

NBER WORKING PAPER SERIES

DO INDUSTRIAL RELATIONS INSTITUTIONS IMPACT ECONOMIC OUTCOMES?:
INTERNATIONAL AND U.S. STATE-LEVEL EVIDENCE

Morris M. Kleiner
Hwikwon Ham

Working Paper 8729
<http://www.nber.org/papers/w8729>

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
January 2002

Funding was provided in part by the Austrian Ministry of Science and Transportation. We thank Sandy Donovan for her assistance with this paper, and Mario Bognanno, John Budd, Ronald B. Davies, John Freeman, Richard Freeman, Takao Kato, and Yijiang Wang for their comments on earlier versions of this paper as well as participants at seminars at the Australian National University, National Bureau of Economic Research, University of Minnesota, and the University of Vienna. The views expressed herein are those of the authors and not necessarily those of the National Bureau of Economic Research.

© 2002 by Morris M. Kleiner and Hwikwon Ham. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Do Industrial Relations Institutions Impact Economic Outcomes?:
International and U.S. State-Level Evidence
Morris M. Kleiner and Hwikwon Ham
NBER Working Paper No. 8729
January 2002
JEL No. J5, F2, P0

ABSTRACT

The impact of government social and labor market institutions on economic outcomes have generated a great deal of attention by economists and policymakers in the U.S. and in other nations. The theoretical model suggests that there are trade offs of higher levels of economic outcomes with more equity-producing labor market institutions. This study examines the impact of national levels of unionization, strike levels, public policies toward labor, and the structure of collective bargaining within a nation on a country's foreign direct investment (FDI). As an additional test of the relationship of labor market institutions and state labor market policies and economic outcomes, we examine the empirical relationship with the economic growth of U.S. states. Examining 20 OECD nations from 1985 through 1995 and all U.S. states from 1990 to 1999, our statistical analysis shows that higher levels of industrial relations institutions are usually associated with lower levels of FDI and slower economic growth for U.S. states. However, within the context of the model the results do not necessarily suggest that a nation or state would be better off trading social equity through fewer restrictive industrial relations institutions for higher levels of economic growth.

Morris M. Kleiner
University of Minnesota
Humphrey Institute and
Industrial Relations Center
260 Humphrey Center
301 19th Street South
Minneapolis, MN 55455
and NBER
mkleiner@hhh.umn.edu

Hwikwon Ham
University of Minnesota
Department of Economics
1035 Heller Hall
1028 27th Ave South
Minneapolis, MN 55455
612-625-1304
hwikwon@econ.umn.edu

“It (exchanging equity for efficiency) is, in my view, our biggest socioeconomic tradeoff, and it plagues us in dozens of dimensions of social policy. We can’t have our cake of market efficiency and share it equally.”

Arthur M. Okun, 1975, p.2.

Introduction

The impact of government social and labor market institutions on economic outcomes have generated a great deal of attention by analysts and policymakers in the U.S. and in other nations. An integral part of the issue has been determining the appropriate level of labor market institutions. A central question has been what is the impact of labor market institutions on the potential equity versus efficiency trade-off in the economy that Arthur Okun referred to in the above quotation (Okun, 1975)? Recent comparative analysis of the effect of labor market institutions on economic efficiency has stated that a holistic approach to institutions, one that includes not just a single factor but a whole group of laws and customs, should form the basis of the ranking of these labor market institutions (Freeman, 2000). In one of the models that Richard Freeman presents, he assumes that there are tradeoffs between different types of labor market institutions and economic outcomes. However, in other examples there is assumed to be multiple equilibrium with many different levels of labor market institutions leading to optimal levels of economic efficiency. Within these alternative models trading efficiency for equity (e.g., reducing income inequality) is small. For example, large increases in equity are associated with small changes in efficiency as evaluated through measures of investment or economic growth.

Recent studies on this issue have found contradictory theoretical and empirical results. A theory-based analysis shows that there is much controversy about the kind of industrial relations institutions that encourage foreign direct investment (FDI), with higher levels of centralization of labor market institutions leading to greater levels of FDI (Leahy and Montagna, 2000). Empirical work using U.S. states as the unit of observation shows there is considerable variation in the estimates of the impact of state labor policies on measures of economic growth, but that greater restrictions are associated with some declines in economic outputs (Autor, Donohue, and Schwab, 2000). In contrast, other studies find that higher levels of overall labor market institutions have no impact on economic outcomes at the state level (Block, Roberts, and Clarke, forthcoming). However, an analysis of the decline in the level of U.S. labor market institutions over time shows that they impact income inequality (DiNardo, Fortin, and Lemieux, 1996). Consequently, not only is the direction of the impact important, but also the elasticity of labor market institutions and its effects on economic outcomes of interest in determining the role of labor market institutions on economic outputs (Hatzius, 2000).

This study examines the economic impact of labor market institutions that affect wages, benefits, and the “voice” of workers in the labor market as well as policies that influence the allocation of labor. Specifically, we focus on the impact of national levels of unionization, strikes, bargaining structure, voice-related public policies toward labor such as works councils, and the level (i.e. plant, industry or national) at which collective bargaining takes place within a nation on foreign direct investment (FDI). As an additional test of the impact of labor market institutions, we examine the effect of state labor market policies on various measures of economic growth for U.S. states. In our cross-country analysis we assume and model that FDI in a country takes place relative to investment in the host nation and in

other developed nations. Consequently, we examine foreign investment between nations and over time. Since we do not have measures of FDI for our U.S. state level measures, we specify estimates which include outcomes such as gross state product, employment, and per capita income.

Labor-related factors such as methods of wage determination, strike activity, unionization, mandated works councils, and other restrictions on management's ability to allocate labor have often been mentioned by business executives as important factors causing reductions in a firm's willingness to invest in a country¹. The recent focus by groups concerned with the growth of international trade and investment have stated that nations which compete for international capital are growing more concerned about developing and maintaining the appropriate economic climate for the growth and maintenance of good jobs. Since these factors together can be considered as an industrial relations system, we develop a single measure to capture these elements into one variable consistent with the approach taken by John Dunlop (1993). In this paper we examine the role of the industrial relations climate for those nations deciding where to invest funds. We gather and use information on foreign direct investment

¹ There are many additional reasons or other labor-related factors that affect FDI beyond the ones we could quantify. Therefore, we also did some qualitative investigations by tape recording in-depth discussions with multinational chemical manufacturing managers in two companies using a structured set of questions. In addition, faculty and Ph.D. students in Austria interviewed managers of similar companies in Germany. The dominant factors in the interviews for FDI were the opportunities in the product market in other countries. However, several of the managers in one U.S. chemical firm stated that they had an "artificial intelligence" system or equation where the industrial relations structure had explicit weights in the decision-making. U.S. firms we interviewed saw labor costs and restrictions in their ability to allocate labor resources within an establishment or company as an impediment to efficiency that had to be counterbalanced by economic returns in the product market.

Other insights that were gained from our interviews with auto and chemical executives for the EU were that EU managers were envious of the low levels of unionization and the ability to hire and fire workers in the U.S. Moreover, one auto executive mentioned that FDI was used to put pressure on local German unions by building new plants in low union and low wage regions of the U.S. These interviews suggest that the economic opportunities offered in the U.S. to E.U. nations appear to be relatively more attractive than the potential profits offered to American firms in the E.U. Although corporate decision-makers on both sides of the Atlantic Ocean view labor costs as only a moderately important item, restrictions in Western Europe seem to encourage outflows of FDI and discourage investment by Americans.

outflows in countries with the fewest labor market restrictions relative to countries where labor market restrictions are much more widespread and limiting for management. We also attempt to provide evidence on the role of these institutions for U.S. states. Although there has been much recent research examining the determinants of U.S. investment in other countries, there has been little work comparing the investment levels of the host relative to the receiving nation (Cooke, 1997, Cooke and Noble, 1998, and Cooke, 2000 and Bognanno et. al, 1998). Moreover, there also has been little research on the role of labor market institutions on economic growth across U.S. states (Bartik, 1985, Block, Roberts, Ozeki, and Roomkin, 2001).

While any one industrial relations factor may be important for a particular organization, these factors taken together as an industrial relations system may provide the underlying latent variable that will influence these economic decisions. The concept of an industrial relations system has been one of the basic tenants of this field dating to the mid 1950s with publication of John Dunlop's *Industrial Relations System* in 1960 (1993). An overarching concept within the model was the view that parts and elements of labor/management relationships and related public policies toward labor are interdependent and may each affect other elements and the outcomes of the system as a whole (Dunlop, 1993). Sumner Slichter noted that "arrangements in the field of industrial relations may be regarded as a system in the sense that each of them more or less intimately affects each of the others so that they constitute a group of arrangements for dealing with certain matters and are collectively responsible for certain results (Slichter, 1955)." Within this approach, public policies, bargaining structure, and unionization would all have a prominent role to play in understanding the role of labor market institutions. Consequently, any attempt to quantify the impact of industrial relations should be

taken in total rather than as a variable holding the other factors' constant. The interactions of these variables would be more important than each factor by itself. Unfortunately, statistical approaches that use overall contextual variables are rare and as a result the systems approach has not been tested regarding its relationship to economic outputs. In a manner similar to the estimates of the factors that affect firm performance, a single independent factor may not matter, but together the industrial relations system may affect economic outcomes (Ichniowski, Shaw, and Prenzushi, 1998).

