section suggests that examining the relative performance of high- and low-wage industries probably provides the best way of getting at this issue.

Assuming fixed ratios of employment to shipments, table 3.7 indicates how changing trade patterns have affected employment in high- and low-wage

Table 3.7 **The Direct Effect of International Trade on Employment by Wage Class, U.S. Manufacturing, 1960–84**

Wage Premium Class[a]	Change in Employment (in thousands) From[b]: Imports	Exports	Net Exports
Overall manufacturing:			
1960–84	−2,621.3	1,107.1	−1,514.2
1980–84	−1,248.0	−168.4	1,416.5
1970–80	−941.5	946.7	5.2
1960–70	−431.7	328.9	−102.9
Lowest quartile:			
1960–84	−1,021.7	71.8	−950.0
1980–84	−576.2	−60.7	−636.9
1970–80	−307.6	113.3	−194.3
1960–70	−138.0	19.2	−118.8
Second quartile:			
1960–84	−457.2	323.0	−134.1
1980–84	−217.7	10.1	−207.6
1970–80	−177.5	242.8	65.3
1960–70	−61.9	70.1	8.2
Third quartile:			
1960–84	−547.8	271.5	−276.2
1980–84	−220.5	−70.1	−290.6
1970–80	−229.9	251.5	21.6
1960–70	97.4	90.1	−7.2
Highest quartile:			
1960–84	−594.7	440.8	−153.9
1980–84	−233.7	−47.6	−281.3
1970–80	−226.6	339.1	112.5
1960–70	−134.4	149.4	15.0

[a]Industries were ranked by the industry wage premium variable defined in n. b of table 3.4 and placed into quartiles on the basis of 1983 employment.

[b]The loss in employment from imports for industry i from period t to t' is defined as $[(M_{it}' - M_{it}) \cdot (L/Q_i]$, where M is imports and $(L/Q)_i$ is the ratio of employment to output in industry i in 1984. Imports and output are measured in quantities with their nominal values deflated by the four-digit SIC industry shipments deflator from the Annual Survey of Manufactures. The gain in employment from exports is analogously defined with exports replacing imports. The trade flow, employment, and output data are from the NBER trade–immigration–labor market data set.

industries. Between 1960 and 1980, the number of jobs displaced by imports was approximately equal to the number of jobs created by exports. Particularly during the 1970s, increased imports led to a reallocation of labor out of the lowest-wage jobs in the manufacturing sector. Increased U.S. exports led to increased employment in high-wage sectors of the economy. During the 1980s, the fraction of workers employed in producing tradable goods declined as the trade deficit increased. Between 1980 and 1984, the last year for which we have data available, the increase in the trade deficit was associated with a reduction of 1.4 million workers producing traded manufacturing goods. Over

600,000, or 43 percent, of these workers worked in the quartile of industries that paid the lowest wages. This reflects the substantial increase in import penetration in industries such as apparel during the early 1980s.

These results conflict dramatically with popular stereotypes suggesting that the United States is being forced away from cutting-edge industries. We suspect that the popular misconception results from the fact that traded goods industries as a whole pay higher wages than the rest of the economy. In a period when the trade deficit rises, good jobs are lost. But these jobs are likely to come back when the trade deficit returns to balance.[23] There appears to be little evidence through 1984 of relative deterioration in the high-wage portion of the American traded goods sector.

These patterns should not be surprising. Postulate that "cutting-edge industries" pay wage premia. Following the discussion of Krugman and Baldwin (1987), assume that other nations are catching up with the United States. They then make incursions into the least progressive sectors of our economy, causing U.S. workers to move toward high-wage industries.

3.4 Conclusions

The analysis in the preceding sections suggests that imperfections in the labor market may have at least as much significance as imperfections in product markets for trade policies. Labor market rents earned by workers in high-wage industries are very large relative to plausible estimates of monopoly profits. Unlike the case of product market imperfections, where optimal policies are not robust to small changes in assumptions about corporate strategies, the theoretical case for policies that promote high-wage premium industries is reasonably robust. Given that export industries in the United States have considerably higher wages than import-competing industries even after controlling for observed worker skill measures, our theoretical arguments suggest that export-promoting policies are much more likely to promote economic welfare than import-competing policies.

