# Foreign Direct Investment, Global Value Chains, and Labor Rights: No Race-to-the-Bottom?

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**Abstract**

In a stylized model of multinational firms choosing host locations for their global value chains, host-country governments choose the strength of collective-bargaining rights that allow their workers to receive a share of the resulting quasi-rents. Each government must trade off the direct benefit of stronger bargaining rights against both the effect of chasing multinationals away to rival countries and general-equilibrium effects of discouraging investment in the industry altogether. We find that an increase in globalization in the sense of lower transaction costs has no effect on equilibrium workers' rights, but

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adding more countries to the global trading system tends, in the limit, to *weaken* them. Thus, as a matter of theory, the effect of globalization on labor rights is ambiguous.

Empirically, we find little evidence that globalization drives movements in labor rights in either direction.

# 1 Introduction.

Every country regulates labor standards for its workers, such as workplace safety conditions or collective-bargaining rights. We ask how globalization affects a government's incentives to do so. In a world in which countries compete for work in a system of globalized supply chains, it is sometimes argued that governments will choose weaker labor standards than optimal in order to make themselves more attractive to multinationals than competing countries – the 'race to the bottom.'

The idea that globalization puts downward pressure on labor rights (as well as environmental regulations and other policies) is widespread in critiques of globalization by non-economists. As phrased by Robert Kuttner (2011):

> The core problem is the increased economic leakiness resulting from globalisation. This leakiness has created a competitive dynamic that fosters a 'race to the bottom.' With jobs and investment highly mobile internationally, countries have an incentive to adopt policies that suppress wages, demand growth, and labour, social, and environmental protection. The reasoning is that this will make them more attractive to corporations and as a site for foreign direct in-

vestment (FDI).

Drezner (2000) provides many examples of this argument and discusses anecdotal evidence against the claim, suggesting that the race-to-the-bottom hypothesis is a myth that persists because it is useful for activists and also for corporations that wish to evade responsibility for misconduct.

The essence of the race-to-the-bottom question is whether, *when participation in global value chains becomes more feasible through the process of globalization, governments have an incentive to choose weaker labor standards.* We will argue that the existing work on this topic does not address this question precisely but related, different ones. We study this question in a stylized equilibrium model in which production of final goods requires a continuum of tasks; each producer must choose in which country each productive task will be performed by local workers; and each government must choose the policies that determine the strength of collective-bargaining rights for its workers, taking into account how this may affect location decisions of firms. We find two contrasting results.

First, consider the case in which international transport/transaction costs fall so that multinational firms move more of their global value chains to host countries. We call this the effect of 'globalization at the intensive margin.' In our model, this kind of globalization has *no* effect on equilibrium collective-bargaining rights. A government considers three effects that result from strengthening the labor rights. First, the direct benefit; for any given amount of available quasi-rent, stronger worker bargaining power allows its workers to capture a higher income. Second, there is a cost that results from driving a certain fraction of multinationals away from that country and toward

other host countries. We can call this the 'competition effect.' This is the term that is emphasized by critiques of globalization. Third, there are general-equilibrium effects: The country's aggressive pro-labor policy can discourage some firms from entering the industry, resulting in reduced product variety that harms everyone. Essentially, the 'race to the bottom' argument is based on an assumption that increased quasi-rents from reduced transaction costs result in governments being more fearful of losing any multinationals, so that the competition effect becomes larger, causing the government to weaken the labor rights. However, in our model the real value of *all three terms* is increased equally by globalization at the margin, resulting in no change in incentives. The increased size of the pie in real terms increases both the reward and the costs to collective-bargaining rights in equal proportion.

Second, consider the case in which the number of potential host countries rises, holding the size of the world economy fixed. We call this 'globalization at the extensive margin.' In this case, in the limit, globalization drives collective bargaining rights to zero. In the long run, each country's share of potential quasi-rents becomes small, but the competition effect does not. When there are many similar host countries, a small increase in worker rights can drive almost all multinationals away to competitors, so competition between host countries eliminates collective-bargaining rights in the limit.

It should be underlined that in our model, in a closed economy there would be no rationale for labor standards to begin with, because their function is to transfer income from the foreign multinational to domestic workers. Therefore, the effect of globalization on labor standards is ambiguous. There is no theoretical presumption in favor of a race-to-the-bottom effect or a race-to-the-top

effect.

This is all in the context of a model that can be argued to be biassed in favor of finding a race-to-the-bottom effect, because in this model a country strengthening its labor rights can only discourage multinationals from using it as a host. Numerous authors have pointed out that there are reasons multinationals can under some conditions be *attracted* by strong labor rights, including the likelihood that they help promote a skilled workforce and can help improve the firm's image with consumers (Rodrik (1996), Drezner (2000), Blanton and Blanton (2012)).

In preliminary empirical work, we find no strong evidence for an effect of globalization on labor rights. Neither our empirical proxy for intensive-margin nor for extensive-margin globalization has a significant effect on collective-bargaining rights, controlling for pre-existing conditions and instrumenting for endogenous globalization. We do, however, find tentative evidence that globalization is more likely to raise labor standards for countries whose competitors for FDI are nearby, and to lower standards for those with farther-away competitors. But all magnitudes are small.

The following section reviews relevant previous work on the topic. Section 3 presents our theoretical model, 4 lays out an empirical strategy, and 5 presents empirical results.

# 2 Previous work.

We will take a moment to review earlier related work, first in the theoretical literature and then in the empirical.

*Theoretical work.* Chau and Kanbur (2006) study equilibrium labor standards in a general-equilibrium model of LDC's that compete in an industrial-country export market. Larger countries have more of an incentive to tighten standards than small ones, owing to the terms-of-trade effect by which increases in the standard create increased local marginal costs, which are passed on to foreign consumers through a higher price. Labor standards are strategic substitutes or complements depending on the shape of the importing-country's demand curve. The terms-of-trade effect is closely related to our own finding that labor standards can be above the optimal level under globalisation. A related argument is made in Dehejia and Samy (2004). Felbermayr, Larch, and Lechthaler (2012) show that a country can impose a negative externality on trade partners by making its unemployment insurance more generous, leading to more generous labor-market protection in more open economies. In related work slightly farther from our interest here, Chau and Kanbur (2013) study how bargaining with asymmetric information between a firm and its unionized workers is affected by the opportunities of the firm to move its capital to other countries, and Chau (2016) studies how equilibrium is affected by anti-sweatshop regulations in a closed-economy setting.

Davies and Vadlamannati (2013) study a partial-equilibrium model in which each FDI host country must set collective-bargaining rights, which determines the bargaining power of local labor unions vis-a-vis a multinational. Increasing the bargaining power of local workers directly raises social welfare by ensuring higher wages in any bargaining match, but indirectly lowers social welfare by driving away some multinationals, convincing them to locate in a rival country instead. In this framework, labor standards exhibit strategic complementarity:

Stronger worker bargaining power in one country drives more multinationals to rival countries, allowing them to choose stronger bargaining power for their own workers.

*Difference from the present paper.* These approaches all take the degree of globalization as given, and therefore they look at related questions separate from our main interest: The effect of increased 'globalization,' or increased integration between countries, in a many-country world, on equilibrium choices of labor standards in host countries.[1] We set up a stylized model of trade in tasks with many countries that allows us to increase globalization in different ways and see how labor standards adjust.

*Empirical work.* It has been more common for empirical studies to look at the direction from human rights or labor rights to FDI than the other way around, which is our interest. Harms and Ursprung (2002) use Freedom House indexes for measures of civil rights and find that improvement of civil rights positively affects FDI flows. Li and Reuveny (2003) examine how FDI affects democracy and find the effects are positive. Blanton and Blanton (2007, 2012) examine how human rights affect FDI flows and look at the other direction as well. They find that the effects are positive in the both directions in the earlier study, and negative overall but positive for manufacturing FDI in the later one. Asiedu and Lien (2010) find that the effect of democracy on FDI depends on the importance of natural resources in the host country's exports. Democracy leads to the increase in FDI in countries where the share of natural resources in total exports is low, but it reduces FDI in countries where exports

[1]The exception is Felbermayr, Larch, and Lechthaler (2012), whose policy focus on unemployment insurance is different from ourss.

are dominated by natural resources. In estimation, they employ dynamic panel analyses to address reverse causality and endogeneity of FDI.

A number of papers look at the effects of standards on FDI flows. Rodrik (1996) examines how labor standards affect U.S. outward FDI and finds that the effect of the total number of ILO convention ratifications is statistically insignificant but the effect of democracy is positive. On the other hand, Cooke and Noble (1998) find that the number of ILO convention ratifications positively affects U.S. outward FDI.

Kucera (2002) looks at core labor standards as FDI determinants. Core labor standards include four elements (Martin and Maskus, 2001): (i) elimination of exploitative use of child labor; (ii) prohibition of forced labor; (iii) elimination of discrimination in employment (normally gender inequality); and (iv) freedom of association and collective bargaining (FACB). Among them, FACB is the most relevant to our interest, and he finds that the effects of FACB on FDI are insignificant. One noble feature in Kucera (2002) is that he constructed an index based on coding textual information, which measures how well FACB rights in a country are respected in laws and practices.

Neumayer and De Soysa (2006) examine how globalization such as trade openness and FDI affect FACB rights. They find that trade openness positively affects FACB, while the effects of FDI are insignificant. Since their analysis is cross-sectional, they cannot address the question of how a rise in globalization affects a government's incentives over time.

Mosley and Uno (2007) expand Kucera's index to have annual data for the period of 1986-2002 and do a panel analysis (but with no fixed effects). They find that FDI is positively related to the rights of workers, suggesting "climb to

the top," but that trade openness is negatively related to it, implying "race to the bottom." However, they do not address endogeneity of FDI in estimation.

