

Draft

Do Industrial Relations Institutions Affect Economic Efficiency?: International and U.S. State-Level Evidence*

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Abstract

Political controversies over economic growth, fairness to workers, and the effect of government social and labor market programs have generated a great deal of debate by activists, academics, and policymakers in the U.S. and in other nations. This study examines the impact of national levels of unionization, strikes, bargaining structure, public policies toward labor, and collective bargaining within the firm and nation on a country's foreign direct investment (FDI). As an additional test of the impact of labor market institutions and state labor market policies, we examine its effect on the economic growth of U.S. states. Initially we model the decisions of firms, and then nations as they decide their trade-offs of social equity and economic efficiency. Using data from 20 OECD nations from 1985 through 1995 and U.S. states from 1990 to 1999, our multivariate 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 national or state industrial relations policies, our results do not necessarily suggest that a nation or state would be better off trading social equity for higher levels of economic efficiency.

“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

Political controversies over economic growth, fairness to workers, and the effect of government social and labor market programs have generated a great deal of debate by activists, academics, and policymakers in the U.S. and in other nations. An integral part of the controversy has focused on the appropriate level of labor institutions in developed and less developed countries. A central issue has been the impact of labor market institutions on the potential equity versus efficiency trade-offs in the economy. 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). Moreover, in one of the models that Richard Freeman presents, he assumes that there are tradeoffs between different types of labor market institutions and the level of economic efficiency similar to one referred to in the above quotation by Arthur Okun (Okun, 1975). However, in other examples that Freeman presents there is assumed to be multiple equilibrium with many different levels of labor market institutions leading to optimal levels of economic efficiency. Within these models trading efficiency for equity (e.g., reducing income inequality) is small. For example, large increases in equity lead to small changes in efficiency as evaluated through measures of economic growth.

Consequently, not only is the direction of the impact important, but also the elasticity of labor market institutions and its effects on national economies is of interest in informing the political debate.

This study examines the 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 within the firm. Specifically, we examine the impact of national levels of unionization, strikes, bargaining structure, public policies toward labor, and the level of collective bargaining within the firm and nation on the foreign direct investment (FDI) of a nation. As an additional test of the impact of labor market institutions and state labor market policies, we examine its effect on the economic growth of U.S. states. For our cross-country analysis we assume and model that FDI in a country takes place relative to investment in the host nation and other nations. Consequently, we examine foreign investment between nations over time. Our U.S. state level measures of growth include estimates of gross state product, employment, per capita income, and state exports.

Labor-related factors such as methods of wage determination, strike activity, unionization, and restrictions on the allocation of labor, have often been mentioned as important factors causing reductions in a firm’s willingness to invest in a country¹. Recent focus of the

¹ There are many additional reasons or other labor-related factors that effect FDI beyond the ones we could quantify. Therefore, we had tape-recorded in depth discussions in the U.S., with multi-national 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 must 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

growth of international trade and investment, nations that compete for international capital are concerned about developing and maintaining the appropriate economic climates for investment that may create additional jobs. Since, these factors can be considered as an industrial relations system, we develop a single measure to capture these elements into one variable consistent with the approach 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 outflows, and attempt to provide evidence on the role of states with the fewest labor market restrictions relative to countries where labor market restrictions are much more widespread and limiting for management. 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). There also has been little work on the role of labor market institutions on economic growth across U.S. states (Bartik, 1985).

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

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.

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 each may affect other elements and the outcomes of the system as a whole (Dunlop, 1993). Dunlop in citing his mentor Harvard Professor 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. 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 with economic factors. In a manner similar to the estimates of the factors that affect firm performance, a single factor may not matter, but together the industrial relations system may affect economic efficiency (Ichniowski, Shaw, and Prennushi, 1998).

This study develops further the theory and rationale for foreign direct investment (FDI) decisions in both the host and receiving nation, and we discuss the role of the industrial relations system on FDI. We also examine a model of national FDI within the context of profit-maximizing firms and wealth maximizing nations when foreign direct investment is included. The model shows that firms and nations that take advantage of opportunities to invest abroad will be on their wealth maximizing frontier. To the extent that higher levels of national income

contribute to economic growth, this can have the effect of raising the base level of income that also could be used for social programs. Our analysis of states also assumes firm maximizing behavior within the context of a standard production function and wealth-maximizing regions.

Theoretical Background of Firm Investment Decisions in Foreign Countries

In order to develop a model of the role of labor market institutions we expand upon a model of production with labor and capital and expand it to include the impact of labor market institutions in the production function. We then show how foreign investment leads to a firm's maximizing profits by engaging in FDI (Hufbauer, 1975). Our model assumes a standard Cobb-Douglas production function of the form:

$$X = A L^{\alpha} K^{\beta} \quad (1)$$

Where X is output, L is labor and K is capital.

The profit-maximizing firm will produce output at the level MR = MC.

Hence the profit-maximizing firm will produce output X at the output price p satisfying the following condition:

$$\begin{aligned} w &= (\alpha X/L)[X(d p/dx) + p] \\ c &= (\beta X/K)[X(d p/dx) + p] \end{aligned} \quad (2)$$

Assume following relationship between output X and national income Y,

y : National income

\$: Elasticity parameters (constant)

& : Income elasticity

$$X = p^{-\alpha} Y^{\alpha} \quad (3)$$

We also can write each country's average return as follows:

$$r = (pX - wL)/K \quad (4)$$

Now we have each country's average return in terms of c , α , β , γ

$$r = c[1 + 1/(\alpha \beta \gamma)] \quad (5)$$

From the equation (5), we can see that average return r depends on the cost of capital c , the elasticity of demand, and the value of α . The model predicts that foreign direct investment will flow from the country with low returns to capital to the countries with high returns to capital.

Unfortunately, empirical studies show no conclusive evidence of these flows (Hufbauer, 1975).