There are of course a number of other considerations that must be weighed before any policy judgments are made. First, following much of the literature, we have abstracted from the possibility that some industries generate technological externalities. If such externalities are generated and are limited by national borders, there is a strong case for encouraging the growth of externality-generating industries. Second, if wages are very sensitive to the rents earned by firms, it is possible that product market effects are more important than we have suggested but show up as labor market rents.[24] Third, we have ignored input-output considerations in our discussion, implicitly assuming that all output is produced in the industry making a given shipment.[25] Fourth, we have ignored political considerations that might lead activist policymakers to take steps that reduce rather than increase efficiency once the decision to undertake industrial policy was made.

Despite these limitations, we believe that our results strengthen the economic case against import-protecting policies and for export-promoting policies. In future research, it would be useful to employ a general equilibrium model such as those developed by Shoven and his collaborators to explore more precisely the effect of various policies in the presence of noncompetitive wage differentials. Of particular interest would be a reevaluation of the 1986 Tax Reform Act, which appears to have heavily burdened the high-wage durable goods manufacturing sector of the economy.

Notes

1. An analysis of labor rents and trade policies paralleling ours in many respects is presented in Dickens and Lang (1988). Our analysis differs in contrasting the relative importance of labor market and product market imperfections, focusing on the manufacturing sector, and making international comparisons of wages and trade flows. A more extensive treatment of the topics covered in this paper is available in Katz and Summers (1989).

2. A prominent exception to this criticism is Krugman (1984), who emphasizes the potential importance of wage differentials caused by unions.

3. The presumption that labor rents are much greater than rents received by firms does not necessarily mean that product market imperfections are a minor source of rents. A large fraction of the rents earned by workers may arise from the ability of both union and nonunion labor to share in product market rents. For example, Salinger (1984) presents evidence indicating that union labor captures most of the monopoly rents in heavily unionized industries.

4. This conclusion is hardly new. It was noted by Adam Smith and highlighted by Sumner Slichter (1950), and it has been emphasized by institutionally oriented labor economists for many years.

5. Although the CPS is partially a panel data set, only individuals in outgoing rotation groups are asked about earnings. Further, people exit the sample only once a year. Thus, all observations reflect unique individuals.

6. We eliminated employees who reported earning less than $1.00 an hour or greater than $250 an hour.

7. The industry labor cost and wage data are reported in the National Income and Product Accounts (NIPAs) and were previously utilized in Krueger and Summers (1988).

8. Since the NIPA and CPS industry classification schemes do not match exactly, caution should be taken in comparing the results in col. 3.

9. The nonunion sample consists of workers not covered by collective bargaining agreements. The results are almost identical when the union membership is used as the criterion for excluding a worker from the nonunion sample.

10. The estimates are taken from table 2 of Krueger and Summers (1988).

11. In contrast, Murphy and Welch (1988) document that the earnings of "skilled" (college-educated) workers rose dramatically relative to those of less-educated workers from 1979 to 1985. They provide some suggestive evidence that increased net imports in manufacturing may have played an important role in the widening of skill differentials.

12. For contrasting findings using matched March CPS data, see Murphy and Topel (1987). Gibbons and Katz (1987) discuss in detail potential reasons for differences in findings in alternative longitudinal data sets.

13. At the cost of some complexity, the special assumption that capital is not used in producing secondary-sector output could be relaxed. It does capture the stylized fact noted in the previous section that high-wage sectors tend to be capital intensive.

14. For an explicit derivation of a $d(L^P)$ schedule from an efficiency wage model, see Bulow and Summers (1986).

15. The optimal subsidy will be set at $d(L^{P\prime})$, where $L^{P\prime}$ is the level of primary-sectory employment at which $p(Y^P)F(K^P,L^P) = w_0$.

16. We focus on the "small open-economy case" to highlight the implications of wage differentials for trade policy. In the case of open economies large enough to affect the prices at which they buy and sell, there are traditional optimal tariff considerations as well. These suggest the desirability of taxing rather than subsidizing exports when expanding exports can lead to at least a moderate terms-of-trade deterioration. In this case, our analysis of employment subsidies is correct if it is assumed that optimal tariffs (taxes) based on these traditional considerations are already in place.

17. This point has also been made by Dickens and Lang (1988).

18. This point is well known from the development literature on project evaluation (e.g., Sah and Stiglitz 1985).

19. Since each new job created in the primary sector removes $1/(1 - u)$ workers from secondary employment, and since $w^0/(1 - u)\ w^P$, the social opportunity cost of labor for an additional job in the primary sector equals the marginal product of labor in the primary sector.