A major problem with this line of research is the endogeneity of FDI. Any shock to an economy is likely to have an effect on FDI, and if the shock also has an effect on labor rights, then treating FDI as an exogenous variable will lead to biased estimates of its effects. For example, if a political party takes power that is committed to a 'pro-business' agenda that includes restrictions on union formation and collective bargaining, as well as lower corporate income taxes, the result could be both a surge in inward FDI and deterioration in labor rights. This would result in a spurious negative correlation between FDI and labor rights. This endogeneity issue has been ignored in most of the studies to date.

The two most closely related papers to ours are Davies and Vadlamannati (2013) and Olney (2013). These both use the Mosley and Uno (2007) data in a cross-country panel regression. The main focus for both is estimating the effect of a change in one country's labor standard on its competitor countries' labor standards, both finding evidence of strong complementarity. In a two-country model, this would imply upward-sloping reaction functions. The present paper has a different focus, in effect asking how the reaction functions shift when globalization increases, rather the sign of the slope.

*Difference from the present paper.* In summary, although several papers look at the effect of FDI on labor rights along with trade effects, those that face the endogeneity issue ask a different question from our focus. They zero in on the sign of the *slope* of each country's reaction function. By contrast, we try to find an effect of an exogenous rise in access to global capital on the

labor-standard Nash equilibrium, which is essentially about the direction in the *shift* in the reaction functions.

# 3 Theory.

Here we present a simple, stylized model of international integration of labor markets with endogenous provision of collective-bargaining rights.

To talk about collective-bargaining rights, we need a model with some surplus over which employers and workers can bargain. The most natural way to incorporate these elements is to allow for monopolistic competition, in which a firm must make a fixed sunk cost in a county before it can produce, and then the workers bargain over the quasi-rent.

Suppose there are $N+1$ countries $j = 0, 1, 2, \ldots N$. Country $j$ has $L^j$ units of labor. Think of country 0 as the home country to multinational producers. We might call country 0 'North' and countries 1 through $N$ together 'South.'

There is a numeraire good, good $Y$, produced in each country with constant unit marginal product of labor. This will tie down the wage to unity in each economy, for any worker who does not benefit from collective bargaining, as discussed below. In addition, there is a sector of differentiated goods. The composite good is denoted $X = \left(\int_0^N x(i)^\eta di\right)^{\frac{1}{\eta}}$, where $x(i)$ denotes the quantity of good $i$ consumed and $\eta \in [0, 1]$ is a constant. All consumers have Cobb-Douglas preferences, with a weight of $\alpha$ on the composite differentiated good.

A producer of a differentiated good must perform one unit each of tasks $z \in [0, 1]$ in order to produce one unit of output. The labor required to do

one unit of task $z$ in country $j$ is $\delta^j a_z^j$, where $\delta^j \geq 1$ is a country-specific cost term that captures the difficulty of offshoring a task across borders, and $a_z^j$ is a country- and task-specific cost shock. For each $z$, $a_z^j$ is distributed Weibull, with shape parameter $\nu > 0$ and scale parameter 1. These values are independently distributed across tasks. The distribution of costs in countries 0 and any other country $j$ with $j \geq 1$ is independent, but all countries $j \geq 1$ have the same realized costs.

There is a fixed and sunk cost of entering the differentiated-products sector, amounting to $F^e$ units of the numeraire good. In addition, in order to perform any tasks in a given country $j$, a firm $i$ must first incur a fixed and sunk cost $F + \epsilon^{ij}$ units of the numeraire good, where $\epsilon^{ij}$ is an idiosyncratic cost for that firm of doing business in that one location.[2] The $\epsilon^{ij}$ term is iid across firms and countries, and is distributed uniformly on $[-\frac{\Delta}{2}, \frac{\Delta}{2}]$.[3]

The fact that all Southern economies have the same pattern of $a_z^j$ realizations together with the fixed cost for operating in any location imply that each firm will operate in at most one Southern economy. This avoids the very substantial complications of choosing an optimal subset of host countries as in Antras, Fort and Tintelnot (2017). We will assume throughout that the parameters are such that each firm chooses to operate both in the North and in one Southern economy.

The model plays out over time as follows. First, each country's government

[2]The reason to add this feature of the model is that otherwise the policy game has a degenerate character, where a small change in policy causes that country to lose all FDI or to capture all of the FDI in the world. A similar device is used in Davies and Vadlamannati (2013).

[3]The uniform distribution allows us to avoid a modelling nuisance. If the idiosyncratic shock had full support, there would be a positive probability of firms exiting after having paid their entry cost $F^e$. This would substantially complicate the model without adding anything of interest to the questions at hand.

announces policy, which can include both the strength of collective bargaining rights and taxation of multinational production, as described below. Second, each entrepreneur who wishes to enter the differentiated-products sector must incur the fixed entry cost $F^e$. Third, firms learn the values of their idiosyncratic costs, choose a host economy, and sunk their cost in that economy. Fourth, each firm bargains with the workers in its chosen host economy, determining what share of the quasi-rent will go to host-country workers and what share will stay with the firm, based on the collective-bargaining rights that were established in Stage 1. Finally, all firms produce, wages are paid, and consumption occurs.

## 3.1 Bargaining.

Consider a firm $i$ that has sunk its cost to operate in host country $j \geq 1$. It must then bargain with local workers in order to produce. If the bargaining is efficient, it will choose the allocation of tasks between countries 0 and $j$ as well as the quantity of labor to hire and the price of final output to maximize the joint surplus. This means that the firm will allocate each task to the country where it can be done at the lowest cost in terms of the opportunity cost of labor, which is the unit wage in both countries. Therefore, a task will be done in $j$ if $\delta^j a_z^j < a_z^0$ and will be done in 0 otherwise.

From Anderson et al. (1987), this cost-minimizing allocation of tasks to the two countries is equivalent to minimizing the cost of producing a unit of $x(i)$ output, where:

$$x(i) = \phi \left\{ (L^0)^\rho + \left( \frac{L^{ij}}{\delta^j} \right)^\rho \right\}^{\frac{1}{\rho}}, \tag{1}$$

with $\rho = \nu/(1+\nu)$ and $\phi = (\Gamma(1+1/\nu))^{-1}$, where $\Gamma(\cdot)$ is the gamma function

and where $L^{ij}$ is the amount of country-$j$ labor employed by firm $i$. Thus, the problem for the firm is equivalent to cost minimization with a CES production function with elasticity of substitution equal to $\sigma \equiv 1/(1-\rho) > 1$.

This implies a marginal cost of production equal to:

$$c^{0j} = \left(1 + (\delta^j)^{\frac{-\rho}{1-\rho}}\right)^{\frac{-(1-\rho)}{\rho}}. \tag{2}$$

Given the demand structure, the elasticity of demand is constant, and maximization of the profit for variety $i$, which is the same as maximization of the bargaining surplus, will imply a constant markup of price over marginal cost. The demand curve is:

$$x^i = \frac{\alpha Y^W}{P^{\frac{\eta}{1-\eta}}}(p(i))^{\frac{-1}{1-\eta}}, \tag{3}$$

where $Y^W$ is world income, and:

$$P = \left(\int p(i')^{\frac{-\eta}{1-\eta}} di'\right)^{\frac{\eta-1}{\eta}} \tag{4}$$

is the composite price of differentiated goods. In the case of a symmetric equilibrium where $p(i) = p \forall i$, this reduces to

$$P = n^{\frac{\eta-1}{\eta}} p.] \tag{5}$$

Given the profit-maximizing markup rule $p(i) = c^{0j}/\eta$, the maximized variable profit for firm $i$ is:

$$\pi^{ji} = \frac{\alpha Y^W}{P^{\frac{-\eta}{1-\eta}}}(1-\eta)\left(\frac{\eta}{c^{0j}}\right)^{\frac{\eta}{1-\eta}}. \tag{6}$$

Since this value will be the same for all firms using country $j$ as a host, hence-

forth we will drop the firm indicator from the superscript and write $\pi^j$.

This value, $\pi^j$, is then the quasi-rent over which the firm and its workers will bargain. Following Davies and Vadlamannati (2013), bargaining by the workers and firm is governed by generalized Nash bargaining where the workers' threat point is employment in the numeraire sector at a unit wage, and the threat point for the firm is zero, since it has already committed to production in country $j$ by that point with its sunk investment. The workers' bargaining power is given by $\beta^j$; this is the fraction of the quasi-rent that goes to the workers. We assume that the rules chosen by the government in Stage 1 determine $\beta^j$, so for the workers and the firm, $\beta^j$ is a fixed parameter that governs their bargaining game, but for the government it is a choice variable. For example, laws that make it easier for workers for form a union or for unionized workers to strike, and rules that make it harder for an employer to fire striking workers or to replace them with temporary non-unionized workers, will increase $\beta^j$. Therefore, firm $i$'s variable profit is equal to $(1-\beta^j)\pi^j$, and the income to firm $i$'s workers in $j$ is equal to the country-$j$ opportunity wage per worker, which is unity, plus $\beta^j\pi^j$ for each multinational firm that produces in $j$, divided up among the workers.

## 3.2 Choosing a host country.

Before making a sunk cost in a host country, but after learning its idiosyncratic shocks, a firm that has entered the differentiated-products sector must choose the optimal host country. This means choosing the country $j$ that offers the highest value of $(1-\beta^j)\pi^j - F - \epsilon^{ij}$.

