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The High Road and the Low Road to International Competitiveness: Extending the Neo-Schumpeterian Trade Model Beyond Technology

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ABSTRACT *Extending the neo-Schumpeterian trade model, we estimate a 'social-gap' model for a group of 17 OECD countries over the period 1975–1995. We find that government spending on social protection, employment protection regulations, union density, strike activity, and income security in the labor market (all measured in 'gap' form) are statistically significantly related to changes in international competitiveness. Specifically, we find some support for a Calmfors–Driffil, nonlinear, relation between cooperative labor relations and social spending patterns on the one hand, and international trade (and inward foreign investment) competitiveness on the other, implying that countries with relatively stronger institutional arrangements have better international economic performance than countries in the middle of the scale of conflict and cooperation. Our results indicate that models focusing solely on innovative effort are misspecified, and may suffer from an omitted variable bias caused by the absence of consideration of other institutional factors influencing international trade and investment.*

KEY WORDS: International trade theory; technology gaps; social expenditure; labor relations

JEL CLASSIFICATION: F10, H50, J50

Introduction

The increase in the international mobility of capital over the past 25 years has called into question the ability of any individual nation to support a distinct set of social policies. Nations with high-cost social policies, the argument goes, have no choice but to cut back on social programs because they either generate capital flight or they raise the cost of doing business, leading to a decline in international competitiveness and, in turn, a decline in domestic growth and employment. Recent experiences in industrialized countries testify to the 'Americanization' of labor relations and the slow erosion of the social safety net, in many cases reportedly a response to the pressures of globalization, for example, the use of more part-time workers in France, cuts in health benefits in Germany, the reduction in

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Canadian unemployment benefits, the decentralization of wage bargaining in Italy, Spain and Sweden, and the tightening of limits for unemployment benefits in the UK and the Netherlands.

Is there an alternative to wage- and benefit-cutting in the face of the heightened competitive pressure created by globalization? In this paper we explore the possibility that even in a more globalized economy, different countries have pursued different paths to successful performance in the international economy—a 'low road' that emphasizes cost-cutting, conflictual labor relations and a narrow set of social programs, and a 'high road' that requires rapid productivity growth and innovation based on cooperative labor relations and generally stronger and more centralized labor unions, high quality production and higher wages, as well as greater state-supported social protection. As with many issues of public policy, economic theories can be used to support both strategies. On the one hand, higher taxes on employers can be expected to push up costs and prices, reducing exports and making inward foreign direct investment less attractive and outward foreign direct investment more attractive. On the other hand, higher wages, coordinated wage bargaining and more cooperative production relations can result in lower unit costs through productivity gains—as emphasized in the literature on social corporatism and efficiency wages—or in higher rates of innovation. There are surprisingly few cross-country empirical studies available to support either theoretical position, and there is anecdotal evidence to support both sides.

Table 1 presents various indicators of economic performance and institutional structure for 20 OECD countries for 1994, and annual growth rates for two measures of international competitiveness for the period 1984–1996. Countries are ranked by their 1994 level of social spending as a percentage of GDP, running from Sweden (35.9%) and Finland (33.9) and Denmark (32.6) down to the US (15.6) and Japan (13.0).[1] We have cut the sample into two groups, with the group with higher levels of social spending labeled 'high road' and the others 'low road'. Bargaining coverage correlates fairly highly with the rankings by social spending (with the exception of Australia), indicating that stronger trade unions exist in countries with more generous social spending. The competitiveness variables do not correlate clearly with these institutional variables, and in fact export share growth on average was slightly higher for the high-road group of countries over the period 1984–1996. On the surface at least, it appears that there is no simple relation between domestic policies and institutions on the one hand, and international competitiveness on the other, suggesting either that more 'high road' insitutional arrangements do not necessarily raise costs, or that relative unit labor costs may be only a part of the international competition puzzle. While different institutional arrangements may give different wage outcomes, they may also generate different patterns of productivity (and thus unit labor costs) as well as differences in non-price dimensions (such as product quality) that are nonetheless economically significant.

Traditional theories of international trade based on comparative advantage are not able to capture these institutional contingencies. We look instead to the neo-Schumpeterian or 'technology-gap' models of international competition. We argue, however, that innovative effort, proxied by such measures as the ratio of R&D expenditures to GDP, is insufficient to capture the institutional differences between high- and low-road paths to international competition. We thus extend the technology-gap trade model beyond the institutions of technological innovation by introducing labor relations, employment protection by the state, and government spending on social protection, giving a 'social-gap' rather than a

Table 1. Institutions and International Competitiveness Selected OECD Countries, 1994 (Ranked by level of social spending)

						Annual Growth Rate 1984-96	
	Social Spending % of GDP	Bargaining Coverage	Private R&D % of GDP	Import Penetration	Net FDI as % GDP (in-out)	Rel. Unit Labor Costs	Export Share
High Road							
Sweden	35.9	89	2.5	0.6	–0.1	–1.6	–0.2
Finland	33.9	95	1.5	0.5	–2.9	–3.3	0.3
Denmark	32.6	69	1.1	0.6	0.6	2.8	0.5
France	29.7	95	1.5	0.4	–0.6	–1.0	–0.3
Netherlands	28.7	81	1.1	1.0	–8.0	–0.6	–0.3
Germany	27.5	92	1.5	0.5	–1.2	1.7	0.2
Belgium	26.8	90	1.1	1.0	3.1	1.2	0.7
Austria	26.7	98	0.8	0.6	0.1	–1.7	1.7
Italy	25.2	82	0.7	0.5	–0.3	–1.7	1.3
Mean	29.7	87.9	1.3	0.6	–1.1	–0.5	0.4
Low Road							
UK	22.8	47	1.4	0.6	–12.4	1.4	–0.5
Norway	22.0	74	1.0	0.7	0.1	0.8	–1.5
Spain	22.0	50	0.4	0.3	6.3	0.9	2.4
Ireland	20.0	–	0.9	0.8	0.8	–5.7	4.3
Canada	18.9	36	1.0	0.4	–0.2	–0.6	–1.7
New Zealand	18.9	31	0.3	0.6	0.2	0.7	–0.5
Portugal	17.9	71	0.1	0.4	1.9	3.3	3.8
Greece	16.9	–	0.1	0.4	1.0	–0.3	–2.6
Australia	16.1	80	0.8	0.3	0.6	–2.0	–0.3
US	15.6	18	1.8	0.2	–2.8	–2.5	–0.1
Japan	13.0	21	1.9	0.3	–1.0	3.5	–1.5
Mean	18.6	47.6	0.9	0.4	–0.5	–0.03	0.2
Overall Mean	23.6	67.7	1.1	0.5	–0.7	–0.2	0.3

Sources: See Data Appendix

'technology gap' model of trade. Expanding the institutional scope allows us also to consider nonlinearities in the relation between national-level institutional arrangements and international performance, similar to the relation posited in the literature on social corporatism and macroeconomic performance.

The study covers a set of countries with relatively high levels of per capita income and a persistent divergence of institutional and government arrangements. The sample includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Italy, West Germany, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, United Kingdom, and the United States. In pooled, times series regressions using aggregate data for 1975–1995, we find that a broad set of policy and labor relations variables, including government spending on social protection, union density, strike activity, and employment protection regulations are statistically significantly related to changes in international competitiveness. Further, these institutional variables (technological innovation, labor relations, social policy) are more often

significant than relative unit labor costs. We find that among OECD countries, relative unit labor costs are often not statistically significant in explaining variations in international competitiveness over time, and may even exhibit a 'paradoxical' direct relation. More generous social spending and more cooperative labor relations are not particularly associated with poor national performance in the international economy, and may be associated with successful performance. In particular, we find some support for a nonlinear relation between the degree of cooperativeness in labor relations and state-provided social protection on the one hand and in international trade competitiveness on the other, implying that countries with relatively stronger institutional arrangements have better trade performance than countries in the middle of the scale of social conflict and cooperation.

Globalization and International Institutional Variation

The premise of this study is that there is a persistent heterogeneity of economic institutions across countries and that this heterogeneity can partly explain national performance in international goods, services and capital markets. If economic integration has brought a harmonization—downward or upward—of growth rates, factor prices, wage bargaining structures and social policies, then the pattern of trade and investment will depend on other variables. In fact, the relation between domestic institutions and international competition is usually approached by assuming the endogeneity of the former in response to the latter: trade theorists expect factor price convergence in response to trade liberalization; growth theorists posit income and growth convergence as a result of 'common forces', 'contagion', 'social capacities' or even trade openness; political economists consider the political responses to international competitive pressure as molding the size of the welfare state. The more recent literature on globalization has proposed that economic liberalization has created more uncertainty and volatility (e.g. a higher elasticity of labor demand) that have generated a greater demand for social protection from the state.[2] In this study we take the institutional differences as given and explore their implications for international economic performance. This approach is perhaps most compatible with the 'varieties of capitalism' approach of political science and management studies, which has developed a rich description of institutional variety (including firm management) among industrialized countries.[3] This perspective's skepticism of a trend toward international institutional convergence trends is summarized by Robert Boyer:

> This syllogism that equates globalization with convergence is logically flawed, and its premises may not correspond to the current state of the world economy … . Wage levels and hierarchies are still shaped by national institutional forms, skill formation and social values. Thus, the choice in organization and technologies will continue to depend on national legacies … . Note that, very different institutional arrangements can be imagined to solve the same economic challenge. (Boyer, 1996, pp. 50, 58)

In Table 1 we provided some evidence of the degree of variation in the level of social spending across OECD countries. While our choice of a cutoff point between the high- and the low-road countries is subjective, there are clear and longstanding differences in the role of the state for those at the top and bottom of the list.