20. For a more detailed discussion of wait unemployment and the measurement of the social opportunity cost of labor, see Sah and Stiglitz (1985) and the references cited therein.

21. The issue is a complex because policies that tax high-wage workers for the benefit of low-wage workers will, at least in some efficiency wage models, have perverse effects on the composition of output by reducing the relative utility of primary-sector workers. Thus, income redistribution policies may undo the allocative effects of subsidies to sectors that pay wage premia.

22. For consideration of the relation between U.S. trade and wages outside the manufacturing sector, see Dickens and Lang (1988).

23. On the other hand, for an argument that transitory exchange rate shocks may permanently affect an economy's ability to compete in some industries, see Baldwin and Krugman (1986).

24. Rent-sharing considerations are examined in detail in Katz and Summers (1989).

25. Dickens and Lang (1988) find that taking into account input-output relations does not greatly affect one's conclusions concerning the cross-sectional relations among wage premiums and trade flows in the United States.

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Comment

Kenneth A. Froot

Lawrence F. Katz and Lawrence H. Summers have written a very nice paper. Its principle point is to remind "new wave" trade economists that factor market distortions are likely to be an important consideration in designing commercial policy. Of course, factor market distortions already occupy a prominent place in the traditional trade literature. Stephen Magee's (1969) famous survey cites over one hundred papers and books going back to Cairnes (1874), Ohlin (1933), and Viner (1964). It is probably fair to say that our current understanding about the first- to the *n*th best treatment of wage distortions in the absence of product market distortions has not changed much since Bhagwati (1971).

Katz and Summers in a sense rejuvenate this older literature. They argue that, in fact, product market distortions, which are the focus of much new wave trade theory, are likely to be small in comparison with labor market distortions. They provide an impressive array of evidence from the United States and a number of other countries that (1) intersectoral wage differentials are large, with a standard deviation of 13–18 percent; (2) the differentials are highly persistent over time and very similar across countries; and (3) export industries tend to have higher wages than import industries. The paper then argues that these differentials do in fact constitute distortions or rents. In other words, intersectoral wage differentials cannot be explained by unobserved differences in the quality of workers or of jobs. Katz and Summers also review briefly the efficiency wage explanation for why such differentials persist.

Whether these differentials are noncompetitive in nature is the subject of debate in labor economics and could not possibly be resolved here. I want to focus instead on the paper's arguments for intervention, taking for granted that the differentials do in fact represent distortions and assuming, as Katz and Summers do, that there are no product market distortions. In short, under these circumstances the paper suggests that intersectoral wage differentials may justify export-promoting policies to improve U.S. welfare.

To study the effects of export promotion, Katz and Summers build a two-sector economy in which labor in the "primary" sector earns a wage higher than the wage in the numeraire sector. The wage premium is a rent. In equilibrium, when the wage is set to the marginal product of labor, the output of the primary good is too low. The first-best allocation of labor can be achieved by a subsidy to employment in the primary sector. In a closed economy, the price of the primary good falls as output expands, yielding a gain in consumer surplus.

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Katz and Summers turn to consider this small economy once it is opened internationally. The effect of trade in their model is to fix the price of the primary good. I wonder whether the fixed-price assumption is appropriate. First, most of the discussion in the paper centers on wage differentials and trade policy in the United States, where the small-country assumption clearly does not hold. Second, manufactured goods, which form the bulk of traded goods in the United States, are often highly differentiated. Even the small country that produces these goods in a perfectly competitive export sector will face declining international demand.

It is easy to show that the case for export promotion relies heavily on the fixed-price assumption. As I show below, a relatively mild terms-of-trade deterioration due to an export expansion program is likely to be enough to reverse the paper's policy conclusions. Ignoring these effects may lead to an overly optimistic view of the scope for intervention. At one point, Katz and Summers suggest that home subsidies that are matched by foreign subsidies are likely to raise welfare in both countries. This result is in contrast to the negative effects on home-country welfare of foreign retaliation in the presence of imperfect competition. Katz and Summers's assertion will depend critically on the terms-of-trade effects of the subsidies and on whether the home country is a net importer or exporter of the primary good.

