What impact of Labor Market Institutions on FDI decisions? An investigation using French-firm data[*]

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Abstract

The paper evaluates the empirical effect of labor market institutions (LMI) on FDI decisions. To that aim, a new dataset is used, that describes French firms expansion strategies abroad over the period 1992-2001. Following Head & Mayer (2004*b*) or Amiti & Javorcik (2005), we estimate the determinants of individual FDI decisions by implementing a discrete choice model on all possible foreign locations. We explicitly derive the set of potential determinants used in the regressions from a theoretical model. Our modelling combines elements of the new trade theory (Krugman (1991)) and the labor market literature (Belot & Van Ours (2004)).

Estimation results suggest that labor market institutions do impact French firms location decisions. The estimated effect depends on the type of LMI considered and the country coverage. Among all LMI, the degree of centralization of wage bargaining seems to matter most. In any case, the magnitude of the effect remains modest, notably as compared to standard FDI determinants such as market potential. Firms may be discouraged by stricter labor regulation but investment inflows and new production sites seem to be primarily driven by demand size considerations.

Keywords: Labour Market, Firms location decisions, firm-level data

JEL codes: F2, F4

1　Introduction

One of the most notable change OECD countries have experienced over the last decades, is the increasing liberalization degree, both in international trade and in the financial area. It has notably induced a globalization of firms production process, which is now taken on a world-wide basis in a large number of sectors. In such a globalized setting, the increasing competition from emerging markets makes the question of firms international competitiveness more crucial. Recurrent debates have thus been emerging, among economists and governments of major developed countries, on the correct way to deal with globalization and the relocation process to less-developed economies it entails.

On that topic, one leading question is related to the "good" way to face with the risk of unemployment, that the reorganization of firms on a worldwide basis may induce, at least in the sectors the most exposed to international competition. Globalization therefore forces economists and politicians to re-think the design of labor market policies in the globalized world. The other way round, national labor market institutions *per se* are likely to affect location decisions of firms among alternative countries. If so, this link has to be taken into consideration in the design of labor market policies, so as to assess all their expected effects on the national economy.

Our paper takes part to the debate empirically. We focus on the question of the impact of labor market institutions (LMI hereafter) on FDI. In contrast with related papers that often use aggregate data (see Delbecque & Lahrèche-Revil (2007) or Golub, Hajkova, Mizra, Nicoletti & Yoo (2003)), our contribution lies on the use of a new dataset describing French firms expansion strategies abroad over the period 1992-2001. This allows us to deepen the analysis of the determinants of FDI decisions at an individual level, and to question the role of LMI on the topic, as in Dewit, Holger & Montagna (2003), Lee (2003) and Javorcik & Spatareanu (2005). Moreover, while most related empirical studies capture LMI in the sigle dimension of employment protection, we enlarge the analysis to a larger set of labour market institutions, notably minimum wage legislation and wage bargaining process. To that aim, we collect data from OECD sources, but also *Economic Freedom* data from the Fraser Institute, *Doing Business* data from the World Bank and the *Institutional Profiles* database build in the French Ministry of Finance.

The question of the impact of labor market regulation on firm location choices has been recently explored by a few papers. The empirical results of Javorcik & Spatareanu (2005) support the conclusion reached by Haaland, Wooton & Faggio (2002). In their theoretical contribution, they obtain that high labor market regulation tends to decrease inward FDI through reduction in firms profits. With respect to the impact of trade unions, the theoretical papers by Clark (1984) and more recently Munch (2003) suggest that powerful trade unions increase the negotiated wage, thereby reducing both firm profits and the appeal to foreign investments. However, the attractiveness loss may be mitigated through indirect mechanisms like improvement in productivity (Clark (1984)) or an aggregate demand effect (Munch (2003)). The overall net impact is not necessarily clear and we intend to shed some light empirically on that matter.

Following Head & Mayer (2004b) or Amiti & Javorcik (2005), we estimate the determinants of French firms FDI decisions by implementing a discrete choice model on all possible foreign locations. This allows us to explain the probability for a French firm to invest in a given country by a set of country- and sector-specific variables. We explicitly derive the set of potential de-

terminants used in the regressions from a theoretical model. Our modelling combines elements of the new trade and the labor market literatures and explicitly relate labour market institutions to location decisions. As Belot & Van Ours (2004), the country-specific wage entering the marginal cost of producing in a given location results from a negotiating process between firms and employees. As a consequence, it can be expressed as a combination of various dimensions of the host country's labor market policies, among them employment protection laws (*i.e.* firing costs), the minimum wage legislation, labor taxes or unemployment benefits. Our theoretical setting therefore delivers useful insights on the direction of the effects of LMI on FDI decisions, that can be tested empirically. It notably shows that the effect varies according to the type of LMI considered. In particular, if generous unemployment benefits or a high minimum wage in the host country are shown to reduce the propensity of firms to locate in the country, the sign is ambiguous with respect to employment protection laws (EPL).

Testing the model's predictions using firm-level data, we show that, besides standard determinants of FDI decisions like the host country's market potential and factor costs, the design of labor market institutions indeed influences the attractiveness of a country from the firms viewpoint. Namely, stringent employment protection laws, powerful trade unions and a more centralized wage-bargaining process significantly reduce the propensity of firms to locate in a country. However, simulation results suggest that the quantitative magnitude of these effects is small in comparison with more standard determinants of FDI, notably the market potential of the host country.

The rest of the paper is organized as follows. Section 2 derives the equation at the root of the estimation using tools of the new trade and the labor market literatures. Then, Section 3 presents our dataset and the variables used to proxy the determinants of location choices underlined in Section 2. In Section 4, after some descriptive statistics on the cross-country variability in LMI, estimation results are presented. Last, Section 5 concludes.

2   The estimated equation

2.1   Main assumptions

We adopt a New Trade Theory framework *à la* Krugman (1991), which explains firms location decisions at an international level by two main determinants, the relative producing costs and the relative aggregate demands within the set of countries to locate. Factorial prices, namely labor price, necessarily intervene in the decision as part of production costs. Their modeling is guided by several concerns.

First, as underlined by Dolado, Felgueroso & Jimeno (2000) and Dickens, Machin & Manning (1999), minimum wages are an important feature of a large number of national labor markets. On that theme, Méjean & Patureau (2007) theoretically show the non-trivial impact of a high minimum wage policy on firms location decisions. These elements lead us to investigate its role empirically. To that aim, production is assumed to require the use of workers paid at the minimum wage level (say, unskilled workers).

Second, we want to enlarge the set of LMI considered beyond minimum wage. In this regard, referring to the labour market literature (Cahuc & Zylberberg (2004), Belot & Van Ours (2004) among others), we assume that production also requires another type of labor (say, skilled la-

bor), whose equilibrium wage is the result of a Nash-bargaining between firms and unions. The resulting negotiated wage is notably affected by the set of labour market institutions in place.

Last, previous empirical papers have underlined other cost determinants susceptible of influencing firms location choices, notably the price of intermediate goods incorporated in the production process (Amiti & Javorcik (2005)) and the cost of various immobile factors (Head & Mayer (2004b)). Our theoretical model takes such elements into account by including a third production factor k, whose price z is proxied by several indicators detailed in Section 3.

As standard in the New Trade literature, monopolistic competing firms are assumed to produce under increasing returns to scale and costly international trade (modelled as iceberg costs à la Samuelson (1954)). Increasing returns to scale are due to the presence of a fixed cost of production F that each monopolistic firm s has to incur to locate and produce in country i. In the following, this fixed cost is assumed to be the same across locations.

Once settled in country i, production of a differentiated firm is given by the following Cobb-Douglas technology:[1]

$$y_{it} = q_{it}^{\alpha} l_{it}^{\chi} k_{it}^{\gamma} \tag{1}$$

with q_{it}, l_{it} and k_{it} the amount of skilled and unskilled labor as well as the third production factor used in production. α, χ and γ are defined over the interval $[0;1]$, with $\chi = 0$ in countries that do not legislate on minimum wages.

The wage cost of unskilled labor is assumed to be given by an exogenous minimum wage level denoted $\underline{w}_{it}$. Skilled labor wage is the result of a Nash-bargaining process between firms and unions. Besides, we suppose that firms have to incur firing costs per skilled worker $w_{it}f_{it}$ (at the end of the period t)

As a result, total skilled labor cost in country i, denoted $\widetilde{w}_{it}^{q}$, is given by:

$$\widetilde{w}_{it}^{q} = w_{it}^{q}\left[1 + f_{it}\right] \tag{2}$$

with w_{it}^{q} the negotiated net wage for skilled workers.[2,3]

The timing of a period may be decomposed in three steps. First, firms decide to enter (or not) a given country i. Then, for the existing number of firms in country i, Nash-bargaining takes place between firms and trade unions, yielding the negotiated wage w_{it}^{q} that prevails on the skilled labor market (the minimum wage level and the third factor price being exogenous). In a third step, each differentiated firm takes decisions with respect to prices and quantities, so as to maximize its operational profit. In the following, this program is solved backwards.