Using equation (2), we can rewrite (5) in terms of labor cost w

$$r = w(\alpha L/K)[1 + 1/(\alpha \beta \gamma)] \quad (a)$$

As wages go up, the average return will go down because the L/K ratio goes down.

We can divide the labor cost w into two parts. The first part is direct wages and benefits and the second part is non wage costs that may be incurred as a result of the industrial relations system.

$$w = w^M + w^{IR} \quad (b)$$

Equation (a) becomes

$$r = (w^M + w^{IR})(\alpha L/K)[1 + 1/(\alpha \beta \gamma)] \quad (a^*)$$

From the equation (a*), we can see that a country with higher non-wage costs will have lower average return, other things being equal. Since, α , β , γ , and c are country specific, the impact of the industrial relations system might differ among countries even with same non-wage costs.

The significance of the model shows that not only do labor costs and its marginal product matter, but that this also includes the non labor costs such as the ability to allocate labor in its most efficient manner, to fire employees, and to tailor wage agreements to the conditions at the

plant level. Nations with lots of collective bargaining legislation, work rules, and national bargaining over wages may drive up the allocation or non wage costs of labor more than they raise their marginal products.

What then are the benefits of foreign investment relative to continued investment in the home nation? For firms seeking either lower labor costs, or attempting to access more lucrative international markets, building new plants or other facilities and hiring more workers is the reason they might choose to invest in a foreign country. The general principal is maximizing risk- adjusted present value of long term profits.

In Figure one we show the effects of the potential benefits of international trade on firms and national income relative to a condition where no international direct investment is allowed or undertaken (Hufbauer, 1975). In the model the line R represents the risk- return path of the multinational company. C_1 and C_2 represent firms on the optimal risk-return frontier that includes international direct investment. If firm F_1 is not allowed or chooses to restrict its investment activity to only domestic activities it will lie below the optimal risk-return path. Consequently, for a firm which has international markets, investments outside the country do not need to yield the highest possible return or the lowest possible variance, but their combination of return and risk entitles them to a place in the firm's portfolio. As with any investment a significant factor is the cost of labor and its marginal product. To the extent that a firm or firms in a nation see relative costs and marginal products which differ across countries, they may choose to disinvest in that nation. If country i sees nation j as a relatively high cost region because of the social contract, restrictions on the allocation of labor, or overall labor costs, then investment would be relatively lower. On the other hand, firms in nation j may see i, with its

relatively low direct and social labor costs, and union-free environment, as a relatively good place to invest relative to other nations. Moreover, relatively higher labor costs in comparison to productivity in nation j may cause investments here to be further below the risk-return line and thus induce firms to look more closely at investment in other nations. Opportunities in the host country and in the destination region as well as the relative factor costs and productivities are assumed to be important in the determination of FDI. Consequently, relative conditions in both the origin and destination countries are assumed to be important for investment decisions. Unfortunately these models do not include the role of employee concerns within the economic structure.

A Game Theoretic Approach to the Trade-offs of FDI and the Industrial Relations System

The theory, thus far, has only examined the efficiency aspects of FDI. In this section we extend the model to also include the effects of industrial relations institutions (IR). However, countries also consider the industrial relations system as 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 (DeNardo, Fortin and Lemieux, 1996, Rees, 1963, and Freeman, 1994). 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. In this section we model how countries may consider both the industrial relations system and efficiency aspects 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 (eg. the U.S. A. and the E.U), and five nonmonotonic strategies with increasing values regarding the industrial relations system.. The payoff is constructed as follows: U^f is the additional FDI and is zero summed between the two countries A and B, U^c is the additional social benefit from implementing a specific IR system: this system is allowed to differ between countries and is non-linear. We also assume that country A starts from an IR system of 1, the lowest number of IR institutions, and that country B starts with a higher level of IR, say 4. In appendix A we solve for the equilibrium levels of both FDI and IR systems using Nash equilibrium approach. We also give examples of outcomes under conditions of efficiency only with no social benefits to an industrial relations system in the Appendix Table A1, and the case where there are explicit tradeoffs in the Appendix Table A2.. The optimal solutions show that there are four pure Nash equilibrium solutions in our model, which are all at the extremes of either the FDI or IR ranges. There are no interior solutions for the highly efficient case, but even with mixed strategies there are only solutions at the extremes of the strategies. From this model it suggests that there can be multiple equilibrium levels of trade-offs of equity for efficiency.

The Structure of the Industrial Relations System

In order to estimate 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 consistent with the theory developed by Slichter and Dunlop. Further, we also assume that there is an underlying structure that goes from a restrictive industrial relations policy to a lenient one.

We further hypothesize that there is a structure to the industrial relations system, and that it is linked in a hierarchical manner that provides a natural scaling of industrial relations characteristics in a nation and the degree or intensity with which those characteristics are implemented in a country. 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 variable will be divided into five categories to resemble a Likert-type scale. The factors are categorized from lowest to highest in terms of their restrictiveness of non wage costs to employers that would be reflected in the overall wage bill, which is consistent with theory. In order to examine the impacts of these variables 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 (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, which is known as a partial credit model. This model assumes that the distance between parameters is equal and that the categories are equal (Wang, 1996). Although we obviously do not include all of the factors that might go into a fully specified industrial relations system variable, we think that we can capture the major items to examine the effect of the industrial relations on economic efficiency.

Measuring Foreign Direct Investment

Firm- level investment is assumed to be an economic measure that is highly responsive to economic characteristics, and by extension to national institutions (Hirsch, 1991). Even if FDI

has measurement issues in capturing “pure gross investment,” it does enhance the economic prospects within a country by moving resources to their optimal use (Lipsey, 2000). For example, when FDI is not a true measure of net investment in the host country, (eg. a takeover of an existing establishment), it does, even in this case, provide benefits by moving less productive resources into their best economic use.