To demonstrate how sensitive the results are to the terms-of-trade effects, consider a version of the Katz and Summers model. To make the point as starkly and simply as possible, I will assume that the country exports all its primary-good output. The social planner faces a noncompetitive wage distortion and must decide whether to subsidize or tax output in the primary sector. Using Katz and Summers's notation, the planner maximizes the value of total output less wage costs:

$$\max_{s} Y^n + PY^p - w_0 L - PY^p,$$

where $L = L^p + L^n$ is the country's total labor force, P is the price of primary output paid by foreigners, the price of numeraire output is one, and s is the subsidy rate. Note that the assumption that primary output is entirely exported makes a production subsidy equal to an export subsidy. Note also that the social planner evaluates the cost of labor at its opportunity cost—the cost of labor in the numeraire sector, w_0. To keep things simple, assume that labor is the only input into production of the primary good, $Y^p = f(L^p)$. (This implies that a production subsidy is also equivalent to a subsidy to employment.) Using the rest of the model as specified in Katz and Summers, we have the standard first-order condition:

$$Pf_L(1/\epsilon^p + 1) - w = 0, \tag{1}$$

where ϵ^p is the price elasticity of foreign primary product demand.[1] Primary-product producers are on their labor demand curve, given the level of the subsidy, s, and size of the wage differential, d:

$$Pf_L = \left(\frac{1 + d}{1 + s}\right)w_0. \tag{2}$$

Combining equations (1) and (2) yields the optimal export subsidy:

$$s^* = d^* - \frac{1 + d^*}{\epsilon^{p*}}, \tag{3}$$

where the asterisk indicates the variable is evaluated at s, the optimal subsidy. Katz and Summers find that a reasonable estimate for d is about 0.25. This implies that, if the price elasticity of exports is five, the optimal subsidy is exactly zero. Most reasonable estimates of export-price elasticities are much less than five. In this case, the optimal policy is an export *tax*. Katz and Summers suggest that, by eliminating the $150 billion U.S. trade deficit entirely through export expansion, U.S. welfare would increase by $12 billion.[2] If this enormous 60 percent expansion of U.S. exports resulted in an 8 percent decline in export prices—an elasticity of roughly eight—the welfare gain would be completely negated. If the price elasticity is lower, as it no doubt is in industries such as aircraft, this method of reducing the trade deficit would reduce welfare, even in the presence of wage distortions.

Notice that this standard result ignores imperfect competition in the primary-product market, which is what justifies export promotion in newer trade models. I do not think that export sectors are perfectly competitive and that the right policy for the United States would be a tax on exports. Rather, my point is that, even in the presence of wage distortions, most arguments for export promotion will ultimately rely on some product market distortion. Indeed, it is quite likely that these factor and product market distortions interact in practice. For example, unions might bid wages up in order to absorb profits generated by imperfect competition in the product market. A more sophisticated theory might even have organized labor in an oligopolistic industry bid up wages not only to absorb current profits but also to restrict output. By forcing firms to up their labor demand curves, unions could reproduce the monopolistic outcome while absorbing all the profits. In such cases, the right policies will be those that undo the underlying product market imperfections. Causality could also run in the opposite direction. Competing firms might find product market collusion more credible if they face similar factor market distortions. Then the right policies will target the labor market distortions. The Katz and Summers paper provides an important stepping stone to this kind of topic.

Notes

1. I assume that the cross-price elasticity is zero.
2. This is $150 \times 0.8 = 12$, where 0.8 is the difference in wages between the average export worker and the average import worker.

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Comment

Raquel Fernandez

The main contribution of this paper is to bring to the attention of trade theorists a great deal of what is known about interindustry wage differentials and a discussion of some of the possible reasons for its causes. The authors quite convincingly show that the wage differential is still large when observed characteristics are controlled for and that job attributes on their own are unlikely to explain the wage differential. Their arguments against unmeasured labor quality are somewhat weaker, but their most convincing counterargument is the fact that wages are correlated across occupations in an industry and that there is no good reason to expect an industry that needs especially good engineers also to need especially good secretaries. Most of the alternative efficiency wage (EW) hypotheses, however, are also unable to account for the correlation of wages across occupations in an industry. As Katz and Summers (K&S) admit, in order to explain this fact it is necessary to marry some sort of Akerlof/egalitarianism type of story to an EW story. But it is also possible to combine an equity story to either unobserved job attributes or labor quality, which would then allow either alternative hypothesis to command more explanatory power than before.