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[1]In order to ease the reading, we directly impose symmetry across firms within a country and neglect subscript s in the following.

[2]Note that unskilled labor is not subject to firing costs. This assumption, which is consistent with our empirical analysis, is made here to simplify the exposure of the model. It could be removed without drastically altering our theoretical results.

[3]In line with our empirical analysis, we consider that various dimensions of the labor market institutions are time-varying.

2.2 Deriving the equation to be estimated

2.2.1 Deriving the optimal price

As standard when using the Dixit & Stiglitz (1977) CES preferences, the profit maximization program of a monopolistic firm producing in country i leads to the following mil price in optimum:

$$p_{it} = \frac{\sigma}{\sigma - 1} MC_{it} \tag{3}$$

with $\sigma > 1$ the elasticity of substitution across varieties. Sale price in country i is set by applying a mark-up rate (that depends on σ) on the optimal marginal cost MC_{it}. Given equation (1), the optimal marginal cost is:

$$MC_{it} = \frac{1}{\alpha^\alpha \chi^\chi \gamma^\gamma} [\widetilde{w}_{it}^q]^\alpha [\underline{w}_{it}]^\chi [z_{it}]^\gamma \tag{4}$$

2.2.2 Deriving the equilibrium wage of skilled workers

Reasoning one step backwards, we now consider the determination of the equilibrium wage on the skilled labor market segment in country i. As our goal is to relate labor market institutions and firms FDI decisions, we retain the partial-equilibrium model developed by Belot & Van Ours (2004). In a right-to-manage of wage bargaining, they analytically establish the link between LMI and the equilibrium wage level. From that aspect our modelling is quite similar to their's, hence we do not come into much details regarding the analytical derivation of the negotiated equilibrium wage.

The right-to-manage model of wage bargaining relies on the assumption that wages are set by a Nash-bargaining process between an union and a firm, so as to maximize the relative surplus of both players. The sharing of the surplus is notably affected by the relative bargaining power of each part. In the following, β_{it} refers to the bargaining power of unions in country i (at time t). Then, for the given negotiated wage, the employment level is set by the firm alone.[4]

Belot & Van Ours (2004) derive the expression of the equilibrium negotiated wage of skilled workers. In the case where negotiations are fully centralized, they get:

$$w_{it}^q = \left[1 + \frac{\mu \beta_{it}}{1 - \mu} \right] \frac{b_{it}}{1 + q_{it} f_{it}} \tag{5}$$

$\mu = 1 - \alpha \frac{\sigma - 1}{\sigma}$ is interpreted by Belot & Van Ours (2004) as the effective degree of firms monopoly power. b_{it} denotes the unemployment benefit ratio (that intervenes in the worker's outside option in the Nash-bargaining process), f_{it} is the firing cost, β_{it} the union's bargaining power ($0 < \beta_{it} < 1$) and q_{it} the exogenous job destruction rate in country i. According to equation (5), an increase in the union's bargaining power (β_i) or unemployment benefits (b_i) raises the negotiated wage, while an increase in firing costs (f_i) leads to a reduction of it. All three elements act on the relative bargaining position of the workers in the Nash-negotiation.

Equation (5) is obtained under the assumption of fully centralized bargaining. However, it has been shown in the labor market literature that the degree of bargaining centralization influences the negotiated wage. According to Belot and Van Ours's (2004) results, the negotiated wage increases when negotiation occurs at a more decentralized level. The seminal Calmfors &

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[4]Since we focus here on the expression of the marginal cost of production, we need not to detail this aspect of the problem.

Driffill (1988) paper rather suggests a non-linear relation between centralization and the level of negotiated wage. According to them, either fully centralized (national-level) or fully decentralized (firm-level) lead to lower wage than semi-centralized negotiations.

This model thus provides us with interesting predictions concerning the impact of country-specific LMI on the marginal cost of producing. On the one hand, given equations (2), (4) and (5), higher values for β_{it} and b_{it} increase the marginal cost of producing in country i, through the skilled wage $\widetilde{w}_{it}^q$. This is also the case for the minimum wage level. On the other hand, the effect of firing costs f_{it} is ambiguous, as their direct positive effect on the total skilled labor cost (equation (2) may be compensated by its indirect decreasing impact on the negotiated wage (equation (5)). Last, whereas the degree of bargaining centralization is likely to impact the negotiated wage, hence location decisions, the labor market literature suggests its direction to be ambiguous.

2.2.3 Analyzing FDI decisions

Having described the optimum output of the last two stages of the play under consideration, let consider now the first step, namely firms entry decisions in national markets. This ultimately determines the number of active firms in country i. At this stage, two remarks need to be formulated. First, and consistently with our empirical analysis, we focus attention on the choice made by an individual firm to locate in country i (*i.e.* in our empirical terms, the choice of a French firm to settle an affiliate in that country). We consequently do not derive results regarding the aggregate number of firms. Second, the decision of a (French) firm to locate in a given host country i is taken in a multi-country environment, as in Head & Mayer (2004b). In such a setting, the optimal operational profit made by a French firm locating its affiliate in country i, at period t, can be written as:

$$\pi_{it}^{op} = \frac{1}{\sigma} MC_{it}^{1-\sigma} RMP_{it} \tag{6}$$

where MC_{it} is the marginal cost of producing in country i. RMP_{it} denotes what Krugman (1992) calls the market potential in country i, which sums over all k countries (attainable from i) national real aggregate demands, weighted by accessibility from country i. In the following, this variable is measured along the lines of Redding & Venables (2004), as detailed in Section 3.

As standard in the related new trade literature, we make the assumption that fixed costs of production are identical across countries. Besides, they are assumed to be independent of the labor market institutions. As a result, they do not alter the profit ordering of potential location choices, and a firm planning to settle a production unit abroad needs only to compare expected operational profits across countries. Within the country choiceset, it will locate in the one yielding the highest operational profit. According to equation (6), incentive to locate in country i is increasing in i's market potential and decreasing in its marginal cost of producing.

Incorporating equation (4) in equation (6), and taking logs, the operational profit equation at the basis of estimation becomes:

$$\ln \pi_{it}^{op} = -\ln \sigma - (\sigma - 1) \left[\alpha \ln \widetilde{w}_{it} + \chi \ln \underline{w}_{it} + \gamma \ln z_{it} \right] + \ln RMP_{it} + \varepsilon_{it} \tag{7}$$

where ε_{it} is a random term capturing the effect of unobserved components of marginal cost or market potential, that are specific to location i and time t.[5] $\widetilde{w}_{it}$ results from the combination of

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[5]Our estimation strategy assumes a structure of errors correlation that is firm-specific.

equations (5) and (2), and the determinants of z_{it} are detailed in Section 3.

Equation (7) is estimated using a discrete choice model, assuming that ε_{it}'s marginal distribution is univariate extreme value. Conditionally on the decision to invest abroad, each firm chooses the host country, where its subsidiary is expected to yield the higher operational profits. This assumption allows to use the conditional logit model, to derive the probability for each location within the country set under consideration to receipt the French firm's investment.[6] Before turning to our estimation results, next section describes our dataset.

3   Data description

3.1   French firms FDI decisions dataset

The dataset describing French-firm foreign expansion strategies comes from three different sources.

- two surveys, the *"Enquête Filiales 2002"*, conducted by the French ministry of Finance (the DGTPE, *General Direction for Economic Policy*) and the *"LIFI"*, a survey by the French official statistics institute (the INSEE). These datasets contain the description of 12215 creations of foreign affiliates by French firms, including the location of the new production unit and the year of investment over the period 1980-2004,

- the *"Enquête Annuelle d'Entreprises"* also conducted by the INSEE, over the 1984-2002 period, that completes the previous dataset with information on the investing firms (sector of activity, number of employees, etc.)

After merging these datasets, we dispose of a single table containing detailed information about French firms and their foreign affiliates. We restrict our analysis to firms that operate in the manufacturing sector in the period 1992-2001, and we eliminate islands as a geographical zone of settlement.[7]

At this step, the dataset covers 2671 investments taken in 77 countries. Consistently with the logit methodology, the next step consists in generating the set of alternatives each decision maker (*i.e.* each French firm) faces. As a result, each observation of our dataset is duplicated for the whole set of countries. We then build an indicator variable for the creation of a subsidiary s in a given country (in some given year), denoted fdi_{ijs}. For each firm s that chooses to invest in country i among all possible locations j, the indicator variable takes the value:

$$f_{ijs} = \begin{cases} 1 & \text{if } j = i \\ 0 & \text{if } j \neq i \end{cases}$$

3.2   The set of explicative variables

The dependent variable fdi_{ijs} equals 1 if the database mentions the opening of a subsidiary of the French firm s in country i. We evaluate the determinants of such decision, relying on the theoretical FDI motives included in equation (7). While firms location decision should rigorously be related to a cross-country comparison of *expected* profits, the determinants of FDI decisions

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[6]Note that, in this setting, investment decisions are assumed to be independent of one another.