This study develops further the theory and rationale for using foreign direct investment (FDI) decisions in both the host and receiving nation, and we discuss the role of the industrial relations system on FDI. The model shows that firms and nations that take advantage of opportunities to invest abroad will base those decisions in part on the costs of the industrial relations system. Further, our analysis of states also assumes the industrial relations system impacts economic outcomes.

Theoretical Background of Firm Investment Decisions in Foreign Countries

In order to develop a model of the role of labor market institutions on economic outcomes, we model a Nash efficient bargaining solution between labor and the owners of capital and include the impact of labor market institutions, which in our model is the industrial relations system, as the determinant of bargaining power.

At time period 0 a firm invests capital based on their profit maximization condition. Then at time period 1 the firm bargains the wage contract with workers. If the bargain succeeds, the firm produces products at their full capacity and pays bargained wage w^* , which is determined by the industrial relations system. Otherwise, it will fall back to its threat point production $\delta f(k,1)$ and pay w^0 to those workers willing to work at their reservation wage (Budd and Wang, 2001). δ is the fraction indicating sub-optimal production due to the quantity or quality of workers, which also is determined by the industrial relations system.

The bargaining problem at time period 1 is

$$\underset{k,w}{Max} (w - w^0)^\alpha (\pi - \pi^0)^{1-\alpha} \quad \text{subject to } \pi = f(k,1) - w \quad (k \text{ is a sunk cost}) \quad (1)$$

Where w : Wage

w^0 : Reservation Wage

k : Capital

π : Profit

π^0 : $\delta f(k,1) - w^0$ where $0 \leq \delta < 1$

$f(k,1)$: Production function. Labor is normalized

$f' > 0, f'' < 0$

$0 \leq \alpha \leq 1$

Then the solution is $w^* = \alpha(f(k,1) - \pi^0) + (1-\alpha)w^0$ (2)

At time period 0 the rational firm uses this negotiated wage w^* to decide on the optimum investment by maximizing profits $\pi = f(k,1) - rk - w$.

$$\underset{k}{Max} f(k,1) - w - rk \quad (3)$$

we substitute w with w^* then

$$\underset{k}{Max} f(k,1) - \alpha(f(k,1) - \pi^0) + (1-\alpha)w^0 - rk \quad (4)$$

or

$$\underset{k}{Max} (1-\alpha)(f(k,1) - w^0) + \alpha\pi^0 - rk$$

The first order condition is

$$(1-\alpha)f(k^*,1)' + \alpha \delta f(k^*,1)' - r = 0 \quad (5)$$

k^* solving the first order condition is the optimum investment for the firm at time 0.

From here we obtain

$$\frac{\partial k^*}{\partial a} = \frac{f' - df'}{(1-a)f'' + adf''} < 0 \quad (6)$$

This implies that when a company makes investment decisions among locations which are identical except for the industrial relations system (α), it will invest more where the industrial relations system restrictions are fewer from management's perspective.

A Game Theoretic Approach when the Industrial Relations System Provides Equity

The theory, thus far, has focused on the economic output aspects of FDI. In this section we extend the model to explicitly include the equity effects of industrial relations institutions (IR). We propose that countries also consider the industrial relations system to be an important determinate of the social stability of a nation. For example, industrial relations institutions affect income distribution, employee voice in the political system, and crime, which are all presumed to be elements of social well-being (Rees, 1963, Freeman, 1994, DeNardo, Fortin and Lemieux, 1996,). Consequently, a country may not want to engage in maximization behavior for only FDI at the expense of reducing the benefits of having a well-developed industrial relations system. We model how countries may consider both the industrial relations system and outputs of the economy through the level of FDI and chose an optimal amount of each "good."

Following a general game theoretic approach for an optimal level of labor market institutions and its relationship to efficiency we expand upon these models to include two major players (Freeman and Lazear, 1995, and Levine, 1995). We initially assume that there are only two countries or blocs of countries A and B (e.g. the U.S.A. and the E.U.), and five strategies, which conform to a standard Likert scale, with increasing values regarding the restrictiveness of the industrial relations system. The lower values give management greater bargaining power.

The payoff is constructed as follows: U^f is the additional FDI, U^e is the additional social benefit from implementing a specific IR system (e.g. greater worker voice or bargaining power resulting in more social stability). The industrial relations system is allowed to differ between countries and is

nonlinear. In Appendix 1 we solve for the equilibrium levels of both FDI and IR systems using a Nash equilibrium approach. We also give examples of outcomes under conditions of efficiency but with no social benefits as a consequence of an industrial relations system in the Appendix Table 1A. In addition, we provide the case where there are explicit tradeoffs of equity and efficiency in the Appendix Table 1B. The optimal solutions show that there are two pure Nash equilibrium solutions [(1,1) and (5,5)] in our model, which are all at the extremes of either the FDI or IR ranges. The examples provided from this model suggest that there can be multiple equilibrium levels of trade-offs of equity for efficiency. Consequently, any further examination of this issue requires data gathering and empirical analysis.

The Structure of the Industrial Relations System

In order to quantify the industrial relations system for a country or a state, we assume that there is an underlying structure for the system that cannot be captured by any single variable, which is consistent with industrial relations theory. Further, we also assume that there is an underlying structure that goes from a lenient industrial relations policy to a more restrictive one from management's perspective. We further hypothesize that there is a structure to the industrial relations system which is linked in a hierarchical manner and provides a natural scaling of industrial relations characteristics in a nation. The degree or intensity with which those characteristics are implemented in a country forms the basis of firm decisions to invest in that nation. In order to operationalize this structure of the industrial relations variables, we create latent variables for the industrial relations factors in each nation and for each state in the U.S. Each individual factor in the industrial relations system was divided into five categories to resemble a Likert-type scale, and they are categorized from lowest to highest in terms of their restrictiveness to employers. In order to examine the robustness of the impacts of this variable we develop two alternative measures. In the first case we use a summated rating scale of industrial

relations system variables which include extent of union coverage, days lost due to strikes per 1000 employees per year, the degree of bargaining centralization and level of bargaining structure, and the extent of employee voice (Calmfors and Drifill, 1988 and Traxler and Kittel, 2000). This summated rating scale is an additive one that measures the intensity of each of the factors and aggregates these factors into one variable (Bartholomew, 1996). An alternative latent variable measure is the Rasch-type model that places each of the variables within a logical structure. The empirical measure of the Rasch model we use is known as a partial credit model. This approach assumes that the distance between parameters is equal and that the categories are equal integers (Wang, 1996). Although we obviously do not include all of the factors that might go into a fully specified structural industrial relations system variable, we think that we can capture the major institutions which likely impact industrial relations and economic outcomes.

Measuring Foreign Direct Investment

Firm-level investment is assumed to be an economic measure that is highly responsive to the institutional characteristics of the firm, which includes unionization (Hirsch, 1991). By extension we anticipate that this would also apply to national labor market institutions. Even if FDI has some measurement problems in capturing “pure gross investment,” it does enhance the economic prospects within a country by, at a minimum, moving resources to their optimal use (Lipsey, 2000)².

Analyzing investment patterns across countries assumes that companies are responsive to the economic characteristics of the home country relative to opportunities in the host country.

²Direct investment capital flows are defined as “equity capital, reinvested earnings, and other capital associated with various intercompany debt transactions” and comprised about 8 percent of international capital flows (Lipsey, 2001).

Consequently, our measure of foreign direct investment used in hypothesis testing is total direct foreign investment from the i^{th} country to the j^{th} divided by the total foreign investment in the i^{th} nation, and this is consistent with other analysis of economic and industrial relations factors that impact U.S. FDI (Cooke, 2000). The use of this measure of FDI allows us to capture the relative flows of FDI between two nations based on economic differences and variations in institutions, such as the industrial relations system in a country. However, given this construct, countries like the U.S., which has a large share of other countries' FDI would usually comprise a disproportionate share of FDI just by virtue of its economic size. Nevertheless, this is generally perceived to be a better measure of the flows of FDI than using total expenditures or gross inflows, which would have an even greater bias toward large nations and have a greater potential for heteroskedastic error terms. Our analysis includes 20 OECD countries using annual data for 10 years from 1985 to 1995.

