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à Mimi +...

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Introduction générale

Les travaux qui vont être présentés ici portent sur les déterminants des investissements directs et plus particulièrement sur les volets de la fiscalité (chapitre 1) et de la réglementation du marché du travail (Chapitre 2). Ces choix revêtent un caractère innovant dans leur mise en application à plusieurs niveaux. Tout d'abord, les recherches effectuées sont basées sur les théories les plus récentes en économie internationale et tirent ainsi bénéfice des avancées en terme de réalisme de la modélisation des phénomènes observés. Deuxièmement, les données utilisées pour la mise en oeuvre de ces travaux sont des données originales qui ont été peu, voire jamais exploitées auparavant. Enfin, les méthodes quantitatives employées représentent une innovation ainsi qu'une alternative pour le traitement des questions de localisation des entreprises (Chapitre 3).

L'attractivité des pays est un enjeu crucial pour les gouvernements et requiert une attention particulière, à *fortiori* dans les marchés très intégrés. En Europe, la libre circulation des biens et des capitaux exacerbe la concurrence entre les états membres. L'adhésion de nouveaux états membre à l'Union Européenne fait craindre aux gouvernements une accélération de cette concurrence, notamment sur les questions sociales. Nombre de décisions politiques restent du ressort des gouvernements nationaux et peuvent être utilisées comme leviers afin d'attirer les investissements directs.

Cette lutte pour attirer les investissements trouve justification dans le fait que ces derniers doivent avoir un effet bénéfique pour le pays d'accueil. Sur le plan théorique, les canaux de transmission des Investissements Directs à l'Etranger (IDE) sur l'économie du pays d'accueil et d'origine sont organisés en trois groupes : les effets sur le marché des produits, les effets sur le marché des facteurs et les effets d'externalité. Sur le premier point, la question majeure

est de savoir si l'arrivée d'une entreprise multinationale augmente la production nationale ou si elle se substitue à une activité locale. En ce qui concerne le marché des facteurs, la majorité des débats se concentre sur l'impact en termes d'emploi. Enfin, les externalités peuvent prendre la forme de transferts de technologie aux entreprises locales, d'acquisition de nouvelles techniques de travail ou d'une meilleure connaissance des marchés.

Les effets sur la production

La question de l'impact de l'IDE sur la production agrégée est liée au problème de la performance relative des entreprises multinationales et des entreprises locales. L'analyse de données d'entreprises montre que la productivité moyenne du travail dans les filiales étrangères d'entreprises multinationales est entre 30% et 70% plus élevée que dans les entreprises nationales. Le différentiel est atténué, mais reste significatif, avec des techniques économétriques plus sophistiquées tenant compte notamment des caractéristiques spécifiques aux entreprises. Parallèlement, les entreprises multinationales sont plus productives, en moyenne, que les entreprises dont l'activité est concentrée dans un seul pays ((Griffith, 1999, Barba Navaretti et Castellani, 2003). De surcroît, les entreprises multinationales ont une taille suffisante pour développer des services spécifiques (recherche-développement, marketing, etc.) enrichissant la valeur ajoutée globale et la performance moyenne. Ces résultats suggèrent que, quand une entreprise nationale transfère une partie de sa production à l'étranger, ou quand inversement elle est achetée par des investisseurs externes, sa performance est généralement meilleure que si elle n'avait pas investi à l'étranger, ou était restée purement nationale, ce qui devrait *in fine* augmenter la production nette dans l'économie d'origine.

Les effets sur l'emploi

Même si les flux d'IDE sortants renforcent la performance des entreprises dans l'économie nationale, la taille des activités conduites dans l'économie domestique peut décliner, dès lors que des employés sont licenciés, des sites de production domestiques rationalisés ou fermés. Les effets sur l'emploi ne sont donc pas pour autant positifs. Les prédictions théoriques sur ce point sont ambiguës. Elles dépendent notamment de savoir si l'emploi et la production domestique et étrangère sont complémentaires ou substituables. Cette question est ainsi à l'origine d'un grand nombre d'études empiriques (Head et Ries, 2001, Bloenigen, 2001). Ces

études montrent que les IDE de type vertical sont généralement complémentaires des activités domestiques : l'entreprise qui transfère une partie de sa production à l'étranger crée parallèlement de nouveaux emplois domestiques, permettant d'assurer la logistique entre unités de production ou d'assembler les composants produits à l'étranger. En ce qui concerne les IDE horizontaux, les résultats montrent que les emplois créés à l'étranger sont en partie substituables aux emplois domestiques, mais que l'ampleur de cette substitution reste faible.

Une seconde question qui émerge dans le débat sur globalisation et emploi est celle des effets des entreprises multinationales sur la répartition de la demande de travail qualifié et non qualifié. Les résultats empiriques suggèrent que l'intensité de la demande domestique en main d'œuvre qualifiée augmente quand les entreprises nationales investissent à l'étranger, surtout s'il s'agit d'IDE dans des pays en développement (Head et Ries, 2002). Ce résultat confirme l'hypothèse selon laquelle l'IDE vertical engendre une relocalisation des étapes de production intensives en main d'œuvre peu qualifiée dans des pays où ce type de travail est relativement abondant. La question de savoir si les entreprises multinationales emploient plus de travailleurs qualifiés que les entreprises nationales dans le pays d'accueil est en revanche, beaucoup moins tranchée sur le plan empirique.

L'existence d'externalités

Enfin, la littérature empirique s'est penchée sur l'analyse des effets des entreprises multinationales en matière d'externalités. En plus de leur propre performance, les entreprises multinationales sont susceptibles d'affecter la performance des entreprises locales au travers de différentes formes d'externalités. Si certains travaux sur la Grande-Bretagne suggèrent la présence d'externalités positives dues aux entreprises multinationales (Griffith, Redding et Simpson, 2003), la majorité des études ne trouvent pas d'effet significatif des entreprises multinationales sur l'efficience du pays d'accueil. De surcroît, un consensus se dégage pour montrer que les effets d'externalités sont d'une ampleur très limitée dans les pays en développement. Ceci a comme implication importante que les IDE entrants ne jouent véritablement aucun rôle dans la transformation de la production domestique des pays les moins avancés.

0.1 Definitions et faits stylisés

Le concept de localisation à l'étranger d'une entreprise est en soi aisément définissable. En revanche, son observation quantifiée dans un but de recherche scientifique est beaucoup plus complexe. La principale source d'information concernant les IDE est la balance des paiements. Celle-ci permet de mesurer les flux d'IDE entrant et sortant dans un pays au niveau agrégé. Ces sources sont largement et publiquement disponibles auprès des banques centrales nationales ou des instituts de statistiques nationaux. Cependant, ne fournissant une information qu'au niveau agrégé, les données publiques de balance des paiements ne permettent pas une étude fine des décisions d'investissements à l'étranger. Il existe actuellement très peu d'agences, nationales ou internationales, responsables de l'observation des délocalisations ou des créations de filiales à l'étranger autorisant l'accès à ces informations. Depuis le début des années 1990, des données d'entreprises ont été mises à disposition de la recherche scientifique aux Etats-Unis, en Allemagne, au Japon, en Italie ou à Taiwan. En France, l'INSEE, les Missions Economiques de la DGTPE et la Banque de France font un effort particulier pour la collecte et la mise à disposition des données d'investissements d'entreprises. Au niveau agrégé, les données du compte IDE de la balance des paiements permettent de traiter ces questions de déplacements de processus de production. Ces données ont plusieurs avantages : elles sont exhaustives au niveau agrégé et elles sont facilement comparables sur le plan international du fait de leur définition établie au niveau supranational. Selon les définitions du FMI et de l'OCDE, les IDE sont des investissements dans des entreprises étrangères à hauteur minimum de 10% du capital social de l'entreprise investie. Ce seuil de 10% reflète deux caractéristiques des IDE qui les différencie de l'investissement de portefeuille. La première est la volonté de l'investisseur de détenir une part significative du capital afin d'obtenir un pouvoir de décision au sein de sa nouvelle filiale ; la deuxième est le caractère durable que revêt l'IDE. En effet, ce type d'investissement, contrairement aux investissements de portefeuille conduit à la modification des stratégies de production de l'entreprise multinationale.