With regard to labor relations, there is no doubt that efforts to raise the flexibility of labor markets in Europe have led to similar changes across European countries,

including a decentralization of wage bargaining in France, the Netherlands, Spain and the UK. Other evidence of this has been a tightening of limits on, or requirements for, the receipt of unemployment benefits in Germany, the Netherlands, Sweden, the UK, a weakening of dismissal laws in Belgium, France, Germany and the UK, an end to wage indexation in Italy, and efforts to reduce pension benefits in France and health care benefits in Germany. The internationalization of production not only increases management bargaining power *vis-à-vis* any particular national labor movement, but it also reduces the incentive for employer coordination at the national level. Large transnational corporations in Sweden (Volvo, Saab, Electrolux), Germany (IBM Deutsch, Hewlett-Packard, and Daimler-Benz) and the Netherlands have aggressively pursued more decentralized bargaining systems.[4] However, there are persistent differences across industrialized countries in terms of labor market regulation (occupational safety and health standards, minimum wage, and severance practices and pay), unemployment benefits and pensions, and outcomes (e.g. hours of work and the degree of worker participation).[5] Freeman (1994, p. 27), for example, notes 'the great variation in institutions that govern the labor market in otherwise comparable advanced economies'.

International Institutional Variation and the Theory of International Trade

Institutions are not typically included in models of international trade, since trade has been understood as the result not of institutional variation, but of the international pattern of naturally endowed factors of production. From this perspective, institutional variation across countries cannot affect the overall trade performance of a country, since wage or exchange rate adjustment will presumably offset any changes in the cost of production resulting from a national-level institutional change. It is only if institutions change the intersectoral pattern of productivity that they will influence trade, and then only the intersectoral trade pattern, not the balance of trade. This is the thrust of recent paper by Belloc (2004), Saint-Paul (2002), and Freeman (2000). In his Ohlin Lectures, Ronald Jones (2000, ch. 2), shows how in the presence of an internationally mobile factor of production comparative advantage may be offset by forces of absolute advantage in the mobile factor. A key implication is that national-level policies that alter the absolute advantage in the mobile factor can affect the pattern and balance of trade. This development opens the door to a more comprehensive consideration of the role of institutions in international trade.

The neo-Schumpeterian (or technology-gap) approach to international trade has perhaps most fully introduced institutions into the analysis, that is, as drivers of trade and even of the overall balance of trade. While there have been neoclassical and neo-Schumpeterian technology-gap models, almost all are based on Posner's (1961) simple insight that international differences in process technology, product design, or innovation in a given sector can be the source of international trade, even when they are not reflected in prices. Technological innovation is the central focus, leaving cost and price adjustments as secondary.[6]

A technology gap is the difference between the technology or innovativeness of a given sector (or country) and that used in the *lead* technology sector (or country). The gap is reflected in a different level of productivity, of mechanization, or of innovation, as captured by innovative effort (e.g. R&D expenditures, number of engineers employed) or innovative output (e.g. productivity, patents, scholarly

engineering journal articles). Technology gaps are observed to be persistent in large part because of scale economies or learning effects.

In technology-gap models, cost-based adjustments resulting from trade imbalance are assumed subordinate to the adjustments from persistent technology gaps. Technological change affects export market share. Market share adjustments lead to income changes, which are expected to swamp the effect of any cost-based changes—such as exchange rate adjustments. The income adjustments affect economic growth more directly than they do the trade balance. By subordinating the role of price competition, technology-gap models leave open the possibility that countries can run persistent trade imbalances over the long run. According to Dosi, Pavitt & Soete (1990, p. 151):

> Our hypothesis is thus that absolute advantages dominate over comparative advantages as determinants of trade flows. Their dominance means that they account for most of the composition of trade flows by country and by commodity at each point in time and explain the evolution of such trade flows over time. This dominance takes two forms. First, absolute advantages/disadvantages are the fundamental factors which explain sectoral and average competitiveness, and, thus, market shares. Second, they also define the boundaries of the universe within which cost-related adjustments take place.

For purposes of empirical study, this perspective suggests that sectoral exports X depend mainly on three factors, technological advantage/disadvantage T, industrial organization and the degree of mechanization O and cost advantage/disadvantage C:

$$X = f(T, O, C), \tag{1}$$

Amendola *et al*. (1993) adopt Silverberg *et al*.'s (1988) 'evolutionary' dynamic formulation, in which the change in exports from period $(t-1)$ to period (t) result from deviations in competitiveness conditions in a given sector relative to rival sectors abroad:

$$x_i(t) - x_i(t-1) = f\{[E_i(t-1) - E_i{}^*(t-1)] / E_i{}^*(t-1)\} \tag{2}$$

where E_{i} represents a vector of variables affecting competitiveness of sector or nation i, and $E_{\mathrm{i}}{}^*$ is a weighted average of the competitive conditions in rival sectors or countries.[7] This specification moves the focus away from equilibrium dynamics, as presumed for example in any dynamic model of comparative advantage. According to Amendola *et al*. (1993), 'it implies changes in trade and technology unpegged to some underlying equilibrium and imperfect adjustments in macroeconomic variables to continuously changing technological "fundamentals"'.

The technology-gap approach has generated a vast empirical literature, much of which confirms a positive relation between innovative effort and export performance in a large number of industries in industrialized countries. In his review of the empirical literature, Fagerberg (1996) concludes that while the technology-gap variables are significant in most industries, price variables are often not. Amable & Verspagen (1995) find price variables significant in only one-third of the sectors analyzed. McCombie & Thirlwall (1994) show the insignificance of relative costs for exports at the aggregate level for a sample of 15 countries, from 1972 to 1990. The implications of this literature is that technological competition is more important

than price competition in the determination of international trade. These results are consistent with Kaldor's (1978) 'paradoxical' finding that countries with the most rapid growth in costs also had the most rapid growth in export shares.[8] These results are not as shocking as they might seem given that most studies focus largely on manufacturing industries in industrialized countries, where the role of technology, innovation and quality are well documented. Amsden (2001, ch. 1) extends the technology–competition argument to a group of fourteen newly industrialized countries.[9]

A weakness of the technology-gap approach is that the focus on technological innovation has been to the exclusion of any discussion of the labor *process*, that is, the labor relations and the social policy environment that makes innovativeness possible. R&D spending alone is of little importance if production is not organized in a way that allows for the efficient introduction of the resulting product and process innovations. The nature of the innovations themselves may depend on workplace organization, job security, and the incentives for innovative activity. In sum, the technology-gap approach ignores potentially important institutional variables such as labor relations, labor standards and the role of the state. Below we assess the statistical importance of these social institutions in determining international economic performance by extending the technology-gap approach to include variables on labor relations and social policies, that is, by moving from a technology-gap to a 'social-gap' model of trade.

A High Road to International Competitiveness?

The absence of a consideration of institutional determinants of productivity, innovation, product quality and production flexibility in the technology-gap approach is surprising given the literature on corporatism, which explicitly links labor relations and economic performance. In corporatist systems, economic performance is typically related positively with the degree of centralization of the wage bargain, higher union density and more participatory work environments, and a macroeconomic and policy environment of more job security. Non-corporatist systems are often understood to be characterized by a negative relation between economic performance and such indicators as labor union strength and government spending on social protection.

The incentives for productivity improvement are different in the two systems. Social-corporatist systems rely on a high degree of job security to encourage workers to be open to the introduction of new innovations, techniques, products, and designs. According to Gordon (1996, p. 149):

> In cooperative [high-road] systems, productivity-enhancing automation is presumably suspected and resisted less by workers, and perhaps even jointly planned by them, because their employment security tends to reduce their fear of technological layoffs.

Non-corporatist systems presumably rely more on the 'stick' than the 'carrot' in the achievement of productivity gains. Thus, for example, higher unemployment rates that raise the expected 'cost' of job loss would be expected to increase work intensity in a deregulated system, while in a cooperative system the same increase in the unemployment rate would be expected to lower work intensity as job security falls. Weisskopf (1987), for example, finds that 'unemployment is most significant [as a determinant of productivity] where industrial conflict is greatest'.[10]

Building on the early corporatist literature, Calmfors & Driffil (1988) proposed that better macroeconomic performance (more wage restraint, lower unemployment and inflation) would come from either highly decentralized or highly centralized wage bargaining systems. In highly centralized bargaining arrangements, unions are expected to internalize the negative effects of large wage increases and show wage restraint. In highly decentralized systems, unions are understood to be simply too weak to achieve gains that might raise unemployment or lower international competitiveness. Bargaining systems located in the middle of this spectrum would presumably lack the positive features of either of these extreme cases, and be likely to have the worst economic performance.[11]

These various perspectives on the relation between the degree of cooperation and economic performance are summarized in Figure 1. The high-road view shows a positive relation and the low-road view a negative relation. The Calmfors–Driffil 'hump-shape' (here inverted) is a combination of the two views, with the high-road hypothesis effective in one range and the low-road one in another, as depicted by the solid lines in Figure 1. This hybrid version captures the Calmfors–Driffil view on extreme versus intermediate arrangements, as well as the more important property that the effect of an increase in the degree of cooperativeness will depend on whether the system is already in the more or less cooperative range. Thus, for example, moves to more cooperation may be successful in Norway but not England. According to Paloheimo (1990, p. 135), 'Mainly it is countries with medium levels of labor relations that should think about either a decentralisation of their labor relations on the one hand, and either a liberalisation or a corporatisation of their economic policies on the other'.