For analyzing a symmetric equilibrium, it is useful to look at a case where all Southern economies have the same parameters and policy choices except for one, to analyze whether or not it is profitable to deviate from the proposed Nash equilibrium. Suppose that all countries $j = 2, \ldots, N$ have the same values of $\delta^j$ and $\beta^j$, which we will denote as $\delta^2$ and $\beta^2$ respectively. Then, naturally, $\pi^j = \pi^2$ for $j = 2, \ldots, N$ as well. The probability that the best value of $(1 - \beta^j)\pi^j - \epsilon^j$ for $j = 2, \ldots, N$ is less than $z$ is:

$$G(z) = \frac{\left(\frac{\Delta}{2} - (1 - \beta^2)\pi^2 + z\right)^{n-1}}{\Delta^{n-1}}, \tag{7}$$

where $G(z)$ denotes the cumulative distribution function for the maximized value for all countries $j \geq 2$, which for the moment we denote as $z$. The probability density function is then:

$$g(z) = \frac{(n-1)\left(\frac{\Delta}{2} - (1 - \beta^2)\pi^2 + z\right)^{n-2}}{\Delta^{n-1}}. \tag{8}$$

The probability that a firm will choose country 1 is denoted $m^1$, is then the probability that $(1 - \beta^1)\pi^1 - \epsilon^1 > z$, and can be computed as:

$$m^1 = \int_{(1-\beta^2)\pi^2 - \frac{\Delta}{2}}^{(1-\beta^1)\pi^1 + \frac{\Delta}{2}} \int_{-\frac{\Delta}{2}}^{(1-\beta^1)\pi^1 - z} \frac{(n-1)\left(\frac{\Delta}{2} - (1 - \beta^2)\pi^2 + z\right)^{n-2}}{\Delta^n} d\epsilon dz \tag{9}$$

$$= \frac{\left((1 - \beta^1)\pi^1 - (1 - \beta^2)\pi^2 + \Delta\right)^N}{\Delta^N N}. \tag{10}$$

The integrand for (9) is the product of the pdf for $\epsilon^{i1}$, namely $1/\Delta$, with $g(z)$. The limits of the inside integral are the possible values of $\epsilon^{i1}$ where country 1 could be the best option, and the limits for the outer integral are the

full range of possible values for $z$, the best possible payoff for countries other than 1. In a symmetric equilibrium where $\beta^1 = \beta^2$ and $\pi^1 = \pi^2$, this becomes simply $m^1 = 1/N$.

Naturally, in an equilibrium with many firms, by the Law of Large Numbers, $m^j$ will also be the fraction of firms that choose $j$ as a host country, a fact that will be important in what follows.

## 3.3 The entry decision and zero profits.

Understanding this choice problem, in the previous stage the firm must decide whether to enter or not to enter the sector. The zero-profit condition that results is:

$$E_{\{\epsilon^{ij}\}}[\max_j\{(1-\beta^j)\pi^j - F - \epsilon^{ij}\}] - F^e = 0. \tag{11}$$

This determines the measure $n$ of firms that enter. Any increase in firms will push down the price of the composite good by (4), which by (6) will push down the value of $\pi^j$ for each country $j$.

It will be useful shortly to know how the expected profit for a multinational will change when the profitability of locating in a given country changes. This is summarized in the following, where we use $\tilde{\pi^j}$ to stand for $(1-\beta^j)\pi^j$.

**Proposition 1.** Let $\Pi^*(\tilde{\pi}^1, \tilde{\pi}^2, \ldots \tilde{\pi}^N) \equiv E_{\{\epsilon^{ij}\}}[\max_j\{\tilde{\pi^j} - \epsilon^j\}]$ denote the expected maximized profit for a multinational before it knows its idiosyncratic shocks. Then if $|\tilde{\pi}^j - \tilde{\pi}^i| < \frac{\Delta}{2}$ for $i, j \in \{1, 2, \ldots, N\}$:

$$\Pi_j^* = m^j, \tag{12}$$

where subscripts indicate partial derivatives.

This is an envelope-theorem result. The change in the profitability of using one country as a host changes the probability that that country will be chosen, but at the optimum a marginal adjustment of the probabilities of each choice makes no difference to the expected value.

Note that in models with the Dixit-Stiglitz structure as here, normally (11) will determine the output level of each firm. In this case, that is not so, because the realized fixed cost for firm $i$ is equal to $F^e + F + \epsilon^{ij}$. The optimal host-country choice of the firm means that the expected value of the third term of this expression, the idiosyncratic shock, is endogenous, and will vary with policy choices and changes in the parameters.

**Proposition 2.** If $(\pi^1, \beta^1)$ are the quasi-rent and worker's share for a firm locating in host Country 1, and $(\pi^2, \beta^2)$ the quasi-rent and worker's share for a firm locating in any other country $j = 2, \ldots, N$, then:

$$\begin{aligned} & E_{\{\epsilon^{ij}\}}[\max_{j=1,\ldots,N} \left((1-\beta^j)\pi^j - \epsilon^{ij}\right)] \\ = \; & (1-\beta^2)\pi^2 + \frac{\Delta}{2} - \frac{\Delta}{N} + \frac{\left((1-\beta^1)\pi^1 - (1-\beta^2)\pi^2 + \Delta\right)^{N+1}}{\Delta^N N(N+1)}. \end{aligned} \quad (13)$$

In the limit the expected value is $(1-\beta^1)\pi^1 + \frac{\Delta}{2}$ since with many countries the odds are good that there will be one with costs near the minimum value of $-\frac{\Delta}{2}$.

Since in equilibrium, the expected value of profits must be equal to zero, so (13) must be equal to $F^e + F$. In any symmetric Nash equilibrium, this

simplifies to

$$(1-\beta^1)\pi^1 = F^e + F - \left(\frac{N-1}{N+1}\right)\frac{\Delta}{2}. \tag{14}$$

If the number of countries does not change, the firm's share of variable profits, the left-hand side of (14), is nailed down by the expected value of fixed costs, which is on the right-hand side. For example, if $\delta^j$ is the same for all countries and it falls, the resulting drop in marginal costs $c^{0j}$ must be matched by a rise in $n$ to keep (6) unchanged.

## 3.4 Global equilibrium conditional on policy.

The income for Country 0 is labor income, equal to $L^0$ given the numeraire wage, plus the profit from the multinational sector, which is equal to zero because of free entry. The income for Country $j > 0$ is equal to labor income, which for each worker not employed in the multinational's value chain is equal to the unit wage per worker, and which for each worker in the value chain is equal to the worker's unit opportunity wage plus the worker's share of the quasi-rent. This yields national income equal to $Y^j = L^j + \beta^j m^j n\pi^j$. Adding these across countries yields world income:

$$Y^W = L^W + \Sigma_{j=1}^N \beta^j m^j n\pi^j, \tag{15}$$

where $L^W$ is the total world labor supply. In a symmetric equilibrium this becomes:

$$Y^W = L^W + \beta^1 n\pi. \tag{16}$$

The second term of (16) is due to the fact that bargaining away a portion of the quasi-rent discourages entry of multinationals, which reduces the resources consumed in fixed cost, liberating those resources to produce more of the numeraire good.

In addition, the structure of consumer demand ensures that in any equilibrium the revenue of the differentiated-products sector will be equal to $\alpha Y^W$. Since the price of each of these products is a markup $\frac{1}{\eta}$ over marginal cost, the variable profit $\pi$ of any firm is equal to $(1-\eta)$ times the firm's revenue, so $\pi/(1-\eta)$ is the firm's revenue. We must therefore have $\frac{n\pi}{(1-\eta)} = Y^W$ in any symmetric equilibrium, and putting this together with (16) produces:

$$n\pi = \alpha Y^W(1-\eta) = L^W \frac{\alpha(1-\eta)}{1-\alpha\beta(1-\eta)}. \tag{17}$$

## 3.5 Policy choices.

Now, to turn to Stage 1, consider country 1's choice of $\beta^1$, taking all other country's choices as given. In the symmetric framework, that means that each other Southern country has a value of $\beta^j$ equal to $\beta^2$, which for now we take as given. When country 1's government increases $\beta^1$, it will reduce each firm's expected net profits at the entry stage, requiring a reduction in the number $n$ of firms that enter, thereby increasing $P$ from (4), and thereby increasing $\pi^j$ for all host countries $j$, by (6). Note that this will not have any effect on the price $p(i)$ charged by any firm for its product, because it will not change the marginal cost $c^{0j}$ for any choice of host country $j$, since the wage in each country is fixed at unity by the numeraire sector.

We can then examine the derivatives $\frac{dm^1}{d\beta^1}$, $\frac{dP}{d\beta^1}$, $\frac{d\pi}{d\beta^1}$, $\frac{dY^W}{d\beta^1}$ and $\frac{dn}{d\beta^1}$, of the five key endogenous variables with respect to country 1's choice of $\beta^1$.

First, from (10), we can derive:

$$\frac{dm^1}{d\beta^1} = Nm^1 \left[ \frac{-\pi^1 + (1-\beta^1)\frac{d\pi^1}{d\beta^1} - (1-\beta^2)\frac{d\pi^2}{d\beta^1}}{(1-\beta^1)\pi^1 - (1-\beta^2)\pi^2 + \Delta} \right]. \tag{18}$$

In the case of a symmetric Nash equilibrium, this becomes:

$$\frac{dm^1}{d\beta^1} = -\frac{\pi^1}{\Delta}. \tag{19}$$

In deriving this, it is important to recall that in a symmetric Nash equilibrium, $\frac{d\pi^1}{d\beta^1} = \frac{d\pi^2}{d\beta^2}$ because the change in $\beta^1$ affects variable profits in any country only through changes in $P$ and $Y^W$, which affect operations in every country in the same way.