Analyzing investment patterns across countries, assumes that companies in nations are responsive to the economic characteristics of the investment country relative to opportunities in the host country. 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 i^{th} nation, and is consistent with other analysis of economic and industrial relations factors that affect 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 differences in institutions such as the industrial relations system in a country. However, given this construct, countries like the U.S. which have a large share of another countries’ FDI would usually be a disproportionate share just by virtue of its size. However, this is generally perceived to be a better measure of the flows of FDI relative to using total expenditures or gross inflows, which would have an even greater bias toward large nations. Our analysis includes 20 OECD countries using annual data for 10 years from 1985 to 1995.

Table 1 presents the means and standard deviations of the economic and institutional variables used in our model to test for the relationship of the industrial relations system and foreign direct investment. We present mean values and standard deviations showing country by country values for each of the economic and institutional variables to allow basic comparisons

for the countries in our sample. The results show that there is much variation in both the economic and institutional variables in our sample of nations. Our measure of the industrial relations system includes both the summated rating scale and the Rasch measure which includes the values for four industrial relations variables. We use collective bargaining coverage since countries like France have low unionization rates, but high coverage of the collective bargaining agreements for workers who do not belong to a union. We include the strike rate per thousand employees in our analysis, since this factor affects the ability of management to maintain a stable level of production with its workforce. As part of our measures of the industrial relations system, we present the level of bargaining centralization and coordination which reflects whether there is local or national wage bargaining in a manner developed by both Calmfors and Drifill (1988) as well as ones developed by Traxler and Kittel (2000). In this context the Calmfors and Drifill index of the industrial relations system is on 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. The last columns show measures 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 17 for Australia and Norway to a low of five for the United States. Our industrial relations system values, which uses a hierarchical scaling system finds results which are consistent with this scaling². Since there is no statistical or

²Each 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 variable has more other high intensity levels of industrial relations coverage. Estimates using factor analysis

theoretical reason to use one approach or 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 .67, which was statistically significant.

Assuming higher average returns will induce greater FDI, from our theoretical model of efficiency only developed in the previous sections, we can estimate the following equation to analyze the impact of the industrial relations system on FDI.

$FDI = f(\text{cost of capital, labor costs(wage, industrial relations system), other factors}) .$

This reduced form model would serve to analyze the extent of the hypothesized relationship between our scaled measure of the industrial relations system and country by country levels of investment.

Table 1 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 promote equity are also minimal. If there is an equity versus efficiency trade-off, having lots of institutions would lead to more FDI going to the U.S. and away from the E. U. countries. For measures of unionization we present both the percentage unionized and the percent covered by collective bargaining contracts. In addition to standard controls found in studies of FDI, we include the relative tax rate of the receiving relative to the host country in order to control for potential tax treat effects (Blonigen and Davies, 2000). Since we assume that countries with

found that all of these factors were highly intercorrelated, except for strike intensity, which had a negative factor loading.

similar industrial relations systems may want to invest in nations that have complementary systems, we control for this 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

A similar approach can be taken 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, 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. 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 that captures the systems approach (Freeman, 1986). In this model levels of economic efficiency follows a standard production function as specified in the equations one through three, but the capital market is assumed to be the same across U.S. states. Rather than measures of FDI, our estimates include gross state product, employment, and per capita income. Although there is no agreement regarding which of these factors is the best measure of economic efficiency, we will examine whether there are trade-offs between equity and efficiency across all three measures as sensitivity checks on our estimates. Similar to the variables used in our international measures, we use controls for labor that include quantity measured by population and nonagricultural employment in the state. Since the price of capital is the same across U.S. states there is no control for this measure. The benefit of using

this unit of analysis is the ability to difference out unobservables that is not easily accomplished in attempting to estimate international differences in economic efficiency. Moreover, this 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 Table 2 we show the basic values for the state level analysis. This table presents means for the basic changes in state output, employment, total exports, and per capita income during the period we analyze. In addition, we include the values for population, manufacturing employment, high school graduation rate, and our measure of industrial relations variables that comprise our index, which include labor union coverage density and measures of labor regulations such as unemployment insurance coverage, workers' compensation coverage, and minimum wages. We also find a high correlation for the measures of the industrial relations variables which comprises our industrial relations system measure. The Crombach's alpha measure of the inter correlation of the industrial relations variables was .85, which was statistically significant.

Estimates of the FDI Model

Table 3 gives multivariate estimates of the equation specified above using yearly data for the countries in our sample which is consistent with the efficiency-oriented theoretical model. We have year by country effects on FDI, our sample size ranges between 2666 to 2846 i to j observations, based on availability of purchasing power parity (PPP) data. Since there is some controversy about the role of PPP for economic variables, we present estimates using both adjusted and unadjusted values in columns one through four. Because we use panel data, we

present the within group, between group and overall measures of goodness of fit³. We use 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. The values of FDI are the outflow metric to the country used to measure investment. We also estimated a similar model using FDI inflow and found basically the same qualitative results as presented in Table 3. Further, statistical estimates for large trading blocks of countries like the U.S. and EU show similar qualitative results for the 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, average employee 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. Other factors which are constant over time include whether the nations with FDI outflows had the same language, and the distance in miles between the capitals of the two countries. In addition, we use the lagged value of FDI, the dependent variable, in the previous year to capture the secular trend of investment overtime⁴. 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. Nevertheless, our use of one variable to capture the industrial relations system, the use of yearly economic data, and

³We also estimated the model using generalized least squares estimates and found similar qualitative results, but even higher levels of significance and larger coefficient values for our IR system variables. Consequently, the results presented in Table 3 should be viewed as lower bound estimates of the impacts of industrial relations system variables on FDI.

⁴Estimates without the lag of investment showed similar results.

controls for capital markets should provide more consistent estimates of the overall role of institutions on capital market flows.