While the labor relations dichotomy between corporatism and non-corporatism is seldom applied to the question of international competition, its relevance is clear. The incentive structures in the two systems imply that increased international competition is more likely to lead to efforts in corporatist countries to improve product quality and to retrain existing workers rather than hire new workers from the outside, while non-corporatist systems would more likely look to weaken labor union strength and reduce wages, benefits and standards. That is, firms in corporatist systems are in theory more likely to seek a value-added approach to international competition, while those in non-corporatist systems

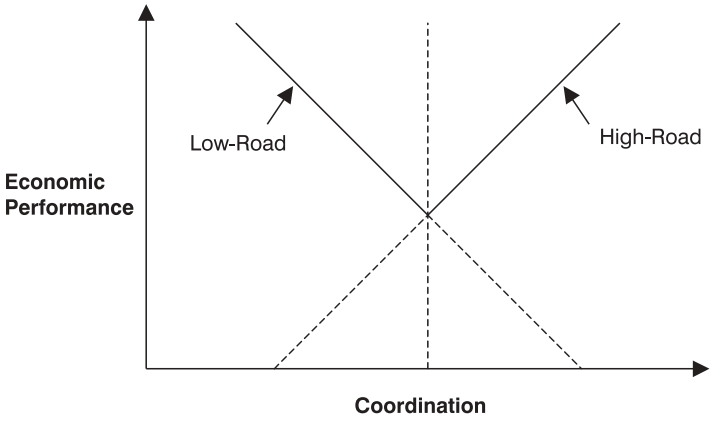


Figure 1. Degree of coordination and economic performance

would be expected to seek cost-cutting. Moreover, corporatist systems are said to be better equipped to respond to shocks, perhaps a prerequisite for successful international competition in an environment of unprecedented volatility in financial and foreign exchange markets.[12]

Differences in systems of labor relations may be particularly relevant in an environment in which innovativeness and flexibility is an important dimension of international competition, that is, when non-price competition has become so important. According to Soskice (1990), 'with computerization of design and production, firms in most industries engage in new products or the modification/customization of existing ones'. Still, the importance of labor relations for international trade cannot be captured by looking only at the firm or even the private market. Soskice (1990) emphasizes that flexibly coordinated systems are characterized by long-term and high-trust relations within and between institutions at the micro *and* macro level. Dore (1990) associates 'micro corporatism' at the level of the firm with 'collectivism' at the level of the state. In contrast, a 'deregulated system' is based on shorter-term and lower-trust institutions, for example, a greater reliance on arms'-length contracts. Either way, the state plays a key role, both in molding the regulatory environment and providing tax incentives for certain types of firm behavior, and by providing a social safety net that complements the private system of labor relations.

Evidence on Social Institutions and International Competitiveness

There is surprisingly little empirical work on the relation between social institutions and social policy on the one hand and international trade or foreign direct investment on the other. Ironically, most studies of standards and trade focus on developing countries, since they are the perceived source of 'social dumping' and developing country governments are often opponents of the inclusion of labor and environmental standards in trade agreements. Regarding industrialized countries, DeGrauwe & Polan (2003) find that more spending on social security (as a share of GDP) is associated with higher levels of competitiveness. These authors reject the hypothesis that the causality runs from competitiveness to social spending, as implied, for example, in Rodrik (1998, 1997). Carlin *et al*. (2001) find that in addition to costs and embodied technology, '"deep" structural features of economies, such as human capital investment and national ownership patterns' are significant in the explanation of trends in export market shares. A study by the OECD found that OECD countries with relatively lower labor standards performed no better in overall trade, but did increase their share of employment and net exports in some sectors such as textiles and apparel. The low-standards countries also were more successful in attracting foreign direct investment. Nivola (1997) focuses not on labor standards but on the regulatory framework generally. He provides an array of examples of how the burdensome regulatory structure ('high' standards for capital) in the USA reduces US international competitiveness.

A few studies of US sectoral-level trade have included a variable on unionization. Blecker & Feinberg (1995) found union coverage to be insignificant in relation to export shares, while Karier (1990) found a positive association between unionization and exports at the four-digit industrial level for the USA. This reversed the finding of Hilke & Nelson (1987) who found union strength positively related to imports and negatively to exports. Greenhalgh (1990) includes the number of strikes in a time series analysis of UK trade at the two-digit level and finds that

they are negatively associated with net exports in most manufacturing sectors, but not outside manufacturing. Moreover, in several industries the relation is positive, that is, 'industrial unrest increases in successful periods' (Greenhalgh, 1990, p. 115).

Figure 2 illustrates the bivariate relationship between measures of export share growth, unit labor costs and different institutional structures. Relative unit labor cost growth is negatively associated with export share growth. However, when we consider just the 17 most industrialized countries in this group (scatterplot not shown here), we find that the relation between relative unit labor cost growth and export market share growth turns positive, indicating that the 'Kaldor Paradox' may be most relevant in high-income countries. As hypothesized by the technology-gap approach, growth in R&D expenditure is clearly positively related to export share growth. Growth in social spending is negatively associated with export market share growth. Overall, these bivariate relations support the low-road view on costs and social spending and the technology gap view on innovative effort.

Figure 3 is a plot of the foreign trade and investment variables against the level of wage-bargain coverage, that is the degree of centralization of the wage bargain. We fit a quadratic function using OLS in order to test the hump-shape hypothesis presented by Calmfors and Driffil. For both export market share growth and growth in import penetration, there is a statistically discernible nonlinear pattern. The relation with net foreign direct investment is much flatter. These graphs give preliminary support for the idea that the low-road may not be the unique path to national success in international competition. However, Figures 2 and 3 show only bivariate relations. We turn now to a multivariate analysis.

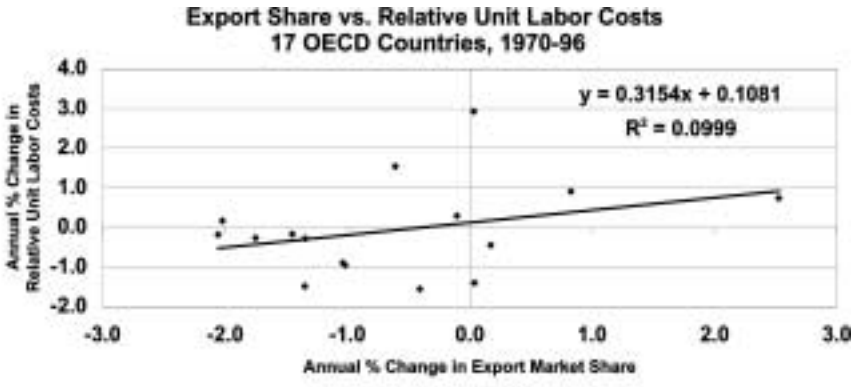
A Social-Gap Model of International Competitiveness

The Basic Framework

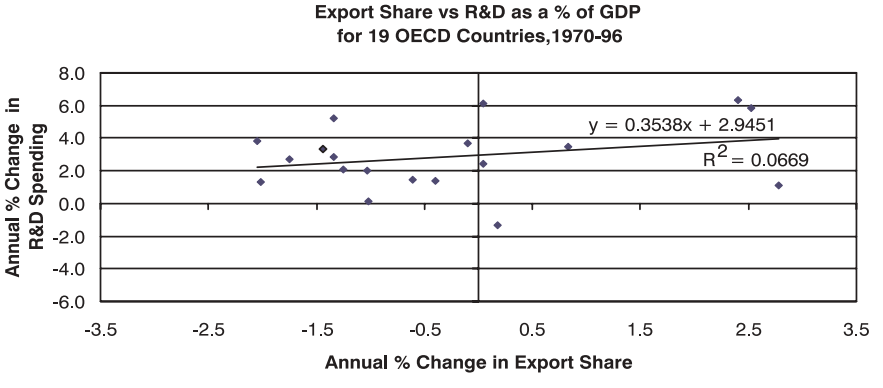
Building from a technology gap framework, we develop a social-gap model of international competitiveness that captures relative cost factors, innovativeness and institutional structures. We regress different measures of international competitiveness against measures of relative unit labor costs, innovative effort, labor relations and government spending on social protection. Pooling annual data for the set of OECD countries for the period 1975–1995, we estimate the following single-equation model:

$$\begin{aligned} X_{it} &= \beta_0 \text{CONSTANT} + \beta_1 \text{RULC}_{it} && \text{(comparative cost model)} \\ &+ \beta_2 \text{KL}_{it} + \beta_3 \text{RD}_{it} && \text{(technology gap model)} \\ &+ \beta_4 \text{UD}_{it} + \beta_5 \text{STRIKE}_{it} + \beta_6 \text{WISN} && \text{(labor relations and social protection)} \\ &+ \beta_7 \text{EP} + \beta_8 \text{SPT}_{it} + u_{it} \end{aligned} \tag{3}$$

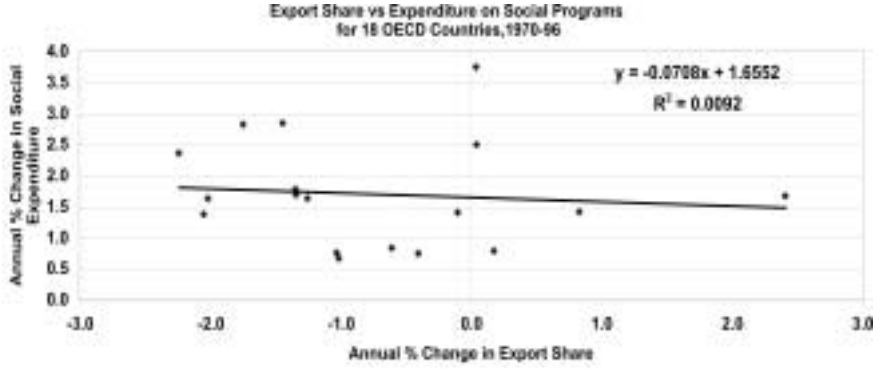
where subscripts i and t refer to country and year, respectively, X is the international competitiveness indicator, CONSTANT is a constant term, RULC is relative unit labor costs, KL is capital labor ratio, RD is R&D expenditure as a percentage of GDP, UD is union density, STRIKE is the average duration of strikes, WISN represents workers involved in strikes divided by total employment, EP is the



Note: Includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, UK, US, Greece, Iceland and Mexico. Excludes South Korea due to data limitations.