Second, note that in this case, (4) reduces to:

$$P = \left( \left(p^1\right)^{\frac{-\eta}{1-\eta}} nm^1 + \left(p^2\right)^{\frac{-\eta}{1-\eta}} (N-1)nm^2 \right)^{\frac{\eta-1}{\eta}} \tag{20}$$

$$= n^{-\frac{1-\eta}{\eta}} \left( \left(p^1\right)^{\frac{-\eta}{1-\eta}} m^1 + \left(p^2\right)^{\frac{-\eta}{1-\eta}} (N-1)m^2 \right)^{\frac{\eta-1}{\eta}}, \tag{21}$$

where $p^1$ is the price charged by any firm that uses country 1 as a host and $p^2$ is the price charged by any firm that uses any country $j = 2, \ldots, N$ as a host. Recall that $m^j$ is the fraction of firms that choose country $j$, and

$m^2 = m^3 = \ldots m^N$ by symmetry. Consequently, we can write:[4]

$$\frac{dP}{d\beta^1} = -\left(\frac{1-\eta}{\eta}\right)\frac{P}{n}\frac{dn}{d\beta^1}. \tag{22}$$

Importantly, changes in $\beta^1$ do not affect the individual product prices, because each one is a fixed mark-up of marginal cost (2), which is not affected by collective bargaining rights under efficient bargaining. This is why the composite price $P$ is affected only through product diverstiy $n$.

The three remaining derivatives need to be solved jointly. From (6) and (5), we can write the derivative of variable profit as:

$$\frac{d\pi^j}{d\beta^1} = \frac{\partial \pi^j}{\partial Y^W}\frac{dY^W}{d\beta^1} + \frac{\partial \pi^j}{\partial P}\frac{dP}{d\beta^1} = \frac{\pi^j}{Y^W}\frac{dY^W}{d\beta^1} - \frac{\pi^j}{n}\frac{dn}{d\beta^1}. \tag{23}$$

However, the zero-profit condition provides a different condition on the derivative of $\pi$. Using the notation of Proposition 1, we must have $\Pi^* = F^e + F$ in equilibrium, so the total derivative of $\Pi^*$ with respect to $\beta^1$ must be zero. Since the change in the variable profit is the same for each host country ($\frac{d\pi^j}{d\beta^1} = \frac{d\pi}{d\beta^1}$ for $j = 1, \ldots, N$), this amounts to a condition[5] that:

$$\frac{d\pi}{d\beta^1} = \frac{\pi m^1}{(1-\beta^1)} = \frac{\pi}{(1-\beta^1)N}. \tag{24}$$

From (15), we can write the derivative of world income with respect to

[4]Note that this expression is valid only in a symmetric equilibrium where marginal costs are the same in all host countries. In asymmetric settings, a change in $\beta^1$ will also change $P$ by changing the mix of goods produced, which will differ in their prices.

[5]The total derivative of $\Pi^*$ is equal to $\Pi_1^*(-\pi^1 + (1-\beta^1)\frac{d\pi^1}{d\beta^1}) + (N-1)\Pi_2^*\frac{d\pi^2}{d\beta^1}$. Given symmetry, $\Pi_j^* = \Pi_1^*$ and $\frac{d\pi^j}{d\beta^1} = \frac{d\pi}{d\beta^1}$ for all $j = 1, \ldots, N$, setting this total derivative equal to zero yields the result.

Country 1's policy choice as:

$$\frac{dY^W}{d\beta^1} = \pi\beta^1 \frac{dn}{d\beta^1} + n\beta^1 \frac{d\pi}{d\beta^1} + n\pi m^1 \tag{25}$$

To derive $\frac{dn}{d\beta^1}$, we need to combine (23), (24), and (25), to yield:

$$\frac{dn}{d\beta^1} = -\left[\frac{L^W - (1-\beta^1)n\pi}{L^W}\right] \frac{n}{(1-\beta^1)N} < 0. \tag{26}$$

The numerator in the square brackets of (26) is positive, because $(1-\beta)n\pi$ is the value of labor absorbed in fixed costs for the multinationals, so that the fraction is the fraction of world labor absorbed in everything other than fixed costs. Using (17), (26) can be re-written:

$$\frac{dn}{d\beta^1} = -\left[\frac{1-\alpha(1-\eta)}{1-\alpha\beta(1-\eta)}\right] \frac{n}{(1-\beta^1)N} < 0. \tag{27}$$

*Summary.* Holding other countries' policies fixed at some common level, strengthening collective bargaining rights in Country 1 above that level (raising $\beta^1$) will (i) chase some multinationals away from Country 1 toward other countries that are not strengthening workers' rights (equation (19)); (ii) discourage entry of firms (equation (27)), resulting in lower product diversity ($n$), and therefore (iii) a worldwide rise in the real utility cost-of-living index $P$ (equation (22)). At the same time, the smaller share of variable profits that multinationals expect *ex ante* requires that the variable profit $\pi$ rise (equation (24)).

## 3.6 Nash equilibrium in policies.

We can use this information to evaluate the optimal policy choice for country 1 and characterize a symmetric Nash equilibrium in policy. The utility of country-1 workers together is:

$$U^1 = \left(L^1 + \beta^1 \pi^1 m^1 n\right) P^{-\alpha}. \tag{28}$$

Workers not employed by multinational firms produce the numeraire good for the unit wage. Workers employed in the value chain of multinational firms receive their opportunity wage, 1, plus the additional share of the quasi-rent that they receive from collective bargaining. As a result, national income is given by the sum in parentheses. Given the Cobb-Douglas preferences, the consumer price index is $P^\alpha$.

The derivative of utility with respect to $\beta^1$, holding $\beta^j$ constant for $j \neq 1$ is then:

$$\begin{aligned} \frac{dU^1}{d\beta^1} &= \left(\pi^1 m^1 n + \beta^1 \pi^1 n \frac{dm^1}{d\beta^1} + \beta^1 m^1 n \frac{d\pi^1}{d\beta^1} + \beta^1 \pi^1 m^1 \frac{dn}{d\beta^1}\right) P^{-\alpha} \\ &- \alpha \left(L^1 + \beta^1 \pi^1 m^1 n\right) P^{-\alpha-1} \frac{dP}{d\beta^1} \end{aligned} \tag{29}$$

The first term within the large parentheses is the direct benefit to Country-1 workers of an increase in $\beta^1$: The increased quasi-rent that they receive for each increase in their share parameter. The second term is a cost that we might call the 'competition effect:' The reduction in the share of multinationals who choose Country 1 as their host. The next two are general-equilibrium effects, the effect on each firm's quasi-rent $\pi$ and on the number $n$ of firms that enter,

which together determine the aggregate size $n\pi$ of the quasi-rent for which host countries are competing. Outside of the large parentheses, the last term shows the general-equilibrium effect on the real utility cost of living due to the reduction in product variety. Importantly, the governments make their policy decisions at the same time, so there is no change in any other government's policy in this expression.

Setting this equal to zero and using the conditions (19), (27), (22), and (24) discussed above, this can be simplified to:

$$\frac{n\pi}{N} - \frac{\beta n\pi^2}{\Delta} + \frac{\beta n^2\pi^2}{N^2 L^W} - \frac{\alpha Y^W}{(1-\beta)N}\left(\frac{1-\eta}{\eta}\right)\left(\frac{1-\alpha(1-\eta)}{1-\alpha\beta(1-\eta)}\right) = 0. \qquad (30)$$

This is a condition for a symmetric Nash equilibrium. The first two terms represent the direct benefit and the competition effect, and the remaining terms represent the various general-equilibrium effects.

We can now discuss the effects of globalization on equilibrium labor rights. Two distinct types of globalization are worth considering. Consider first a particular form of globalization in which $\delta^j \equiv \delta$ is the same for all countries and its value falls, so that the marginal cost of production (2) falls for every multinational. We might call this 'globalization at the intensive margin.' Consider how (30) changes for a fixed value of $\beta$. By (17), the total amount of quasi-rent $n\pi$ in the world economy does not change (and, also from (17), world income $Y^W$ in terms of the numeraire is also unchanged). That is determined by the fraction $\alpha$ of income that world consumers spend on differentiated products and other parameters. In addition, from the zero-profit condition (14), for a given value of $\beta$, $\pi$ will also be unchanged. These two findings imply that $n$

will also be unchanged. (Note that in (6), the composite price $P$ will fall in exactly the same proportion as the marginal cost $c$, leaving each firm's variable profit unchanged.) Consequently, the value of $\beta$ that satisfied (30) before the drop in $\delta$ is still an equilibrium value after the change.

We conclude that this form of globalization has, in this model, *no* effect on labor standards, ether a race-to-the-bottom effect or its opposite. The reduction in transaction costs across borders merely produces a drop in consumer prices in terms of the numeraire, which raises the real income of every consumer everywhere. This raises the stakes in policy setting without changing the optimal choice: The real value of each term in the derivative (29) increases as the cost of living decreases, so that the marginal benefit of raising $\beta^1$ goes up exactly in proportion to the marginal cost.

Note that this form of globalization *will* affect the allocation of tasks between the home country and the host. Since the wage in each country remains at unity, (1) shows that when $\delta$ falls, each firm will substitute host-country labor for home-country labor, which implies expanding the range of tasks done in the host country. Since the elasticity of substitution between home- and host-country labor is greater than 1, this implies that the amount of labor hired by multinationals in each host country will rise. In the data, we will see that the fraction of host-country GDP that comes from hiring by multinationals is higher than before the change. But this increase in multinational value-added in those countries does not generate an incentive for those governments to change labor policy. To summarize:

**Proposition 1.** If $\delta^j = \delta$ for $j = 1, \ldots, N$, then in a symmetric Nash equilibrium, if $\delta$ falls: (i) The values of $n$, $\pi$, and each country's GDP will

be unchanged. (ii) The fraction of each host country's income that is derived from multinational supply chains increases. (iii) The price of each differentiated product falls, and so does the composite price $P$, and so all workers everywhere see an increase in real income. (iv) No country changes its labor standard.