[7]We restrict our analysis over the 1992-2001 period because of data availability constraints regards some of the variables included in the regression. Besides, descriptive statistics show that FDI decisions are mostly concentrated in the 90's.

that are considered, are taken the year of investment. The related literature usually retains this assumption as it prevents from making additional assumptions on the formation of firms expectations. Moreover, as the identification of parameters mainly lies on the cross-country variability in the conditional logit setting, it is sufficient to assume that determinants observed the year of investment are correlated with the variables entering the expectation function.

3.2.1 The market potential of country i

Several market potential indicators can be found in the empirical literature. We retain the structural measure of market potential proposed by Redding & Venables (2004), so as to be the closest to Krugman's (1992) expression of market potential.[8] We thus build a "real market potential" variable based on the following equation:

$$RMP_i = \sum_j I_j P_j^{\sigma-1} \phi_{ij} \tag{8}$$

where I_j is the nominal expenditure in country j, P_j is the price level that reflects the competition degree and ϕ_{ij} is a bilateral measure of the "free-ness" of trade that increases from zero to one when trade becomes cheaper (see Baldwin, Forslid, Martin, Ottaviano & Robert-Nicoud (2005)). In accordance with the Krugman's (1992) definition, equation (8) takes into account the market potential of each country j attainable from i, as well as the degree of competition captured by the price index.

We build the series annually over 1992-2001 period, using trade and gravity data taken from the *IMF-Dots* and *CEPII-Distance* databases. The underlying model estimated by Redding & Venables to get the market potential variable is a gravity-type equation explaining bilateral trade between country i and j (X_{ij}) by exporter- and importer-specific dummy variables (respectively called cty_i and ptn_j in what follows) and various proxies for bilateral trade barriers (vector Φ_{ij}, capturing trade barriers ϕ_{ij} in equation (8)):

$$\ln X_{ij} = \theta + \mu_i cty_i + \lambda_j ptn_j + \delta \Phi_{ij} + \epsilon_{ij} \tag{9}$$

Equation (8) is derived from a structural new trade model comparable with ours (Section 2). First, the exporter-specific dummies account for the number of producers in country i as well as their price competitiveness, called by Redding & Venables the "supply capacity" of country i. Second, the importer fixed effects catch the $I_j P_j^{\sigma-1}$ terms entering the real market potential, *i.e.* the size of each market (I_j) and the degree of competition producers selling goods on it face (summarized in the aggregate price index P_j). The real market potential RMP_i is a weighting sum of these "market capacities", weighted by the ease of access of each market for a firm located in country i. From the estimation of (9), one can thus restore a measure of real market potential as:

$$\hat{RMP_i} = \sum_j \left(exp(ptn_j) \right)^{\hat{\lambda}_j} \left(exp(\Phi_{ij}) \right)^{\hat{\delta}}$$

This variable is built from the estimation of (9) for each year between 1992 and 2001. Following Head & Mayer (2004b), the chosen proxies entering Φ_{ij} are the distance between both

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[8]Many thanks to Thierry Mayer for having let us dispose of his Stata program. Details on the method are provided in his joined paper with Keith Head, Head & Mayer (2004b).

countries, a dummy equal to one if i and j share a common border, another one controlling for past colonial links, a "Common language" variable as well as a set of dummy variables reflecting trade agreements and monetary unions. In the conditional logit, the variable is taken in logarithm and denoted "ln market potential". According to equation (7), we expect a positive sign for the coefficient associated with it.

3.2.2 Labour costs

According to our theoretical framework, the labour cost variable that intervenes in the marginal cost expression (equation (4)) is made of three elements, the minimum wage (if any) $\underline{w}_{it}$ remunerating low-skilled workers in country i, the negotiated wage w_{it}^q paid to skilled workers, and firing costs f_{it}. Moreover, the equilibrium wage resulting from the Nash-bargaining in country i (equation (5)) depends on the union's bargaining power β_{it}, the unemployment benefit ratio b_{it}, the firing cost f_{it}. As suggested by Belot & Van Ours (2004) or Calmfors & Driffill (1988) (among others), it is also affected by the degree of centralization of the wage-bargaining process. These various dimensions of LMI thereby affect the operational profit expected from country i. As our dataset covers a large sample of countries, we cannot necessarily include all these dimensions of the labor market institutions in our regressions. We are able to do so for the restricted set of OECD countries, as the OECD provides us with sufficiently detailed information. With respect to non-OECD countries, we rely on other sources providing data on the labour market institutions in place. In that case, we can only capture some specific dimensions of the LMI variables, that intervene in FDI decisions.[9]

- **With regard to OECD countries**, the set of LMI dimensions intervening in FDI decisions are captured by the following variables, taken from the OECD's *Labor Statistics* database.

  - the gross benefit replacement rate taken in log and denoted "ln ben. repl. ratio", that captures the generosity of the unemployment system (b_{it} in the terms of equation (5)),
  - the employment protection legislation (EPL) index proxying firing costs (f_{it}). In this regard, we consider the degree of employment protection for all workers (denoted "EPL, all"), for regular workers ("EPL, regular") and for temporary workers ("EPL, temporary").
  - The unions' bargaining power (β_{it}) captured by two variables, union density and union coverage. The "union density" variable is defined as the share of labor force which is union member. The "union coverage" variable is the share of labour force covered by collective agreements. Depending on the country' legislation, it may be the case that workers that are not union members nevertheless benefit from the collective agreements signed by unions (as in France for instance). As a result, a low share of workers that are union-members (low value for "union density") is not necessarily the sign of a low bargaining power for unions. We thus favor union coverage, as it may better captures the unions bargaining power than union density. Yet, union density is also used in the regressions as a robustness check.

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[9]See Appendix A for details.

- the degree of centralization of wage bargaining and the degree of coordination of wage bargaining, respectively denoted "central. degree" and "coord. degree" in the following tables, used as two alternative proxies for the degree of centralization,

- the ratio of minimum over median wage that measures the degree of constraint attributable to minimum wage legislations.[10]

Depending on the LMI variable considered, this dataset covers from 10 to 27 countries.

- **With regard to our whole set of countries**, we do not dispose of a such detailed LMI dataset. We use information respectively provided by the World Bank "Doing Business" database, the Fraser Institute (Gwartney & Lawson (2006)) and the *Institutional Profiles* database built by the French Ministry of Finance. LMI indicators provided by "Doing Business" have no time dimension as they are 2005 values. This is not the case for LMI variables provided by the Fraser Institute or from the French Ministry of Finance. Given these three datasets, we are able to capture some of the LMI dimensions that intervene in FDI decisions through the following variables.

  - Firing costs f_i are proxied by two employment protection indicators provided by Doing Business: *i)*, the Difficulty of firing Index, and *ii)* a direct measure of Firing costs. The first one, denoted "Diff. of firing", varies between 0 and 100 and increases with the amount of firing costs. We also include the Rigidity of Employment Index ("Rig. of Empl. index (DB)") which is a broader indicator of the rigidity of labor market practices (see Appendix A for details). The *Institutional Profiles* database also provides us with two alternative proxies for this variable: *i)* an indicator of "Labor Contract Protection" that varies between 1 and 4 (1 being the degree of strongest protection), and *ii)* a "Dismissal Procedures" indicator equal to zero if there is no laws or arrangements and increasing between 1 and 4 to qualify the degree of observance of the existing laws.

  - the Bargaining Process is measured using two variables (besides the ones obtained from the OECD database): *i)* the "degree of centralization of wage bargaining" provided by the Fraser Institute, and denoted "Centralization degree (EF)", that measures the share of labor force covered by collectively bargained wages, and *ii)* the "Bargaining Level for blue-collar workers" variable of the French Department of Finance, lying between 1, if the wage bargaining is done at the national level, and 4 if wages are negotiated individually.

  - the Minimum Wage legislation is measured by the French Ministry of Finance's index equal to zero if there is no legal minimum wage and increasing between one and four according to the degree of accordance. Alternatively, Economic Freedom provides an index defined over the range [0, 10] that measures the degree of constraints imposed by minimum wages. The higher value, the less minimum wage legislation is stringent.[11]

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[10]On that point, OECD sources provide us with 10 countries. We complete information on minimum wages using data provided by the International Labour Organization from the United Nations, Eurostat and Botero, Djankov, La Porta, López-de Silane & Shleifer (2004). See Appendix A for details.

[11]Precisely, the index measures the extent to which legal minimum wage "has little impact on wages because it is too low or not obeyed".