In Appendix two the means and standard deviations of the economic and institutional variables used in our model are presented. The table gives measures of the industrial relations system variable which includes both the summated rating scale and the Rasch measure. For collective bargaining we use national union coverage, since countries like France have “low unionization rates,” but a high percent of coverage via the collective bargaining agreements for workers who do not belong to a union. Since unions and works councils both influence the ability of managers to make decisions, we use a measure of the interaction of intensity of mandated employee representation in the country and the level of unionization (Freeman and Lazear, 1995, Kleiner and Ay, 1996). We include the index value of the “strike rate per thousand employees” in our analysis, since this variable affects the ability of management to maintain a stable and consistent level of production for its workforce (Beggs and

Chapman, 1987).³ As part of our measures of the industrial relations system, we present the level of bargaining centralization and coordination which reflects whether there is establishment, local or national wage bargaining in a manner developed by both Calmfors and Drifill (1988) as well as a subsequent study by Traxler and Kittel (2000)⁴. The last two columns of the Table show measures from management's perspective of the summated rating scale and the Rasch scale for each of the countries' industrial relations system. The summated rating scale ranges from a high of 20 for Australia to a low of six for the United States. Our industrial relations system values use a hierarchical scaling system and we find results which are consistent with this scaling⁵. Since there is no overriding statistical or theoretical reason to use one approach over the other, we present both in most of our analysis. Statistically, these measures of the industrial relations system are highly correlated. For the composite index measure we found that Cronbach's alpha measure of the inter correlation of the industrial relations variables was .81, which was beyond the acceptable statistical threshold (Nunnally, 1978).

In order to specify a model to capture the impacts of the industrial relations system on FDI we

³Even though there is controversy of this measure based on various definitions across countries, there is no reason to believe the changes over time are similarly biased (Beggs and Chapman, 1987)

⁴ In this context the Calmfors and Drifill index of the industrial relations system is of the degree of centralization of bargaining, whereas the Traxler and Kittel index modifies this index to include the coordination of bargaining of national and local labor market objectives.

⁵Each of the factors of an industrial relations system that are in each of the countries in our sample are scaled by the intensity of use of those factors. A higher value means that a factor would reduce the likelihood that FDI would occur in a particular nation. If there is a single dimensional ordering for the four industrial relations system variables, no country would have a more advanced or intense level of a policy without also having a lower practice. Our data fits this pattern reasonably well, but not perfectly. For example, nations that have high levels of union coverage are more likely to have most of the other practices, and 12 nations have this practice with at least one other high intensity practice, which is the highest value for all the system factors. No other industrial relations system variables have more other high intensity levels of industrial relations coverage. Values generated using factor analysis found that all of these factors were highly intercorrelated, except for strike intensity, which had a negative factor loading.

specify a reduced form model. The Data Appendix 2 shows a clear variation in the types of labor market institutions in the U.S. versus E.U. countries. The U.S. epitomizes the “free” labor market from management’s perspective, since both union membership and coverage are low, and other governmental institutions that restrict managerial behavior also are minimal. If there is an equity versus efficiency trade-off for investors, having lots of industrial relations institutions would be associated with more FDI going to the U.S. and away from E. U. countries. In addition to many of the standard controls found in studies of FDI, we include the tax rate of the receiving country relative to the host country in order to control for potential tax treatment effects. We use data from the OECD volume on “Taxing Profits in a Global Economy” (OECD, 1992). Since we assume that countries with similar industrial relations systems may want to invest in nations that have complementary systems, we control for this interaction by adding a dummy variable for whether the sending and host nation has the same quintal industrial relations system using the summated rating scale.

Extensions of the Model to U.S. States

Unfortunately, we do not have measures of outcomes, like FDI, at the state level, which are highly responsive to economic and institutional incentives. We do, however, use a similar approach to analyze the impact of the industrial relations system on U.S. states. One advantage of examining U.S. states is the reduction in unobserved heterogeneity in customs, English -speaking language, common legal framework, and standard capital markets relative to examining cross-national FDI. Yet, there is still considerable variation among the states for measures such as unemployment benefits, minimum wages, disability payments, right to work laws, and levels of unionization. Using a latent variable approach similar to the one we used to examine FDI, Richard Freeman developed an index of social

legislation favorable to labor from a “composite worker protection index” and gathered data from various government sources. We have modified this index to include industrial relations factors and structured it to fit into a summated rating scale index that captures the systems approach, yet differs by providing the scale from managements’ perspective (Freeman, 1986, Spector, 1992). In this model levels of economic outcomes follow a standard function as specified in the equations one through six, but the capital market is assumed to be the same across U.S. states. Instead of measures of FDI, our estimates include gross state product, employment, and per capita income. Although there is no agreement as to of these factors is the best measure of economic outcomes, we examine all of them to determine whether there are trade-offs between equity and economic outcomes across all these measures as robustness checks of our estimates. Our state level controls for economic factors that vary across states include the log of population, overall tax rates, and the log of manufacturing employment in the state. Since the price of capital is assumed to be the same across U.S. states there is no control variable for this measure. The benefit of using this unit of analysis is the ability to difference out unobservables that are not easily accomplished by attempting to estimate international differences in economic outcomes. Moreover, the state data within the U.S. gives evidence and serves as an additional check on the ability to generalize these findings to other political entities.

In Appendix Table 3 we give the basic values for the state level analysis. This table presents the means for the basic changes in state output, employment, and per capita income for the time period we analyze. These IR variables include labor union coverage density and measures of labor regulations such as unemployment insurance coverage, workers’ compensation coverage, and minimum wages. Again, we find a high correlation for the measures of the industrial relations variables which comprise

our industrial relations system measure. The Cronbach's alpha, which measures the inter correlation of the industrial relations variables or consistency, was .85, and this is beyond the acceptable threshold (Nunnally, 1978)

Industrial Relations Institutions, Income Inequality, and FDI

In Figure one we show the basic country relationships between our measures of industrial relations institutions and income inequality as measured by the Gini coefficient in panel A and the ratio of earnings of persons in the 90th percentile relative to those at the 10th percentile in panel B. Our measure of the industrial relations system is the summated ratings' value for each nation. Consistent with findings in other studies, the slope of the line is negative, suggesting that the impact of more numerous and more intense levels of labor market institutions are associated with less inequality in the country (DiNardo, Fortin, and Lemieux, 1996). Of course, analysis with greater controls and econometric modeling may change the basic relationship. Nevertheless, this result is suggestive of the basic equity- efficiency trade-off of the impact of industrial relations institutions suggested by Okun in the opening comment to this paper.

Figure 2 presents the basic relationship between FDI outflows to other countries as a percentage of total outflows from the U.S. in panel A and from Germany in panel B for 1990, the midpoint of our data analysis. The vertical axis shows the percent of total FDI outflow that goes to other nations and the horizontal axis presents the nation's industrial relations summated rating scale. Estimates for the U.S. show a modest negative slope in panel A, but there is a much steeper negative slope for Germany in panel B. Perhaps countries like Germany with more restrictive industrial relations systems are more likely to choose to invest in countries with less rigid institutions, as our interviews with

German executives suggested. These results, however, fail to control for many of the covariates that are likely to affect FDI.

Estimates From the FDI Model

Table 1 gives reduced form panel corrected standard error regression estimates of the equation specified above using yearly data for the countries in our analysis. This specification is consistent with the theoretical model using industrial relations as a determinate of FDI. In columns one and two we give the linear specification of both the summated rating scale and the Rasch estimates. In columns three and four we present the quadratic form of the specification by giving the linear and squared term for both the summated rating scale and the Rasch estimates. We have year by country effects on FDI, and our sample size of 2442 observations are based on i to j movements of FDI with adjustments for purchasing power parity (PPP) for the specific country⁶. We use reduced form panel corrected standard error estimates with three- year moving averages for the economic variables as a statistical smoothing technique, but the use of yearly averages without smoothing shows similar qualitative results.⁷ The values of FDI are the outflows as a percentage of overall FDI to the countries in our sample. We also estimated a similar model using FDI inflow as a percentage of all FDI to the nation and found basically the same qualitative results as presented in Table 1. In Appendix 4 we present random effects

⁶ Since there is some controversy about the use of PPP for normalizing economic variables, we estimated models using both adjusted and unadjusted values and found qualitatively similar results.

⁷ This approach estimates the coefficients using OLS and their standard errors with corrections to allow for heteroskedasticity, cross-panel heteroskedasticity and panel specific autocorrelation. In our model the number of cross-section observations is larger than time series ones. Consequently, we can not use GLS with this error structure. As a result we used panel corrected standard error estimates found in several econometrics software packages (Stata, SHAZAM, Limdep). For more details about this econometric approach see Beck and Katz(1995) and Greene(2000) .

specifications of our basic model and find similar results to those shown in Table 1. Further, analysis for large trading blocs of countries like the U.S. and E.U. show similar qualitative results for the impact of industrial relations variables on FDI (Kleiner and Ham, 2000).

The economic variable controls included in our model of FDI are yearly measures of education using percent of the workforce having completed high school, nonpublic sector compensation differences between the two countries, interest rate differences, gross domestic product per capita, imports minus exports divided by gross domestic product, relative tax rate, measures of industrial relations complementarity, and the unemployment rate. These variables largely capture the variables in our theoretical model for the role of market factors that affect FDI. Other factors which are constant over time include whether the nations with FDI outflows had the same native language, and the distance in miles between the capitals of the two countries⁸. Our measures of the industrial relations system remain relatively constant over time, since there were small changes in most of the relative components of the variables, although measures such as the strike rate and union density showed some variability. Nevertheless, the use of one variable to capture the industrial relations system, the use of yearly economic data, and controls for capital markets should provide more consistent estimates of the overall impact of labor institutions on FDI flows.