Efficiency Implications of Wage Subsidies

Acknowledging the diversity of reasons that may underlie interindustry wage differentials, K&S nonetheless state that the implications of noncompetitive wage differentials among nonunion workers for trade policies do not depend on their precise cause. Is this really true? Consider the following scenario. Suppose that there are two industries and two occupations: managers

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and engineers. For simplicity, assume that the marginal product of labor in each occupation is independent of the number of workers employed in the other occupation. Furthermore, suppose that engineers in industry 1 earn higher wages than engineers in industry 2 (i.e., $w_2 = w_1 + \alpha$) because work conditions for engineers in industry 1 are more unattractive. Let us argue, moreover, that managers in industry 1 also earn higher wages than managers in industry 2 for sociological/social equity types of reasons. Concretely, let us assume that each percentage increase in the wage of engineers must be met by an equal percentage increase in the wage of managers. What would be the effect if, following K&S's prescription, we were to subsidize all employment in industry 1? The effect of a wage subsidy s is shown in figure 3C.1. The employment of engineers in industry 1, previously socially efficient, would increase, creating an allocative distortion in the market for engineers. The wage of engineers also increases (but by less than the full amount of the subsidy). More surprisingly, however, while the subsidy would tend to increase the employment of managers in industry 1, thus increasing efficiency (since the value of the marginal product of managers is greater in industry 1), the increased wage of engineers sets up a countervailing force since the wage of managers must increase by at least the same percentage. If managers' wages had originally been greater than those of engineers, then it is possible, as shown in figure 3C.1, that the economy could end up with less managers employed in industry 1 than there were prior to the subsidy, thus increasing inefficiency in both labor markets. Note that this effect is not due to the assumption of the way that the market for engineers functions. Suppose that the higher wages for engineers in industry 1 were really a result of some EW story. A subsidy would now create an improvement in the allocation of engineers, but it is still possible that the employment of managers in industry 1 could fall and that overall efficiency would worsen by a sufficient degree.

There are other reasons why a labor subsidy might be counterproductive. Schumpeterian considerations, such as the hypothesis that the existence of rents causes firms to be less innovative since there is less competitive pressure, imply that subsidizing high-wage firms may also have unfavorable effects on the effort that firms expend on research and development activities. Indeed, the positive empirical correlation between rents and high wages may simply imply that the distortion is occurring in the product market and then being passed on to the labor market through some bargaining mechanism. In this case, a first-best policy would probably imply some intervention on the product rather than on the labor market side. On the whole, while many scenarios do have a high wage being indicative of a higher value of the marginal product of labor and result in a labor subsidy improving allocative efficiency, the fact that the implications of bargaining in the workplace and of the strategic interactions of the product market with the labor market have only recently received attention leads me to be rather more wary than the authors about the efficiency implications of a labor subsidy.

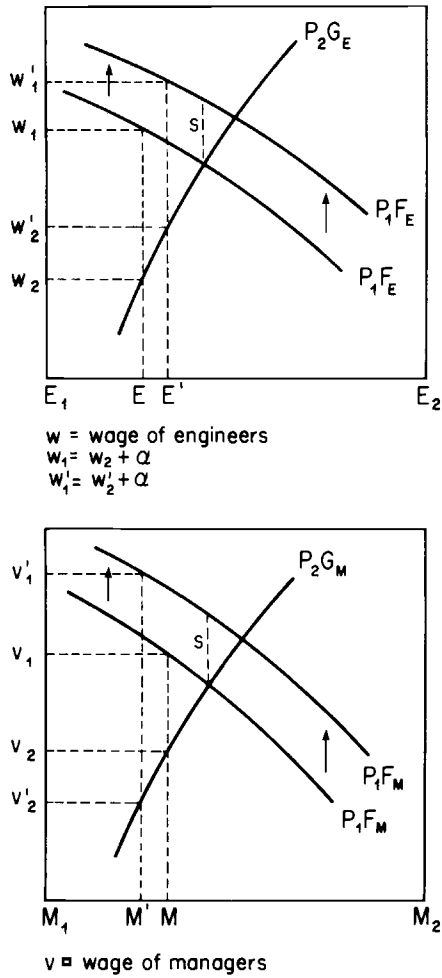

Fig. 3C.1

Welfare Consequences

The welfare consequences of labor subsidies, on the other hand, have the property in almost every plausible scenario of not being Pareto improving and, moreover, worsening the distribution of income. In the example discussed by K&S, it is necessary to assume that workers are homogeneous and that the movement of workers between sectors is characterized by a Markovian process in order that a labor subsidy be Pareto improving. The second assumption is especially objectionable, and any relaxation of it results in a labor subsidy not being Pareto improving. Nor can one wave the usual magic wand and appeal to some income distributional mechanism to take care