What are the expected signs of the coefficients associated with the different LMI variables in the regressions? According to equations (2) and (5), generous unemployment benefits (b_{it}) and strong union's bargaining power β_{it} tend to increase the equilibrium wage, and the optimal marginal cost as well. Given equation (7), we thus expect that they reduce the propensity of firms to locate in the host country. Things are not so cut-off regards firing costs. On the one hand, they increase labor cost (equation (2)). On the other hand, they exert downward pressure on the negotiated wage, as they strengthen the firms bargaining power (equation (5)). The expected effect regards firms location decisions is thus ambiguous. This is also the case for the degree of bargaining centralization, as the labour market literature yields contrasted results regards its impact on negotiated wages. Last, the direct impact of minimum wages on the firms competitiveness is negative, as it raises the marginal costs of production. We thus expect a negative sign associated with. Yet, Méjean & Patureau (2007) reach the theoretical result that it may also positively affect the country's attractiveness, as a high minimum wage contributes to sustain aggregate demand, in what case we could get a positive sign.[12]

3.2.3 Non-labour costs

To approximate other factorial prices affecting the firm's marginal cost (z_{it} in the terms of equation (7)), we use three additional variables.

Supply access: Following Amiti & Javorcik (2005), the related empirical literature has reached to the conclusion that intermediates are a key element of location choices, and all the more as productive processes are more fragmented in the current decades. When intermediate goods are included in the production function, firms have an incentive to locate where they are the cheapest , *i.e.* near intermediate good suppliers. Following Amiti & Javorcik (2005), we capture intermediate goods availability by a variable that measures the access investing in country i gives to firm operating in sector k regards intermediate goods. We construct that variable by using information about the actual matrix of inter-industry linkages. Namely, its construction is based on several assumptions. First, intermediate goods are assumed to be either locally produced or imported from neighbor countries j (the country set *adj* hereafter). Second, an affiliate abroad is supposed to use intermediate inputs in the same proportion as firms of its industry in France. This is a convenient assumption as it allows to use the French Input/Output (I/O) tables to measure technological coefficients. Third, we only account for the location of French affiliates producers of inputs, *i.e.* we restrict ourselves to the co-location of French firms that usually work together and neglect any belonging of these foreign affiliates to the same multinational corporation. This implicitly assumes that French affiliates abroad are more likely to buy intermediate inputs from other French affiliates (or that the location patterns of French affiliates abroad is a good representation of the distribution of other firms one can source inputs from).

Based on these assumptions, our supply access measure for a firm operating in sector k,

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[12]For this to happen in our empirical setting, it should be the case that the indirect effect of minimum wage on FDI decisions is not captured by the market potential variable *per se*.

locating its affiliate in country i, is calculated according to the following formula:

$$SA_{ikt} = \beta_{kt} \sum_l a_{klt} \sum_{j \in adj} \frac{empl_{lt}^j}{empl_{lt}^{world}} \frac{1}{dist_{ij}}$$

where β_{kt} is the share of intermediate goods in the production of sector k whose subsidiary belongs to, and a_{klt} is a technical coefficient that measures the factorial intensity in input l of the production of sector k (taken from the I/O Tables). The employment level of industry l in country j ($empl_{lt}^j$) is used as a proxy for output of sector l in country j. Consequently, $\frac{empl_{lt}^j}{empl_{lt}^{world}}$ represents the share of country j in the world production of the intermediate good l. As it is weighted by the distance between i and j, it takes into account the degree of accessibility for an affiliate (i, k) to intermediate suppliers located in country j. To avoid simultaneity bias, we use the lag value of the variable (taken in log and denoted "ln (supply access -1)"). We expect a positive sign associated with, since a better access to intermediate suppliers is supposed to reduce the price of inputs for the subsidiary.

Cost of immobile factors: We proxy the cost of other immobile factors by (the log of) country i's GDP per capita. This variable is commonly used in the empirical literature on FDI determinants, as it allows to control for a large number of immobile production factors, like the price of physical capital or housing. As a related advantage, its extensive use in the literature allows us to confront our results to others (Head & Mayer (2004b) notably). According to equation (7), we expect a negative sign for the coefficient associated with.

Transaction costs: As standard in the related literature, we control for other transaction costs linked to various determinants of the "easiness" for investing in a specific country. First, we control for information and communication costs using various gravity-type variables, namely the distance between France and the host country i (in log, denoted "ln distance"), a "common language" dummy variable, set to 1 if country i is French-speaking, an "ex colony" dummy, equals to 1 if country i is a former French colony, and continental dummies that capture fixed effects of investing in a given zone. We expect a negative sign associated with distance from France and a positive sign associated with the "common language" and "ex colony" dummies. Nevertheless, we cannot neglect that gravity variables may also capture the influence of omitted variables that intervene in location choices. This may induce some instability in the associated coefficients according to the specification and sample under consideration.

Second, we consider that the affiliate's productivity level may be affected by positive spillovers due to past investment decisions taken by French firms of the same industry. Recent empirical literature (Head & Mayer (2004a) notably) points out the importance of mimetic behaviors of investors as a determinant of FDI decisions. Investors are more likely to agglomerate in countries where other affiliates in the same sector have been settled. These spillovers are proxied by a variable measuring the cumulated number of French subsidiaries of the same industry that have been set in the past in country i (in log, denoted "ln(# of same ind. firms -1)"). Yet, one has to note that this variable may capture some country-specific characteristics that have been influencing location decisions both in the past and nowadays. In any case, we expect a positive sign of the coefficient associated with in the regressions.

4 Estimation

4.1 Some descriptive statistics analysis

In this section, we present some descriptive statistics regarding the characteristics of our LMI variables, either in the cross-country dimension or in the time-dimension. Relying on simple descriptive statistics analysis, we question the relationship between FDI decisions and the labor market functioning of the host country.
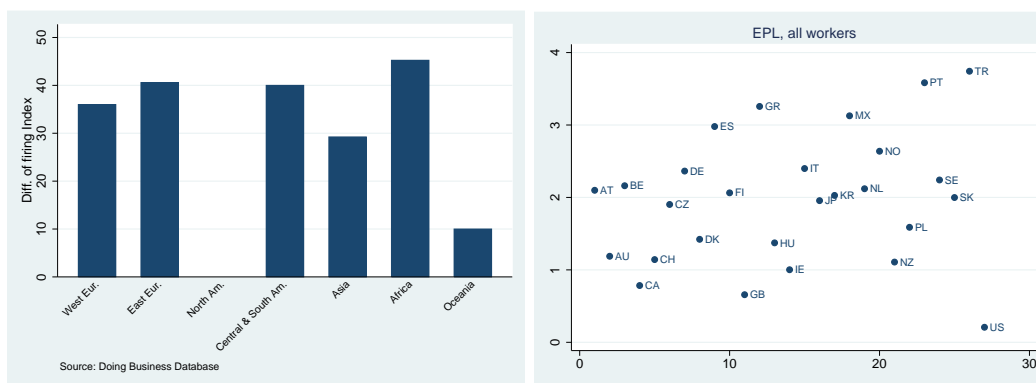
4.1.1 Labor Market Institutions: a brief description

The question addressed in the paper can be summed up as follows: Do cross-country differences in labor market institutions (LMI) affect French firms FDI decisions? As a first step, it is necessary to check that there is some heterogeneity in LMI in our dataset. Descriptive statistics analysis of our LMI variables indeed yields the conclusion that LMI have been changing over the period, but in a contrasting way depending on the set of countries considered. This result is suggestive of some heterogeneity in both the cross-section and time-dimension of the data. We investigate that point further in the following.

Table 1 reports a summary of the cross-country distribution of our measures of labor market regulation (covering a different number of countries depending on the source of data). It confirms a substantial degree of heterogeneity in the labor market institutions, as shown by the strong dispersion around the mean for each LMI variable.

To have a closer idea of which countries may be qualified as "rigid" and which ones as "flexible", Figure 1 reports the cross-country dispersion of the "Difficulty of Firing index" for the large set of countries (emanating from the Doing Business database, left panel) and of the Employment Protection Laws Index for OECD countries (all workers, in 2000, right panel). Since the Difficulty of Firing Index covers a large number of countries, it is more convenient to group countries by continent.