On the other hand, consider a different form of globalization, in which the number $N$ of potential host countries increases. For example, economic reform in a Communist country may lead to that country joining the world economy after an autarchic existence. We might call this 'globalization at the extensive margin.' Inspecting (30), all terms have $N$ in the denominator except for the second one, which quantifies the competition effect. The derivative of a country's share of value-chain employment with respect to that country's policy variable does not fall to zero as the number of competitor countries becomes large. This suggests that the arrival of a sufficiently large number of host countries can result in much lower labor standards, and that is indeed the case:

**Proposition 2.** If $N \to \infty$, in a symmetric Nash equilibrium, $\beta \to 0$.

**Proof.** Consider a sequence of values for $N$, $N(k), k = 0, \ldots, \infty$ such that $N(k) \to \infty$ as $k \to \infty$. Let $n(k)$, $\pi(k)$, $Y^W(k)$ and $\beta(k)$ be the corresponding equilibrium values for each $k$. From (17), it is clear that $n(k)\pi(k)$ is bounded, so from the symmetric Nash equilibrium condition (30), we must have:

$$-\frac{\beta(k)n(k)\pi(k)^2}{\Delta} - \frac{\alpha Y^W(k)}{(1-\beta(k))N(k)}\left(\frac{1-\eta}{\eta}\right)\left(\frac{1-\alpha(1-\eta)}{1-\alpha\beta(k)(1-\eta)}\right) \to 0.$$

From (14), $(1-\beta(k))\pi(k)$ takes a limit of $F^e + F - \frac{\Delta}{2}$, so we can conclude,

multiplying all terms by $(1-\beta(k))$:

$$-\beta(k)\left((1-\beta(k))\pi(k)\frac{n(k)\pi(k)}{\Delta}\right)-\frac{\alpha Y^{W}(k)}{N(k)}\left(\frac{1-\eta}{\eta}\right)\left(\frac{1-\alpha(1-\eta)}{1-\alpha\beta(k)(1-\eta)}\right)\rightarrow 0.$$

The second term takes a limit of zero (since everything other than the $N(k)$ in the denominator takes a finite limit). The contents of the large parentheses in the first term take a strictly positive limit, and so we conclude that $\beta(k)$ must take a limit of zero. **QED.**

As the number of rival countries becomes large, the dominant effect on the incentives for any one host country is the fact that any tightening of that country's labor standards will induce multinationals to choose one of the wide variety of alternative countries for its value chain. We can thus identify a 'race-to-the-bottom' effect from this second kind of globalization.

# 4 Empirical investigation.

Naturally, the effects described in the theory model above are difficult to measure empirically, since we have no controlled experiments in globalization and all of these effects can be observed only at the country level, with numerous confounding variables and with the added complication that every control variable is endogenous. Here we describe an imperfect approach that attempts to deal with these issues as well as possible. Details of variables and estimation will be presented in the next section, but here we sketch the approach. We have two approaches to measuring globalization, which correspond roughly to Propositions 1 and 2.

In our main specification, we regress the strength of a country's collective-bargaining rights on a country fixed effect; a year fixed effect; some country controls; and the main variable of interest, a measure of inward FDI. Inward FDI is a proxy for globalization, and in the contex of the model it can be interpreted as a proxy for a reduction in $\delta^i$ as in Proposition 1, since in equilibrium such a reduction leads to an increase in inward FDI relative to GDP for each host country. The interpretation will be that the coefficients on FDI will measure the effect of an exogenous increase in availability of FDI on the country's labor standards. Inward FDI is of course an endogenous variable, and we use an instrumental-variable strategy for it as described below. We deal with the endogeneity of country controls by using only initial-period values of the controls for each country and interacting them with dummies for each subsequent year. Thus, each regression will measure the effect on labor rights of an endogenous rise in FDI, relative to the typical time-path of labor rights for a country with the same initial conditions. To allow for heterogeneous effects, we also run a version in which the FDI variable is interacted with a measure of how distant are the country's competitors for FDI, as described below. This yields the following regression equation:

$$\begin{aligned} &\textit{Labor Rights}_{it} \\ &= \alpha + \beta_1 FDI_{it} \quad + \quad \beta_2 \textit{compdist}_{it} + \beta_3 FDI_{it} * \textit{compdist}_{it} + X'_{it}\gamma + \mu_i + \xi_t + \varepsilon_{it}, \end{aligned} \tag{31}$$

where $i$ indicates a country and $t$ time; the dependent variable is a measure for collective labor rights; $FDI_{it}$ is the ratio of the stock of FDI to GDP; $\textit{compdist}_{it}$ is a measure of 'how far' country $i$ is from the countries with which

competes for FDI, either geographically or in product space (omitted in the basic specification); $X'_{it}$ is the row vector of control variables; $\mu_i$ is a country fixed effect, $\xi_t$ is a year fixed effect, and $\varepsilon_{it}$ a random variable. This allows for the possibility that countries with closer competitors are more likely to be those for which globalization pushes down labor standards can be captured as the hypothesis that $\beta_3 > 0$.

An alternative specification is closer to the interpretation of Proposition 2, where 'globalization' is an increase in the number of countries with which country $i$ is competing for FDI. Hence, instead of using the FDI ratio as a independent variable, we measure and use the number of competing countries as follows. For country $i$, for each country $j$ that sends some FDI to $i$, count up all of the other countries to which $j$ has sent FDI. Then, add up all of those countries across $j$. When adding up these, we use the average number of destinations of each source country to avoid the double-counting problem. The final result is the number of 'competitors' $i$ has for FDI. We use this measure in place of the FDI ratio as an alternative approach.

The difference between what we attempt here and previous empirical work can be summarized as follows. Consider a simplified two-country model of Nash equilibrium in government standard-setting as shown in Figure 1. Country 1's choice of labor standard is measured on the horizontal axis while Country 2's is on the vertical, and the two country's reaction functions are displayed as solid curves with a Nash equilibrium at point $E$. Both Davies and Vadlamannati (2013) and Olney (2013) regress country $i$'s labor standard on the other's standard, finding a coefficient strictly between zero and one, implying strategic complements and a unique equilibrium. What we do instead is to ask how the

equilibrium moves when globalization increases, meaning that FDI or access to international value chains becomes more available. In the figure, a hypothetical increase in globalization is shown as shifting country 1's reaction function to the left and country 2's down, so that the equilibrium moves to point $E'$ with lower standards for both. That would imply a race-to-the-bottom effect, but of course the opposite could occur as discussed above.

## 4.1 Exogenous variation in access to globalization.

We use FDI stock data from the comprehensive database of the external wealth of nations mark II compiled by Lane and Milesi-Ferretti (2007).[6] They use cumulative flow data with valuation adjustments designed to capture shifts in relative prices across countries and construct estimates of foreign asset and liability positions for a large sample of countries for 1970-2011. FDI data includes controlling stakes in acquired foreign entities (at least 10% of an entity's equity) as well as greenfield investments. In estimation, we use the ratio of FDI liabilities to GDP.

To extract the portion of variation in FDI that is exogenous to host-country shocks, we employ a Bartik shift-share instrument variable. For the host county $i$, we construct the weighted average of FDI from all source countries net of FDI into the host country:

$$\frac{\sum_j \left( FDI_{j,i,0} \sum_{k \neq i} FDI_{j,k,t} \right)}{\sum_j FDI_{j,i,0}}. \tag{32}$$

Here $FDI_{j,k,t}$ is the FDI from source country $j$ in host country $k$ as of date $t$.

[6]The most up-to-date data can be found in http://www.philiplane.org/EWN.html.

If we add up all of the FDI from $j$ to anywhere in the world except for host $i$, we get $\sum_{k \neq i} FDI_{j,k,t}$, which is in the numerator. That can be thought of as exogenous to country-$i$ shocks, and represents source-country $j$ shocks over time. Expression (32) is the weighted average of this for all source countries $j$, where the weights are given by $j$'s *initial*-period share of FDI in host $i$ (i.e., the FDI stocks at $t = 0$). In other words, country $i$'s total initial FDI is the denominator, $\sum_j FDI_{j,i,0}$, and country $j$'s share of that initial stock is:

$$\frac{FDI_{j,i,0}}{\sum_j FDI_{j,i,0}}. \tag{33}$$

Since we use FDI as the ratio to GDP, we use expression (32) as the ratio to initial real GDP in estimation.[7]

## 4.2 Effective distance from competitor countries.

The main idea of the theory is that (i) higher incomes from globalization lead to rising standards, but (ii) when a country competes with similar countries for multinational jobs, that competition is more likely to weaken labor standards. Consequently, we need some measure of how similar are the countries that are competing with country $i$. For example, for a country $i$ that would like to be a recipient of FDI from source country $j$, we could first compute how far away the average competitor $k$ is from $i$, weighted by $FDI_{j,k}$, which is the FDI each

[7]We have experimented with many other instruments. We conjecture that natural disasters or civil violence in countries that are neighbors to country $i$ could lead potential multinational enterprises to shift some of their investment that would have gone to those neighboring countries to $i$ instead. Thus, we use natural disasters and civil violence as instruments. Also, we use the Feyrer's instrument variable (2019) for trade flows as a measure of the effective economic proximity of each country to its potential partners in globalization or an instrument for FDI flows. However, these variables turn out to be weak instruments in estimations.

country $k$ receives from source country $j$:

$$\frac{\sum_k FDI_{j,k} DIST_{i,k}}{\sum_k FDI_{j,k}}. \tag{34}$$

If this is a big number, then $i$ doesn't compete very much with other countries for FDI from $j$, since the other countries that $j$ finds attractive for investment are mostly far away from $i$. Then we can take the average of this over all possible source countries $j$ (weighted by FDI):

$$compdist_i \equiv \frac{1}{\sum_j FDI_{j,i}} \sum_j \left( FDI_{j,i} \frac{\sum_k FDI_{j,k} DIST_{i,k}}{\sum_k FDI_{j,k}} \right) \tag{35}$$

If this is a big number, then $i$ does not have a lot of competition for its inward FDI, since its major potential competitors from any source tend to be far away. We call this $compdist_i$ because it measures the average distance of potential competitors to $i$.