The results show that the summated rating scale and the Rasch measures of the industrial

⁸ Estimates were made of F-levels for each of the equations with and without the industrial relations system variables. We found that the F-level for column 1 was 7.20 and for column 2 was 8.15, each of these values are statistically significant at a 99 percent confidence level. We also estimated these equations with the lag of FDI and they showed similar results.

relations system are statistically significant in all of the specifications, and negatively related to FDI.⁹ In the quadratic specifications the squared term is positive and statistically significant, suggesting that there is a positive or at least a flattening out of the negative relationship between the industrial relations system and FDI. These general results are similar to ones found for the impact of labor variables for U.S. FDI outflows (Bognanno et. al., 1998, Cooke and Noble, 1998, and Cooke, 2000). Moreover, the coefficients for the other control variables are consistent with other studies of FDI that focus on the effects of taxes or exports and imports (Summers, Gruber, and Vergara, 1993, Engen, and Skinner, 1996, Blonigen and Davies, 2000).

In order to test for the robustness of our results in panel A of Table 2 we also estimated the equations in Table 1 dropping one of the measures of the industrial relations system variables and then examining the results. The estimates seem robust to dropping an element of the overall value of the latent variable. In panel B we estimate the direct effect of each of the elements of the industrial relations system on FDI and find that bargaining centralization, strikes, and mandated employee representation is all statistically significant on their own. It appears that the overall industrial relations system construct matters rather than any one variable, and there is a complementarity with the variables in our overall latent variable index. To further proxy a potential “fixed effect” for a country that changed their industrial relations institutions, we saw that large changes in labor market institutions occurred in New Zealand during the 1990s. In that country-specific case, there were more business-sponsored industrial relations policies implemented which resulted in large gains in imports and growth in foreign

⁹When available we used the percentage of employees covered by collective bargaining agreements. However, when this information was not available we used the percent belonging to a union in the country, and denoted this with a dummy variable in our statistical analysis (Little and Rubin, 1987).

capital (Blumenfeld, Crawford, and Walsh, 2001).¹⁰

Beyond FDI activity, however, these industrial relations variable institutions seem to have produced narrowing levels of wage and income dispersion within countries (Freeman and Katz, 1995, DiNardo, Fortin, and Lemieux, 1996). Consequently, the effect of industrial relations institutions may be to reduce the ability of managers to allocate resources, but the benefits to workers through greater voice and labor standards for all employees may be worth the costs to a nation through less foreign investment. However, from our game theory examples, countries may choose higher levels of industrial relations institutions, which they see as optimal from a social perspective, even though it means lower levels of FDI.

U.S. State Level Evidence on Measures of Economic Outcomes

Table three shows estimates of our state level model of the impact of the IR system on measures of state economic growth, which includes employment change, change in per capita income, and gross state product.¹¹ We present two sets of econometric results. In Panel A we show the estimates for changes from 1990 or 1993 to 1998 or 1999 using all 50 U.S. states, with the summated rating scale index for the beginning year.¹² Panel B we show the impact of the industrial relations

¹⁰A country that moved in the other direction in terms of implementing more stringent levels of industrial relations institutions was South Korea. This nation had few industrial relations institutions in 1985, but greatly increased the number and kinds of collective bargaining-related policies during the late 1980s and 90s.

¹¹ We also estimated the model using state exports and found qualitatively similar results. However, upon further examination we found that the state exporter of record is not necessarily where the product was produced. Further, the state of production is not necessarily the exporter, but rather the point of shipment state gets credit for the state of export. For all these reasons we decided against reporting these results given the major potential errors in variables problems.

¹²Estimates using the Rasch approach showed similar statistically significant results. These estimates are available from the authors. Estimates using end of period IR system variables showed similar results.

variable using year by year results from 1990 or 1993 to 1998 or 1999 using panel corrected standard error regression estimates with a sample size ranging from 400 to 450. In Appendix 5 we give estimates from a random effect econometric approach to estimating our model and the results are similar to those in Table 3. The estimates of the industrial relations variables in both sets of specifications are robust for all the measures of economic outcomes using the pooled cross-section-time series results and for most of the change in economic variables from 1990 to 1999¹³. The interpretation of the variables is that a one unit change in the IR system is associated with a .05 percent reduction in the growth rate of state per capita income.¹⁴ These estimates for states are consistent with firm level analysis using aggregate latent variable measures of human resource practices on productivity (Ichniowski, Shaw, and Prenzushi, 1998).

The consistency of the measures of economic outcomes for international comparisons of FDI and state-level comparisons of economic growth are similar. For firms seeking profit-maximizing investments, labor costs and the ability to allocate labor in the most efficient manner possible appears to have an impact on key measures of economic outputs. These results are consistent with our game theory simulation, which says that states may choose lower economic growth for the social gains of a more equitable labor market.

Counterfactual Simulations for Countries and States

¹³We do not include a quadratic specification because the U.S. is at the lowest end of the IR system values. Consequently, there would be little variation among the states in comparison to the wide variance in national IR systems.

¹⁴Estimates using an F-test for the significance of all the individual variables shows that the industrial relations variables are statistically significant for employment changes with an F-value of 2.55 for the cross-section estimates from 1990 to 1999 and a Chi-squared value of 15.14 for the pooled time-series cross-section estimates.

Table 4 gives the results of a simulation for both international FDI, and for changes in state per capita income. In this model we use the coefficients from the regression estimates from Tables 1 and 3 and estimate the impact of changes from a country or state that has the lowest values of their industrial relations system as measured by the summated rating scale relative to the other more intense institutional arrangements in other countries or states¹⁵. These results can be thought of as a counterfactual estimate of the impact of a change in the industrial relations system on measures of economic outcomes relative to the one with the lowest level of these labor market institutions. In panel A we show the effect of the countries in our sample adopting the same industrial relations system as the U. S. on FDI. The results for the top five and bottom five affected nations show that annual FDI inflow would be increased by more than 2 percent per year for Japan if they adopted the U.S. IR system. In contrast, this assumed change to a U.S. industrial relations system would increase FDI inflows from the nations in our sample by almost 10 percent per year for Australia, the country with the highest level of industrial relations-related benefits. Panel B presents the state level estimates. The estimates show what the impact would be on other states of a change from the industrial relations system in Arizona, the state with the lowest worker-related benefits, relative to the five top and bottom U.S. states. The results range from no change for a state like Mississippi to a growth of almost one percent per year in per capita income per year for Alaska and by .72 percent for Connecticut, Maine, Michigan and New Jersey. Worker protections and related institutions are important to the overall state social safety net, as well as for employee well-being. However, they appear to come at a

¹⁵Estimates using the Rasch approach for the coefficients for the industrial relations variables produced similar results for both international and state level estimates.

price of reduced growth in per capita income.

Conclusions

This study has examined the impacts of the industrial relations system on direct foreign investment, as well on measures of economic growth for U.S. states. We implement a systems approach, rather than using individual variables to examine the role of industrial relations on the amount of direct foreign investment in the destination nations. We state the rationale for this latent variable method using industrial relations theory, rather than using a single variable or a group of individual variables. Our theoretical model suggests that nations with higher levels of industrial relations reduce returns to capital within a Nash model. Further, using a game theory approach shows that nations can have multiple equilibrium when both FDI and industrial relations system voice and equity factors are considered. The measures that we use seem to fit into this systems approach and include measures of unionization, strike activity, centralization and level of bargaining, and mandated employee involvement. The data and time period for our study includes 20 OECD nations for the ten years 1985 through 1995, as well as 50 U.S. states from 1990 to 1999.

Linear and quadratic estimates from the reduced form model, which is consistent with theory, show that the industrial relations system is statistically significant and of moderate size in the specification of the systems variable. Moreover, developing a counterfactual estimate using our model and the industrial relations system coefficients, shows that a movement from a country with institutions like Australia to the U.S. would diminish the host nation's FDI by almost 10 percent per year. However, the transactions cost of changing an industrial relations system is presumably high, although countries like New Zealand and South Korea have done so with some economic impacts.

In contrast to some previous analysis our results suggest further that multinational firms in more developed nations tend to be somewhat sensitive to the industrial relations climate, preferring ones that provide management with a greater amount of leeway in allocating labor and setting standards at work. Of course public policies must consider more than foreign investments by large firms and their choice of the kinds of an industrial relations and social climate they wish to provide employees. Giving workers an environment where they have a greater say at the workplace with higher wages and benefits may be worth the reduction in foreign investment which is the unintended consequence of these policies. However, policy makers and interest groups need to be aware of the efficiency consequences of their constituents' equity concerns (Okun, 1975, Freeman, 2000). Further examination using more nations and time periods with changes to different systems, as well as using more microeconomic data and field interviews of executives and other employees, may complement the insights into this issue which can be provided by this large- scale analysis using aggregate data.