Figure 1: Rigidity of employment practices, cross-country dispersion

In both panels, North America (*i.e.* Canada and the United States), followed by Oceania (*i.e.* Australia and New Zealand) display the lower degree of constraint with regard to the functioning of their labor market. As shown in the left panel, Asian countries closely follow. This is consistent with the widespread view that such countries are "flexible", at the opposite of the "rigid" European countries (either Western or Eastern), characterized by a higher degree of
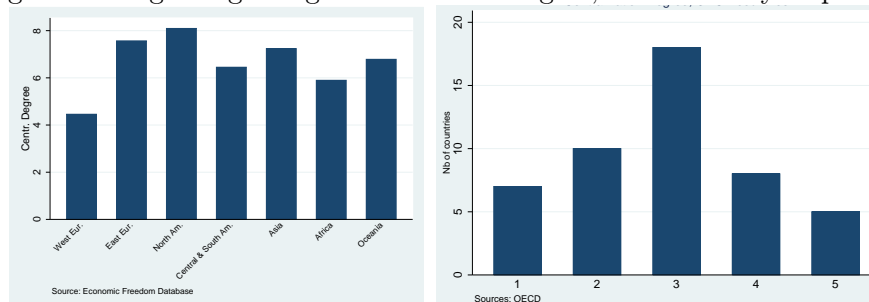
Table 1: Cross-country dispersion of LMI variables

Variable	Nb of countries	Year	Mean	Std. Dev.	Min	Max
Doing Business Database						
Diff. of Firing index	80	2005	37.0	24.8	0	100
Firing costs	80	2005	50.4	52.8	0	359.7
Rigidity of Empl. Index	80	2005	40.3	17.5	0	77
Fraser Institute Database						
Centralization Degree	62	2001	6.2	1.7	2.2	8.7
Min. wage impact	57	2001	4.0	0.8	1.9	5.3
MINEFI Database						
Labor Contract Protection	81	2001	2.6	0.8	1	4
Dismissal Proceedings	81	2001	2.7	1.1	0	4
Bargaining Level	81	2001	2.6	1.0	1	4
Minimum Wage	81	2001	2.5	1.2	0	4
OECD Database						
EPL, all	27	2000	2.0	0.9	0.2	3.7
EPL, regular	27	2000	2.2	0.8	0.2	4.3
EPL, temporary	27	2000	1.8	1.3	0.3	4.9
Union density	27	2000	33.0	19.5	6.1	80.3
Union coverage	18	2000	65.8	28.9	14	98
Centr. Degree	21	2000	2.3	1.2	1	5
Coord. Degree	21	2000	2.9	1.4	1	5
Ben. Repl. Ratio	20	2000	30.9	12.6	10.5	56
Min. Wage Ratio	10	2000	42.4	8.02	32	58

rigidity.

Figure 2 details another dimension of cross-country heterogeneity, related to the degree of centralization of wage bargaining. Left panel displays the Index of Centralization Degree for the large sample of countries (provided by the Fraser Institute, year 2000-values) grouped by continent. Right panel reports a similar picture for OECD countries: it presents the number of OECD countries for each value of the centralization degree index (from 1 to 5, increasing with the degree of centralization).
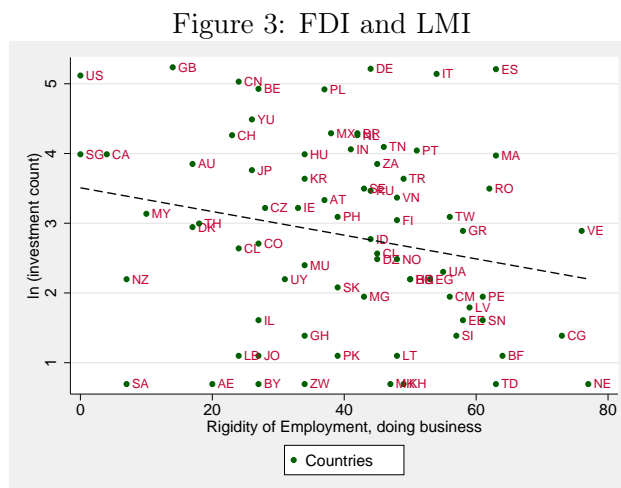
According to Figure 2, diversity of situations holds, across OECD countries as well in the large sample covered by the Economic Freedom's database.

Figure 2: Wage bargaining centralization degree, cross-country dispersion

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4.1.2 The link between FDI and LMI: a first look

How does the functioning of the labor market affect FDI decisions of foreign investors? Before investigating further, we question that point using simple descriptive statistics. To that aim, we determine the number of FDI decisions French firms have made in each country over the period and relate it to the LMI in place. Figure 3 plots the number of FDIs in each country (in log) versus the Rigidity of Employment index provided by the Doing Business database.

Figure 3: FDI and LMI

According to Figure 3, the higher degree of employment rigidity, the lower FDIs in the host country. Moreover, the correlation between this LMI indicator and the number of LMI equals -0.255 and is significantly negative (at the 5% level). These results comfort our intuition, that LMI matter in FDI. Obviously, in order to draw robust conclusions, one has to check for other possible factors that could affect FDIs. This is done in the next section.

4.2 Estimation results

In that section, the impact of labour market institutions on FDI decisions is investigated using a dataset describing foreign expansion strategies of French firms over the period 1992-2001. We successively consider three aspects of the labor market functioning, namely the degree of employment protection, the impact of the bargaining process and the role of minimum wage legislation.

4.2.1 Employment protection and FDI decisions

Table 2 reports results of the Conditional Logit regression, focusing on the impact of employment protection. In a first step however, the regression is run on the standard set of explanatory variables found in the related literature (Head & Mayer (2004b) among others), excluding LMI variables so as to check for the consistency of our data. Results are provided in column (A) of Table 2.

As expected, the market potential variable enters with a positive sign in the conditional logit: firms are attracted by large markets with high purchasing power. Moreover, the magnitude of this coefficient matches usual findings in the literature. With variables taken in logs (and a large number of location choices), the coefficient on each variable is very close to the elasticity of the

probability of choosing a country for the average investor with respect to the explicative variable (see Train (2003)). According to colmun (A), a 10% increase in market access therefore increases the probability of attracting French investors by about 3.5%. Among the three transaction costs variables, distance and "ex-colony" enter with the expected sign: the further the host country, the lower the tendency for French firms to invest in there, this effect being mitigated for former French colonies. The "common language" dummy is negatively signed, contrary to expectation. However, this result is sensitive to the specification, as shown in subsequent regressions, which probably reflects the correlation of this variable with other omitted determinants of location choices.[13] With regards to the other variables capturing production costs, results are consistent with the literature. Namely, incentive to invest in a given country appears to be negatively correlated with its GDP per capita. Moreover, vertically-linked agglomeration forces are found to have a significant impact on firms location. The positive sign associated with "ln (supply access -1)" indeed suggests that firms have an incentive to move close to suppliers, as it reduces transportation of intermediate goods hence production costs. Moreover, the presence of French firms operating in the same industry matters in firms decisions, suggestive of the presence of strong externalities, such as better market knowledge, easier administrative procedures, and more broadly production externalities.

Results displayed in column (A) confirm that most standard results obtained in the literature regarding the determinants of FDI decisions are still relevant in our dataset. This allows us to turn now on evaluating the impact of labor market protection on FDI location. In this regard, we are able to compare estimation results obtained with two proxies of firing costs, and with five synthetic indicators of the global "rigidity" of employment protection.

Column (B) in Table 2 provides estimation results when adding the Labor Contract Protection indicator (provided by the French Ministry of Finance) in the list of regressors. The more labor contracts are protected, the lowest the index. The significantly positive coefficient thus indicates that the probability of investment is decreasing in the protection degree of labor contracts. According to the theoretical model of Section 2, this suggests that the direct upward effect of firing costs on the firms producing cost tends to dominate its indirect downward effect on the negotiated wage, thereby discouraging entering FDI flows. However, this result is not confirmed in column (C), that uses a more specific indicator measuring the degree of constraint of dismissal proceedings legal arrangements. Given the way the variable is constructed, the positive coefficient rather suggests that more heavy dismissal proceedings increase the propensity to locate in the country. As the country coverage is quite close in both cases, this inconsistency must be explained by different definitions of the firing costs proxies. Namely, the *Dismissal Proceedings* variable has a broader signification than labor protection laws, as it measures the extent to which labor contract and dismissal proceeding are respected. For some developing countries, this variable may proxy the overall degree of law enforcement in general. In that case, firms may positively react to jurisdictions where contracts - in general - are respected.

Columns (D) to (F) evaluate the robustness of this result, when location choices are contemplated within the reduced sample of OECD countries.[14] Although there is a substantial fall in the observation number in that case, results regards employment protection are significant.

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[13]The "common language" dummy is also negatively signed in Mayer, Méjean & Nefussi (2007).

[14]Note that in all regressions run on the OECD sample, the "colony" dummy is dropped because of multicolinearity.