In computing $compdist_{it}$ the term $DIST_{i,k}$ is defined in two ways. The first way is simply the great-circle distance between the two counties. Implicit in computing things this way is the idea that if $i$ and $k$ are far away, it would be more difficult for a multinational firm to switch a plant in $i$ off and replace it with a plant in $k$, or there are likely to be different advantages to the two locations because of different geography so they would be likely to be used for different and non-substitutable purposes. We call this formulation the 'geographic' formulation of $compdist_{it}$. The second way of defining $DIST_{i,k}$, is as the difference between the two economies, such as, for example, the Euclidean distance between the vector of GDP shares of industries in $i$ and in $k$:

$$DIST_{i,k} \equiv \left( \sum_n (s_n^i - s_n^k)^2 \right)^{\frac{1}{2}}, \tag{36}$$

where $s_n^i$ is industry $n$'s share of GDP in country $i$. We call this formulation the 'industry' version of $compdist_{it}$. We use both the geographic and industry formulations in what follows. Since $compdist_{it}$ varies by time and it is possible that $compdist_{it}$ and labor rights are simultaneously determined for a given country, we use $compdist_{it}$ of the initial year for country $i$ in estimation in order to avoid simultaneity bias.

To construct *compdist*, we need bilateral FDI data, whose limited availability is well known in the literature. We use the outward FDI stock data from the OECD International direct investment database.[8] One limitation of using this database is that source countries are constrained to OECD countries, though host countries include both developed and developing countries. We find that the OECD data covers about 60% of world total FDI stocks in 2000.[9]Hence, we believe that the OECD data provide reasonable estimates of world bilateral FDI. Geographic distance is the bilateral distance between most populated cities of two countries, which is obtained from the CEPII database.[10] For the Euclidean distance between the vector of GDP shares of industries in two countries, we use the UNCTAD database.[11] Specifically, for a given country, we use the share of value added of GDP for seven industries.[12]

[8]This is available at https://stats.oecd.org/index.aspx?DataSetCode=FDI_FLOW_PARTNER.

[9]According to the UNCTAD, world total outward FDI stocks are $7,409 billions in 2000. The OECD data report this number as $4,367 billions.

[10]This is available at http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6.

[11]This is available at https://unctadstat.unctad.org/wds/TableViewer/dimView.aspx.

[12]They are agriculture; manufacturing; mining and utilities; construction; whole sale, retail, hotels and restaurants; transport, storage, and communication; and other service activities.

## 4.3 Measuring labor rights.

As noted earlier, Layna Mosley (2011) expanded Kucera's index to have a panel dataset for 1985-2002. The collective labor rights indicators, which we use as a measure for labor rights, assess violations of labor rights in six broad categories: freedom of association and collective bargaining-related liberties; the right to establish and join worker and union organization; other union activities; the right to bargain collectively; the right to strike; and rights in export processing zones. The coding rules for the collective labor rights indicators follow Kucera (2002). The coding template records 37 types of violations in the six categories. In each of these broad categories, specific violations include the absence of legal rights, limitations on legal rights, and the violations of legal rights by government agents or employers. A different weight is given to each violation. Assessments of violations are based on three sources: the U.S. State Department annual *Country Reports on Human Rights Practices*; reports from the International Labor Organization's Committee of Experts on the Applications of Conventions and Recommendations and the Committee on Freedom of Association; and the International Confederation of Free Trade Unions' *Annual Survey of Violations of Trade Union Rights*.[13]

## 4.4 Controls.

In line with our strategy of excluding control variables that are likely correlated with country-specific shocks, we include year dummies interacted with initial GDP per capita to allow for richer economies to have a different time path for

[13]This dataset and detailed coding methodology is available at https://hdl.handle.net/1902.1/15590.

labor rights than poorer ones, and also year dummies interacted for a dummy for post-communist transition economies.

### 4.5 Descriptive statistics.

Table 1 shows descriptive statistics for the variables. We have an unbalanced panel of 149 countries observed between 1985 and 2002. The most important features of the data are summarized in Figure 2. This is a scatter plot that shows for each country the difference between 1990 and 2000 in our measure of inward FDI on the horizontal axis and the difference in our measure of labor rights on the vertical axis. The largest concentration of dots is in the fourth quadrant, indicating a strong trend toward increased FDI and weaker labor rights during this period. Many observers would interpret a causal relationship between these two trends. However, there is no discernible relationship between the two variables within the quadrant. This point more or less holds up after instrumenting for FDI and adding controls, leading us to suggest that there is no real evidence for FDI availability as a driving force for movements in labor rights in either direction.

## 5 Results.

Table 2 shows the regression results from the FDI specification. All regressions have country and year fixed effects. (Coefficients of controls interacted with time dummies and intercepts are not shown.) In each column, the dependent variable is the measure of labor rights by country and year. Columns (1), (3), and (5) use OLS, while the other columns use TSLS with the Bartik shift-

share instrument. The first two columns run regressions without interactions. Columns (3) and (4) include the interaction term between FDI and the initial geographic *compdist*, and the last two columns use its industry definition. Note that the interaction term is instrumented by the interaction between the Bartik shift-share instrument and the initial value of *compdist*.

The first row of Columns (1) and (2) show that the average effect of FDI is insignificant in both OLS and TSLS. However, when including the interaction term between FDI and the geographic *compdist*, both the first-order term and the interaction term are significant in OLS and TSLS (Columns (3) and (4)). Observe that our instruments are strong in the case of the geographic *compdist* (Column (4)), as the first-stage $F$ statistic is well above 10. The results imply that FDI, on average, does not matter for labor rights, but for a country with higher geographical *compdist*, FDI is more likely to decrease labor rights compared to a country with lower *comdist*. In other words, a country's increase in access to inward FDI is more likely to be accompanied by a rise in labor standards if the countries with which it competes for FDI are nearby, which is somewhat surprising. Next, we use the industry measure of *compdist* and interact it with FDI, and the interaction term is again significantly negative in OLS but insignificant in TSLS (Columns (5) and (6)).

We calculate the implied median marginal effect of FDI on labor rights, given by $FDI_{it}$ which, from (31), is equal to $\beta_1 + \beta_3 compdist_{med}$, where $compdist_{med}$ is the median value of *compdist* over the sample (which is 8.904). Focusing on the IV results for the geographic *compdist*, the marginal effect is 0.049, but insignificant. To see how meaningful these numbers are, we can calculate the magnitude of the FDI effect in terms of the estimated value of the

interquartile effect ratio as follows. The marginal effect of $FDI_{it}$ is multiplied by the interquartile range (IQR) for FDI (22.56) and divided by the interquartile range of the labor-rights variable (12.5). The results are illustrated in Figure 3, which shows the magnitude of the marginal effects of FDI in terms of estimated value of interquartile effect ratio as a function of the initial geographic *compdist* with 95% confidence intervals. Note that for the median country, the ratio is small and positive, albeit insignificant, suggesting that an increase in FDI by its IQR in the median country would lead to 8.9% of the IQR of labor rights. Figure 3 also shows that for countries with a lower range of initial geographical *compdist*, the magnitudes are significantly positive, but for countries with a higher range of it, they are significantly negative. In other words, FDI increases are associated with a rise in labor rights for countries whose competitors for FDI are close by, and with decreases in labor rights for countries whose competitors are located far away. However, in either cases the magnitudes of the marginal effects of FDI are relatively small. The magnitudes range over 50-60% for countries with the low end of *compdist*, while they hover around -10-20% for countries with the high end of *compdist*.

Table 3 shows the results when we use the number of competing countries instead of the FDI variable. The first column shows the average effect of the number of competitors, which is insignificant. Column (2) includes the interaction term between the initial geographic *compdist* and the number of competitors. The interaction term is significantly negative, suggesting that for a country with higher (lower) *compdist*, an increase in the number of competitors decreases (increases) labor rights. This result is consistent with the previous results when using the FDI variable. When we use the industry *com-*

*pdist*, the interaction term is again insignificant (column (3)). As before, we plot the magnitude of the marginal effects of the number of competitors in terms of estimated value of interquartile effect ratio as a function of the initial geographical *compdist* with error bands (Figure 4). We find that this magnitude is rather small, less than 25% of the IQR of labor rights in absolute value in either direction, and it is significant only for countries with the above median level of *compdist*. As before, we compute the magnitude of the marginal effects of the number of competitors in terms of estimated value of interquartile effect ratio as a function of the initial geographical *compdist*. We find that this magnitude is rather small, less than 25% of the IQR of labor rights in absolute value in either direction, and it is (barely) significant only for countries with the above median level of *compdist*.

*Summary.* The overall story of these empirical exercises is that, although the general pattern over the data is for FDI to increase over time and collective bargaining rights to be weakened over time, there is no tendency for a country with a larger increase in FDI to see a larger erosion of the labor rights. This is true whether or not we use an instrumental variable to extract the exogenous portion of the variation in FDI. Consequently, the data do not support a story in which globalization leads government to water down labor rights. A similar story emerges when the measure of globalization is the number of competitors for FDI. The data do not provide consistent support *either* for a race to the bottom or to the top.