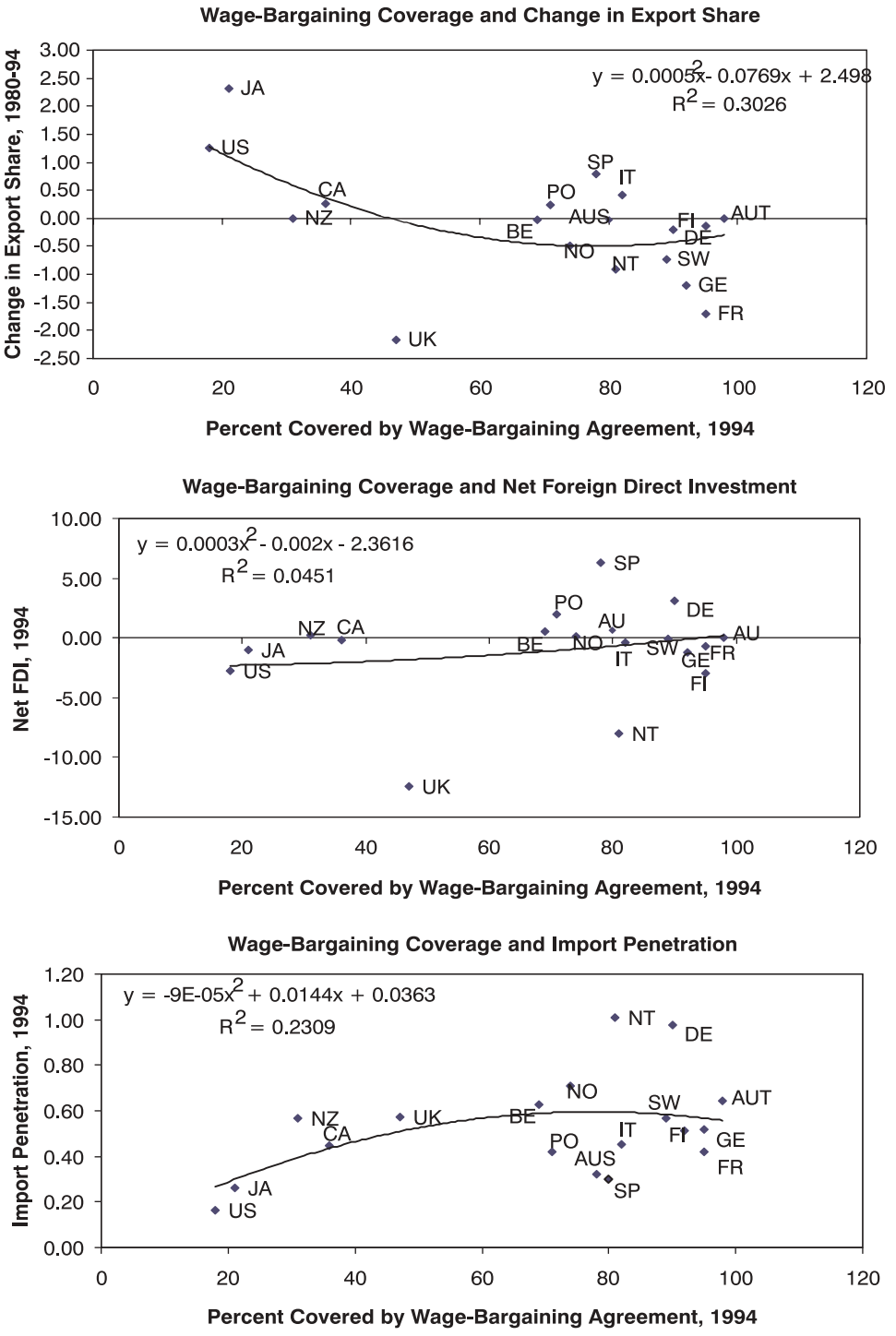
Note: Includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, UK and US. Excludes Greece, Korea, Iceland and Mexico due to data limitations.



Note: Includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, UK, US, Greece, Excludes Iceland, South Korea, Mexico, Portugal and Spain.

Sources: OECD Economic Outlook, 1996, OECD Anberd data base and OECD Social Expenditure data base. See Data Appendix for details.

Figure 2. (a) Export share and unit labor costs. (b) Export share and R&D spending. (c) Export share and social spending



Source: Authors' calculation based on sources listed in Data Appendix Percent covered by wage bargaining agreements are from OECD Employment Outlook, 1997 and Freeman (1994)

Figure 3. (a) Wage-bargaining coverage and export share. (b) Wage-bargaining coverage and Net FDI. (c) Wage-bargaining coverage and import penetration

index of the degree of employment protection, SPT is total social expenditure as a percentage of GDP, and $u_{it} = \mu_i + v_{it}$ is a one-way error component assumed to have a normal distribution.

To be consistent with the technology-gap approach, and to best compare our results with those in the technology-gap trade literature, we measured all variables as 'gap' variables, that is relative to the (trade-weighted) average of the values in the rest of the OECD countries, using 1980 trade weights. In general, variable x is defined in gap form as:

$$x_{i,t} = \left(\frac{x_{i,t}}{\sum_{j=1}^{n} x_{i,t} * \lambda_j} \right), i, j = 1 \ldots n.$$

where n is the number countries in the sample, t is the year, and the weights λ_i are defined $\lambda_i = (E_i^{1980} / \sum_i^n E_i^{1980})$, where E_i^{1980} are country i exports of goods and services in 1980.

The comparative cost and technology-gap trade models can be seen as subsets of equation (3). The comparative cost model represents the classical case of trade shares driven strictly by relative unit costs (RULC), and the technology-gap model would include also the variables for technology (R&D), capital intensity (KL). The 'social-gap' model includes the labor relations variables on union density (UD),[13] industrial conflict (STRIKE and WISN) and employment protection (EP), as well as the measure of state expenditure on social protection (SPT). Note that by using the ratio of spending to GDP we are capturing the size of the public sector, but not the state's capacity for deficit spending.

The classical trade model predicts that export market shares will vary inversely with relative unit labor costs. A positive value for β_1 would be evidence of the Kaldor paradox. Unit labor costs depend on both wages and productivity, and thus there could be high- and low-road paths to reduced unit labor costs. We expect that relative unit labor costs will explain a higher proportion of trade performance for low-road countries because they depend much less on quality improvements than do the high-road countries. Technology-gap theory predicts a positive sign on the R&D expenditure and capital-labor ratio. We expect this result will depend on whether the country is high- or low-road: R&D should contribute more to explaining international competitiveness in high-road than in low-road countries, since quality improvements drive performance in the high-road case and low costs drive outcomes for the low-road countries. The expected signs on the labor relations and state spending variables also differ according to whether the regime is high-road or low-road. The high-road view predicts a positive sign on relative unit labor costs, union density, employment protection and the social expenditure variable, and a negative sign on the conflict variables, duration of strike, and the percent of workers involved in strikes.[14] Higher union density will promote coordination. Higher social expenditure and greater employment security are associated with greater income security in the labor market which is expected to spur innovativeness and organizational flexibility—and thus non-price competitiveness.

The low-road view would predict a positive sign on the conflict variables (subject to the caveat mentioned in footnote 15), and a negative sign on union density, employment protection, and social expenditure, as work intensity and organizational flexibility are expected to increase when unions are weaker and job and income security is lower. The low-road view would also predict a negative sign on relative unit labor costs, with wage costs, as opposed to productivity increases, driving the effect.

Social-Gap Model Estimation

The effects of technological change, firm organization and social programs are likely to be cumulative and best captured over a relatively longer period of time. To differentiate between short- and long-run effects, we estimated two different models. For the long-run model we follow Wickens & Breusch (1988), with the long-run effects defined as the estimated coefficients on the contemporaneous value of the first difference of independent variables, where controls are included for the (optimal) lagged values of the first difference of the independent variables. The short-run model excludes these controls, thus capturing all movement within the first-difference variables. In order to reduce the contemporaneous correlation of errors, we use in both cases the seemingly unrelated regression (SUR) estimation (Zellner, 1962). Using SUR brings some loss in the efficiency of the estimator. However, it allows, in a single equation, to capture the long-run effects.[15] Every estimated regression includes a control for domestic demand, that is, a proxy for country size, constructed for consistency into 'gap' form, as defined above. The dataset draws from a variety of OECD sources for the trade and competitiveness related variables; labor relations and employment protection data are from the ILO and the *Labor Market Institutions Database* of Nickell & Nunziata (2001); and social protection data are from the OECD Social Expenditure Database (SOCX). The Data Appendix provides a full definition of all variables and their sources.

Tables 2–5 report the results of the 'short-run model' estimation for three competitiveness indicators: export market share, import penetration, and net foreign direct investment as a percentage of GDP. Table 2 includes the full sample, and in Tables 3–5 we break out sub-samples of high- and low-road countries and estimate the model for each grouping separately for each of the different international competitiveness variables.[16] High- and low-road groups are defined according to the level of social expenditure as a percentage of GDP, as shown in Table 1 and discussed above. In most cases the labor relations and social policy variables are statistically significant, independent of relative unit labor costs give some statistical justification for inclusion of these variables in empirical tests of the determinants of trade and competitiveness.