Ces nouvelles stratégies de production adoptées par les multinationales peuvent être de deux types. Dans le premier cas, l'entreprise souhaite réorganiser les différentes étapes de la production en localisant les productions intermédiaires et la production finale en différents

lieux pour des motivations que nous présenterons plus loin, on parle alors d'IDE vertical. Dans le second cas, l'entreprise souhaite dupliquer son modèle de production et le reproduire au travers de la filiale installée dans le pays destinataire de l'investissement, il s'agit d'IDE horizontal. Bien que rarement prise en compte de manière explicite dans les travaux d'économie appliquée, cette distinction est cruciale, tant pour ce qui concerne les motifs de ces IDE que pour les effets générés par ces décisions stratégiques.

L'implantation dans un pays peut se faire de deux façons : par fusion-acquisition ou par implantation "greenfield". Dans le cas d'une fusion-acquisition, soit l'entreprise dévient détentrice d'une part du capital d'une entreprise étrangère pré-existante soit deux entreprises de nationalités différentes fusionnent. Dans le cas d'un investissement dit "Greenfield", l'entreprise crée une nouvelle entité de production dans le pays de destination. Le choix entre l'acquisition et la création se fera sur plusieurs critères. Tout d'abord sur les caractéristiques inhérentes au pays d'accueil. D'après les résultats théoriques, les petites économies attireront davantage d'investissements par le biais de fusion-acquisition alors que les IDE greenfield iront vers les grandes économies (Ferrett (2004)). Ce phénomène est renforcé si les coûts liés à l'implantation sont faibles. Ensuite, le degré de concurrence du marché doit influencer le type d'investissement, Görg (2000) montre que dans la plupart des cas, une prise de participation dans une entreprise étrangère sera préférée en raison d'un coût d'entrée plus faible. De plus, Görg présente l'analyse dans le cadre d'un duopole. Dans ce cas, l'implantation d'une nouvelle entité de production en augmentant les quantités produites réduit les marges sur les prix. Ainsi, en situation de concurrence imparfaite, l'investissement par fusion-acquisition serait plus profitable puisque les entreprises bénéficient d'une marge (markup) au dessus du prix d'équilibre de concurrence parfaite.

Enfin, les caractéristiques de la maison-mère et de la filiale ont également un rôle dans le choix du type d'IDE. Empiriquement, les entreprises de taille importante (en termes d'emploi et de revenus) avec une forte expérience de l'implantation à l'étranger investissent davantage par fusion-acquisition. Les entreprises diversifiées dans leurs activités avec d'importants programmes de recherche et développement adoptent plus aisément des stratégies "greenfield" (Brouthers & Brouthers (2000) et Harzing (2002)).

Soutenues par les directives des institutions internationales et les politiques nationales d'ouverture, l'activité et la mobilité des entreprises multinationales ont connu une forte augmentation depuis la fin des années 1980[2]. Multiplié par trois au cours de la décennie 70 et de la décennie 80[3], le montant des IDE entrants a été multiplié par 5,7 entre 1990 et 2000, atteignant 1400 milliards de dollars en 2000. Après un net recul conjointement au dégonflement de la bulle des nouvelles technologies, les flux d'investissements ont à nouveau triplé entre 2003 et 2007, passant de 560 à 1833 milliards de dollars US.

Ces chiffres cachent de larges disparités entre pays développés et pays en développement ou émergents (PED/PE) ainsi qu'entre pays en développement ou émergents. L'offre d'investissements directs étrangers émane principalement des pays développés (90,8 % des flux d'IDE sortants entre 2002 et 2004). Toutefois, depuis la fin des années 1990, la part des entreprises multinationales originaires de PED/PE (essentiellement asiatiques) a sensiblement augmenté, atteignant 25 % en 2006 contre 14 % en 1992. Si les pays avancés sont les principaux pourvoyeurs d'IDE, ils en sont également les principaux récipiendaires. Entre 1970 et 2004, la part des pays avancés dans les flux entrants d'IDE a fluctué entre 58 % et 78 %. Là encore, les années 1990 ont témoigné d'une augmentation marquée des flux d'IDE à destination des pays en développement (Asie et Amérique latine essentiellement, avec une place prépondérante pour la Chine au sein des pays asiatiques). Le mode d'entrée choisi par les entreprises multinationales est également très disparate entre groupes de pays. Entre 1995 et 2000, de 80% à 95% des investissements entrants dans les pays développés étaient réalisés par le biais de fusions-acquisitions contre 13% à 37% pour les PED/PE. Les montants des investissements "Greenfields" dans les PED/PE étaient en moyenne deux fois supérieurs à ceux dans les pays riches entre 2000 et 2005.

Le constat selon lequel la majorité des flux d'IDE ont lieu entre pays développés est généralement interprété comme un signe de la prépondérance des IDE de type horizontal. Les coûts de production étant relativement similaires dans ce groupe, ces investissements ont, à priori, pour objectif d'atteindre à moindre coût des marchés riches, donc stratégiques. Néanmoins, la part croissante des flux d'IDE en direction des pays en développement témoigne

[2] Toutes les statistiques présentées ici sont tirées ou calculées à partir de la base FDI/TNC de la Banque Mondiale et du World Investment Report, 2008.

[3] Calculs effectués sur des montants d'IDE en dollars US courants

de l'augmentation des IDE de type vertical, en lien avec la fragmentation des processus productifs (Yi (2003)).

Les présents travaux sont effectués sur des données individuelles d'investissements directs d'entreprises françaises provenant de la Banque de France (Chapitres 1 et 3) et de l'INSEE (Chapitre 2). Les données de la Banque de France permettent de retracer annuellement le stock d'IDE des entreprises dans chacune de leurs filiales. Ces données renseignent également sur les secteurs d'activité de la mère et de la filiale ainsi que sur la quote-part détenue par la maison-mère. La base permet donc non seulement de mesurer les stocks d'IDE mais également de calculer les flux ainsi que d'observer les créations de filiales à l'étranger (IDE initial). Les données de l'INSEE de la base LIFI (liaisons financières) associées à celles de l'EAE (enquête annuelle d'entreprises) renseignent sur la création de filiales d'entreprises françaises à l'étranger. Elles ne permettent pas de connaître les montants d'investissements. Ces bases indiquent également les secteurs d'activité de la maison-mère et de la filiale ainsi que des informations de bilan de la maison-mère.