References

- Autor, David H., John J. Donohue, and Steward J. Schwab, "The Costs of Wrongful Discharge Laws,"
National Bureau of Economic Research, Cambridge, Ma., July 2000.
- Baldi, Stephane and et.al., *International Education Indicators : A Time- Series
Perspective, 1985-1995*. Washington, DC : U.S. Dept. of Education, 2000.
- Bartholomew, David. *The Statistical Approach to Social Measurement*, Academic Press, London, 1996.
- Bartik, Timothy, "Business Location Decisions in the United States: Estimates of the Effects of Unionization,
Taxes, and Other Characteristics of States," *Journal of Business and Economic Statistics*, 3: pp. 14-
22, 1985.
- Beck, Nathaniel ; Katz, Jonathan N. "What to Do (and Not to Do) with Time-Series Cross-Section Data"
American Political Science Review v89, n3 (September 1995): 634-47
- Beggs, John J. and Bruce J. Chapman, "Declining Strike Activity in Australia 1983-85: An International
Phenomenon?" *Economic Record* Volume 63, no. 183 (December 1987): pp. 330-39.
- Block, Richard, Karen Roberts, Cynthia Ozeki, and Myron J. Roomkin, "Models of International Labor
Standards," *Industrial Relations*, Vol 40, No. 2, April 2001, pp. 258-292.
- Block, Richard, Karen Roberts, and R. Oliver Clarke, *Labor Standards in the United States and Canada*,
Kalamazoo, Mi. : W.E. Upjohn Insitute for Employment Research, forthcoming.
- Blonigen, Bruce, A. and Ronald B. Davies, " The Effects of Bilateral Tax Treaties on U.S. FDI Activity",

NBER Working Paper 7929, pp. 35, October 2000.

Blumenfeld, Stephen, Aaron Crawford, and Pat Walsh, "Import Penetration and Union Membership in a Small Open Economy: New Zealand in the 1990s", Proceedings of the Industrial Relations Research Association, New Orleans, January 2001, p. 317-325.

Bognanno, Mario. F., Keane, Michael. P., Yang, D. "The Influence of Wages and Industrial Relations Environments on the Production Location Decisions of US Multinational Corporations." *Working Paper, Industrial Relations Center, University of Minnesota, 1998.*

Budd, John and Yijiang Wang, "Labor Policy and Investment", University of Minnesota, Working Paper, 2001.

Calmfors, L., Driffill, J. "Bargaining Structure, Corporation and Macroeconomic Performance." *Economic Policy, April 1988, 14-61.*

Cooke, W. N. "The Influence of Industrial Relations Factors on U.S. Foreign Direct investment Abroad." *Industrial and Labor Relations Review, 1997, 50 (1), 3-17.*

_____ and Noble, D. S. "Industrial Relations Systems and U.S. Foreign Direct Investment Abroad." *British Journal of Industrial Relations, 1998, 51 (2), 171-186.*

_____ and _____, "The Effects of Labor Costs and Workplace Constraints on Foreign Direct Investment Among Highly Industrialized Countries, Working Paper, Wayne State University, 2000.

Dinardo, John, Nicole Fortin, and Thomas Lemieux, "Labor Market Institutions and the Distribution of

Wages, 1973-1992: A Semiparametric Approach”, *Econometrica*, Vol. 65, September 1996, pp. 1001-44.

Dunlop, John T. *Industrial Relations Systems*. Boston: Harvard Business School Press, 1993.

Engen, Eric M. and Jonathan Skinner, “Taxation and Economic Growth”, NBER Working Paper 5826, November 1996.

Figlio, David N. ; Blonigen, Bruce A. “The Effects of Foreign Direct Investment on Local Communities” *Journal of Urban Economics* v48, n2 (September 2000): 338-63

Fitzpatrick, Gary L. and Modlin, Marilyn J., *Direct-line Distances*. Metuchen, N.J. : Scarecrow Press, 1986.

Freeman, Richard B., "Crime and the Job Market." *NBER Working Paper*, w4910, October 1994.

_____, "Single Peaked Vs. Diversified Capitalism: The Relation Between Economic Institutions and Outcomes." *NBER Working Paper*, w7556, February 2000.

_____, “Unionism and Protective Labor Legislation,” *Industrial Relations Research Association, Proceedings*, 1986, pp. 260- 267.

_____ and Katz, Lawrence F. *Differences and Changes in Wage Structures*. Chicago: University of Chicago Press, 1995.

_____ and Edward Lazear, “An Economic Analysis of Works Councils,” in *Works Councils*, ed. Joel Rogers and Wolfgang Streeck, Chicago: University of Chicago Press, 1995.

Fudenberg, D., and Jin Tirole. *Game Theory*. Cambridge, Mass. MIT Press. 1991

Gibbons, Robert. *Game Theory for Applied Economists*. Princeton, N.J., Princeton University Press 1992.

Golden, Miriam, Peter and Michael Wallerstein. Union Centralization Among Advanced Industrial Societies:
An Empirical Study. <http://shelley.sscnet.ucla.edu/data> . 11-3-1998 .

Greene, William, *Econometric Analysis, Fourth Edition*, Prentice-Hall, 2000

Hatzius, Jan, "Foreign Direct Investment and Factor Demand Elasticities," *European Economic Review*,
44, pp. 117-143, 2000.

Hirsch, Barry, *Labor Unions and the Economic Performance of Firms*, W.E. Upjohn Institute for
Employment Research, Kalamazoo, Michigan, 1991.

Hufbauer, G. C. "The Multinational Corporation and Direct Investment," Kenen, Peter B. Ed., *International
Trade and Finance : Frontiers for Research*. Cambridge: Cambridge University, 1975.

Hsiao, Cheng. *Analysis of Panel Data*, Cambridge; New York and Sydney: Cambridge University Press
1986

Ichniowski, Casey, Kathryn Shaw, and Giovanna Prennushi, "The Effect of Human Resource Practices on
Productivity: A Study of Steel Finishing Lines," *American Economic Review*, Vol. 87, No. 3, June 1997,
pp.291-313.

ILO Bureau of Statistics. LABORSTA. <http://www.ilo.org/public/english/support/lib/dblist.htm>.

Kleiner, Morris M. and Chang-Ruey Ay, "Unionization, Employee Representation, and Economic Performance: Comparisons Among OECD Nations," *Advances in Industrial and Labor Relations*, Vol. 7, JAI Press, pp 97- 121.

Kleiner, Morris M. and Hwikwon, Ham, "What Impact Do the Different Industrial Relations Systems in the U.S and the European Union Have on Foreign Direct Investment?", in *Multinational Companies and Transnational Workplace Issues*, ed. W. Cooke, M.E. Sharpe Publishers, Armonk, New York, 2002, pp. 83-94.

Leahy, Dermot ; Montagna, Catia "Unionisation and Foreign Direct Investment: Challenging Conventional Wisdom?" *Economic Journal*, v110, n 462 (March 2000): pp. 80-92

Levine, David, *Reinventing the Workplace*, Brookings Institution, Washington, D.C. 1995.

Little, Roderick, and Daniel Rubin, *Statistical Analysis with Missing Data*. New York, NY: John Wiley and Sons, 1987.

Lipsey, Robert E. "Interpreting Developed Countries' Foreign Direct Investment", NBER Working Paper 7810, pp. 1-24, July 2000.

_____, Foreign Direct Investment and the Operations of Multinational Firms: Concepts, History and Data, National Bureau of Economic Research Working Paper, 8665, Cambridge, Massachusetts, December 2001.

Nunnally, J C., *Psychometric Theory*. 2nd ed. New York : McGraw-Hill, 1978.

- OECD. "Trends in Trade Union Membership," *Employment Outlook*. Paris: Organization for Economic Co-operation, and Development, 1991, 97-134.
- OECD. "Collective Bargaining: Levels and Coverage," *Employment Outlook*. Paris: Organization for Economic Co-operation, and Development, 1994, 167-194.
- OECD. "Economic Performance and the Structure of Collective Bargaining," *Employment Outlook*. Paris: Organization for Economic Co-operation, and Development, 1997, 63-92.
- OECD and DSI, Data Service. *OECD Statistical Compendium : CD-ROM*. 1998.
- OECD. "Taxing Profits in a Global Economy: Domestic and International Issues, 1992.
- Okun, Arthur M.,. *Equality and Efficiency: The Big Tradeoff*. Washington: The Brookings Institution, 1975.
- Rees, Albert, "The Effects of Unions on Resource Allocation" *Journal of Law and Economics*, pp.69-78, V. I, 1963.
- Slichter, S. *Proceedings, of the Eighth Annual Meeting of the American Academy of Arbitrators*. Boston: Bureau of National Affairs, 1955.
- Summers, Lawrence, Jonathan Gruber, and Rodrigo Vergara, "Taxation and the Structure of Labor Markets: The Case of Corporatism", *Quarterly Journal of Economics*, v108, n2 (May 1993): pp. 385-411
- Spector, Paul, E., *Summated Rating Scale Construction*, Sage Publications, Newbury Park, Ca. 1992.,.