# 6 Conclusion.

The question of a 'race to the bottom' in labor rights is a question of the comparative statics of a Nash equilibrium in policy decisions across countries as globalization proceeds. We have formalized a stylized model of multinational firms choosing host locations for their global value chains, while host-country governments choose the strength of collective-bargaining rights that allow their workers to receive a share of the quasi-rents generated by multinational firms locating operations there. In this model, the only motivation for government labor standards is to transfer income from foreign multinationals to workers, so in a closed economy there would be no such standards imposed. But in the presence of global value chains, each government must trade off the direct benefit of stronger bargaining rights, which transfer more rents to the local workers, against both the effect of discouraging multinationals from locating in that country and general-equilibrium effects of discouraging investment in the industry altogether. We find that an increase in globalization in the sense of lower transaction costs, leading to more offshoring from the headquarters country, has no effect on equilibrium collective-bargaining rights in our model. One might call this an 'intensive-margin' finding. On the other hand, globalization in the sense of adding more countries to the global trading system tends, in the limit, to *weaken* collective-bargaining rights. One might call this an 'extensive-margin' effect, and a 'race-to-the-bottom' finding. Thus, as a matter of theory, the effect of globalization on labor rights is ambiguous.

Looking at international data from 1985 to 2002, we find no robust evidence of any effect of globalization on labor rights in either an intensive-margin or an

extensive-margin form. There is a strong tendency for labor rights to weaken over that period at the same time as FDI was rapidly increasing, but there does not seem to be any correlation across countries between the two, after controlling for exogenous trends, whether instrumental variables are used to correct for the endogeneity of FDI or not.

# 7 Appendix.

**Proposition 1.** Let $\Pi^*(\tilde{\pi}^1, \tilde{\pi}^2, \ldots \tilde{\pi}^N) \equiv E_{\{\epsilon^{ij}\}}[\max_j\{\tilde{\pi^j} - \epsilon^j\}]$ denote the expected maximized profit for a multinational before it knows its idiosyncratic shocks. Then if $|\tilde{\pi}^j - \tilde{\pi}^i| < \frac{\Delta}{2}$ for $i, j \in \{1, 2, \ldots, N\}$:

$$\Pi^*_j = m^j, \tag{37}$$

where subscripts indicate partial derivatives.

**Proof.** For the moment hold the $\tilde{\pi^j}$ values fixed. Note that any firm, if country $j$ is preferred to $i$ for a given realization of $\epsilon^j$ and $\epsilon^i$, then it will also be preferred for any other realizations $(\epsilon^j)'$ and $(\epsilon^i)'$ with $(\epsilon^j)' - (\epsilon^i)' < \epsilon^j - \epsilon^i$. Therefore, there will exist a value $B^{ij}$ such that $j$ will be preferred to $i$ if and only if $\epsilon^j - \epsilon^i < B^{ij}$. As a result, without loss of generality, we can write:

$$\Pi^*(\tilde{\pi}^1, \tilde{\pi}^2, \ldots \tilde{\pi}^N) = \max_{\{\mathbf{B}\}} \left\{ \Sigma_{j=1}^N \int (\tilde{\pi}^j - \epsilon^j) f(\epsilon) D^j(\epsilon, \mathbf{B}) d\epsilon \right\}, \tag{38}$$

where $\epsilon = (\epsilon^1, \epsilon^2, \ldots \epsilon^N)$, $f(\cdot)$ is the density for $\epsilon$, $\mathbf{B} = \{B^{ij}\}_{i,j=0,\ldots,N}$, and:

$$D^j(\epsilon, \mathbf{B}) = \begin{array}{ll} 1 & \text{if } \epsilon^j - \epsilon^i \leq B^{ij} \text{ for } i = 1, \ldots, N, \text{ and} \\ 0 & \text{otherwise.} \end{array}$$

In other words, $D^j = 1$ if and only if the firm chooses host country $j$. An optimizing firm will choose the $B^{ij}$ cutoffs to maximize profit *ex post*, and will therefore maximize expected profit *ex ante*. (It is easy to see that the optimal choice will be $B^{ij} = \tilde{\pi^j} - \tilde{\pi^i}$.)

Note that for each $j$, the integral in (38) can be written as:

$$\int_{-\frac{\Delta}{2}}^{\frac{\Delta}{2}} \int_{\epsilon^j - B^{Nj}}^{\frac{\Delta}{2}} \cdots \int_{\epsilon^j - B^{2j}}^{\frac{\Delta}{2}} \int_{\epsilon^j - B^{1j}}^{\frac{\Delta}{2}} \frac{\left(\tilde{\pi}^j - \epsilon^j\right)}{\Delta^N} d\epsilon^1 d\epsilon^2 \cdots d\epsilon^N d\epsilon^j,$$

where both ellipses omit the $j^{th}$ term. This expression is clearly differentiable with respect to each of the $B^{ij}$ terms. Consequently, we can use the Envelope Theorem, and in taking the derivative of $\Pi^*$ with respect to $\tilde{\pi}^j$, we can hold $B$ fixed. This gives us:

$$\Pi_j^* = \int f(\epsilon) D^j(\epsilon, B) d\epsilon,$$

and the right-hand side is, by definition of $D(\cdot, \cdot)$, equal to $m^j$. **Q.E.D.**

Table 1: Summary Statistics.

| Variable | Obs | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|---|
| Labor rights | 2,506 | 27.18815 | 7.825008 | 2.5 | 37 |
| FDI as a ratio of GDP | 2,506 | 37.66101 | 160.2837 | -1.283061 | 2391.321 |
| Number of competitors | 2,199 | 104.262 | 51.6155 | 5 | 227 |
| Geographic compdist (in logs) | 2,506 | 8.8458 | 0.4065651 | 7.188074 | 9.869908 |
| Industry compdist (in logs) | 2,506 | 3.154982 | 0.5558248 | 0.755083 | 4.141341 |
| Initial GDP per capita (in logs) | 2,506 | 7.872952 | 1.557837 | 4.959368 | 10.96064 |
| Dummy for transition countries | 2,506 | 0.1093376 | 0.3121246 | 0 | 1 |

Table 2: The Effect of Inward FDI.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | OLS | IV | OLS | IV | OLS | IV |
| FDI. | -0.001 | -0.332 | 0.021*** | 1.552*** | 0.002 | 0.528 |
| | (0.001) | (0.875) | (0.008) | (0.531) | (0.002) | (1.948) |
| Geographic compdist*FDI. | | | -0.003*** | -0.169*** | | |
| | | | (0.001) | (0.057) | | |
| Industry compdist*FDI. | | | | | -0.001* | -0.261 |
| | | | | | (0.001) | (0.851) |
| Observations. | 2,506 | 1,880 | 2,506 | 1,880 | 2,506 | 1,880 |
| R-squared. | 0.181 | | 0.181 | | 0.181 | |
| Number of countries. | 175 | 167 | 175 | 167 | 175 | 167 |
| First-stage F stat. | | 0.162 | | 20.195 | | 0.075 |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Year fixed effects. | Yes | Yes | Yes | Yes | Yes | Yes |

*Dependent variable is the strength of collective bargaining rights. Coefficients of controls interacted with time dummies and intercepts are not shown.*

Table 3: The Effect of the Number of Competitors for FDI.

| | (1) | (2) | (3) |
|---|---|---|---|
| | OLS | OLS | OLS |
| Number of competitors | -0.008 | 0.215** | -0.004 |
| | (0.008) | (0.105) | (0.033) |
| Initial geo. compdist*Number of competitors | | -0.025* | |
| | | (0.012) | |
| Initial industry compdist*Number of competitors | | | -0.001 |
| | | | (0.010) |
| Observations | 2,337 | 2,337 | 2,337 |
| R-squared | 0.189 | 0.192 | 0.189 |
| Number of countries | 184 | 184 | 184 |
| Country fixed effects | Yes | Yes | Yes |
| Time fixed effects | Yes | Yes | Yes |

*Dependent variable is the strength of collective bargaining rights. Coefficients of controls interacted with time dummies and intercepts are not shown.*

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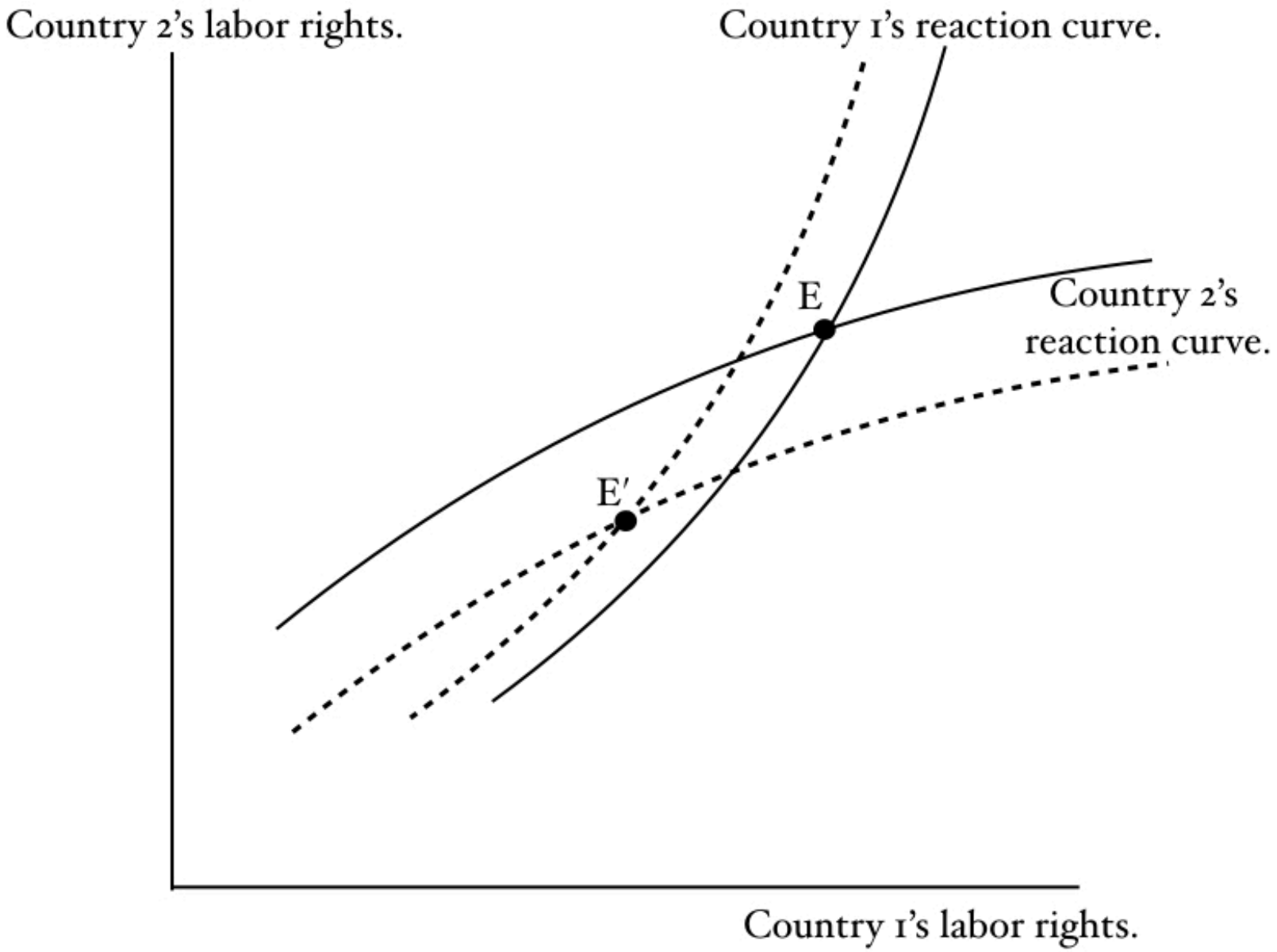