Ces bases montrent que, comme pour l'ensemble des IDE internationaux, la majorité des flux et des stocks d'IDE vont vers les pays développés. Plus précisément, l'Union Européenne accueille plus de 60% des IDE français, les pays frontaliers étant les premiers récipiendaires d'investissements français. Les Etats-Unis restent la première destination des IDE français[4].

Ces données n'ont que peu, voire jamais été utilisées auparavant. Leur exploitation permet de mener une nouvelle analyse fine des investissements français à l'étranger. L'utilisation de données individuelles permet de tenir compte des caractéristiques sectorielles et intrinsèques à l'entreprises et de s'affranchir du "bruit" lié aux données agrégées au niveau national.

0.2 Déterminants

Dans ce contexte de forte intensité des mouvements de production des firmes multinationales, il est important de préciser les phénomènes situés en amont de ces mouvements. Quels sont les facteurs qui vont promouvoir et inciter au déplacement des entreprises ? Ces facteurs peuvent être propres au pays d'accueil, au pays récepteur ou aux entreprises elles-mêmes.

[4]Stocks d'IDE en euros courants en 2003

De nombreux travaux empiriques ont récemment exploité des données agrégées, sectorielles ou individuelles, pour essayer de comprendre les déterminants de l'IDE. Cette étape est en effet essentielle pour connaître les marges de manœuvre éventuelles qu'ont les autorités politiques confrontées au problème de délocalisation.

Le résultat empirique le plus robuste de cette littérature est que la taille du marché, aussi appelée « potentiel de marché », apparaît comme le facteur prépondérant de la décision d'IDE. Le lien entre la décision d'investir et la taille du marché local s'explique assez facilement dans le cadre des « Nouvelles Théories du Commerce » développées à la suite de Krugman (1991). Ces modèles montrent qu'en présence de barrières à l'échange international et d'économies d'échelle, il existe un volume seuil de ventes au-delà duquel il est préférable pour une entreprise de servir le marché cible directement en y établissant une filiale plutôt que d'exporter, i.e. de faire de l'IDE horizontal (Head et Ries, 2001). Il faut souligner que cette notion de potentiel de marché ne se limite pas à la demande émise par le pays cible lui-même, mais qu'elle intègre également celle des pays voisins. Par exemple, une entreprise japonaise qui établit une filiale en Belgique accède par la même occasion à tout le marché européen (Head et Mayer, 2004).

Les barrières à l'échange international constituent également un déterminant important de l'IDE. La littérature empirique a ainsi étudié le rôle de ses différentes dimensions (coût de transport, distance, obstacles liés à la politique commerciale, etc.). Les travaux sur données agrégées, dominées par de l'IDE horizontal, montrent que les ventes réalisées par des filiales à l'étranger sont d'autant plus importantes relativement au commerce, que les obstacles à l'échange international sont élevés (Brainard, 1997, Yeaple, 2003). A l'inverse, quand les IDE de type verticaux peuvent être identifiés, il ressort que des coûts de transport élevés freinent la décision d'IDE (Hanson, Mataloni et Slaughter, 2001). Les barrières au commerce découragent les IDE verticaux en venant augmenter le coût d'échange des différentes composantes entre unités de production.

La recherche d'optimisation des coûts de production est à la base de l'IDE qualifié de vertical. L'entreprise cherchant à optimiser son fonctionnement, choisit de s'établir dans le pays qui lui offre la plus faible fonction de coût. Le niveau des salaires et, plus généralement,

des différents éléments du coût du travail ont alors un rôle important. Théoriquement, on s'attend à ce qu'un niveau de rémunération élevé dans l'économie d'accueil soit un facteur désincitatif de l'IDE. Les résultats empiriques amènent pourtant à des résultats contrastés. Si Amiti et Javorcik (2008) estiment un effet significativement négatif du salaire en étudiant les choix de localisation d'entreprises entre différentes provinces chinoises, Head et Mayer (2004) et Devereux et Griffith (1998) obtiennent que le niveau des rémunérations joue un rôle non significatif sur les choix d'IDE des entreprises respectivement japonaises et américaines au sein de l'Union Européenne.

Plus récemment, la littérature s'est penchée sur le rôle du mode de régulation du marché du travail qui, en affectant la détermination des salaires dans l'économie, est susceptible d'affecter les performances de l'entreprise et donc ses décisions d'investissements. Elmeskov, Martin et Scarpetta (1998), Görg et Ströbl (2002), Haaland, Wooton et Faggio (2002) et Javorcik et Spatareanu (2005) montrent qu'un degré de protection de l'emploi élevé a un effet désincitatif sur l'IDE. Néanmoins, l'impact quantitatif des institutions du marché du travail sur la probabilité de s'implanter est limité en comparaison d'autres déterminants de l'IDE comme le potentiel de marché ou l'accès aux fournisseurs.

Parce qu'elle intervient dans la valeur du profit opérationnel des entreprises, la théorie suggère que la politique fiscale influence les choix de localisation des filiales à l'étranger. Il ressort d'un certain nombre d'études empiriques que les entreprises ont un avantage à s'implanter dans les pays où l'impôt sur les bénéfices des sociétés est faible (Devereux, 2007). Néanmoins, l'impact de la fiscalité doit être évalué de manière relative et certains facteurs liés à la fiscalité doivent être prix en compte dans les travaux d'évaluation des effets de l'impôt sur les sociétés. Les travaux initiés par Hartman (1981) montrent l'importance de la redistribution des prélèvements fiscaux notamment au travers des investissements publics en infrastructures (Bénassy-Quéré et al. (2007)). Il apparaît en effet que, malgré la persistance de l'effet négatif de la fiscalité, les investissements dans les infrastructures ou l'enseignement et la recherche, en réduisant les coûts marginaux de productions ont un impact positif sur l'IDE.

0.3 Motivations et apports de la thèse

Le premier chapitre se concentre sur le rôle de la fiscalité sur les stratégies d'investissements directs à l'étranger.

Les effets de la fiscalité sur les choix de localisation des investissements étrangers ont été mis en valeur dès les années 1980 avec le développement des études sur les multinationales impulsé, entre autres, par les travaux de Dunning (1981, 1988) et Helpman (1984). Ces avancées théoriques ont donné lieu à des évaluations empiriques, parmi lesquelles Hartman (1985) et Selmrod (1990), toutefois limitées par le manque de données concernant les firmes multinationales. Les modèles de Nouvelle Economie Géographique (NEG) présentés par Krugman (1991), Krugman et Venables (1995) et Markusen et Venables (1998) se sont vu suivis de nombre d'études appliquées intégrant désormais les concepts de concurrence monopolistique, de côuts de transport et d'agglomération (Devereux et Griffith (1998), Grubert et Mutti (2000)). Cependant, tous ces travaux considèrent l'effet de la fiscalité comme indépendant des facteurs propres aux modèles NEG. En effet, sur la base du modèle de "Footloose Capital" de Baldwin (1999), Baldwin et Krugman (2004) montrent théoriquement que l'effet de la fiscalité est non-linéaire lorsqu'on le confronte au potentiel de marché ou au niveau de barrières aux échanges. A mesure que le potentiel de marché et les barrières aux échanges augmentent, l'effet de la fiscalité sur la localisation du capital doit diminuer. Ces résultats n'ont jusqu'à présent jamais été confrontés aux données. Aussi, les résultats de cette thèse contribuent à la confirmation de ces résultats théoriques.

Le second chapitre de cette thèse porte sur l'impact des différences de réglementations de marché du travail sur les choix de localisation des IDE.