The results on the full sample estimation do not give unambiguous support for the high-road or the low-road view. For each dependent variable we present the estimation results on two different specifications, corresponding to different labor market protection variables. The first variable, 'employment protection,' is an index measure taken from the *Labor Market Institutions Database* of Nickell & Nunziata (2001). A higher value of the index—representing more protection—will be expected to raise trade competitiveness in cooperative systems. The second is the 'cost of job loss', a measure based on the work of Gordon (1994) that captures both labor market policy and macroeconomic conditions affecting the labor market. A higher cost of job loss will improve trade competitiveness in the

Table 2. Social-Gap, Short-Run Model of International Competitiveness, OECD Countries, 1975-95

	I. Export Market Share		II. Import Penetration		III. Net Foreign Direct Investment 1973-95	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	–0.00006 ***	–0.00004***	0.0018 ***	0.0016***	–0.008	–0.003
	(–2.5)	(–1.63)	(8.56)	(11.01)	(–0.64)	(–0.19)
($DEP_{i,t}$ - $DEP_{i,t-2}$)	0.58823 ***	0.58612***	0.7118 ***	0.7091***	0.641 ***	0.656***
	(40.11)	(34.49)	(67.34)	(70.14)	(17.21)	(17)
($DEP_{i,t}$ - $DEP_{i,t-3}$)	–0.13730 ***	–0.13309***	–0.2048 ***	–0.2018***	–0.107 ***	–0.121***
	(–12.5)	(–9.6)	(–27.53)	(–26.01)	(–3.49)	(–3.79)
$DEM_{i,t}$ - $DEM_{i,t-1}$	0.00109 ***	0.00105***	–0.0019 ***	–0.0016***	0.216 ***	0.281***
	(5.05)	(3.75)	(–3.9)	(–3.41)	(2.44)	(2.72)
$RULC_{i,t}$ - $RULC_{i,t-1}$	0.00009 ***	0.00009***	–0.0008 ***	–0.0008***	–0.001	–0.001
	(29.37)	(25.49)	(–35.16)	(–29.46)	(–0.48)	(–0.55)
$RULC_{i,t-1}$ - $RULC_{i,t-2}$	–0.00012 ***	–0.00012***	0.0006 ***	0.0006***	–0.005 ***	–0.004***
	(–37.9)	(–32.71)	(26.86)	(22.73)	(–4.02)	(–3.61)
$KL_{i,t}$ - $KL_{i,t-1}$	0.00026 ***	0.00024***	0.0170 ***	0.0154***	–0.659 ***	–0.632***
	(2.93)	(2.35)	(8.69)	(7.5)	(–4.02)	(–3.65)
$RD_{i,t}$ - $RD_{i,t-1}$	0.00088 ***	–0.00009	–0.0357 ***	–0.0337***	0.124*	0.122 *
	(2.12)	(–0.18)	(–16.59)	(–16.44)	(1.39)	(1.67)
$UD_{i,t}$ - $UD_{i,t-1}$	0.00192 ***	0.00193***	0.0280 ***	0.0272***	–1.065 ***	–0.983***
	(7.47)	(5.59)	(8.58)	(7.32)	(–4.2)	(–3.77)
$STRIKE_{i,t}$ - $STRIKE_{i,t-1}$	0.00005 ***	0.00004***	–0.0012 ***	–0.0012***	–0.018 ***	–0.012
	(5.59)	(4.52)	(–21.28)	(–19.56)	(–2.14)	(–1.3)
$WISN_{i,t}$ - $WISN_{i,t-1}$	–0.00001 ***	–0.00001***	–0.0001 ***	–0.0001***	–0.002 ***	–0.001
	(–2.8)	(–2.63)	(–9.7)	(–9.64)	(–2.3)	(–0.94)
$SPT_{i,t}$ - $SPT_{i,t-1}$	..	0.00136***	..	–0.0004	..	0.173
		(6.09)		(–0.23)		(0.99)
$SPT_{i,t-1}$ - $SPT_{i,t-2}$	0.00263 ***	..	–0.00912***	..	–0.759 ***	..
	(12.21)		(–3.87)		(–4.31)	
$EP_{i,t}$ - $EP_{i,t-1}$	0.00189 ***	..	–0.0421 ***	..	–0.286	..
	(2.85)		(–6.2)		(–1.05)	
$CJL_{i,t}$ - $CJL_{i,t-1}$	..	0.00134***	..	0.0490***	..	–1.995***
		(1.76)		(6.72)		(–4.23)
Obs	306	306	306	306	374	374
Countries	17	17	17	17	17	17
R-squared	0.63	0.63	0.71	0.71	0.45	0.45
Adj. R-squared	0.61	0.61	0.70	0.70	0.43	0.43
S.E. of regression	0.002	0.002	0.03	0.03	2.35	2.36
Durbin-Watson	2.95	2.94	2.85	2.85	3.27	3.29

Notes: t-statistics are in parantheses. All models were estimated with seemingly unrelated regression (SUR). All variables are measured in gap form as follows:

$$GAPX_{i,t} = \frac{x_{i,t}}{\sum x_{i,t}\ w}$$ where w is the 1980 trade weight.

Variable definitions: DEP is the dependent variable; DEM measures aggregate domestic demand, a control for country size; RULC is relative unit labor costs; KL is the capital-labor ratio; RD is R&D expenditure as a percentage of GDP; UD is net union density; STRIKE is a measure of strike duration; WISN is the number of workers involved in strikes per total employment; SPT is total expenditure on social programs as a percentage of GDP; EP is an index of employment protection, CJL is the cost of job loss, a macro indicator of job insecurity.

Table 3. Export Market Share, 1975-95 High-Road Countries: Sweden, Netherlands, Denmark, France, Finland, Belgium, Austria, Germany, Italy Low-Road Countries: New Zealand, Norway, UK, Spain, Canada, Australia, US, Japan

	High Road Countries		Low Road Countries	
	(1)	(2)	(1)	(2)
Constant	–0.0001	–0.00009	0.00001	0.000004
	(–1.16)	(–0.96)	(0.06)	(0.04)
$(XSHR_{i,t} - XSHR_{i,t-2})$	0.5517 ***	0.55350 ***	0.57 ***	0.56 ***
	(11.07)	(11.07)	(9.01)	(9.01)
$(XSHR_{i,t} - XSHR_{i,t-3})$	–0.0979 ***	–0.10021 ***	–0.11 **	–0.10 **
	(–2.4)	(–2.45)	(–2.12)	(–1.99)
$DEM_{i,t} - DEM_{i,t-1}$	0.0021	0.00218	–0.00043	–0.0004
	(0.84)	(0.87)	(–0.61)	(–0.63)
$RULC_{i,t} - RULC_{i,t-1}$	0.0001 ***	0.00007 ***	0.0001 ***	0.0001 ***
	(4.76)	(4.56)	(5.4)	(5.62)
$RULC_{i,t-1} - RULC_{i,t-2}$	–0.0001 ***	–0.00011 ***	–0.0001 ***	–0.0001 ***
	(–8.54)	(–8.43)	(–7.24)	(–6.96)
$KL_{i,t} - KL_{i,t-1}$	0.0002	0.00012	0.0009	0.0009
	(0.58)	(0.43)	(0.9)	(0.8)
$RD_{i,t} - RD_{i,t-1}$	–0.0013	–0.00120	0.00028	0.00024
	(–1.12)	(–1.02)	(0.11)	(0.09)
$UD_{i,t} - UD_{i,t-1}$	0.0031 ***	0.00262 **	–0.00006	0.00003
	(2.37)	(1.85)	(–0.05)	(0.02)
$STRIKE_{i,t} - STRIKE_{i,t-1}$	0.0001 ***	0.00012 **	0.00002	0.00002
	(2.27)	(1.86)	(1.02)	(1.02)
$WISN_{i,t} - WISN_{i,t-1}$	–0.00001 ***	–0.00001 **	0.00012	0.00010
	(–2.19)	(–1.84)	(1.47)	(1.29)
$EP_{i,t} - EP_{i,t-1}$	–0.001	–0.002	–0.007	–0.007
	(–0.3)	(–0.78)	(–0.68)	(–0.76)
$SPT_{i,t-1} - SPT_{i,t-2}$	0.002 ***	..	0.001	..
	(2.96)		(1.27)	
$SPH_{i,t} - SPH_{i,t-1}$	..	0.002 *	..	–0.0014
		(1.71)		(–0.93)
$SPO_{i,t-1} - SPO_{i,t-2}$	..	0.002 ***	..	0.0008
		(2.85)		(1.08)
Obs	162	162	144	144
Countries	9	9	8	8
R-squared	0.64	0.63	0.59	0.59
Adj. R-squared	0.61	0.60	0.56	0.55
S.E. of regression	0.00	0.00	0.003	0.003
Durbin-Watson	2.87	2.87	3.04	3.02

Notes: t-statistics are in parantheses. All models were estimated with seemingly unrelated regression (SUR). All variables are measured in gap form as follows:

$$GAPX_{i,t} = \frac{x_{i,t}}{\sum x_{i,t}\ w}$$

where w is the 1980 trade weight.

Variable definitions: The dependent variable XSHR is goods and services export market share; RULC is the relative unit labor costs; KL is the capital-labor ratio; RD is R&D expenditure as percentage of GDP; UD is net union density; STRIKE is a measure of strike duration; WISN is the number of workers involved in strikes per total employment. EP is an index of employment protection; SPT is the total expenditure on social programs as a percentage of GDP; SPH is social expenditure on health as a percentage of GDP; SPO is all non-health related social expenditure as a percentage of GDP.