Our results show that the summated rating scale and the Rasch measures of the industrial relations system are statistically significant in three of the four specifications, and negatively related to FDI.⁵ These results are similar to ones found for the impact of labor variables for U.S. FDI outflows (Cooke and Noble, 1998, Cooke, 2000 and Bognanno et. al., 1998). Moreover, the coefficients for the other control variables are consistent with other studies of FDI that focus on taxes or exports and imports (Blonigen and Davies, 2000). We also estimated the equations using each variable separately, and found that the Calmfors and Driffill index was statistically significant in one of the specifications along with strike incidence index. These estimates are given in Appendix B. It appears that the industrial relations system matters rather than any one variable. To proxy a 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, the reduction in equity-based labor policies resulted in large gains in imports and foreign capital (Blumenfeld, Crawford, and Walsh, 2001).⁶

Beyond FDI activity, however, these industrial relations variable institutions have produced narrowed levels of wage and income dispersion within countries (Freeman and Katz, 1995, DiNardo, Fortin, and Lemieux, 1996). Consequently, the effect of industrial relations

⁵When 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).

⁶A country that arguably moved in the other direction was South Korea. They had few labor institutions in 1985, but greatly increased the number and kinds of collective bargaining-related institutions during the late 1980s and 90s.

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 in the form of less foreign investment. However, from our game theory solutions, countries may choose higher levels of industrial relations, which they see as optimal from a social perspective, even though it means lower levels of FDI.

U.S. State Level Evidence on Economic Efficiency

Table four shows the 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 changes in total state exports. We present two sets of econometric results. In the top panel 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 and ending year.⁷ In the bottom panel we show the effects of the industrial relations variable using year by year results from 1990 or 1993 to 1998 or 1999 using a pooled time series cross-section panel with a sample size ranging from 250 to 400. In the panel results we use the lag of the dependent variable to control for the secular trend of the state economic variables. The estimates of the industrial relations variables in both sets of specifications are generally robust for all the measures of economic efficiency, except for many of the specifications of the state exports equation. 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. In Appendix C we show the effects of individual industrial relations variables in our model on the measures of state economic

⁷Estimates using the Rasch approach showed similar statistically significant results. These estimates are available from the authors.

well-being. Unionization is significant in the specifications, but again it appears that the overall industrial relations system matters rather than any specific component of the index. These results are consistent with firm level analysis of human resource practices on productivity (Ichniowski, Shaw, and Prennushi, 1998).

The consistency of the measures of efficiency 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 make a difference in measures of economic efficiency. Although the coefficient values are not large, they support the view that there is a trade-off of equity for efficiency at the state level. Again consistent with our game theory approach, states may choose lower growth for the social gains from a more equitable labor market.

Counterfactual Simulations for Countries and States

Table 5 gives the results of a simulation for both international FDI, and for changes in state per capita income. In this simulation we use the coefficients from the regression estimates from Tables 3 and 4 to estimate the effect 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 the countries or states⁸. These results can be thought of as a counterfactual estimate of the impact a change in the industrial relations system on measures of economic efficiency 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

⁸Estimates using the Rasch approach for the coefficients for the industrial relations variables produced similar results for both international and state level estimates.

same industrial relations system as the U. S. on FDI. The results show that annual FDI inflow would be reduced by .5 percent for Japan, which is the nation with industrial relations system closest to the U.S. using our indices. In contrast, this assumed change to a U.S. industrial relations system would increase FDI inflows from the nations in our sample by 6 percent for Australia and Norway the countries with the highest level of worker-related benefits. Panel B presents our state level estimates and shows that a change from the industrial relations system in Arizona, the state with the lowest worker-related benefits relative to the other U.S. states. The results range from no change for a state like Mississippi to a growth of .88 percent per year in per capita income for several states like Michigan, New Jersey, Pennsylvania, Rhode Island, and Washington. 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 price of reduced economic growth.

Conclusions

This study has examined the effects of variations in the industrial relations system on direct foreign investment based on the destination of that investment activity and the impact of these system variables on measures of economic growth using U.S. states as observations. We implement a systems approach to examine the role of industrial relations on the amount of direct foreign investment in the destination nations. We state the rationale for this systems method using industrial relations theory rather than using a variable or a group of individual variables to analyze the effect of these institutions on direct foreign investment. In the context of theory, foreign investment opportunities should make the firm more profitable, and the nation more prosperous. Within a game theory approach nations can have multiple equilibriums when both

FDI and industrial relations are considered. Moreover, non wage industrial relations-related costs are shown to contribute to the economic returns to capital and labor in a standard production function. The measures that we use seem to fit into this systems approach and include measures of unionization, strike activity, and centralization of bargaining, which are available for 20 OECD nations for the ten years 1985 through 1995, and U.S. 50 states from 1990 to 1999.

Estimates of our reduced form model, which is consistent with theory, shows that the industrial relations system is usually significant based on the form of the specification of the systems variable. Moreover, using estimates from our statistically significant specifications for the industrial relations system, a movement from a country with institutions like Australia to ones like the U.S. would diminish the host nations FDI by approximately 6 percent per year. However, the transactions costs of changing an industrial relations system is presumably high, although countries like New Zealand and South Korea have done so with some economic efficiency affects.

New developments by unions as a response to issues of globalization in both the E. U. and U.S. may have complex roles to play in future analysis of the role of industrial relations and FDI. For example, commercial airline pilots have formed alliances to deal with multinational companies and are attempting to equalize wages across regions of the world. Unions leaders at Diamler-Chrysler in Germany and the U.S. have met to establish common areas of interest for collective bargaining. If these examples of globalization expand to a much larger extent, variances of FDI based on labor issues would likely narrow as cross-national differences in bargaining institutions narrow.

For U.S. states, areas with few labor market restrictions like Arizona, Georgia, and Nebraska, are more likely to experience economic growth than states with many restrictions and public policies that provide greater worker protection like New York and Connecticut. Given this trade-off, policy makers and interest groups need to be aware of the efficiency consequences of their constituents equity concerns.