Comme nous l'avons dit précédemment, la littérature orientée vers l'économie du travail et qui tente de déterminer l'impact des salaires sur le choix de localisation des capitaux productifs conduit vers des résultats contrastés. D'une part, les niveaux de rémunération élevés en augmentant les coûts de production réduisent le profit opérationnel et réduisent l'attractivité des pays (Amiti et Javorcik (2008)), d'autre part, des salaires élevés peuvent conduire à une augmentation de la demande et ainsi représenter un atout pour les entreprises s'installant dans le pays concerné (Méjean et Patureau (2007)). Enfin, la rémunération du

travail pouvant avoir plusieurs interprétations antagonistes (coût, productivité, protection sociale...), ce facteur peut ne donner aucun résultat dans les études empiriques.

Afin de trouver une réponse à ce problème, les travaux présentés proposent de compléter le coût du travail (approximé par le PIB par habitant) par les caractéristiques des institutions du marché du travail, telles que la protection de l'emploi, les négociations salariales, le salaire minimum et les allocations chômage. Ces différents aspects de la régulation du marché, s'ils sont contraignants, vont réduire l'attractivité des pays.

Le troisième chapitre de la thèse vise à offrir une méthode alternative aux modèles de choix discrets actuellement utilisés dans les études de choix de localisation d'entreprises à l'étranger.

Un aspect plus technique concernant les études de localisation de firmes multinationales est le choix de l'outil quantitatif employé afin de modéliser ces comportements. La variable observée étant binaire, il convient d'utiliser des méthodes de choix discrets permettant de limiter les valeurs des variables dépendantes à l'ensemble {0,1}. Jusqu'à présent, plusieurs méthodes ont été utilisées avec succès mais toujours en imposant des hypothèses fortes sur les variables observées. Ici nous proposons une méthode dérivée d'autres champs scientifiques permettant de relacher ces hypothèses et d'obtenir des résultats fiables.

Bibliographie

[1] Amiti, M. and Javorcik, B. S. (2008), Trade Costs and Location of Foreign Firms in China, Journal of Development Economics 85(1-2), 129–149.

[2] Baldwin, R., (1999). Agglomeration and endogenous capital. European Economic Review, 43,253-280.

[3] Baldwin, R., Krugman P., (2004). Agglomeration, integration and tax harmonization. European Economic Review, 48-1, 1-23.

[4] Barba-Navaretti, G. et Castellani, D., (2003). Does investing abroad affect performance at home ? Comparing Italian multinational and national enterprises. Centro Studi Luca d'Agliano Development Studies, Working paper 180.

[5] Bénassy-Quéré, A., Gobalraja, N., Trannoy, A. (2007). Tax and public input competition. Economic Policy, 22, 385-430.

[6] Brainard S.L., (1997). An empirical assessment of the proximity-concentration trade-off between multinationals sales and trade. American Economic Review, 87, 520-544.

[7] Brouthers, K., Brouthers, L. (2000). Acquisition or greenfield start-up ? Institutional, cultural and transaction cost influences. Strategic Management Journal, 21-1, 89-97

[8] Devereux, M. (2007), The Impact of Taxation on the Location of Capital, Firms and Profit : A Survey of Empirical Evidence, Working Paper 0702, Oxford University Centre for Business Taxation.

[9] Devereux, M., Griffith, R., (1998). Taxes and the location of production : evidence from a panel of US multinationals. Journal of Public Economics, 68, 335-367.

[10] Dunning, J. (1981). International Production and the Multinational Enterprise, George Allen and Unwin, Londres.

[11] Dunning, J, (1988). The Eclectic Paradigm of International Production : a restatement and some possible extensions. Journal of International Business studies, 19, 1-31.

[12] Elmeskov, J., Martin, J., Scarpetta, S. (1998). Key Lessons For Labour Market Reforms : Evidence From OECD Countries' Experience. Swedish Economic Policy Review, 5-22.

[13] Ferrett, B. (2005). Greenfield Investment versus Acquisition : Alternative Modes of Foreign Expansion. University of Nottingham GEP Research Paper No. 2005/39. December 2005.

[14] Fujita, M., Krugman, P., Venables, A. (2001). The Spatial Economy : Cities, Regions, and International Trade, The MIT Press.

[15] Görg, H., (1998). Analysing Foreign Market Entry : The Choice between Greenfield Investment and Acquisitions. Economics Technical Papers 981, Trinity College Dublin, Department of Economics.

[16] Görg, H., Strobl, E. (2002). Multinational companies and indigenous development : An empirical analysis. European Economic Review, 46-7, 1305-1322.

[17] Griffith, R. (1999). Using the ARD establishment-level data to look at foreign ownership and productivity in the United Kingdom, Economic Journal, 109, 416-442.

[18] Grubert, H., Mutti, J. (2000). Do Taxes Influence Where U.S. Corporations Invest ?. National Tax Journal, 53-4.

[19] Haaland, J.,Wooton, I. and Faggio, G. (2002), Multinational Firms : Easy Come, Easy Go ?, FinanzArchiv : Public Finance Analysis 59-1, 335-367.

[20] Hartman, D., (1981). Tax Competition and foreign direct investment. NBER working paper, 689.

[21] Hartman, D.. (1985). Tax policy and foreign direct investment in the United States. NBER Working Paper 967.

[22] Hanson, G., Mataloni, R. and M. Slaughter (2001), Expansion Strategies of U.S. Multinational Firms, NBER Working Paper 8433, August 2001.

[23] Harzing, A. (2002). Acquisitions versus greenfield investments : international strategy and management of entry modes. Strategic Management Journal, 23-3, 211-227

[24] Head, K., Mayer, T. (2004), Market Potential and the Location of Japanese Investment in the European Union. The Review of Economics and Statistics 86, 959–

[25] Head, K., Ries, J. (2001). Overseas Investment and Firm Exports. Review of International Economics, 9-1, 108-22

[26] Head, K., Ries, J., (2002). Offshore production and skill upgrading by Japanese manufacturing firms. Journal of International Economics, 58, 81-105.

[27] Head, K., Ries, J., Swenson, D., (1995).Agglomeration benefits and location choice : Evidence from Japanese manufacturing investments in the United States. Journal of International Economics, 38-3, 223-247.

[28] Head, K., Ries, J., Swenson, D. (1999). Attracting foreign manufacturing : Investment promotion and agglomeration. Regional Science and Urban Economics, 29-2, 197-218.

[29] Helpman, E. (1984). Simple theory of international trade with multinational corporations. Journal of political Economy, 92, 451-471.

[30] Javorcik, B. S. and Spatareanu, M. (2005), Do Foreign Investors Care About Labour Market Regulations ?, Review of World Economics (Weltwirtschaftliches Archiv) 127-3, 375–403.

[31] Krugman, P. (1991), Increasing Returns and Economic Geography. Journal of Political Economy 99-3, 483–99.

[32] Krugman, P., Venables A.J., (1995). Globalization and the inequality of nations. Quarterly Journal of Economics, 110, 857-880.

[33] Markusen, J., Venables, A., (1998). Multinational firms and the new trade theory. Journal of International Economics, 46, 183-203.

[34] Méjean, I. and Patureau, L. (2007), Minimum Wages and Location Decisions, CEPII Discussion Papers 2007-16, CEPII.