Table 4. Import Penetration, 1975-95 High Road Countries: Sweden, Netherlands, Denmark, France, Finland, Belgium, Austria, Germany, Italy Low Road Countries: New Zealand, Norway, UK, Spain, Canada, Australia, US, Japan

	High Road Countries		Low Road Countries	
	(1)	(2)	(3)	(4)
Constant	0.001	0.001	0.001	0.001
	(0.51)	(0.39)	(0.76)	(0.77)
$(MPEN_{i,t} - MPEN_{i,t-2})$	0.664 ***	0.685 ***	0.680 ***	0.638 ***
	(12.85)	(13.7)	(17.03)	(18.51)
$(MPEN_{i,t} - MPEN_{i,t-3})$	–0.156 ***	–0.178 ***	–0.168 ***	–0.173 ***
	(–4.16)	(–4.83)	(–5.85)	(–6.8)
$DEM_{i,t} - DEM_{i,t-1}$	0.002	–0.009	–0.001	–0.002 ***
	(0.07)	(–0.42)	(–1.26)	(–2.57)
$RULC_{i,t} - RULC_{i,t-1}$	–0.001 ***	–0.001 ***	–0.0005 ***	–0.001 ***
	(–6.92)	(–7.15)	(–8.61)	(–9.16)
$RULC_{i,t-1} - RULC_{i,t-2}$	0.001 ***	0.001 ***	0.001 ***	0.0005 ***
	(5.45)	(6.24)	(9.21)	(8.57)
$KL_{i,t} - KL_{i,t-1}$	–0.001	–0.003	0.037 *	0.017
	(–0.14)	(–0.31)	(1.71)	(0.94)
$RD_{i,t} - RD_{i,t-1}$	–0.025 *	–0.030 ***	–0.013	–0.026 ***
	(–1.66)	(–2.18)	(–0.99)	(–2.17)
$UD_{i,t} - UD_{i,t-1}$	0.036	0.032	–0.017	–0.012
	(1.31)	(1.2)	(–1.37)	(–1.17)
$STRIKE_{i,t} - STRIKE_{i,t-1}$	–0.0002	–0.0004	–0.001 ***	–0.001 ***
	(–0.26)	(–0.57)	(–6.95)	(–8.14)
$WISN_{i,t} - WISN_{i,t-1}$	0.000005	–0.00001	–0.002 *	–0.001 *
	(0.1)	(–0.24)	(–1.74)	(–1.53)
$EP_{i,t} - EP_{i,t-1}$	–0.033	–0.015	–0.12 *	–0.11 *
	(–0.9)	(–0.42)	(–1.69)	(–1.61)
$SPT_{i,t-1} - SPT_{i,t-2}$	–0.006	..	–0.009	..
	(–0.35)		(–1.13)	
$SPO_{i,t} - SPO_{i,t-1}$	..	–0.018 *	..	0.015 ***
		(–1.71)		(2.37)
$SPH_{i,t} - SPH_{i,t-1}$	..	–0.040 **	..	–0.085 ***
		(–2.1)		(–5.07)
Obs	162	162	144	144
Countries	9	9	8	8
R-squared	0.70	0.70	0.79	0.80
Adj. R-squared	0.68	0.68	0.77	0.78
S.E. of regression	0.03	0.03	0.01	0.01
Durbin-Watson	2.83	2.86	2.82	2.85

Notes: t-statistics are in parantheses. All models were estimated with seemingly unrelated regression (SUR). All variables are measured in gap form as follows:

$$GAPX_{i,t} = \frac{x_{i,t}}{\sum x_{i,t}\ w}$$

. where w is the 1980 trade weight.

Variable definitions: The dependent variable MPEN is import penetration; RULC is the relative unit labor costs; KL is the capital-labor ratio; RD is R&D expenditure as percentage of GDP; UD is net union density; STRIKE is a measure of strike duration; WISN is the number of workers involved in strikes per total employment. EP is an index of employment protection; SPT is the total expenditure on social programs as a percentage of GDP; SPO is all non-health related social expenditure as percent of GDP; SPH is social expenditure on health as percentage of GDP.

Table 5. Net Foreign Direct Investment, 1973-95 High-Road Countries: Sweden, Netherlands, Denmark, France, Finland, Belgium, Austria, Germany, Italy Low-Road Countries: New Zealand, Norway, UK, Spain, Canada, Australia, US, Japan

	High Road Countries		Low Road Countries	
	(1)	(2)	(5)	(6)
Constant	0.01	0.01	–0.03	–0.03
	(0.81)	(0.98)	(–0.38)	(–0.44)
$(FDI_{i,t} - FDI_{i,t-2})$	0.51 ***	0.52 ***	0.48 ***	0.44 ***
	(6.61)	(7.03)	(7.18)	(6.21)
$(FDI_{i,t} - FDI_{i,t-3})$	0.05	0.06	0.04	0.07
	(0.68)	(0.9)	(0.81)	(1.17)
$DEM_{i,t} - DEM_{i,t-1}$	0.20	0.12	0.20	0.30
	(0.51)	(0.32)	(0.81)	(0.89)
$RULC_{i,t} - RULC_{i,t-1}$	0.003	0.004	–0.003	–0.002
	(0.89)	(1.21)	(–0.91)	(–0.38)
$RULC_{i,t-1} - RULC_{i,t-2}$	0.002	0.004	–0.01 *	–0.004
	(0.71)	(1.18)	(–1.65)	(–0.73)
$KL_{i,t} - KL_{i,t-1}$	–0.09	–0.06	–1.59	–2.60
	(–0.54)	(–0.37)	(–0.64)	(–1.03)
$RD_{i,t} - RD_{i,t-1}$	–0.07	–0.08	1.33	0.65
	(–0.9)	(–1.29)	(1.03)	(0.39)
$UD_{i,t} - UD_{i,t-1}$	–0.37	–0.34	–1.47	–1.89 *
	(–0.94)	(–0.89)	(–1.45)	(–1.69)
$STRIKE_{i,t} - STRIKE_{i,t-1}$	–0.01	–0.002	–0.04	–0.06 **
	(–0.35)	(–0.1)	(–1.29)	(–1.92)
$WISN_{i,t} - WISN_{i,t-1}$	0.001	0.001	–0.22 ***	–0.20 ***
	(0.66)	(0.55)	(–4.82)	(–3.96)
$EP_{i,t} - EP_{i,t-1}$	–0.02	0.11	0.31	0.67
	(–0.04)	(0.32)	(0.07)	(0.12)
$SPT_{i,t-1} - SPT_{i,t-2}$	–0.20	..	–0.93	..
	(–0.6)		(–0.97)	
$SPO_{i,t} - SPO_{i,t-1}$	..	–0.39 **	..	–0.31
		(–1.82)		(–0.39)
$SPH_{i,t} - SPH_{i,t-1}$	..	–0.30	..	0.82 **
		(–1.3)		(1.91)
Obs	189	189	168	168
Countries	9	9	8	8
R-squared	0.40	0.40	0.44	0.45
Adj. R-squared	0.36	0.36	0.40	0.40
S.E. of regression	0.63	0.63	3.44	3.44
Durbin-Watson	2.95	2.94	2.98	2.94

Notes: t-statistics are in parantheses. All models were estimated with seemingly unrelated regression (SUR). All variables are measured in gap form as follows:

$$GAPX_{i,t} = \frac{x_{i,t}}{\sum x_{i,t}\ w}$$

where w is the 1980 trade weight.

Variable definitions: The dependent variable FDI is net foreign direct investment; RULC is the relative unit labor costs; KL is the capital-labor ratio; RD is R&D expenditure as percentage of GDP; UD is net union density; STRIKE is a measure of strike duration; WISN is the number of workers involved in strikes per total employment. EP is an index of employment protection; SPT is the total expenditure on social programs as a percentage of GDP; SPO is all non-health related social expenditure as percent of GDP; SPH is social expenditure on health as percentage of GDP.

non-cooperative setting. In general, the dependent variables related to trade behave more according to the high-road expectation, and the net foreign direct investment variable often follows the low-road expectation. This is most notable for the employment protection variable: greater employment protection is associated with higher export market share, lower import penetration and lower net foreign direct investment. Relative unit labor costs (contemporaneous first difference) are positively associated with export market share and negatively with import penetration, evidence of the Kaldor paradox. R&D expenditure is positively and significantly associated with export market share and negatively with import penetration. Labor union strength (as measured by union density and workers involved in strikes) is associated with a greater export market share, higher import penetration and lower net foreign direct investment.

Breaking out the countries into low- and high-road sub-samples according to the level of social expenditure gives some support to the notion that the low-road and high-road countries conform to different models of international competition. Consider first the high-road sample. There is evidence again of a Kaldor paradox—more rapid growth in relative unit labor costs associated with more rapid growth in export market share—but now the employment protection variable is statistically insignificant. However, social spending is positively (and statistically significantly) related to export market share and negatively to import penetration. This relation with respect to social spending holds for both subcategories of spending—spending on healthcare and other social spending.

The decomposition of social spending between healthcare and other is revealing also when we turn to the low-road subsample. In this case, social spending other than health care is statistically significantly associated with higher import penetration, as predicted in the low-road formulation. The low-road sample also gives high-road results with respect to unit labor costs. Union density and employment protection are not statistically significantly associated with export market share.

Long-Run Model Estimation

The results in Tables 2–5 are suggestive, but we are interested in finding out whether or not social gaps have an impact over the long run. According to Baltagi (1995, p. 193), in models using panel data, long-run effects are similar to the 'between' estimator (or cross-sectional) variation, and short-run dynamics are captured by the 'within' estimator (time-series) component. In order to capture both short- and long-run effects in a single equation, we estimate the model using the SUR estimator and include contemporaneous and lagged values of the first differences of the explanatory variables. Since we are interested in the long- and short-run dynamics, we include the lagged value of the dependent variable as well. Finally, in order to overcome the potential endogeneity between relative unit labor costs and our trade competitiveness indicators due to the endogeneity of the exchange rate to aggregate export market shares, we also included lagged values of the first difference in relative unit labor costs as an instrument.

Table 6 shows the estimation results. Following Wickens and Breusch (1988) and Amendola *et al*. (1993), we interpret the estimated coefficients on the contemporaneous levels of the independent variables as capturing the long-run relation between that variable and the dependent variable. Choice of the lag structure followed the Akaike criterion and a maximum lag of three years.