Our results suggest that firms tend to be somewhat sensitive to the industrial relations climate preferring ones that provide management with a greater amount of leeway in decision-making. Of course the public policy arena must consider more than foreign investments by large firms in their choice of the kinds of an industrial relations and social climate it wishes 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 that are the unintended consequence of these policies. The estimates along with the interviews with executives in multi-national firms conducted for this study, do suggest some trade-off of “equity for efficiency”(Okun, 1975, Freeman, 2000). Further examination using more nations and time periods with fixed effects of changers to different systems, as well as using more microeconomic data and field interviews may complement the insights into this issue which can be provided by this large scale analysis using aggregate data.

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Figure 1

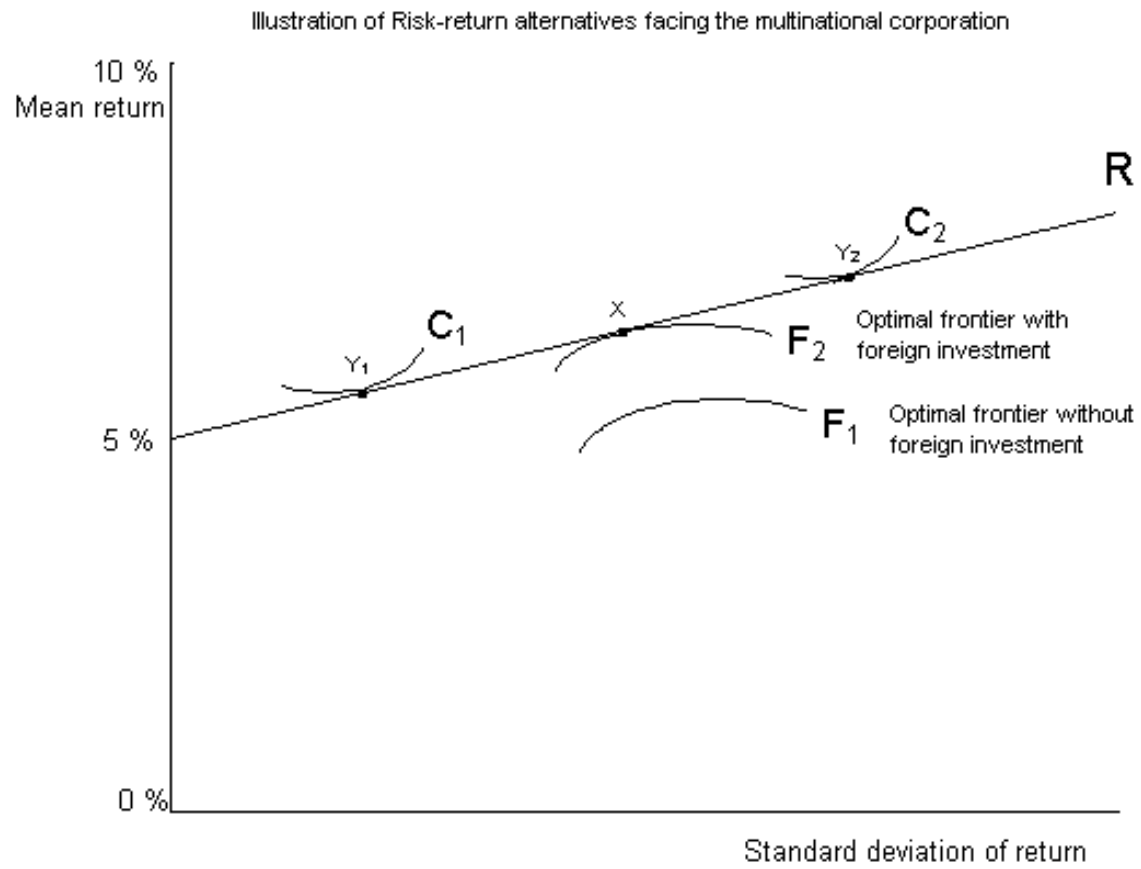


Table 1. Summary of Economic and Industrial Relations System Variables by Country (1985-1995) *

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	17	1.00
Austria	22,553 (3776)	19,818 (5939)	-0.054 (.01)	7.13 (1.11)	7.39 (0.83)	5.05 (0.66)	85.02	14	0.32
Belgium	29,403 (5591)	19,676 (5846)	-0.013 (.03)	6.79 (.47)	8.61 (1.14)	11.12 (1.52)	79.10	13	0.15
Canada	25,411 (3827)	18,503 (2548)	0.024 (.01)	8.48 (1.58)	9.54 (1.03)	9.56 (1.35)	70.28	9	-0.54
Denmark	20,469 (3187)	23,779 (6019)	0.006 (.03)	7.17 (.92)	9.51 (1.39)	9.87 (1.58)	98.91	14	0.32
France	25,772 (3560)	19,596 (4901)	-0.007 (.01)	7.89 (1.04)	9.15 (1.40)	10.41 (1.04)	73.62	11	-0.18
Germany	23,733 (3070)	19,515 (6685)	0.032 (.018)	6.41 (.47)	7.17 (0.83)	7.82 (1.08)	87.35	14	0.32
Greece	13,309 (1294)	7,567 (2007)	-0.125 (.02)	7.75 (3.91)	19.82 (2.29)	8.21 (1.08)	78.23	15	0.51
Italy	23,904 (3429)	23,274 (5521)	-0.010 (.02)	7.09 (.79)	12.09 (1.26)	9.95 (1.09)	52.62	16	0.73
Japan	23,352 (3788)	26,724 (8764)	0.022 (.01)	8.11 (1.55)	5.21 (1.07)	2.54 (0.35)	93.60	6	-1.36
Korea	12,116 (3818)	4,688 (1990)	-0.024 (.01)	- ³	13.54 (1.52)	2.75 (0.62)	85.50	7	-1.00