Table 2: Impact of Labor Market Rigidity

Model :	Dependent Variable: Chosen Country							
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
ln market potential	0.35^a	0.50^a	0.53^a	0.47^a	0.38^a	0.49^a	0.34^a	0.34^a
	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)
ln distance	-0.41^a	-0.61^a	-0.57^a	0.46^b	-0.15	0.56^b	-0.44^a	-0.41^a
	(0.08)	(0.08)	(0.09)	(0.19)	(0.15)	(0.23)	(0.08)	(0.08)
common language	-0.41^a	0.13	0.27^c	-0.26^b	-0.53^a	-0.18	-0.50^a	-0.40^a
	(0.08)	(0.14)	(0.14)	(0.11)	(0.11)	(0.12)	(0.09)	(0.08)
ex colony	0.36^a	0.07	0.07				0.38^a	
	(0.12)	(0.15)	(0.15)				(0.12)	
ln GDP per capita	-0.27^a	-0.38^a	-0.37^a	-0.61^a	-0.57^a	-0.54^a	-0.29^a	-0.25^a
	(0.03)	(0.04)	(0.04)	(0.10)	(0.10)	(0.10)	(0.03)	(0.03)
ln (# of same ind. firms -1)	0.51^a	0.40^a	0.42^a	0.23^a	0.23^a	0.26^a	0.51^a	0.51^a
	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)
ln (supply access -1)	0.12^a	0.089^a	0.08^a	0.20^a	0.15^a	0.20^a	0.12^a	0.12^a
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Labor Cont. Protect (MIN)		0.15^a						
		(0.04)						
Dismissal Proceedings (MIN)			0.06^c					
			(0.03)					
EPL all (OECD)				-0.26^a				
				(0.05)				
EPL Regular (OECD)					-0.20^a			
					(0.04)			
EPL Temporary (OECD)						-0.15^a		
						(0.04)		
Diff. of Firing (DB)							0.00^b	
							(0.00)	
Firing costs (DB)								0.00
								(0.00)
N	202377	123695	123695	46818	46818	46818	196675	196675
Nb countries	77	58	58	27	27	27	75	75
Nb FDI	2664	2170	2170	1734	1734	1734	2659	2659
R^2	0.098	0.113	0.113	0.082	0.082	0.081	0.095	0.094

Note: Standard errors in parentheses with ^{a}, ^{b} and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.

Strictness of employment legislation (either for regular contracts, temporary contracts or all contracts) negatively affect the propensity of French firms to locate in the host country. This result is in line with those obtained using the labor contract protection in column (B). Rigidity in laying off workers *ceteris paribus* make the country less attractive for investors. Columns (G) and (H) present estimation results when more specific measures of firing costs are included in the regression ("Diff. of Firing" and "Firing costs", provided by the Doing Business database). Both estimations suggests that the amount of firing costs does not significantly impact the French firms investment decisions. This result is in line with a large consensus in the labor market literature (see Cahuc & Zylberberg (2004)) that the evaluation of the strictness of employment protection relies on a much larger set of elements that pure firing costs. Accordingly, results displayed in Table 2 confirm that indicators of the overall employment rigidity much more significantly (and negatively) affect French firms FDI decisions than firing costs *per se*.

4.2.2   Trade unions, Wage Bargaining Process and FDI decisions

Table 3 gives results concerning the impact of trade unions and the bargaining process on FDI location. Columns (A) and (B) report estimation results on OECD countries, when union coverage (*i.e.* the share of labour force which is covered by collective agreements) and union density (*i.e.* the share of labor force which is union member) are alternatively included in the list of regressors. Both variables attempt to capture the role of trade unions in the host country (β_i in our theoretical setting). In both cases, the coefficient is estimated significantly negative. This result, that a strong bargaining power for unions reduces the incentive to locate in the host country, is in line with theoretical predictions. As a strong bargaining power *ceteris paribus* leads to a higher negotiated wage, it exerts an upward pressure on production costs, thereby dis-enticing firms to locate in the country. Unfortunately, given lack of available data we cannot test the robustness of this result over larger set of countries.

Columns (C) to (G) focus on the impact of the wage bargaining process on FDI decisions. In this regard, the seminal paper by Calmfors & Drifill (1988) establishes an hump-shape relation between the centralization degree of the wage bargaining process and the negotiated wage, suggesting that the "good" level is either centralized or decentralized. Belot & Van Ours (2004) reach a similar conclusion in the theoretical part of their paper. However, Cahuc & Zylberberg (2004) underline that robustness of this result seems to be fragile, either theoretically or empirically, and discussions on that point remain opened in the labor market literature. In that respect, the contribution of the paper is to evaluate how the organization of the wage bargaining process is perceived by firms contemplating to settle in the country. To that aim, several proxies describing the countries' bargaining process are used. First, the " Degree of Centralization" computed by the Fraser Institute and the "Bargaining Level Indicator" of the French Ministry of Finance are added to the regression run on the largest sample (columns (C) and (D) respectively). Then, two OECD indicators are tested on the reduced sample, the centralization degree and the coordination degree (columns (E)-(F)).

Neither the Economic Freedom nor the MINEFI indicators of bargaining centralization allow us to conclude on a significant impact of the degree of centralization on firms' location choices. Two explanations may be advanced. First, it may indeed be the case that its impact on perceived wage costs is not large enough for it to have a significant impact on the FDI decision. Alterna-

Table 3: Impact of Trade Unions & Bargaining Process

Model :	Dependent Variable: Chosen Country					
	(A)	(B)	(C)	(D)	(E)	(F)
ln market potential	0.35^a	0.39^a	0.29^a	0.51^a	0.56^a	0.54^a
	(0.06)	(0.04)	(0.03)	(0.04)	(0.05)	(0.05)
ln distance	-0.09	-0.02	-0.35^a	-0.63^a	1.45^a	1.43^a
	(0.26)	(0.16)	(0.10)	(0.08)	(0.24)	(0.24)
common language	-0.45^a	-0.28^a	-0.49^a	0.28^c	0.38^a	0.43^a
	(0.17)	(0.12)	(0.09)	(0.15)	(0.15)	(0.14)
ex colony			1.46^a	0.03		
			(0.31)	(0.15)		
ln GDP per capita	-0.70^a	-0.32^a	-0.30^a	-0.35^a	-0.76^a	-0.35^a
	(0.12)	(0.10)	(0.03)	(0.04)	(0.11)	(0.12)
ln (# of same ind. firms -1)	0.04	0.28^a	0.43^a	0.42^a	0.10	0.12^b
	(0.07)	(0.0.6)	(0.05)	(0.05)	(0.06)	(0.06)
ln (supply access -1)	0.16^a	0.14^a	0.13^a	0.07^a	0.17^a	0.23^a
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Union Coverage (OECD)	-0.01^a					
	(0.00)					
Union Density (OECD)		-0.01^a				
		(0.00)				
Centr. Degree (EF)			-0.03			
			(0.02)			
Bargaining Level (Min)				0.03		
				(0.03)		
Centr. Degree (OECD)					-0.43^a	
					(0.04)	
Coord. Degree (OECD)						-0.39^a
						(0.03)
N	21240	46818	109372	123695	32823	32823
Nb countries	18	18	58	58	21	21
Nb FDI	1180	2601	2292	2170	1563	1563
R^2	0.091	0.080	0.079	0.109	0.085	0.087

Note: Standard errors in parentheses with ^{a}, ^{b} and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.

tively, it could be that French firms do not necessarily have enough information concerning the exact functioning of wage bargaining before effectively entering the foreign market, when FDI decisions are contemplated over the large set of around 50 countries. Estimation results on the reduced sample of OECD countries leads us to favor the second explanation. Columns (E) and (F) indeed suggest that the wage bargaining process significantly affects location decisions within OECD countries. Firms are all the less enticed to locate in the country that its wage bargaining process is set at a centralized level. Interpretation of these contrasted results is twofold. First, it could mean that French firms have a better knowledge of OECD countries' bargaining practices than the rest of the world's. Second, it could mean that this type of LMI is more relevant when the country choiceset is limited to countries that are closer with regards to other determinants of FDI, like their market potential.

4.2.3 Minimum wage legislation and generosity of the unemployment system

Table 4 presents results concerning the impact on investment decisions of minimum wages (columns (A) to (D)), and of unemployment benefit ratio (column (E)).

In column (A), the indicator computed by the French Ministry of Finance is used, that increases with the degree of observance of minimum wage legislation. Its impact on the conditional logit is not significant. However, when using the Economic Freedom's indicator (column (B)), the estimated coefficient is positive and significant. According to this last result, strong minimum wage constraints for firms (associated to a strict observance of minimum wage legislation) significantly reduce incentive to locate in the host country.

Estimation results displayed in columns (C) and (D), over a reduced sample of countries, confirm the result that minimum wage matters in FDI decisions. In column (C), the ratio of minimum over median wage (for a set of 24 countries) is included in the regression. This ratio is commonly used in the labor market literature to measure the degree of constraint attributable to the legislation. In column (D), estimation is driven over the set of 34 countries for whom we have information regarding minimum wage policy.[15] This allows us to test for the location impact of minimum wages conditionally on *1)* the firm investing in a minimum wage country (column (C)), and *2)* in a larger sample where the firm has the possibility to invest either in a minimum-wage country or in a market that does not impose such constraint (column (D)). Results suggest that, for a given firm investing in a minimum wage country (column (C)), the presence of a high minimum wage relative to the median wage tends to reduce its incentive to invest in the country. This is consistent with the model's prediction that the cost impact of high minimum wages *ceteris paribus* reduces a country's attractiveness for foreign investors. However, as shown in column (D), this result is not robust when countries that do not legislate on minimum wages are included in the country choiceset. In that case, the impact of the minimum wage ratio is indeed significantly positive. This result may reflect the correlation between a country's decision to legislate on minimum wages and other variables enhancing the business climate from the firm's viewpoint.