[35] Yeaple, S. (2003). The complex integration strategies of multinationals and cross country dependencies in the structure of foreign direct investment, Journal of International Economics, 60-2, 293-314.

[36] Yi, K. (2003). Can Vertical Specialization Explain the Growth of World Trade ? Journal of Political Economy, 111-1, 52-102.

Chapitre 1

Tax Competition and Foreign Direct Investment : assessing the role of market potential and trade costs in a "Footloose Capital" framework.

1.1 Introduction

In this chapter, we investigate the impact of the corporate income tax on the geographical distribution of French firms' Foreign Direct Investment distribution across 26 European countries. The empirical assessment is based on Baldwin (1999) and Baldwin & Krugman (2004) new economic geography models in which we focus on the location of firms with respect to the level of taxation. In these models, the magnitude of the impact of taxation on location decisions partly depends on market size and the level of trade costs. Indeed, firms may not only seek lower production costs but also better market access and market opportunity when investing abroad. Through panel data regressions, we find a negative impact of the corporate income tax rate on Foreign Direct Investment. We also find that host country's trade costs

level increases incoming Foreign Direct Investment. In advanced specifications we show that increasing trade costs reduce the impact of tax level on capital location.

For fifty years, European integration has been reducing barriers on trade, capital and human flows between member states, allowing for greater transparency for consumers and producers across Europe. Still, most economic areas remain within the competence of member states and there is scope for competition across governments. Amongst these areas, taxation, fiscal policy, and labour regulation are still determined by national governments. Many studies focus on the impact of taxation within the EU and found that when the tax base is mobile, such as capital is, tax policies may impact on capital location (see for instance Wilson (1999) and Devereux (2007) for surveys) because capital moves where tax rates are low. Tax policies can be an efficient tool for attracting foreign capital, since downward pressure on corporate income tax rates might lead to a "race to the bottom" between governments (Markusen *et al.* 1996) creating distortions in both the tax level and the financing of public goods. While reducing corporate income tax rates (CIT thereafter) can lead to an increase in inward capital and eventually taxable profits, the effect of such a policy depends on the relative increase in the tax base compared to tax rates, as in the traditionnal Laffer curve.

Since Krugman (1991), Krugman & Venables (1995) and Venables (1996) and the emergence of "new economic geography" models, tax competition studies have taken a new path where increasing returns in production, and agglomeration have a major impact on capital location. Indeed, firms tend to move where demand is located rather than where production costs are lowest. With a proximity-concentration trade-off, the relation between tax rates and attractiveness needs not be linear and network externalities may lead to different results compared with standard tax competition models.

Consistently, Baldwin & Krugman (2004), Ludema & Wooton (2000) and Anderson & Forslid (2003) have shown that within an economic geography framework and in the presence of rents of size, also called "home market effect", dominant countries may be able to increase the tax rate on the mobile factor while keeping firms in the home market. There is less "race to the bottom" in these new models.

In the empirical literature, many determinants of FDI have been highlighted. Brainard

(1997), and Hanson *et al.* (2001) evaluate the impact of trade costs on FDI. It appears that horizontal FDI is encouraged by increasing trade costs while vertical FDI is limited by high trade costs. The size of the market is shown to be a fundamental factor of attraction for multinational firms (Markusen & Maskus (2002)). Indeed, most FDI flows go towards large markets. The influence of factor cost differentials, especially the costs of labour still raises controversy. In the classical analysis, high labour cost, possibly due to the presence of strong trade unions, increasing wage above its equilibrium value, reduces operational profit, and discourages capital inflows (Clark (1984)). However, recent research has found a positive effect of labour cost on FDI, emphasising the fact that high wages increase purchasing power (Javorcik & Spatareanu (2005)). Turning to taxation as a determinant of FDI, a large empirical literature, surveyed by Wilson (1999) and Devereux (2007), amongst others, has highlighted a negative impact of taxation on inward FDI.

Most empirical papers focusing on FDI are based either on aggregated data of bilateral FDI flows or on US firms individual data. Only recently have emerged a few papers using German or Japanese firms level data (Buch *et al.* (2005) Head *et al.* (1999) ; Head & Mayer (2004) ; Büttner & Ruf (2007)).

In this chapter, we aim at bringing Baldwin's (1999) "Footloose Capital" and Baldwin & Krugman (2004) models to the French data, and more particularly to study the non-linear impact of taxation on FDI depending on geographic variables. We focus on productive capital distribution over possible locations depending on "freeness of trade", demand size, network forces and the corporate income tax. We study the impact of the corporate income tax (CIT) on the geographical distribution of French firms' FDI across 26 European countries. We use a new longitudinal database of 1447 French firms surveyed between 1998 and 2003 by the French Central Bank. This database provides valuable information thanks to the large coverage of the survey, incuding amounts of FDI and not only locations. This allows us to focus on the magnitude of firms' FDI.

The chapter is constructed as follows. Section 1.2 presents elements of theory we rely on. Section 1.3 details the data. Section 1.4 sets the empirical methodology. Section 1.5 discusses the results and section 1.6 concludes.

1.2 Theoretical framework

1.2.1 Assumptions

Our empirical assessment confronts Baldwin (1999) "Footloose Capital" and Baldwin & Krugman (2004) models to the French data. These models are more tractable in many ways than Krugman (1991) "Core-Periphery" (see Baldwin *et al.* (2003) for a comprehensive comparison). Due to the assumption of capital mobility and labour immobility (which is quite consistent with the current situation within the EU, as well as between the EU and the rest of the world) the model can be solved analytically.

The theory considers two countries (A and B), two sectors (agriculture and manufacturing) and two productive factors. Labour is immobile across countries, capital is supposed to be perfectly mobile but capital owners are immobile. This assumption implies that capital reward is re-imported to capital-owners country. The agricultural sector is characterised by constant returns to scale and perfect competition. Moreover, the agricultural good is traded freely, leading to the equalisation of labour prices. The manufacturing sector is characterised by Dixit-Stiglitz monopolistic competition and increasing returns to scale.

In the Footloose Capital model, the spatial division of industries is driven by two main principles. First, the level of income (which is proportional to the level of capital owned by a country) and the resulting level of demand drives industries to countries where potential demand is sufficiently high to benefit from increasing returns. Second, in the case of free mobility of goods, firms tend to locate in a single production location due to increasing returns. Conversely, the higher the trade costs in goods, the more firms disaggregate production and produce close to the market (proximity - concentration trade-off).

1.2.2 Baldwin's long-run equilibrium and location decision

In order to determine the division of production, capital owners (or firms) estimate their expected profits in both locations. The rate of return in country A equals to the weighted sum of demand in A and in B[1]. The rate of return π is defined as follows :

[1] See Appendix A for the full model description.

$$\begin{aligned} \pi &= b\left[\frac{e}{\Delta} + \phi\frac{(1-e)}{\Delta^*}\right] \\ \text{with } \Delta &= n + \phi(1-n) \\ \Delta^* &= \phi n + (1-n) \\ b &= \frac{\mu}{\sigma}\frac{E^w}{K^w} \\ 0 &\leqslant \phi \leqslant 1 \end{aligned} \tag{1.1}$$

where e is the relative income (or wealth) in A (i.e. the relative demand), n is the relative number of firms (or capital) located in A (the model considers one firm as one unit of capital producing one variety). Δ represents the number of varieties available for consumers in A. The analogous Δ^* holds for country B. b is a constant term including the share of the manufactured good in total consumption (μ), the demand elasticity between varieties (σ), the total income (E^w) and the total amount of capital (K^w). ϕ measures the degree of trade freeness. When $\phi = 1$, trade in goods is perfectly free. Conversely, if $\phi = 0$, no trade can occur and the varieties are limited to domestic ones : n in A and $1-n$ in B. Moreover, when $\phi = 0$ profit in A only depends on A's demand.