Table 6. Social-Gap Model of International Competitiveness Estimation of the "Long-Run" Coefficients, OECD Countries, 1975-95

	(1) Export Share	(2) Import Penetration	(3) Net FDI 1973-95
Constant	0.000788 **	0.0112 **	–0.01
	(1.96)	(1.92)	(–0.06)
$(DEP_{i,t} - DEP_{i,t-2})$	0.456234 ***	0.6505 ***	0.56 ***
	(20.19)	(22.36)	(12.63)
$(DEP_{i,t} - DEP_{i,t-3})$	0.001194	–0.1449 ***	–0.03
	(0.08)	(–6.98)	(–0.92)
$DEM_{i,t}$	–0.000136 ***	–0.0005	0.01
	(–2.1)	(–1.33)	(0.34)
$DEM_{i,t} - DEM_{i,t-1}$	0.000820 ***	–0.0009	0.31 ***
	(2.29)	(–1.02)	(2.39)
$RULC_{i,t}$	–0.000001	–0.0001 ***	–0.0005
	(–0.6)	(–2.12)	(–0.4)
$RULC_{i,t} - RULC_{i,t-1}$	0.000076 ***	–0.0007 ***	–0.001
	(12.37)	(–11.84)	(–0.8)
$RULC_{i,t-1} - RULC_{i,t-2}$	–0.000123 ***	0.0008 ***	–0.003 *
	(–25.72)	(12.55)	(–1.67)
$KL_{i,t}$	–0.000014	–0.0003	–0.002
	(–1.45)	(–0.92)	(–0.1)
$KL_{i,t-1} - KL_{i,t-2}$	0.000181	0.0202 ***	0.62 *
	(0.6)	(3.2)	(1.75)
$RD_{i,t}$	0.000291 *	0.0008	0.001
	(1.59)	(0.53)	(0.01)
$RD_{i,t-1} - RD_{i,t-2}$	–0.000809	–0.0020	0.05
	(–0.93)	(–0.25)	(0.08)
$UD_{i,t}$	0.000087	–0.0001	–0.09 *
	(0.68)	(–0.05)	(–1.5)
$UD_{i,t-1} - UD_{i,t-2}$	0.001653	–0.0042	1.98 **
	(1.22)	(–0.24)	(1.87)
$UD_{i,t-1} - UD_{i,t-3}$	–0.000657	0.0095	–0.63
	(–0.76)	(0.81)	(–0.92)
$STRIKE_{i,t}$	0.000085 ***	–0.0004 ***	–0.03
	(3.48)	(–2.44)	(–1.39)
$STRIKE_{i,t-1} - STRIKE_{i,t-2}$	0.000015	0.0006 ***	0.04 **
	(0.81)	(3.96)	(2.04)
$EP_{i,t}$	0.000217 **	0.0010	–0.05
	(1.79)	(0.61)	(–0.64)
$EP_{i,t} - EP_{i,t-1}$	–0.001922	–0.0215	0.14
	(–1.27)	(–0.69)	(0.17)
$SPO_{i,t}$	–0.000238 *	–0.0018	–0.10
	(–1.65)	(–0.79)	(–1.04)
$SPO_{i,t-1} - SPO_{i,t-2}$	0.002747 ***	0.0192 ***	–0.36
	(7.8)	(2.72)	(–0.94)
$SPH_{i,t}$	–0.000929 ***	–0.0019	0.32 *
	(–3.93)	(–0.62)	(1.52)
$SPH_{i,t-1} - SPH_{i,t-2}$	0.003915 ***	0.0048	–5.13 ***
	(8.07)	(1.13)	(–9.11)
Obs	344	344	347
Countries	17	17	17

Table 6. *Continued*

	(1) Export Share	(2) Import Penetration	(3) Net FDI 1973-95
R-squared	0.59	0.60	0.45
Adj. R-squared	0.56	0.57	0.41
S.E. of regression	0.003	0.03	2.39
Durbin-Watson	2.61	2.71	3.01

Notes: t-statistics are in parantheses. All models were estimated using seemingly unrelated regression (SUR). Levels variables are denoted $X_{i,t}$ and represent the long-run determinants; all other variables are short-run determinants denoted in difference form. All variables are in gap form. Variable definitions: DEP is the dependent variable; DEM as aggregate demand, a control for country size; RULC is relative unit labor costs; KL is the capital labor ratio; RD is R&D expenditure as a percentage of GDP; UD is the union density; STRIKE is a measure of strike duration; EP is the employment protection index; SPO is public expenditure on non-health social programs a percentage of GDP; SPH is public expenditure on health as a percentage of GDP.

We again break social spending into two components, spending on public health and all other social spending. This isolates, to the extent possible given the available data, the labor market spending in the 'other social spending' category. These include expenditures on old age and disability cash benefits, occupational safety and health, parental and family leave benefits, child and family assistance, sickness benefits, unemployment insurance, active labor market programs (training, job services, etc.), housing, and family and disability services. Disaggregated data for social expenditure by category is only available from 1980 forward.[17] However, looking at five categories of labor market spending (old age pensions, disability, occupation health and injury, active labor market programs and unemployment) together accounted for between 60 and 80% of the 'other' social expenditure category.

As with the short-run model, there is more consistency in the results across trade variables than between either trade variable and the investment variable. However, Table 6 shows that our results are consistent with those found by Amendola *et al*. (1993) in terms of technology gaps, and provides initial evidence that social gaps matter for long-run competitiveness. We found significant coefficients on several of the labor relations variables and the variables on employment and social protection. This suggests that both cost factors and employment protection policies relate to international competitiveness as predicted by the high-road view. Higher relative unit labor costs are associated in the long run with lower import penetration. Social spending on labor market activities is negatively related to trade and negatively to inward foreign investment.

Conclusion

We began by reversing the usual approach to studying the relation between globalization and domestic institutions, asking if particular policies and institutions are associated with better international performance as measured by trade and foreign investment. A hump shape relation, similar to the finding of Calmfors and Driffil with regard to macroeconomic performance, was found in the relation between wage bargaining coverage and international competitiveness. Estimation of a single equation, social-gap model shows that the comparative evolution of a nation's trade

and investment are statistically significantly associated with variables related to innovative effort, labor relations and public spending on social protection. By breaking our sample into high- and low-road countries, we found further evidence that comparative social structure produces predictable outcomes in international competition. Both R&D spending and union density related differently to international competitiveness, as predicted by the extended Calmfors–Driffil framework. In the long-run model, social spending on labor market activities was found to be positively associated with trade performance and negatively with inward foreign direct investment. In sum, more generous social spending and more cooperative labor relations are not uniformly associated with poor national performance in the international economy, and in some contexts—even in an era of globalization—are associated with improved international competitiveness.

Finally, one aim of this paper has been methodological. We have argued that social institutions, social policy and disequilibrium should be integral to any model of international competitiveness. Trade models that assume automatic adjustment in the balance of payments are unrealistic and those that allow for persistent imbalances but focus strictly on their technological determinants are too narrowly construed. We have proposed an extension of the technology-gap approach to a consideration of social gaps that include labor relations and social policy. Our results indicate that models focusing solely on innovative effort are misspecified, and specifically may suffer from an omitted variable bias due to the absence of consideration of other institutional factors influencing competitiveness.

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Notes

1. Social spending includes all categories of government spending on social protection, including health care, education, labor market protection (unemployment insurance), old age and disability cash benefits, old age pensions, occupational safety and health, parental and family leave benefits, child and family assistance, sickness benefits, active labour market programmes (training, job services, etc.), housing, and family and disability services.
2. See DeGrauwe & Polan (2003), Rodrik (1998, 1997), Bowles & Wagman (1997) and Garret (1995).
3. See Hall & Soskice (2001).
4. See Walsh (1995, pp. 182–184).
5. See Ehrenberg (1994).
6. The seminal work from the neo-Schumpeterian perspective is Dosi, Pavitt & Soete (1990), and the key neoclassical contribution is Grossman & Helpman (1991).
7. This specification of the dynamics lends itself to a straightforward autoregressive distributed lag model for econometric estimation of long-run elasticities with respect to the arguments of *E*.
8. For a survey of more recent empirical support for the Kaldor paradox, see Fagerberg (1996).
9. Carlin *et al*. (2001) argue that exchange rates are endogenous to changes in exports at the aggregate level, and that this endogeneity is responsible for the low or positive elasticity of export market shares with respect to relatuive unit labor costs. Using disaggregated data, they find a negative and significant elasticity of export share with respect to relative unit labor costs of –0.26.
10. See also Green & Weisskopf (1990) and Buchele & Christiansen (1992).
11. For a succinct restatement, see Calmfors (1993, p. 165).
12. Bruno & Sachs (1985) stressed this responsiveness in explaining macroeconomic outcomes.
13. Bargaining coverage is admittedly a better measure of union power than union density, but data on coverage are unavailable for the full time period.

14. The conflict variables may alternatively (or additionally) capture labor union strength, which would lead to a predicted sign precisely the opposite. See Checchi & Lucifora (2002).
15. Sample size constraints precluded the explicit inclusion of country and time dummy variables. We do include, however, a control for domestic demand at the national level.
16. Variables are measured with respect to the full sample even in the case of the subsample estimations.
17. Data are from OECD (1996b).

References

Amable, B. & Verspagen, B. (1995) The role of technology in market shares dynamics, *Applied Economics,* 27, pp. 197–204.

Amendola, G., Dosi, G. & Papagni, E. (1993) The dynamics of international competitiveness, *Weltwirtschaftliches Archiv,* 129, pp. 451–471.

Amsden, A. (2001) *The Rise of 'the Rest': Challenges to the West from Late-Industrializing Economies* (New York: Oxford University Press).

Baltagi, B. H. (1995) *Econometric Analysis of Panel Data* (New York: John Wiley).

Belloc, M. (2004) Do labor market institutions affect international comparative advantage? An empirical investigation. Mimeo, University of Siena, May.

Blanchard, O. & Wolfers, J. (2000) The role of shocks and institutions in the rise of European unemployment: the aggregate evidence, *The Economic Journal,* 110, pp. C1–C33.

Blecker, R. & Feinberg, R. (1995) A multidimensional analysis of the international performance of U.S. manufacturing industries, *Weltwirtschaftliches Archiv,* 131, pp. 339–359.

Blondal, S. (1995) Unemployment and other non-employment benefits, *Oxford Review of Economic Policy,* 11, pp. 136–169.

Bowles, P. & Wagman, B. (1997) Globalization and the welfare state: four hypotheses and some empirical evidence, *Eastern Economic Review,* 23, pp. 317–336.

Boyer, R. (1996) The convergence hypothesis revisited: globalization but still the century of nations, in: S. Berger & R. Dore (Eds) *National Diversity and Global Capitalism* (Ithaca, NY: Cornell University Press).

Bruno, M. & Sachs, J. (1985) *Economics of Worldwide Stagflation* (Cambridge, MA: Harvard University Press).