Traxler, Franz and Kittel Bernhard, "The Bargaining Systems and Performance: A Comparison of 18 OECD Countries," *Comparative Political Studies*, Volume 33, No. 9, 2000, pp. 1154-1190.

Wang, Andrew. "Economic Reform and State Enterprise Productivity in China: An Application of Robust Estimation and Latent Variable Measurement Methods," Ph.D. Thesis, Harvard University, 1997.

Figure 1. Industrial Relations System Relationship with the Gini Coefficient and Percentile Ratio 90/10
 (using the Summated Rating Scale by country)

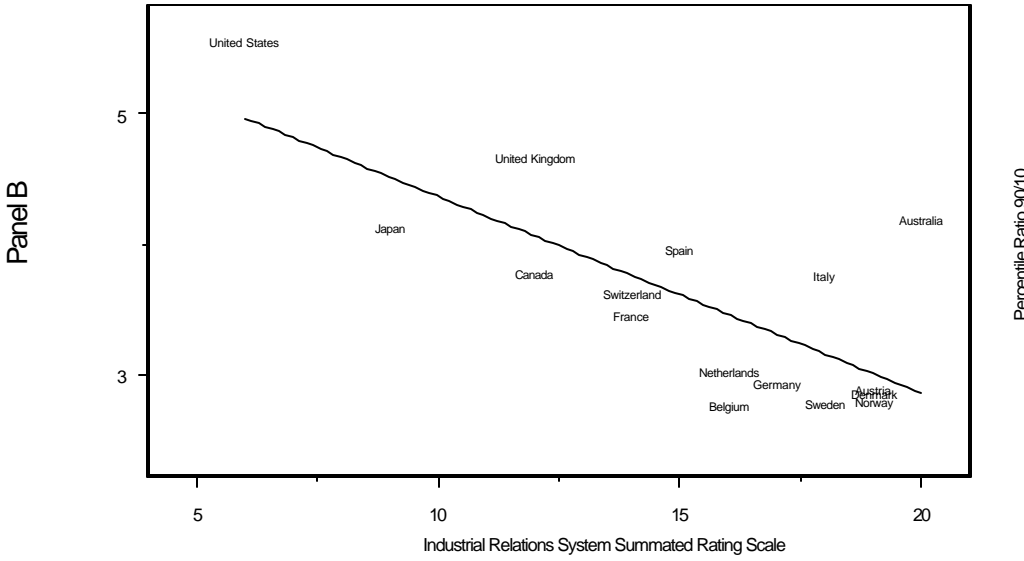
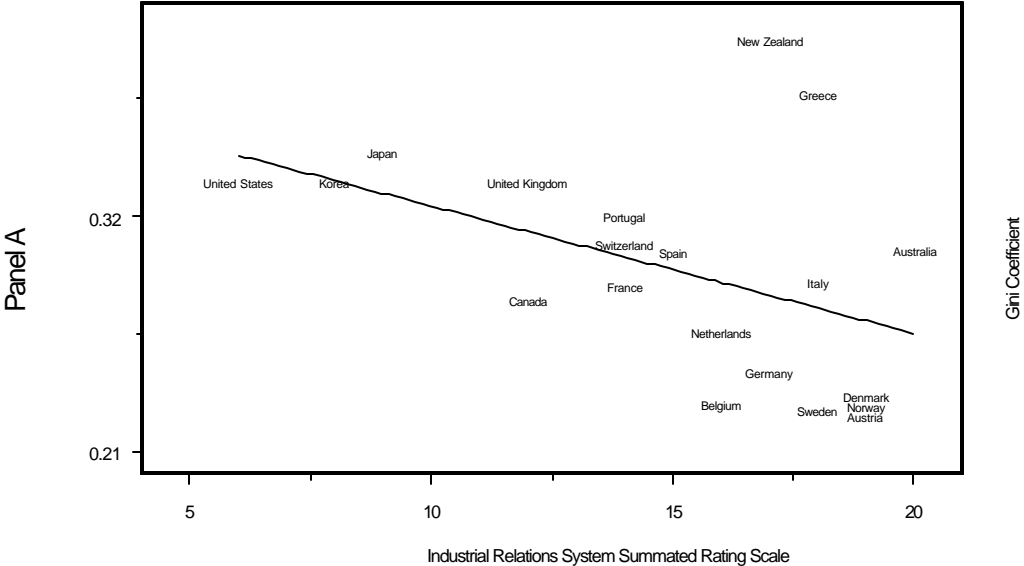


Figure 2. FDI Outflows and the Industrial Relations System Relationships in 1990
 (using the Summated Rating Scale by country)

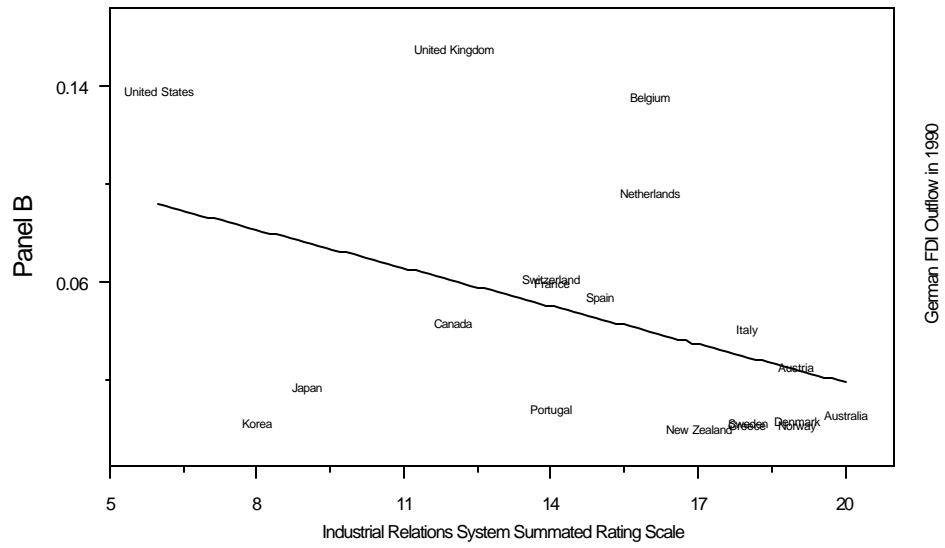
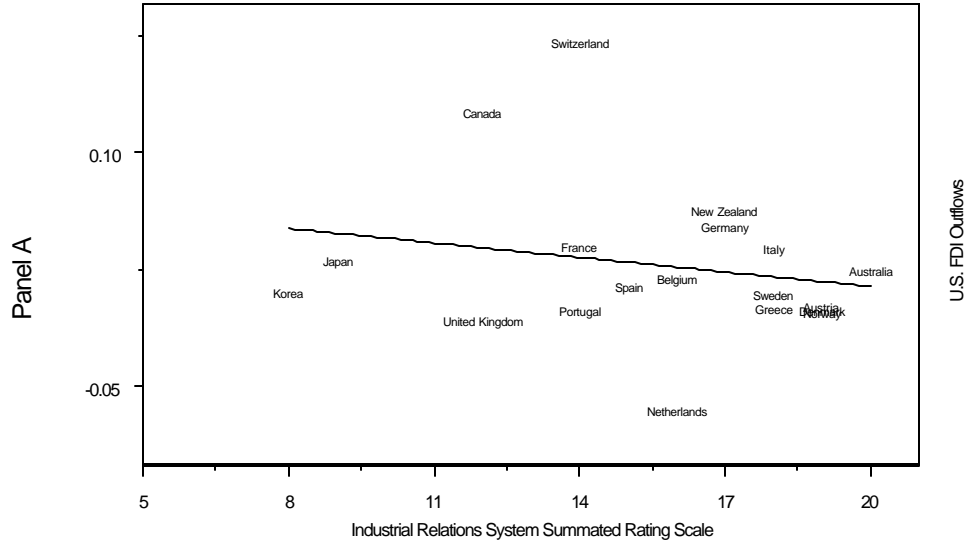


Table 1. Panel Corrected Standard Error Estimates of the Impact of the Industrial Relations System on the Percent of Total Net FDI Outflows (1985 - 1995)**