Netherlands	26,213 (3725)	18,301 (4871)	0.022 (.02)	7.11 (1.41)	7.24 (0.95)	7.12 (1.21)	73.81	12	-0.02
New Zealand	15,860 (2006)	12,241 (2544)	0.002 (.02)	9.64 (1.79)	11.72 (3.86)	6.97 (2.50)	. ³	13	0.15
Norway	22,620 (4118)	25,773 (5490)	0.043 (.03)	6.47 (.64)	10.45 (2.43)	4.33 (1.55)	76.35	17	1.00
Portugal	12,001 (2301)	6,801 (2725)	-0.123 (.04)	7.93 (1.94)	18.72 (5.29)	6.17 (1.64)	31.22	12	-0.02
Spain	22,860 (3718)	10,720 (3593)	-0.052 (.01)	8.25 (1.94)	12.15 (1.45)	20.05 (2.73)	63.55	12	-0.02
Sweden	22,057 (3229)	22,829 (4972)	0.020 (.02)	6.42 (1.40)	10.92 (1.43)	4.04 (2.72)	80.75	16	0.73
Switzerland	29,586 (5161)	31,031 (8049)	-0.024 (.02)	6.85 (1.09)	5.03 (0.93)	1.90 (1.76)	84.56	9	-0.54
U.K.	22,281 (3062)	15,459 (3417)	-0.025 (.01)	6.98 (.84)	9.58 (1.29)	9.10 (1.99)	78.20	11	-0.18
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	5	-1.97

Note

* 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

Table 2. Summary of Economic and Industrial Relations System Variables by State

State	Gross State Product ¹	Per Capita Income ²	Total Exports ³	Population ²	Employment ²	Manufacturing Employment ²	High School Graduation Rate	SR 1990	SR 1999	Rasch 1990	Rasch 1999
Alabama	90	19	3,844	4,230	2,233	394	67	9	10	-1.4	-1.2
Alaska	24	26	875	596	367	19	87	25	23	4.2	2.2
Arizona	97	21	9,361	4,219	2,255	203	79	6	5	-2.9	-4.0
Arkansas	50	18	1,764	2,459	1,356	256	66	11	12	-0.9	-0.7
California	914	25	91,772	31,502	17,354	2,004	76	16	16	0.2	0.2
Colorado	104	25	9,572	3,681	2,418	206	84	13	14	-0.5	-0.3
Connecticut	116	32	11,834	3,275	1,986	301	79	22	23	1.8	2.2
Delaware	26	26	4,446	713	447	64	78	16	17	0.2	0.4
Florida	329	23	19,720	14,080	7,529	513	74	10	9	-1.2	-1.4
Georgia	191	22	8,927	7,126	4,155	587	71	7	7	-2.2	-2.2
Hawaii	36	25	252	1,166	745	21	80	21	19	1.4	0.9
Idaho	24	19	1,652	1,140	656	76	80	15	12	0.0	-0.7
Illinois	344	25	29,501	11,820	6,780	977	76	21	21	1.4	1.4
Indiana	141	22	11,826	5,760	3,346	672	76	10	14	-1.2	-0.3
Iowa	69	21	2,725	2,830	1,776	252	80	17	19	0.4	0.9
Kansas	63	22	4,348	2,571	1,605	200	81	12	10	-0.7	-1.2
Kentucky	87	19	5,818	3,832	2,092	312	65	13	15	-0.5	0.0
Louisiana	108	19	4,117	4,308	2,193	194	68	7	7	-2.2	-2.2
Maine	27	20	1,402	1,240	718	100	79	22	16	1.8	0.2
Maryland	135	27	3,493	4,996	2,807	190	78	16	16	0.2	0.2
Massachusetts	191	28	14,984	6,064	3,712	474	80	21	23	1.4	2.2
Michigan	239	23	36,578	9,616	5,115	969	77	22	19	1.8	0.9
Minnesota	127	25	12,567	4,582	2,978	434	82	19	22	0.9	1.8
Mississippi	51	17	1,255	2,673	1,349	257	64	6	6	-2.9	-2.9
Missouri	132	22	6,222	5,300	3,192	430	74	12	14	-0.7	-0.3
Montana	17	19	335	851	498	28	81	15	13	0.0	-0.5
Nebraska	42	22	2,195	1,627	1,073	112	82	9	12	-1.4	-0.7
Nevada	46	25	717	1,502	956	37	79	14	19	-0.3	0.9
New Hampshire	31	25	1,669	1,145	684	109	82	12	15	-0.7	0.0
New Jersey	262	29	18,569	7,943	4,369	523	77	22	22	1.8	1.8
New Mexico	39	18	1,268	1,650	872	50	75	9	10	-1.4	-1.2
New York	586	28	43,536	18,121	9,760	1,006	75	20	15	1.1	0.0
North Carolina	184	22	11,242	7,136	4,331	860	70	14	15	-0.3	0.0
North Dakota	14	19	530	638	413	22	77	14	14	-0.3	-0.3
Ohio	281	23	22,442	11,103	6,279	1,107	76	20	17	1.1	0.4
Oklahoma	68	19	2,466	3,256	1,808	181	75	10	10	-1.2	-1.2
Oregon	78	22	8,463	3,105	1,839	244	82	21	20	1.4	1.1
Pennsylvania	304	24	17,283	11,998	6,493	983	75	22	21	1.8	1.4
Rhode Island	25	24	1,029	994	546	89	72	22	22	1.8	1.8
South Carolina	82	19	4,880	3,691	2,050	376	68	9	8	-1.4	-1.7
South Dakota	17	20	454	720	463	45	77	9	8	-1.4	-1.7
Tennessee	127	21	8,797	5,195	3,101	535	67	8	11	-1.8	-0.9
Texas	497	22	49,512	18,517	10,469	1,073	72	8	10	-1.8	-1.2
Utah	44	19	2,649	1,942	1,139	126	85	13	11	-0.5	-0.9
Vermont	14	21	2,579	580	363	50	81	18	19	0.6	0.9
Virginia	183	24	10,445	6,554	3,934	420	75	9	10	-1.4	-1.2
Washington	148	24	29,503	5,363	3,134	375	84	22	24	1.8	3.0
West Virginia	34	18	1,055	1,810	833	87	66	15	15	0.0	0.0
Wisconsin	127	22	8,245	5,099	3,098	602	79	18	18	0.6	0.6
Wyoming	15	22	128	472	298	12	83	11	9	-0.9	-1.4