The analogous expression holds for rate of return in country B :

$$\pi^* = b\left[\phi\frac{e}{\Delta} + \frac{(1-e)}{\Delta^*}\right] \tag{1.2}$$

In the model, capital is perfectly mobile so that rates of return in the two countries equalise ($\frac{\pi}{\pi^*} = 1$) and the location of production is given by :

$$\begin{aligned} n &= \frac{1}{2} + \Phi\left(e - \frac{1}{2}\right); \\ \text{where } \Phi &= \left(\frac{1+\phi}{1-\phi}\right) \end{aligned} \tag{1.3}$$

The interpretation for Equation (1.3) is that as trade costs decrease (Φ increases), firms tend to locate in the country where they can benefit from increasing returns to scale and

reach all other markets through trade from one main production site. Conversely, as trade costs increase, firms will disseminate their production in the two countries.

In this model, the relative size of capital invested in the north n depends positively on the relative level of A's expenditures e. The level of trade costs emphasises the impact of the market size. This is the "Home Market Effect".

$$\frac{\delta n}{\delta e} = \Phi > 1; \tag{1.4}$$

The analysis of the interaction between trade costs and market size (Equation (1.4)) shows that the lower the trade costs, the greater the impact of the market size on the location of investment. If trade costs are low, the change in the location of capital is more than proportional to the change in the market size.

1.2.3 Introducing taxation

Starting from Baldwin (1999), Baldwin & Krugman (2004) introduce the impact of profit taxation on the location of capital n and reach the following results. Keeping the same notations, n, the relative amount of capital (or firms) invested in country A in the long-run equilibrium is given by after-tax profit equilisation :

$$\left(\frac{1-t}{1-t^*}\right)\frac{\pi}{\pi^*} = 1 \tag{1.5}$$

where t and t^* are respectively A's and B's CIT rates. The new equilibrium value of n and the elasticity of n with respect to the tax rate t now write :

$$\begin{aligned} n &= \frac{1}{2}\left(1 - T\Phi^2\right); \\ T &= \frac{t - t^*}{2 - t - t^*}; \end{aligned} \tag{1.6}$$

$$\frac{\delta n}{\delta t} = -\frac{1}{4(1-t)}\Phi^2; \tag{1.7}$$

n depends negatively on country B's tax rate : when CIT rates increase, the after-tax profit

declines so does the incentive for investment. In addition, the "freeness" of trade magnifies the impact of taxation on the location of productive capital. As the number of firms is fixed, any characteristic affecting the location in one country mechanically affects the location in the other. Then, if country B's CIT rate increases, the number of firms (or amount of capital) decreases in B and increases in A.

1.3 The data

1.3.1 FDI

Investment data used in this paper are taken from a restricted database provided by the *Banque de France*[2]. This database gives information on the position of French firms investment abroad, the host country of investment, their industry, the foreign affiliate, the amount of capital owned in the foreign affiliate, the profit. Data are collected annually by the *Banque de France*. Firms that hold more than 10 million long-term financial assets are asked to provide information covering their investment abroad. Although using a threshold drops the smallest firms, the remaining firms account for more than 80% of total French FDI. Besides investment amounts, the database includes parents' turnover and dividends paid to capital owners. Although this information could be of great interest, it is not available for all firms and not reliable in a dynamic framework. The methods used by the central bank for evaluating FDI changed in 1998. Thus we restrict the sample to 1998-2003.

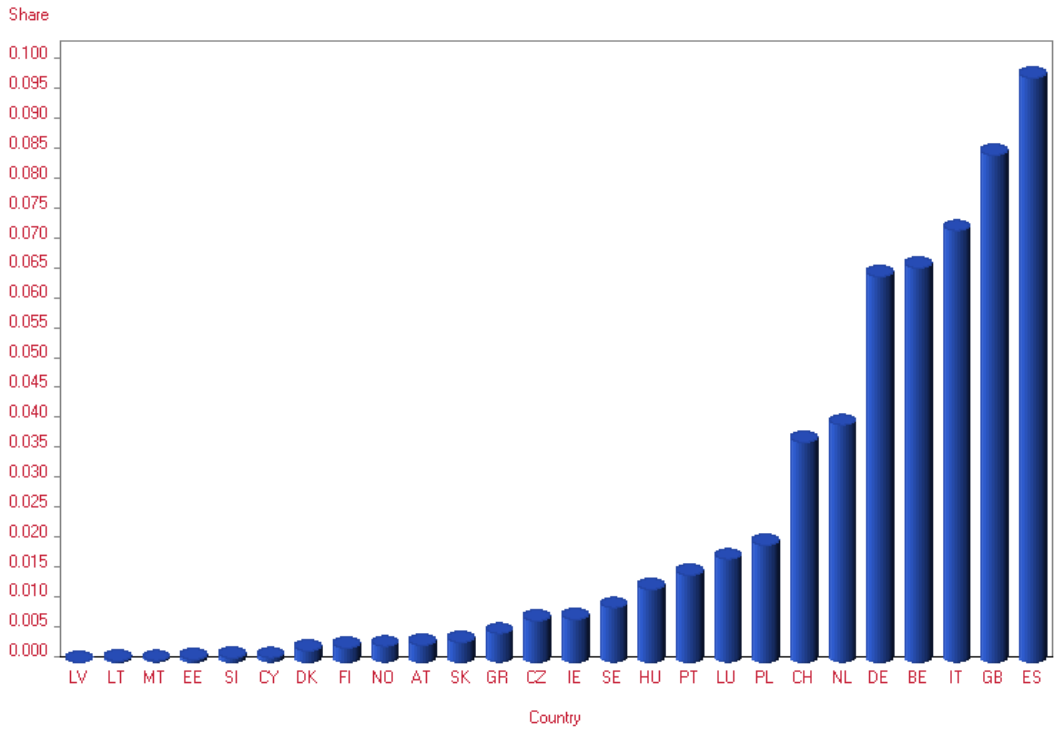
Since we are concerned with the distribution of productive capital over multiple possible locations, the data have been transformed in order to obtain for each firm the distribution of its FDI position across 26 countries. The original database includes 1447 parent firms. We keep firms investment positions in 26 European countries, over the period 1998-2003. Investments towards these countries account for more than 60% of total investment in 2003. Besides criteria imposed by the *Banque de France* for their annual survey, FDI definition is based on a threshold of 10% of the subsidiary equity.

Figure 1.1 shows the average distribution of FDI across the 26 possible destinations in 2003 (see appendices for the list of countries). On average, almost 50% of a firm's FDI is

[2]I would like to thank Pierre Sicsic for data provision and enlightning advice.

located in the UK, Germany, Italy, Spain, Belgium and Switzerland. Surprisingly, Ireland accounts for only 1% of French firms FDI stock in 2003.

Figure 1.1 : FDI distribution in 2003 (% of total investment)



Source : Banque de France

As explained in the introduction, the distinction between horizontal and vertical FDI (HFDI and VFDI respectively) can be of a particular interest. Indeed, we know from the literature that the two types of investment may react in different maners with respect to certain country characteristics. Our database does not identify both types of FDI. We try to identify HFDI and VFDI by comparing the parent's and the affiliate's NACE. Appendix C details the inconclusive results we reached.[3].