Figure 1: Interpretation of the empirical exercise.

Figure 2: Changes in FDI and labor rights, 1990-2000.

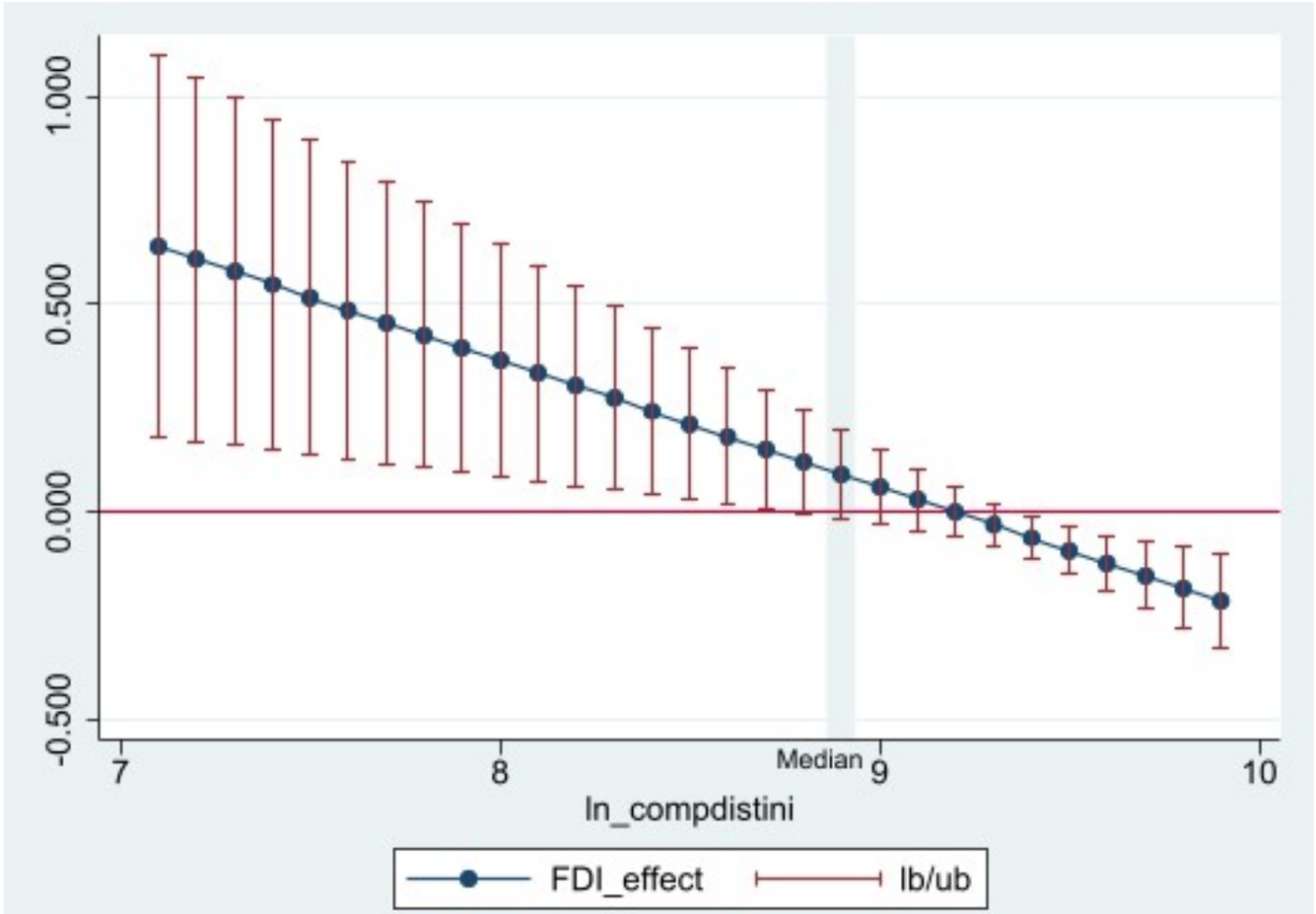


Figure 3: Magnitude of FDI effect;
variation by closeness of competitor countries.

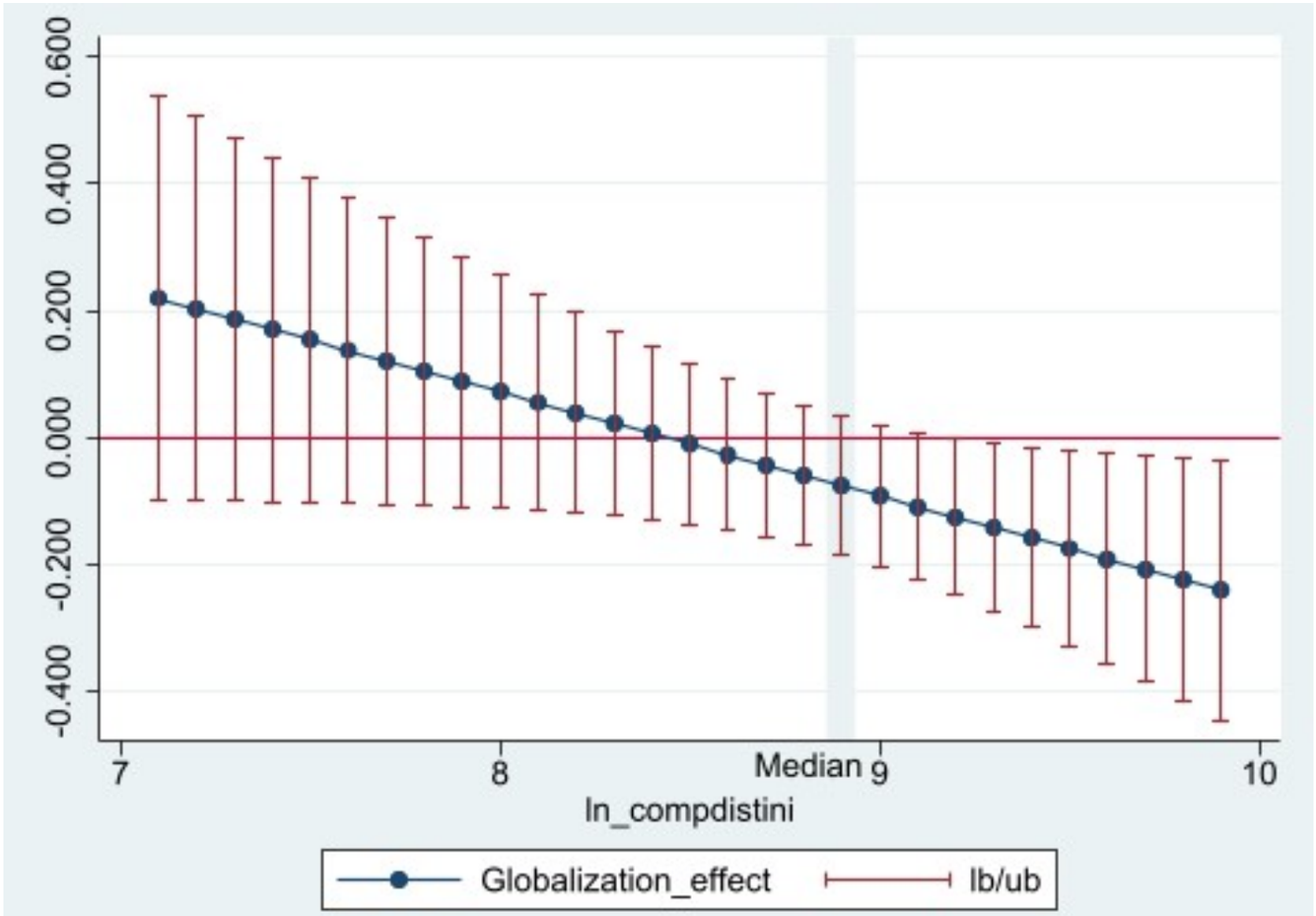


Figure 4: Magnitude of effect of number of competitor countries; variation by closeness of competitor countries.