Buchele, R. & Christiansen, J. (1992) Industrial relations and productivity growth: a comparative perspective, *International Contributions to Labour Studies,* 2, pp. 77–97.

Calmfors, L. (1993) Centralisation of wage bargaining and macroeconomic performance—a survey, *OECD Economic Studies,* No. 21, pp. 161–191.

Calmfors, L. & Driffil, J. (1988) Centralization of wage bargaining, *Economic Policy,* April.

Carlin, W., Glyn, A. and Van Reenen, J. (2001) Export market performance of OECD countries: an empirical examination of the role of cost competitiveness, *Economic Journal,* 11, pp. 128–162.

Checchi, D. & Lucifora, C. (2002) Unions and labour market institutions in Europe, *Economic Policy,* October, pp. 362–408.

DeGrauwe, P. & Polan, M. (2003) Globalisation and social spending. CESifo Working Paper No. 885, March.

Dore, R. (1990) Two kinds of rigidity: corporate communities and collectivism, in: R. Brunetta & C. Dell'Aringa (Eds) *Labour Relations and Economic Performance* (New York: New York University Press).

Dosi, G., Pavitt, K. & Soete, L. (1990) *The Economics of Technical Change and International Trade* (New York: New York University Press).

Edwards, P. K. & Hyman, R. (1994) Strikes and industrial conflict: peace in Europe?, in: R. Humna & A. Feurer (Eds) *New Frontiers in European Labor relations* p. 254 (Cambridge, MA: Basil Blackwell).

Ehrenberg, R. (1994) *Labor Markets and Integrating National Economies* (Washington, D.C.: The Brookings Institution).

Fagerberg, J. (1996) Technology and competitiveness, *Oxford Review of Economic Policy,* 12(3), pp. 39–51.

Freeman, R. (Ed.) (1994) *Working Under Different Rules* (New York: Russell Sage Foundation).

Freeman, R. (2000) Single peaked vs. diversified capitalism: the relation between economic institution and outcomes. NBER working paper, Available at: http//ideas.repec.org/p/nbr/nberwo/7556.html

Garrett, G. (1995) Capital mobility, trade, and the domestic politics of economic policy, *International Organization,* 49, pp. 657–687.

Gordon, D. M. (1994) Bosses of different stripes: monitoring and supervision across the advanced economies, *American Economic Review,* 84, pp. 375–379.

Gordon, D. M. (1996) *Fat and Mean: Wage Squeeze and the Myth of Corporate Downsizing* (New York: Basic Books).

Green, J. & Weisskopf, T. (1990) The worker discipline effect: a disaggregative analysis, *Review of Economics and Statistics,* May 1990, pp. 241–249.

Greenhalgh, C. (1990) Innovation and trade performance in the United Kingdom, *The Economic Journal,* 100, pp. 105–118.

Grossman, G. & Helpman, E. (1991) *Innovation and Growth in the Global Economy* (Cambridge, MA: MIT Press).

Hall, C. & Nelson, P. B. (1987) International competitiveness and the trade deficit. Federal Trade Commission, Bureau of Economics, Staff Report, Washington, D.C.

Jones, R. (2000) *Globalization and the Theory of Input Trade* (Cambridge, MA: MIT Press).

Kaldor, N. (1978) The effect of devaluation on trade in manufacturers, in: N. Kaldor, *Further Essays on Applied Economics* pp. 99–116 (London: Duckworth).

Karier, T. (1990) *Trade Deficits and Labor Unions: Myths and Realities* (Washington, D.C.: Economic Policy Institute).

Lazear, E. (1990) Job security provisions and employment, *Quarterly Journal of Economics,* 105, pp. 699–726.

McCombie, J. & Thirlwall, A. (1994) *Economic Growth and the Balance of Payments Constraint* (New York: St. Martin's Press).

Nickell, S. & Nunziata, L. (2001) *Labour Market Institutions Database* (London: Centre for Economic Performance, London School of Economics).

Nivola, P. (Ed.) (1997) *Comparative Disadvantages? Social Regulations and the Global Economy* (Washington, D.C.: Brookings Institution).

OECD (1996b) Social expenditure statistics of OECD members, *Labour Market and Social Policy Occasional Papers,*No. 17 (Paris: OECD).

Paloheimo, H. (1990) Between liberalism and corporatism: the effect of trade unions and governments on economic performance in eighteen OECD countries, in: R. Brunetta & C. Dell'Aringa (Eds) *Labour Relations and Economic Performance* pp. 325–352 (New York: New York University Press).

Posner, M. V. (1961) International trade and technological change, *Oxford Economic Papers,* 13, No. 3, October.

Rodrik, D. (1997) *Has Globalization Gone Too Far?* (Washington, D.C.: Institute for International Economics).

Rodrik, D. (1998) Why do more open economies have bigger governments?, *Journal of Political Economy,* 106(5).

Saint-Paul, G. (2002) Employment protection, international specialization, and innovation, *European Economic Review,* 46(2), pp. 375–395.

Silverberg, G., Dosi, G. and Orsenigo, L. (1988) Innovation, diversity and diffusion: a self-organization model, *The Economic Journal,* 98, pp. 1032–1054.

Soskice, D. (1990) Wage determination: the changing role of institutions in advanced industrialized countries, *Oxford Review of Economic Policy,* 6(4), pp. 36–61.

Walsh, J. (1995) Convergence or divergence? Corporatism and the dynamics of European wage bargaining, *International Review of Applied Economics,* 9, pp. 169–191.

Weisskopf, T. (1987) The effect of unemployment on labor productivity: an international comparison, *International Review of Applied Economics,* 1, pp. 129–151.

Wickens, M. & Breusch, T. (1987) Dynamic specification, the long-run and the estimation of transformed regression models, *The Economic Journal,* 98(390) Supplement, pp. 189–205.

Zellner, A. (1962) An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias, *Journal of the American Statistical Association,* 57, pp. 348–368.

Appendix

Variable Descriptions and Data Sources

Full sample: 17 countries

Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, United Kingdom, United States.

High-road countries. Sweden, Finland, Denmark, France, Netherlands, Germany, Belgium, Austria and Italy.

Low-road countries. UK, Spain, Canada, Norway, New Zealand, Australia, USA, Japan.

Variable definitions. All of the variables listed below are in *GAP* form, measured with respect to the weighted average of the other countries in the sample, using trade weights from 1980.

Dependent Variables on International Competitiveness

XSHR: Goods and services export market share, value of good and services exports BOP basis, in US dollars,1975-95. Source: *OECD Economic Outlook* (2000) No. 70.
MPEN: Import Penetration calculated as the value of imports over the value of GDP minus exports plus imports values. Source: *OECD Economic Outlook* (2000) No. 70.
NFDI: Net foreign direct investment as a percentage of GDP.
IMF Yearbook of Financial Statistics, 2000. Source for GDP: *OECD Economic Outlook* (2000) No. 70.

Independent Variables

Demand Demand: Total Domestic Demand.
Source: OECD Economic Outlook (1998) No. 64.

Labor costs RULC: Relative Unit Labour Cost Index, Manufacturing Sector, Common Currency.
Source: OECD Economic Outlook (2000) No 70.

Technology R&D: Expenditure on R&D in Business Enterprise as a percentage of GDP.
Source: OECD, ANBERD Database (2002).
K/L Ratio: Constructed from real capital stock (business) and total non-government employment. The UK is constructed using total business employment as a denominator.
Source: OECD Economic Outlook (2000) No. 70.

Labor Relations and Social Protection

UD: Net Union density, 1975-95 Net union density counts only active union members (does not include retired members). Source: Labor Market Institutions

Database (Nickell and Nunziata, 2001). WISN: Number of workers involved in strikes (in thousands) as a percentage of total employment (in thousands). Source for workers involved in strikes is, ILO Laborstat Database. Source for total employment is *OECD Economic Outlook* (2000) No.70.

SDUR: Duration of strikes, 1975-95, measured as the number of days lost to strikes per number of workers involved in strikes. Definition is from Edwards & Hyman (1994). Data *Source*: ILO Laborstat Database.

CJL: Cost of job loss, 1975-95, is the ratio of expected wage loss to current real wage. Calculation follows Gordon (1994):

$$CJL = [RW - ((RW * NEWEARN * 1 - UN))) + (REPL * RW) * (UN)))] / RW$$

where RW is real wage, NEWEARN is the ratio of new earnings from new job to old, UN is the unemployment rate and REPL is the gross unemployment replacement ratio.
Sources: OECD Economic Outlook (2000) No. 70; Blondal (1995), Table 2.

EP: Employment protection index, 1975–1995. Index is a composite of quantitative measures evaluating employment protection legislation and other employment protection indicators based on Blanchard & Wolfers (2000), and Lazear (1990). The index range is from {0,2} increasing with strictness of employment protection. *Source: Labour Market Institutions Database* of Nickell & Nunziata (2001).

SPT: Total social expenditure as a percentage of GDP, 1975–1995.
Sources: For data from 1970 to 1980 see *New Orientations for Social Policy* (Paris, OECD). For data from 1980 to 1995 see *OECD Social Expenditure Database* (herein SOCX). Social expenditure categories include the following: (a) old-age cash benefit, (b) disability cash benefit, (c) occupational injury and disease, (d) sickness benefits, (e) elderly and disabled services, (f) survivors benefits, (g) family cash benefits, (h) family services, (i) active labor market programs, (j) unemployment benefits, (k) health, (l) housing benefits, and (m) other contingencies.

SPO: Social expenditure on non-public health categories as a percentage of GDP, 1975–1995. These include expenditures on old age and disability cash benefits, occupational safety and health, parental and family leave benefits, child and family assistance, sickness benefits, unemployment insurance, active labor market programs (training, job services, etc.), housing, and family and disability services. *Source*: OECD SOCX database.

SPH: Social expenditure on public health as a percentage of GDP, 1975–1995. Source: OECD SOCX database.