Column (E) reports estimation results when the benefit replacement ratio in OECD countries is included in the regression. Its coefficient is estimated significantly negative. A generous

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[15]Precisely, the minimum wage ratio for the previous 24 countries, and this ratio which is set to 0 for the other 10 countries that do not legislate over minimum wage given information delivered by Botero et al. (2004). Details are provided in Appendix A.

Table 4: Impact of minimum wage and benefit replacement ratio

Model :	Dependent Variable: Chosen Country				
	(A)	(B)	(C)	(D)	(E)
ln market potential	0.52^a	0.33^a	0.22^a	0.35^a	0.28^a
	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)
ln distance	-0.63^a	-0.31^a	-0.67^a	-0.08	-0.95^a
	(0.09)	(0.10)	(0.16)	(0.11)	(0.20)
common language	0.29^b	-0.51^a	-0.87^a	-0.43^a	-0.68^a
	(0.13)	(0.09)	(0.13)	(0.09)	(0.13)
ln GDP per capita	-0.36^a	-0.33^a	-0.38^a	-0.45^a	-0.60^a
	(0.04)	(0.03)	(0.05)	(0.04)	(0.12)
ln (# of same ind. firms -1)	0.42^a	0.41^a	0.33^a	0.30^a	0.13
	(0.05)	(0.05)	(0.06)	(0.05)	(0.06)
ln (supply access -1)	0.07^a	0.13^a	0.18^a	0.14^a	0.13^a
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Minimum Wage (MIN)	0.01				
	(0.03)				
Impact of min. wage (EF)		0.06^a			
		(0.02)			
ln Minimum Wage Ratio			-0.33^a		
			(0.12)		
ln Minimum Wage Ratio				0.03^a	
				(0.01)	
Benefit Repl. Ratio (OECD)					-0.02
					(0.00)
N	123695	124292	42678	66354	27780
Nb countries	58	54	24	34	20
Nb FDI	2170	2328	1781	1953	1389
R^2	0.113	0.087	0.073	0.099	0.101

Note: Standard errors in parentheses with ^{a}, ^{b} and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.

unemployment insurance system exerts a negative influence on the propensity of French firms to locate in the country. According to the model, this is because a generous benefit replacement ratio tends to increase the negotiated wage, hence production costs. Every thing else equal, this deters firms to invest in the country. However, this result has to be taken with some caution, given the reduced sample of countries it has been obtained for. Unfortunately, we cannot test its robustness given the lack of available data.

4.3 Simulations

As most of our LMI variables are built as indices, one cannot directly interpret the estimated coefficients in terms of elasticity. To assess the impact of labor market institutions on the probability to invest *in quantitative terms*, we need to rely on simulations. To that aim, we implement the following method (see Train (2003) for further details). In a first step, we determine the probability for a firm to invest in a country whose characteristics are the average sample values. In a second step, we simulate a shock on the variable of interest and calculate the predicted

Table 5: Quantitative impacts of changes in explanatory variables

		Impact on the probability of investment			
		Av. prob.	Estim. prob.	Change	Change
			(1 s.d. increase)	(in percent)	(in percentage points)
		(A)	(B)	(C)	(D)
(1)	ln market potential	1.30	3.00	131	1.7
(2)	ln GDP per capita	1.30	0.92	-29	-0.38
(3)	Labor cont. protect (MIN)	1.72	1.94	13	0.22
(4)	EPL all (OECD)	3.70	2.91	-21	-0.79
(5)	EPL regular (OECD)	3.70	3.11	-16	-0.59
(6)	Union coverage (OECD)	5.56	4.42	-21	-1.14
(7)	Union density (OECD)	3.70	3.27	-12	-0.43
(8)	Centr. degree (OECD)	4.76	2.90	-39	-1.86
(9)	Coord. degree (OECD)	4.76	2.79	-41	-1.97
(10)	Impact of min. wage (EF)	1.85	1.94	5	0.09
(11)	ln Min. wage ratio (34)	2.94	3.25	11	0.31
(12)	ln Min. wage ratio (24)	4.17	3.79	-9	-0.38

Note: The average probability equals 1/N where N is the number of countries in the sample

probability that this "mean" country has to be chosen after the shock. We can thus derive the change in the probability of investment following a change in the explicative variable of interest. Results of simulations are reported in Table 5.

As shown in Table 5, we make the exercise with respect to changes in the market potential, GDP per capita (in log) and most LMI variables that have been found significant in the regression. Precisely, we alternatively and independently simulate a 1 standard deviation increase (s.d. hereafter) in each of these explicative variables. In Table 5, column (A) reports the average probability (or equiprobability) for a firm to invest in the "mean" country (before the shock). Column (B) reports the investing probability when increasing the value of the interest variable (after the shock). Columns (C) and (D) respectively present the percentage of variation and the change in percentage points attributable to the shock.

The first two lines of Table 5 refer to simulation results in the benchmark model, absent any LMI in the regression (column (A), Table 2). A 1 s.d. increase in market potential increases the probability of investment by 131 %, while an 1 s.d. increase in GDP per capita reduces the chance of FDI by 29%. This confirms the significant role of the market potential in attracting FDI flows found in the literature (Head & Mayer (2004a)).

Table 5, lines (3) to (5) report simulation results of a shock in the employment protection degree. Whatever the indicator, the quantitative effect on the probability for a country to be chosen as location is far from being negligible, as the negative impact of the various indicators ranges from 13 % (Labor Protection contract Index of the French Ministry of Finance) to 21% for the OECD ones.

We then evaluate the impact of changes in the unions' bargaining power (union density and union coverage in OECD countries). Table 5, lines (6) and (7) report that the impact of a change in union coverage (-1.14 percentage points) is twice as large as a change in union density (-0.43).

This result is consistent with the view that the strength of unions is better captured by the number of workers covered by negotiation, than the number of union members. It thus does not come as a surprise that an increase in union coverage exerts a more negative effect on the investing probability than a change in union density.

As shown in Table 5, lines (8) and (9), centralization and coordination of wage bargaining have a negative impact of similar magnitude. A 1 s.d. change in each indicator respectively reduces the probability of location by 39% et 41%. The effect is of significant size in quantitative terms. In particular, results displayed in Table 5 suggest that, among LMI variables, it is the degree of centralization of wage bargaining that most affects the probability of investing in the host country.

Table 5, lines (10) to (12), evaluate the impact of changes in the minimum wage legislation on FDI decisions. The effect is much more limited in the regression using the minimum wage index for the large sample of countries (an effect estimated to 0.09 percentage points), than in the specification accounting for changes in the minimum wage ratio in the OECD (around 0.30 percentage points). This result may be related to those obtained regards changes in employment protection (limited impact when the sample includes a large set of countries (line (3)), much larger when only OECD countries are concerned (lines (4) and (5)). They suggest that changes in LMI are not the primary driving force of location decisions, when such decisions are contemplated over a large range of countries. Yet, when the choiceset is restricted to a reduced sample of countries, notably OECD countries, changes in labor market institutions are found to have a larger impact on French firms location decisions. This may potentially be accounted by the fact that information on such institutions is not necessarily well-known or comparable at a world-wide scale, while it is not the case regards OECD labor market situations.

In any case, simulations results reported in Table 5 show that, although LMI do have a significant impact on FDI, their magnitude is not as large the market size criteria. Firms may be discouraged by stricter labor regulation but investment inflows and new production sites are first driven by demand size.

5   Conclusion

The objective of the paper is to evaluate the empirical effect of labor market institutions on FDI decisions. To that aim, we use a new dataset describing expansion strategies abroad over the period 1992-2001. With respect to empirical papers using aggregate FDI data, our dataset allows to deepen the analysis of FDI flows determinants at the individual level. Moreover, unlike most related papers, we enlarge the set of LMI considered beyond employment protection. Our dataset notably includes information regards the role of trade unions, wage-bargaining centralization degree, generosity of unemployment systems and minimum wage legislation.

Following Head & Mayer (2004*b*) or Amiti & Javorcik (2005), we estimate the determinants of French firms FDI decisions by implementing a discrete choice model on all possible foreign locations. This allows us to explain the probability for a French firm to invest in a given country by a set of country- and sector-specific variables. We explicitly derive the set of potential determinants used in the regressions from a theoretical model. Our modelling combines elements of the new trade and the labor market literatures (namely the modelling adopted by Belot & Van Ours (2004)).