¹ In Billion² In Thousand³ In Million

Table 3. Impact of the Industrial Relations System on the Percent of Total Net FDI Outflows (1985 - 1995)¹

	Adjusted by PPP		Not Adjusted by PPP	
	(1)	(2)	(3)	(4)
Host Country IR System (Summated Rating)	-.005 (.003)		-.008 * (.002)	
Host Country IR System (Rasch)		-.029 * (.012)		-.042 * (.011)
Language Complementarities	.088 * (.030)	.088 * (.030)	.097 * (.029)	.094 * (.029)
IR System Complementarities	.016 (.019)	.017 (.019)	.015 (.019)	.016 (.019)
High School Graduation Rate ²	.0004 (.0006)	.0004 (.0006)	.0004 (.0006)	.0005 (.0006)
Distance Between Countries	-.004 * (.002)	-.005 * (.002)	-.004 * (.002)	-.005 * (.002)
Employee Compensation Differences ³	-.002 (.003)	-.002 (.003)	-.001 (.001)	-.001 (.001)
Interest Rate Differences ³	-.006 (.003)	-.006 (.003)	-.004 (.003)	-.004 (.003)
Tax Rate	-.014 * (.006)	-.015 * (.006)	-.015 * (.006)	-.016 * (.006)
GDP per Capita ³	.007 (.005)	.005 (.005)	-.001 (.002)	-.002 (.002)
(Export-Import) ³	.132 (.224)	.189 (.225)	.332 (.225)	.388 (.225)
Unemployment Rate ³	.003 (.002)	.003 (.002)	.002 (.002)	.002 (.002)
Lag Dependent Variable	.016 (.022)	.015 (.022)	.019 (.021)	.017 (.021)
Constant	.100 (.102)	.056 (.094)	.253 * (.078)	.157 * (.071)
No. of Observations	2200	2200	2290	2290
R ²				
Within	.023	.024	.021	.023
between	.640	.654	.557	.575
overall	.027	.028	.023	.025

Note

* Significant at 5% level

¹ Standard Errors in Parenthesis and all results include year dummies and Union coverage data dummy

² Average over Various years

³ Three Year Moving Average (1983 - 1995)

Table 4. Impact of the Industrial Relations System on Economic Efficiency of U.S. States¹

A. % change between 1990-1999

	Independent Variables		Sample Size	R ²
	IR Index 1990 ³	IR Index 1999 ³		
Gross State Product ²	-2.08 * (.50)		50	.30
		-1.60 * (.56)	50	.17
Per Capita Income	-.65 * (.17)		50	.37
		-.47 * (.19)	50	.26
Employment	-1.26 * (.27)		50	.37
		-1.07 * (.30)	50	.26
Total Exports ⁴	-4.79 (3.02)		50	.14
		-4.32 (3.17)	50	.13

B. % Change over a Year (Panel 1990-1999)

Gross State Product ²	-.11 * (.03)		350	.19
		-.08 * (.03)	350	.17
Per Capita Income	-.05 * (.02)		400	.11
		-.04 * (.02)	400	.10
Employment	-.06 * (.01)		400	.44
		-.05 * (.01)	400	.42
Total Export ⁴	-.53 * (.27)		250	.03
		-.47 (.28)	250	.03

* Significant at 5% level

¹ All regressions include constant and control variables; high school graduation rate, log of population and manufacturing employment. Panel B also includes lag dependent variable as a control. Standard errors are in parenthesis. Economic Data is from the

² Gross State Product includes only data through 1998

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

⁴ Export estimates only includes data from 1993

Table 5. Simulated Impacts of Changes in the IR System on Changes on Economic Efficiency from the Country/State with the Lowest IR Value

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

Country	Change in FDI (SR)	Country	Change in FDI (SR)
Australia	6.00%	Korea	1.00%
Austria	4.50%	Netherlands	3.50%
Belgium	4.00%	New Zealand	4.00%
Canada	2.00%	Norway	6.00%
Denmark	4.50%	Portugal	3.50%
France	3.00%	Spain	3.50%
Germany	4.50%	Sweden	5.50%
Greece	5.00%	Switzerland	2.00%
Italy	5.50%	U.K.	3.00%
Japan	0.50%	U.S.	-

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

State	Change in Per Capita Income (SR90)	State	Change in Per Capita Income (SR90)
Alabama	0.16%	Montana	0.49%
Alaska	1.04%	Nebraska	0.16%
Arizona	-	Nevada	0.44%
Arkansas	0.27%	New Hampshire	0.33%
California	0.55%	New jersey	0.88%
Colorado	0.38%	New Mexico	0.16%
Connecticut	0.88%	New York	0.77%
Delaware	0.55%	North Carolina	0.44%
Florida	0.22%	North Dakota	0.44%
Georgia	0.05%	Ohio	0.77%
Hawaii	0.82%	Oklahoma	0.22%
Idaho	0.49%	Oregon	0.82%
Illinois	0.82%	Pennsylvania	0.88%
Indiana	0.22%	Rhode Island	0.88%
Iowa	0.60%	South Carolina	0.16%
Kansas	0.33%	South Dakota	0.16%
Kentucky	0.38%	Tennessee	0.11%
Louisiana	0.05%	Texas	0.11%
Maine	0.88%	Utah	0.38%
Maryland	0.55%	Vermont	0.66%
Massachusetts	0.82%	Virginia	0.16%
Michigan	0.88%	Washington	0.88%
Minnesota	0.71%	West Virginia	0.49%
Mississippi	0.00%	Wisconsin	0.66%
Missouri	0.33%	Wyoming	0.27%

Appendix A: Solutions and Examples

The Nash equilibrium solutions are as follows:

Definition : In the n-player normal game $G = \{S_1, \dots, S_n; u_1, \dots, u_n\}$, the strategies (s_1^*, \dots, s_n^*) are a Nash equilibrium if, for each player i , s_i^* is (at least tied for) player i 's best response to the strategies specified for the $n - 1$ other players,

$$(s_1^*, \dots, s_{i-1}^*, s_{i+1}^*, \dots, s_n^*):$$

$$u_i(s_1^*, \dots, s_{i-1}^*, s_i^*, s_{i+1}^*, \dots, s_n^*) \geq u_i(s_1^*, \dots, s_{i-1}^*, s_i, s_{i+1}^*, \dots, s_n^*)$$

for every feasible strategy s_i in S_i ; that is, s_i^* solves

$$\max_{s_i \in S_i} u_i(s_1^*, \dots, s_{i-1}^*, s_i, s_{i+1}^*, \dots, s_n^*).$$

Definition : In the normal-form game $G = \{S_1, \dots, S_n; u_1, \dots, u_n\}$, suppose $S_i = \{s_{i1}, \dots, s_{iK}\}$. Then a mixed strategy for player i is a probability distribution $p_i = (p_{i1}, \dots, p_{iK})$, where $0 \leq p_{ik} \leq 1$ for $k = 1, \dots, K$ and $p_{i1} + \dots + p_{iK} = 1$.

[From R. Gibbons, 1992, p. 8 and 31]

In our model;

There are only two countries A and B ($n=2$) with 5 strategies ($K=5$).

Also, the payoff is constructed as following;

We separate the payoff u in two parts u^f and u^c .

u^f is the gain of FDI and is zero sum between two countries.

u^c is the gain of social benefit from implementing IR system, is allowed differ between countries, and is non-linear.

We also assume that country A starts from IR system = 1 (ex. U.S.) and country B starts from IR system = 4 (ex. EU)

Table A1. Normal Form Game when $U = U^f$

B

A

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

Table A2. Normal Form Game when $U = U^f + U^c$

B

A

	1	2	3	4	5
1	-2.4 0.	-2.6 1.	-2.8 2.	-3. 3.	-2.4 4.
2	-1.4 -0.33	-1.6 0.67	-1.8 1.67	-2. 2.67	-1.4 3.67
3	-0.4 -0.67	-0.6 0.33	-0.8 1.33	-1. 2.33	-0.4 3.33
4	0.6 -0.33	0.4 0.67	0.2 1.67	0. 2.67	0.6 3.67
5	1.6 0.	1.4 1.	1.2 2.	1. 3.	1.6 4.

Appendix B.. Impact of the Industrial Relations System on the Percent of Total Net FDI Outflows (1985 - 1995)¹

	Adjusted by PPP	Not Adjusted by PPP
Union Coverage	-0.002 (.006)	-0.002 (.006)
Strike	-0.023 * (.007)	-0.025 * (.006)
Bargaining Centralization	-0.014 (.009)	-0.021 * (.009)
Bargaining Level	-0.001 (.009)	-0.002 (.009)
Language Complementarities	.102 * (.030)	.110 * (.029)
IR System Complementarities	.016 (.019)	.014 (.019)
High School Graduation Rate ²	.0003 (.0007)	.0005 (.0006)
Distance Between Countries	-0.004 * (.002)	-0.004 * (.002)
Employee Compensation Differences ³	.000 (.003)	-0.001 (.001)
Interest Rate Differences ³	-0.007 * (.003)	-0.006 * (.003)
Tax Rate	-0.012 * (.006)	-0.013 * (.006)
GDP per Capita ³	.007 (.005)	-0.002 (.002)
(Export-Import) ³	.087 (.223)	.287 (.234)
Unemployment Rate ³	.006 (.002)	.004 (.002)
Lag Dependent Variable	.012 (.022)	.014 (.021)
Constant	.105 (.104)	.249 * (.079)
No. of Observations	2200	2290
R ² Within	.027	.027
between	.642	.599
overall	.031	.029

Note

* Significant at 5% level

¹ Standard Errors in Parenthesis and all results include year dummies and Union coverage data dummy

² Average over Various years

³ Three Year Moving Average (1983 - 1995)

Appendix C. Impact of the Industrial Relations System on Economic Efficiency of U.S. States¹

A. % change between 1990-1999

	Independent Variables					Sample Size	R ²
	% of Unemp. Rec'v UI Benefits 1988	Max. WBA for UI, 1990	Union Coverage 1990	Min. Wage July 30, 1990	Max. Wkly Benefits for Permanent Total Disability 1990		
Gross State Product ²	-2.09 (2.33)	-1.21 (2.49)	-5.40 (2.83)	1.06 (3.94)	-1.63 (2.08)	50	.33
Per Capita Income	-1.41 (.78)	.50 (.84)	-.85 (.95)	-.47 (1.32)	-1.18 (.70)	50	.41
Employment	-1.06 (1.26)	-.52 (1.35)	-3.40 * (1.54)	.83 (2.14)	-1.50 (1.13)	50	.40
Total Exports ⁴	-11.99 (13.69)	-14.32 (14.65)	-25.82 (16.65)	42.70 (23.13)	.56 (12.23)	50	.23

B. % Change over a Year (Panel 1990-1999)

Gross State Product ²	-.10 (.11)	-.09 (.12)	-.38 * (.14)	.11 (.19)	-.01 (.10)	350	.20
Per Capita Income	-.10 (.07)	.06 (.07)	-.13 * (.08)	-.03 (.12)	-.07 (.06)	400	.12
Employment	-.04 (.05)	-.05 (.05)	-.25 (.06)	.11 (.09)	-.002 (.05)	400	.45
Total Export ⁴	-1.42 (1.21)	-2.06 (1.32)	-2.43 (1.48)	5.04 (2.07)	-.08 (1.09)	250	.06

* Significant at 5% level

¹ All regressions include constant and control variables; high school graduation rate, log of population and manufacturing employment. Panel B also includes lag dependent variable as a control. Standard errors are in parenthesis. Economic Data is from the

² Gross State Product includes only data through 1998

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

⁴ Export includes only data from 1993