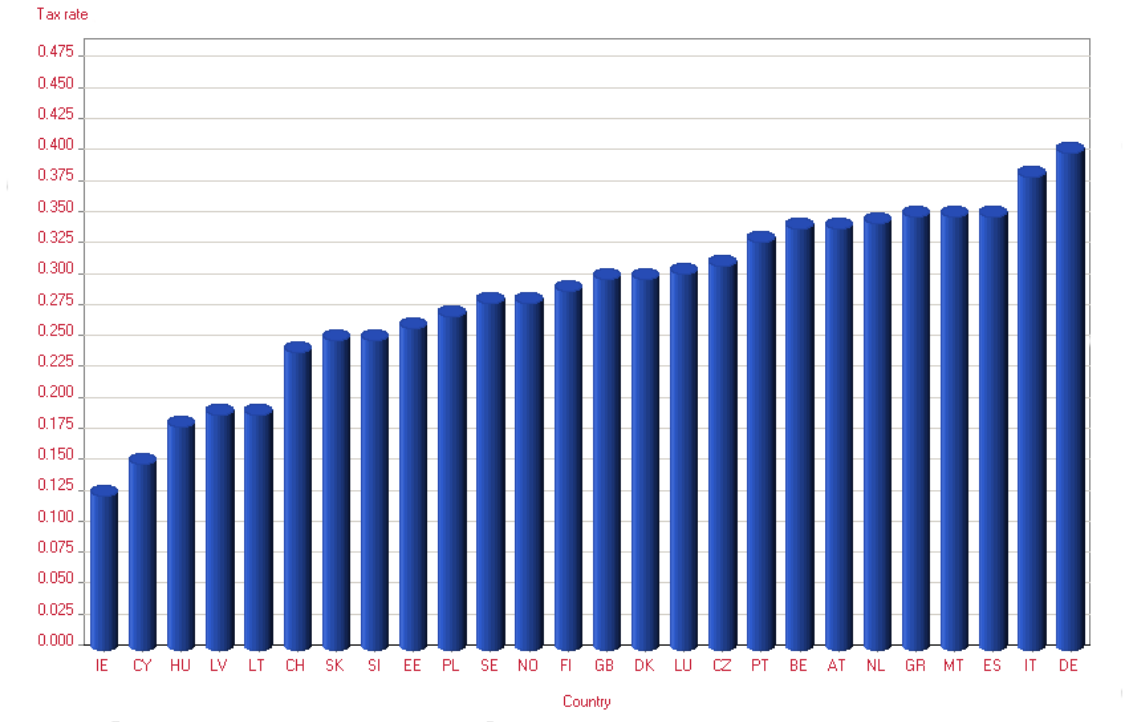
[3]Few databases are able to disentangle HFDI from VFDI

1.3.2 Tax rate

As we are not focusing on marginal FDI, we can use either the statutory or the effective average CIT rate as the tax variable (Devereux *et al.* (2002)). The CIT rate does not account for differing tax bases across countries. However, Devereux *et al.* (2002) show that most of the cross-country variance between effective tax rates comes from the differences in statutory tax rates. Moreover, Devereux & Griffith (1998) and Buettner & Ruf (2007) show that using statutory CIT rates leads to reliable results. Besides, statutory rates have two advantages : first they are available for a larger set of coutries, and second, they do not rely on strong assumptions like effective rates do. The tax rate dataset is constructed from different sources, Devereux and Griffith, Eurostat, OECD, KPMG and national sources (see Figure 1.2)[4]. When different CIT rates apply in a given country, the average rate is calculated for the country.

[4]The Statutory Tax Rate data were kindly provided Agnès Bénassy-Quéré (CEPII)

Figure 1.2 : Statutory Tax Rates in 2003



Source : Devereux & Griffith, Eurostat, OECD, KPMG

Figure 1.2 displays CIT rates for 2003. It can be seen that old Western member states exhibit higher rates than new member states. However, putting together figure 1 and 2, it appears that despite high taxation, these countries are the main recipients of French FDI. Thus, at first sight, the correlation seems not to be negative.

Accounting for countries' economic size, we can roughly observe that the largest countries (Germany, Italy, Spain, the Netherlands) maintain relatively high rates compared to small new member states such as Latvia, Lithuania or Slovenia. These figures give us a first insight on the possible ability for countries with large market size to implement higher tax rates. This relation will be tested in the following sections.

1.3.3 Estimation of the "Freeness of trade" variable.

As shown in the theoretical framework, the "freeness of trade" (the inverse of trade costs) plays an important role in the distribution of production across countries. The more countries are reachable through trade, the less they will attract investment unless they are large enough to draw industries in. Three different factors act as trade enhancer or reducer. First, bilateral trade policies have an impact on trade. These trade agreements, by reducing the costs of reaching foreign market, sharply increase goods transaction between countries. Second, transport costs between countries increase the price of shipped goods. The closer the countries, the lower the transport costs. Third, historical features can ease exchange between two countries. For example, sharing common language can ease transaction between contractors. The "freenees of trade" variable estimated here includes these three characteristics.

How can we assess countries freeness of trade Φ ? Inspired by Head & Mayer (2004)[5], our approach is to determine the bilateral factors (between goods exporters and importers) that modify trade levels above or below their expected values. Assuming that trade between i and j depends on each country's characteristics over time, we have :

$$\log X_{ijt} = \alpha + E_{it} + M_{jt} + \mu_t + \epsilon_{ijt} \tag{1.8}$$

where E_{it} is a dummy variable capturing country i's characteristics over time, and M_{jt} is a dummy variable capturing country j's characteristics over time. i is the host country and $j = 1, ...J$ is i's direct or indirect neighbour. μ_t is a time dummy accounting for annual exogenous shocks, and α is a constant term. ϵ_{ijt} is the error term. This error term will be positive if trade is higher than its potential, considering i and j's characteristics, due to bilateral factors that are not included as regressors and that increase trade between two countries. We consider this term as an exhaustive indicator for bilateral freeness of trade. ϵ_{ijt} can itself be expressed as a linear combination of a set of bilateral variables (E_{it} and M_{jt} are not bilateral and account only for country-time variant characteristics) :

[5] Unlike Head & Mayer (2004), we use a two-step method for clarity, though it does not change the results.

$$\begin{aligned}\epsilon_{ijt} &= \beta_0 + \beta_1 COMLANG_{ij} + \beta_2 \log DIST_{ij} \\ &\quad + \beta_3 CONTIG_{ij} + \beta_4 EUROZONE_{ij} + \eta_{ijt}\end{aligned} \tag{1.9}$$

where $COMLANG_{ij}$ is a binary dummy variable indicating if i and j use a common language, $DIST_{ij}$ is the geographic distance between the two countries, $CONTIG_{ij}$ takes the value 1 if the two countries share common borders, and $EUROZONE_{ij}$ is also a binary dummy variable indicating whether the two countries are part of the Euro area. β_0 is a constant term and η_{ijt} the error term.