	(1)	(2)	(3)	(4)
Host Country IR System (Summated Rating)	-.0069 *		-.0479 *	
	(.0020)		(.0112)	
(Summated Rating) ²			.0015 *	
			(.0004)	
Host Country IR System (Rasch)		-.0454 *		-.0130 *
		(.0090)		(.0159)
(Rasch) ²				.0242 *
				(.0085)
Language Complementarities	.0815 *	.0842 *	.0913 *	.0928 *
	(.0324)	(.0309)	(.0333)	(.0312)
IR System Complementarities	.0205	.0228	.0253	.0250
	(.0190)	(.0186)	(.0176)	(.0162)
High School Graduation Rate ^{***}	.0009 *	.0010 *	.0009 *	.0010 *
	(.0003)	(.0003)	(.0004)	(.0003)
Distance Between Countries	-.0045 *	-.0047 *	-.0057 *	-.0051 *
	(.0008)	(.0008)	(.0012)	(.0011)
Employee Compensation Differences ^{****}	-.0003	-.0005	-.0013	-.0010
	(.0007)	(.0007)	(.0007)	(.0007)
Interest Rate Differences ^{****}	-.0021	-.0022	-.0016	-.0011
	(.0014)	(.0013)	(.0014)	(.0012)
Tax Rate	-.0092 *	-.0095 *	-.0106 *	-.0100 *
	(.0032)	(.0029)	(.0025)	(.0029)
GDP per Capita ^{****}	.0065	.0033	.0004	-.0006
	(.0043)	(.0043)	(.0038)	(.0042)
(Export-Import) ^{****}	-.1165	-.0131	-.0446	.0141
	(.3081)	(.2985)	(.3062)	(.2853)
Unemployment Rate ^{****}	.0031 *	.0030 *	.0035 *	.0031
	(.0014)	(.0014)	(.0016)	(.0016)
Constant	.0267	-.0280	.4095	.0370
	(.1050)	(.1057)	(.1080)	(.0902)
No. of Observations	2442	2442	2442	2442
R ²	.035	.037	.039	.041

Note

* Significant at 5% level

** Standard Errors in Parenthesis and all results include year dummies.

*** Average over Various years

**** Three Year Moving Average (1983 - 1995)

Table 2 Responsiveness of the FDI Model to Alternative Specifications: Impact of the Industrial Relations System on the Percent of Total Net FDI Outflows (1985 - 1995)¹

		(1)	(2)
Without Union Density	Host Country IR System (Summated Rating)	-.0118 *	
		(.0022)	
	Host Country IR System (Rasch)		-.0180 *
			(.0022)
Without Strike Rate	Host Country IR System (Summated Rating)	-.0038	
		(.0023)	
	Host Country IR System (Rasch)		-.0104 *
			(.0047)
Without Bargaining Centralization	Host Country IR System (Summated Rating)	-.0077 *	
		(.0023)	
	Host Country IR System (Rasch)		-.0420 *
			(.0096)
Without Bargaining Level	Host Country IR System (Summated Rating)	-.0090 *	
		(.0018)	
	Host Country IR System (Rasch)		-.0488 *
			(.0081)
Without Worker Representation	Host Country IR System (Summated Rating)	-.0074 *	
		(.0029)	
	Host Country IR System (Rasch)		-.0483 *
			(.0122)

Panel B :Individual Variable Impacts

Union Density	Strike Rate	Bargaining Centralization	Bargaining Level	Worker Representation
.0026	-.0124 *	-.0191 *	-.0120	-.0299 *
(.0046)	(.0046)	(.0084)	(.0076)	(.0054)

Note

* Significant at 5% level

¹ Standard Errors in Parenthesis and all results include same control variables as in Table 1.

Table 3. Estimates of the Impact of the Industrial Relations System on Economic Outcomes for U.S. States¹

	A. % change between 1990-1999		B. % Change over a Year (Panel 1990-1999)	
	IR SR ³	IR Rasch ³	IR SR ³	IR Rasch ³
Gross State Product ²	-1.39 * (.61)	-6.45 * (2.22)	-.17 * (.04)	-.76 * (.15)
Per Capita Income	-.32 * (.20)	-1.49 * (.74)	-.05 * (.01)	-.21 * (.05)
Employment	-1.11 * (.35)	-4.22 * (1.29)	-.11 * (.02)	-.39 * (.06)

* Significant at 5% level

¹ All regressions include constant and control variables; high school graduation rate, log of per capita tax revenue, log of population and manufacturing employment. Standard errors are in parenthesis. Economic Data is from the BLS and BEA Website

² Gross State Product includes only data through 1998

³ The industrial relations system variable uses a summated ratings scale (See Freeman 1986)

Table 4. Simulated Impacts of Switchings the IR System on Economic Outcomes from the Country/State with the Lowest IR Value : 5 Highest and Lowest Rated Values

Panel A. Country-Effects : Changes in % Annual FDI

Country	Change in FDI (SR)	Change in FDI (Rasch)	Country	Change in FDI (SR)	Change in FDI (Rasch)
Australia	9.69%	13.84%	Switzerland	5.54%	9.76%
Denmark	8.99%	13.03%	United Kingdom	4.15%	8.35%
Norway	8.99%	13.03%	Canada	4.15%	8.35%
Austria	8.99%	13.03%	Japan	2.08%	5.67%
Italy	8.30%	12.35%	Korea	1.38%	4.45%

Panel B. State-Effects : % Changes in Annual Per Capita Income

State	Change in Per Capita Income (SR90)	Change in Per Capita Income (Rasch90)	State	Change in Per Capita Income (SR99)	Change in Per Capita Income (Rasch90)
Alaska	0.86%	1.49%	Tennessee	0.09%	0.24%
Connecticut	0.72%	0.98%	Texas	0.09%	0.24%
Maine	0.72%	0.98%	Georgia	0.05%	0.15%
Michigan	0.72%	0.98%	Louisiana	0.05%	0.15%
New Jersey	0.72%	0.98%	Mississippi	0.00%	0.00%

Appendix 1A. Normal Form Game When the Payoff is FDI

B

A

	1	2	3	4	5
1	5 5	0 5	0 5	0 5	0 5
2	5 0	4 4	0 4	0 4	0 4
3	5 0	4 0	3 3	0 3	0 3
4	5 0	4 0	3 0	2 2	0 2
5	5 0	4 0	3 0	2 0	1 1

Appendix 1B. Normal Form Game When the Payoff is Sum of FDI and Utility from IR Equity

B

A

	1	2	3	4	5
1	6 6	1.5 6	2.24 6	3.34 6	5 6
2	6 1.5	5.5 5.5	2.24 5.5	3.34 5.5	5 5.5
3	6 2.24	5.5 2.24	5.24 5.24	3.34 5.24	5 5.24
4	6 3.34	5.5 3.34	5.24 3.34	5.34 5.34	5 5.34
5	6 5	5.5 5	5.24 5	5.34 5	6 6

Appendix 2. Summary of Economic and Industrial Relations System Variables by Country (1985-1995) *

Country	Employee Compensation	Per Capita GDP	(Import-Export)/GDP	Tax Rate	Interest Rate	Unemployment Rate	High School Graduation Rate ¹	IR System Summated Rating ²	IR System Rasch ²
Australia	19,665 (2423)	15,806 (3216)	-0.002 (.01)	8.16 (1.07)	11.33 (2.33)	8.51 (1.55)	88.50	20	0.76
Austria	22,553 (3776)	19,818 (5939)	-0.054 (.01)	7.13 (1.11)	7.39 (0.83)	5.05 (0.66)	85.02	19	0.58
Belgium	29,403 (5591)	19,676 (5846)	-0.013 (.03)	6.79 (.47)	8.61 (1.14)	11.12 (1.52)	79.10	16	0.14
Canada	25,411 (3827)	18,503 (2548)	0.024 (.01)	8.48 (1.58)	9.54 (1.03)	9.56 (1.35)	70.28	12	-0.45
Denmark	20,469 (3187)	23,779 (6019)	0.006 (.03)	7.17 (.92)	9.51 (1.39)	9.87 (1.58)	98.91	19	0.58
France	25,772 (3560)	19,596 (4901)	-0.007 (.01)	7.89 (1.04)	9.15 (1.40)	10.41 (1.04)	73.62	14	-0.14
Germany	23,733 (3070)	19,515 (6685)	0.032 (.018)	6.41 (.47)	7.17 (0.83)	7.82 (1.08)	87.35	17	0.28
Greece	13,309 (1294)	7,567 (2007)	-0.125 (.02)	7.75 (3.91)	19.82 (2.29)	8.21 (1.08)	78.23	18	0.43
Italy	23,904 (3429)	23,274 (5521)	-0.010 (.02)	7.09 (.79)	12.09 (1.26)	9.95 (1.09)	52.62	18	0.43
Japan	23,352 (3788)	26,724 (8764)	0.022 (.01)	8.11 (1.55)	5.21 (1.07)	2.54 (0.35)	93.60	9	-1.04

Appendix 2. Summary of Economic and Industrial Relations System Variables by Country (1985-1995) (continued)*