Our empirical results may be summarized as follows. First, labor market institutions do impact French firms location decisions. Second, the estimated effect depends on the type of LMI considered, and the set of potential locations. However, in all cases, stringent employment protection laws, powerful trade unions and a more centralized wage-bargaining process significantly reduce the propensity of firms to locate in the country. Third, simulation results suggest that, among all LMI, it is the degree of centralization of wage bargaining that matters most. Fourth, whatever the type of LMI considered, the magnitude of the effect remains modest as compared to other standard FDI determinants, such as market potential. Firms may be discouraged by stricter labor regulation, but investment inflows and new production sites are primarily driven by demand size considerations.

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A   Data appendix: definitions and sources

A.1   Labor Market Institutions

A.1.1   From the Doing Business, World Bank database

Data coming from the Doing Business database, provided by the World Bank, are available on the website `http://www.doingbusiness.org`, "Employing Workers" section. Data are 2005 values and cover 78 countries of our whole set of 87 countries. Each of the three indicators considered takes values between 0 and 100. The higher value, the higher the difficulty of hiring, firing workers and the higher rigidity of employment.

A.1.2   From the Fraser Institute

Data coming from the Fraser Institute are available on the website `http://www.freetheworld.com`. Definition of the LMI variables is the following:

- The impact of minimum wage: the minimum wage, set by law, has little impact on wages because it is too low or not obeyed;

- The degree of constraint of hiring and firing practices: hiring and firing practices of companies are determined by private contract;

- The degree of centralization of wage bargaining: the share of labor force whose wages are set by centralized collective bargaining;

- The Synthetic Index of Labor Market Regulations

Each index takes values between 0 and 10, hence the higher value of the index, the lower the degree of constraints on that aspect of the labor market functioning. The interpretation of the coefficients signs associated with these variables is reversed with respect to the LMI variables coming from Doing Business.

We consider raw data that are given for the years 1990, 1995, 2000, 2001 and 2002, and we rely on interpolation for the missing years over the period 1992-2002.

A.1.3   From OECD sources

We collect data on various LMI for OECD countries, over the period 1992-2002. The sample country size varies from 20 to 27, depending on the LMI variable considered. We focus on the following set of Labor Market Institutions variables:

Employment Protection Laws   We consider the EPL indicator provided by the OECD, for all workers, regular and temporary workers. Data is available on `http://stats.oecd.org/`. Each index takes values in the range 0,5, increasing with strictness of employment protection. Precisely:

- EPL for all workers: the overall EPL index Version 1: the strictness of employment protection legislation.

- EPL, regular workers: the overall strictness of protection against dismissals;

- EPL, temporary workers: the overall strictness of regulation.

Data are given for 1990, 1998 and 2003. They are interpolated over the period 1992-2002 (own calculations). They cover 27 countries, that are: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

Union Density   It is the percentage of Union membership in Employment, constructed by dividing the number of unions members by the number of employees. It is calculated using administrative and survey data from the OECD labour market statistics database (`http://www1.oecd.org/`). Data are annual values over the period 1989-2002. We rely on interpolation in case of missing values. The set of countries covered are identical to those for EPL.

Centralization degree of bargaining   This is an index of bargaining centralization with range 1,5 taken from OECD (2004). It is increasing in the degree of centralization.

- 1 =Company and plant level predominant.

- 2 =Combination of industry and company/plant level, with an important share of employees covered by company bargains.

- 3 =Industry level predominant.

- 4 = Predominantly industrial bargaining, but also recurrent central-level agreements.

- 5 = Central-level agreements of overriding importance.

Coordination degree of bargaining   This is an index of bargaining coordination with range 1,5 taken from OECD (2004). It is increasing in the degree of coordination in the bargaining process on the employers' as well as the unions' side.

- 1 = Fragmented company/plant bargaining, little or no coordination by upper-level associates.

- 2 = Fragmented industry and company level bargaining, with little or no pattern-setting.

- 3 = Industry level bargaining with irregular pattern-setting and moderate coordination among major bargaining actors.

- 4 = *a)* Informal coordination of industry and firm-level bargaining by peak associations, *b)* Coordinated bargaining by peak confederations, including government-sponsored negotiations or government imposition of wage schedules, *c)* Regular pattern-setting coupled with high union concentration and/or bargaining coordination by large firms, *d)* Government wage arbitration.

- 5 = *a)* Informal coordination of industry-level bargaining by an encompassing union confederation, *b)* Coordinated bargaining by peak confederations or government imposition of a wage schedule/freeze, with a peace obligation.

For both previous indicators, we get data over a 5-year- period, on 1980-84, 1985-89, 1990-1994, 1995-2000. We conserve the most recent value for 2001-2002. 21 countries are covered: Australia, Austria, Belgium (BLX), Canada, Czech Republic, Denmark, Finland, Germany, Hungary, Ireland, Italy, Japan, Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, United Kingdom, United States.

Benefit replacement ratio We consider the gross replacement rates data provided by the Social and Welfare Statistics provided by OECD. It is defined as the average of the gross unemployment benefit replacement rates for two earnings levels, three family situations and three durations of unemployment. Raw data are with one observation every two years, starting in 1985. We rely on interpolation for missing years. 20 countries are covered: Australia, Austria, Belgium, Canada, Denmark, Finland, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

Minimum wage legislation The ratio of minimum wage to median wage series are constructed using the OECD Labour Force Statistics. Minimum wages in national currency units, at current prices, and adjusted median wages allow to calculate ratios of minimum to median wages.

We complete information using data from:

- **Eurostat, Population and Social Conditions**. Minimum wages in national currency units.

- **ILO Bureau of Statistics, LABORSTA**. It provides us with legal and negotiated minimum wages in national currency and international US$ in 2003. Used to reconstitute series of minimum wages for countries in which minimum wages are negotiated at the sectorial level, that are not included in OECD data (precisely, Switzerland, China, Germany, Finland, Italy, Mauritius, Indonesia). As the ILO data have no time dimension, it has been assumed that negotiated minimum wages only adjust to inflation. Under this assumption, time series can be rebuilt using inflation series obtained from national statistic institutes. The ratio of minimum to median wages is then calculated using **OECD Earnings** data, on median wages.

We thus obtain a group of 24 countries with a positive minimum wage ratio. Information is completed using Botero et al. (2004), that documents the existence or not of minimum wage legislation in a large sample of countries. Crossing both pieces of information delivers a set of 34 countries, for whom we know whether a minimum wage legislation is in place, and if so the minimum wage ratio. For countries that have neither statutory nor negotiated minimum wage, we set the ratio equal to 0.0001 so that the logarithm of the minimum wage ratio can still be calculated.

A.2   The other explicative variables

A.2.1   Data sources

Sources for the other variables included in our sample are the following:

- The real market potential variable is constructed as in Redding & Venables (2004), relying on importation data taken from the "Dots" database of the IMF and gravity variables taken from the "Distance" CEPII database. All details regarding the construction methodology are given in Mayer et al. (2007).

    Series for GDP are taken from the "*World Development Indicators*" provided by the World Bank (in value). The centrality index comes from the CEPII "*Distance*" database, available on the web-site `http://www.cepii.fr/francgraph/bdd/distances.htm`.

- The proxy for z_{it} is obtained by dividing GDP series by the population level of the country, based on the "*World Developments Indicators*", World Bank.

- Gravity variables (ln *distance*, "common language", and "ex colony") are built using the CEPII "*Distance*" database.

A.2.2 Regional dummies

We include continental dummies in our regressions, which take the value 1 if the host country belongs to one of the following zone: Africa, North America, Latin and South America, Asia, Oceania, East Europe. Such zones are defined as follows (considering the whole sample of 87 countries):

- Africa and Middle East: Algeria, Burkina Faso, Chad, Congo, Comoros, Egypt, Gabon, Ghana, Israel, Ivory Coast, Jordan, Lebanon, Madagascar, Mali, Mauritius, Morocco, Niger, Nigeria, Saudi Arabia, Senegal, South Africa, Togo, Tunisia, United Arab Emirates, Zimbabwe;

- North America: Canada, United States;

- Latin and South America: Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela;

- Asia: Cambodia, China, Japan, India, Indonesia, Korea, Malaysia, Myanmar, Pakistan, Philippines, Singapore, Taiwan, Thailand, Vietnam;

- Oceania: Australia, New Zealand;

- East Europe: Byelorussia, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Russia, Slovakia, Slovenia, Turkey, Ukraine, Yugoslavia;

- West Europe: Austria, Belgium-Luxembourg, Denmark, Finland, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, United-Kingdom, Sweden, Switzerland.

The reference zone is West Europe. When regressions are run on the set of OECD countries, the two dummies for American countries are grouped together, as Mexico is the only Latin American country.