of this redistributive aspect. Indeed, one of the main benefits of a model in which labor market distortions are endogenous is that it allows one to examine the feasibility of different redistributive measures. Whereas the study of labor market interactions with trade often assumes that the labor market distortion is exogenous (e.g., rigid exogenous wage differentials) and thus is able to claim that a system of lump-sum taxes and subsidies will take care of compensation problems, the taxation of workers in sector 1 in an EW model reduces those workers' after-tax income (presumably what they care about) and must be counteracted by the firm by an increase in the wage in order to leave the after-tax income at its optimal level. Consequently, unless firms are generating a sufficient amount of rent that may be taxed without creating a distortion, the tax to pay for the wage subsidy must fall on sector 2 workers, thus serving to worsen the distribution of income. This seems a strong reason to recommend against the subsidization of employment in high-wage industries.

Strategic Trade Policy Implications

Katz and Summers observe that the wage differential between the typical worker in import- and export-intensive industries is about 8 percent (in favor of the export-sector worker). This suggests to them that, for the United States, policies that succeed in promoting trade and increases in the volume of export and imports will tend to raise welfare by moving workers from the lower- to the higher-wage industries. Once again, the aforementioned caveats regarding welfare apply. Moreover, Dickens and Lang (1988), who include the agricultural and service sector in their study, conclude that the average wage surplus in the export sector relative to the import sector is approximately equal. Furthermore, arguing in favor of export subsidies is potentially dangerous. Retaliation in the form of a tariff that, say, leaves the total quantity of the good imported by the foreign country at the same level it was at prior to the subsidy simply allows the foreign country to capture the revenue associated with the tariff without producing any compensatory allocational effects at home. Labor subsidies, while not only being first best, also have less of a chance of being retaliated against since GATT rules may allow subsidies whose primary purpose is not seen as expanding exports.

The Deindustrialization Debate

Katz and Summers attempt to debunk the idea that the United States is losing its cutting-edge, high-wage industries. Although they note that, during the period 1980–84, the increase in the trade deficit was associated with a reduction of 1.4 million workers producing traded manufacturing goods, they do not find this to be a cause for concern since these jobs will come back when the trade deficit returns to balance. Their faith on this eventuality rests on the transversality condition: the United States cannot run a trade deficit forever. Accepting this, nonetheless, there is no a priori reason to believe that, by the time the United States eventually does run a trade surplus, the composition of

exports will still have a preponderance of high-wage occupations. That is, in order to be able to discuss the legitimacy of the deindustrialization arguments sensibly, one must be able to say something about what our comparative advantage will be in the future. Standard neoclassical economic theory, however, has very little to tell us about the dynamic determinants of a country's comparative advantage. It may very well be that the latter depends very heavily on the policies that our and foreign governments follow today. Hence, we may interpret the deindustrialization debate as telling us that we must worry about the dynamic consequences of the trade deficit.

General Considerations

The factors that result in efficiency wages may also produce other important distortions. The hiring of other productive factors will also be distorted. More important, it may be that if, as in some EW stories, firms fear the power of workers to disrupt the workplace (say, by destroying costly capital equipment) those firms are led to expend less resources than what is socially optimal in technological innovation or perhaps to place too great an emphasis on labor-saving technology. Hence, another avenue that the authors may find interesting to explore is whether wage differentials are more significant in some countries than in others and thus whether social institutions, worker-management schemes, profit-sharing mechanisms, and so on are capable of playing a role that firms in the United States may also profitably use to deal with the reasons that efficiency wages arise.

To conclude, I found K&S's reminder to trade theorists of the significance of labor market rents both timely and important, as demonstrated by the ability of labor rents to overturn the welfare implications of the Airbus subsidy and as they enable us to make some economic sense of the significance of the deindustrialization debate.

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