Country	Employee Compensation	Per Capita GDP	(Import-Export)/GDP	Tax Rate	Interest Rate	Unemployment Rate	High School Graduation Rate ¹	IR System Summated Rating ²	IR System Rasch ²
Korea	12,116 (3818)	4,688 (1990)	-0.024 (.01)	-. ³	13.54 (1.52)	2.75 (0.62)	85.50	8	-1.31
Netherlands	26,213 (3725)	18,301 (4871)	0.022 (.02)	7.11 (1.41)	7.24 (0.95)	7.12 (1.21)	73.81	16	0.14
New Zealand	15,860 (2006)	12,241 (2544)	0.002 (.02)	9.64 (1.79)	11.72 (3.86)	6.97 (2.50)	-. ³	17	0.28
Norway	22,620 (4118)	25,773 (5490)	0.043 (.03)	6.47 (.64)	10.45 (2.43)	4.33 (1.55)	76.35	19	0.58
Portugal	12,001 (2301)	6,801 (2725)	-0.123 (.04)	7.93 (1.94)	18.72 (5.29)	6.17 (1.64)	31.22	14	-0.14
Spain	22,860 (3718)	10,720 (3593)	-0.052 (.01)	8.25 (1.94)	12.15 (1.45)	20.05 (2.73)	63.55	15	0.00
Sweden	22,057 (3229)	22,829 (4972)	0.020 (.02)	6.42 (1.40)	10.92 (1.43)	4.04 (2.72)	80.75	18	0.43
Switzerland	29,586 (5161)	31,031 (8049)	-0.024 (.02)	6.85 (1.09)	5.03 (0.93)	1.90 (1.76)	84.56	14	-0.14
U.K.	22,281 (3062)	15,459 (3417)	-0.025 (.01)	6.98 (.84)	9.58 (1.29)	9.10 (1.99)	78.20	12	-0.45
U.S.	29,627 (3800)	23,032 (3367)	-0.019 (.01)	7.51 (1.59)	7.91 (1.29)	6.34 (0.78)	72.32	6	-2.29

* OECD Statistical Compendium Unless Otherwise Specified

¹ Average over Various Years (International Education Indicators)

² Based on Average over 1981-1992 (Data Source: Bognanno, Keane and Yang 1998 Golden, Peter and Michael Wallerstein 1998)

³ Not Available

Appendix 3. Summary of Economic and Industrial Relations System Variables by State

State	Gross State Product¹	Per Capita Income²	Total Exports³	Population²	Employment²	Manufacturing Employment²	High School Graduation Rate	SR 1990	Rasch 1990
Alabama	90	19	3,844	4,230	2,233	394	67	9	-1.4
Alaska	24	26	875	596	367	19	87	25	4.2
Arizona	97	21	9,361	4,219	2,255	203	79	6	-2.9
Arkansas	50	18	1,764	2,459	1,356	256	66	11	-0.9
California	914	25	91,772	31,502	17,354	2,004	76	16	0.2
Colorado	104	25	9,572	3,681	2,418	206	84	13	-0.5
Connecticut	116	32	11,834	3,275	1,986	301	79	22	1.8
Delaware	26	26	4,446	713	447	64	78	16	0.2
Florida	329	23	19,720	14,080	7,529	513	74	10	-1.2
Georgia	191	22	8,927	7,126	4,155	587	71	7	-2.2
Hawaii	36	25	252	1,166	745	21	80	21	1.4
Idaho	24	19	1,652	1,140	656	76	80	15	0.0
Illinois	344	25	29,501	11,820	6,780	977	76	21	1.4
Indiana	141	22	11,826	5,760	3,346	672	76	10	-1.2
Iowa	69	21	2,725	2,830	1,776	252	80	17	0.4
Kansas	63	22	4,348	2,571	1,605	200	81	12	-0.7
Kentucky	87	19	5,818	3,832	2,092	312	65	13	-0.5
Louisiana	108	19	4,117	4,308	2,193	194	68	7	-2.2
Maine	27	20	1,402	1,240	718	100	79	22	1.8
Maryland	135	27	3,493	4,996	2,807	190	78	16	0.2
Massachusetts	191	28	14,984	6,064	3,712	474	80	21	1.4
Michigan	239	23	36,578	9,616	5,115	969	77	22	1.8
Minnesota	127	25	12,567	4,582	2,978	434	82	19	0.9
Mississippi	51	17	1,255	2,673	1,349	257	64	6	-2.9
Missouri	132	22	6,222	5,300	3,192	430	74	12	-0.7
Montana	17	19	335	851	498	28	81	15	0.0

Appendix 3. Summary of Economic and Industrial Relations System Variables by State(Continued)

State	Gross State Product¹	Per Capita Income²	Total Exports³	Population²	Employment²	Manufacturing Employment²	High School Graduation Rate	SR 1990	Rasch 1990
Nebraska	42	22	2,195	1,627	1,073	112	82	9	-1.4
Nevada	46	25	717	1,502	956	37	79	14	-0.3
New Hampshire	31	25	1,669	1,145	684	109	82	12	-0.7
New jersey	262	29	18,569	7,943	4,369	523	77	22	1.8
New Mexico	39	18	1,268	1,650	872	50	75	9	-1.4
New York	586	28	43,536	18,121	9,760	1,006	75	20	1.1
North Carolina	184	22	11,242	7,136	4,331	860	70	14	-0.3
North Dakota	14	19	530	638	413	22	77	14	-0.3
Ohio	281	23	22,442	11,103	6,279	1,107	76	20	1.1
Oklahoma	68	19	2,466	3,256	1,808	181	75	10	-1.2
Oregon	78	22	8,463	3,105	1,839	244	82	21	1.4
Pennsylvania	304	24	17,283	11,998	6,493	983	75	22	1.8
Rhode Island	25	24	1,029	994	546	89	72	22	1.8
South Carolina	82	19	4,880	3,691	2,050	376	68	9	-1.4
South Dakota	17	20	454	720	463	45	77	9	-1.4
Tennessee	127	21	8,797	5,195	3,101	535	67	8	-1.8
Texas	497	22	49,512	18,517	10,469	1,073	72	8	-1.8
Utah	44	19	2,649	1,942	1,139	126	85	13	-0.5
Vermont	14	21	2,579	580	363	50	81	18	0.6
Virginia	183	24	10,445	6,554	3,934	420	75	9	-1.4
Washington	148	24	29,503	5,363	3,134	375	84	22	1.8
West Virginia	34	18	1,055	1,810	833	87	66	15	0.0
Wisconsin	127	22	8,245	5,099	3,098	602	79	18	0.6
Wyoming	15	22	128	472	298	12	83	11	-0.9

¹ In Billion

² In Thousand

³ In Million

Appendix 4. Random Effect Estimates of the Impact of the Industrial Relations System on the Percent of Total Net FDI Outflows (1985 - 1995)^{**}

	(1)	(2)	(3)	(4)
Host Country IR System (Summated Rating)	-.0058 *		-.0417 *	
(Summated Rating) ²			.0013 *	
Host Country IR System (Rasch)		-.0390 *		-.0126
(Rasch) ²		(.0097)		(.0133)
Language Complementarities	.0951 *	.0940 *	.0931 *	.0938 *
	(.0216)	(.0214)	(.0211)	(.0210)
IR System Complementarities	.0297	.0303 *	.0319 *	.0313 *
	(.0152)	(.0151)	(.0150)	(.0148)
High School Graduation Rate ^{***}	.0006	.0007	.0003	.0005
	(.0005)	(.0005)	(.0005)	(.0005)
Distance Between Countries	-.0038 *	-.0040 *	-.0046 *	-.0043 *
	(.0011)	(.0011)	(.0011)	(.0011)
Employee Compensation Differences ^{****}	-.0008	-.0010	-.0020	-.0016
	(.0014)	(.0014)	(.0015)	(.0014)
Interest Rate Differences ^{****}	-.0011	-.0012	-.0005	-.0002
	(.0019)	(.0019)	(.0019)	(.0019)
Tax Rate	-.0067	-.0067	-.0072 *	-.0063 *
	(.0037)	(.0036)	(.0036)	(.0036)
GDP per Capita ^{****}	.0052	.0026	-.0002	-.0020
	(.0030)	(.0032)	(.0034)	(.0035)
(Export-Import) ^{****}	-.1210	-.0380	-.0182	.0547
	(.1688)	(.1711)	(.1697)	(.1723)
Unemployment Rate ^{****}	.0036 *	.0033 *	.0034 *	.0028
	(.0016)	(.0015)	(.0015)	(.0015)
Constant	.0230	-.0229	.3806	.0658
	(.0848)	(.0765)	(.1431)	(.0818)
No. of Observations	2442	2442	2442	2442
R ² Within	.001	.001	.001	.001
between	.194	.208	.216	.225
overall	.042	.045	.047	.050

Note

*Significant at 5% level.

** Standard Errors in Parenthesis and all results include year dummies.

*** Average over Various years

**** Three Year Moving Average (1983 - 1995)

Appendix 5. Random Effect Estimates of the Impact of the Industrial Relations System on Economic Efficiency for U.S. States¹

	A. % change between 1990-1999		B. % Change over a Year (Panel 1990-1999)	
	IR SR ³	IR Rasch ³	IR SR ³	IR Rasch ³
Gross State Product ²	-1.39 * (.61)	-6.45 * (2.22)	-.12 * (.03)	-.54 * (.10)
Per Capita Income	-.32 * (.20)	-1.49 * (.74)	-.06 * (.02)	-.24 * (.06)
Employment	-1.11 * (.35)	-4.22 * (1.29)	-.06 * (.01)	-.21 * (.05)

* Significant at 5% level

¹ All regressions include constant and control variables; high school graduation rate, log of per capita tax revenue, log of population and manufacturing employment. Standard errors are in parenthesis. Economic Data is from the BLS and BEA Website

² Gross State Product includes only data through 1998

³ The industrial relations system variable uses a summated ratings scale (See Freeman 1986)