We can now take the prediction of equation (1.9) $\widehat{\epsilon}_{ijt}$:

$$\begin{aligned}\widehat{\epsilon}_{ijt} &= \widehat{\beta}_1 COMLANG_{ij} + \widehat{\beta}_2 \log DIST_{ij} \\ &\quad + \widehat{\beta}_3 CONTIG_{ij} + \widehat{\beta}_4 EUROZONE_{ij}\end{aligned} \tag{1.10}$$

Finally, we calculate the $FREENESS_{it}$ variable for country i at time t as follows :

$$FREENESS_{it} = \frac{\sum_{j=1}^{J} \exp(\widehat{\epsilon}_{ijt})}{J} \tag{1.11}$$

1.3.4 Geographic variables

We use two dummy variables $COMLANG$ and $CONTIG$, and the $DIST$ variable for the distance between France and alternative host countries. These three variables are defined as in the preceding section.

New trade models also emphasise the role of network between firms (Head & Mayer, 2004). Network can be seen as a driving force for attracting firms as in may create positive externalities such as better and cheaper access to intermediate goods or market knowledge sharing. The network variable (NET) is calculated as the number of French affiliates divided by the host country gross domestic product.

Finally, market size plays a significant role in economic geography models. The greater

the potential demand in a country, the greater the incentive for a firm to locate in that country. We must not only account for the demand in the host country but also from demand in neighbour countries. To that aim we construct a market potential *à la* Harris (1954) indicator as shown in (1.12) :

$$\begin{aligned} MKP_{it} &= GDP_{it} + \sum_{j=1}^{J} \left(\frac{GDP_{jt}}{DIST_{ij}} \right); \\ \text{with} \quad j &\neq i \end{aligned} \tag{1.12}$$

where GDP_{it} is the current GDP of country i at time t converted in current Euros. The GDP data is taken from Eurostat.

1.3.5 Relative exogenous variables

Although the Footloose Capital model assumes wage equalisation across countries due to perfect competition and free trade in the agricultaural good, we empirically observe wage gaps between countries. We then aim at assessing the effect of wage differential in the geographical distribution of FDI. We thus include a Unit Labour Cost (ULC) variable in our regressions. The latter is caculated as the total labour cost divided by the total number of our worked. The ULC variable is taken from Eurostat.

When choosing a location, a firm not only measures country-specific costs and benefits, but also compares costs between different locations in a same region. These multiple alternatives introduce conditionality in firms' choices. Moreover, as we are estimating shares, the share of country i is conditional on shares of other countries j. For instance if a firm invests in Germany and Italy, and increases its investment position in Italy, the share of Germany in its distribution will mechanically decrease. This conditionality will not be handelled through the econometric method, rather through the construction of exogenous variables. Consistently, exogenous variables such as Unit Labour Cost, CIT rate, Market Potential and Network are transformed as shown in (1.13).

$$
\begin{aligned}
x^*_{it} &= \frac{x_{it}}{\overline{x}_{it}} \\
\text{with } \overline{x}_{it} &= \frac{\sum_{j=1}^{J}(x_{jt}.Dist_{ij})}{\sum_{j=1}^{J} Dist_{ij}} \\
\text{and} \quad j &\neq i
\end{aligned}
\tag{1.13}
$$

where x^*_{it} and x_{it} are respectively the "relative" and the absolute values of characteritics x for country i at time t. $Dist_{ij}$ is the geographical distance between j and i. These relative variables are used in the empirical part with the prefix "**GEO**". With these relative variables, an increase in x_{jt} (country j characteristics at time t) that has a positive effect on the investment share in j will mechanically reduce x_{it} and the investment share in i. We chosse to weight the effect of x_{jt} by the distance because we think that firms are more sensitive to the characteristics of countries that are geographically close to their investment target rather than very distant countries. For instance, if a firm wants to serve northern Europe markets and considers producing in Great Britain, it will be more sensitive to Ireland's or Netherland's characteristics rather than Italy's or Spain's.

These relative variables have to advantages. First they are closer to Baldwin's model relative factors. Second they allow us to introduce conditionality between alternative countries without relying on a restrictive econometric method[6].

1.3.6 A first look at the data

Table 3.1 shows some descriptive statistics concerning the variables used in the following econometric section. The "Euro10" group is made of the 2004 new member states, while the "Euro16" is the EU15 minus France, plus Norway and Switzerland. Although variables cannot be interpreted directly, we observe higher values for old member states than for new

[6] The conditional logit or multinomial logit model for instance, do not allow for multiple location choices. Moreover, it would not permit to use individual specific effects.

TAB. 1.1 – Statistics by region in 2003

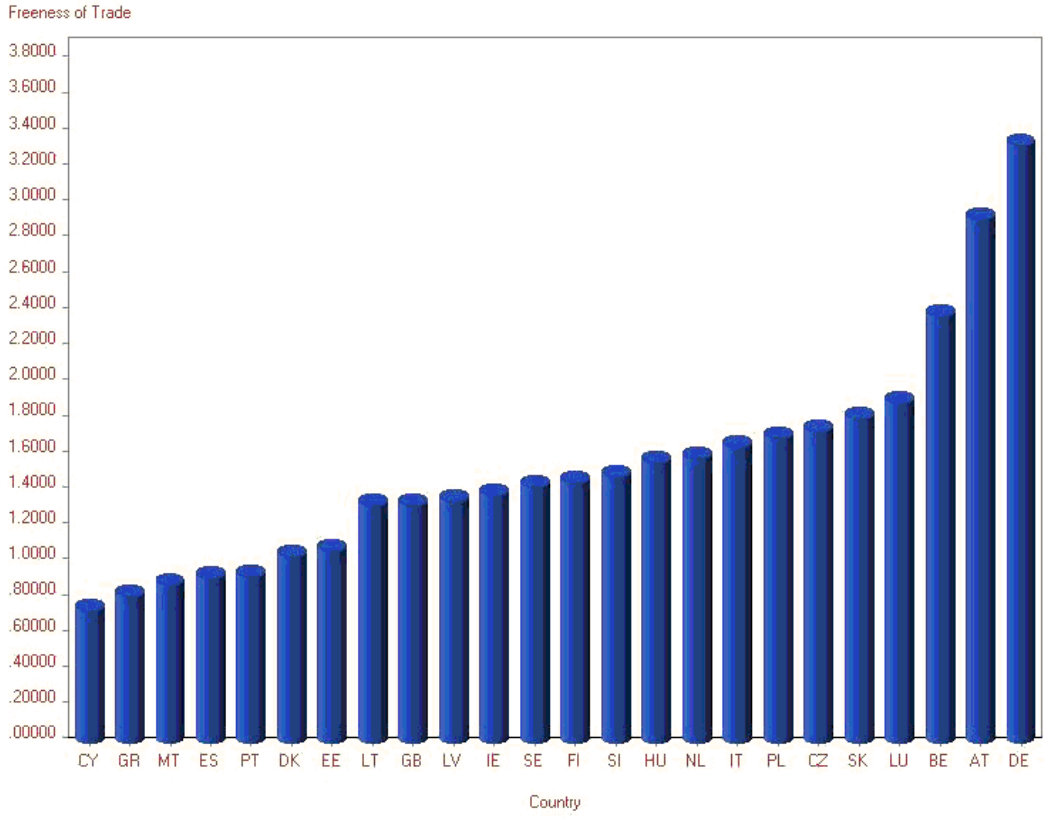
	Euro 16				Euro 10			
Variable	Mean	Min.	Max.	Std.dev.	Mean	Min.	Max.	Std.dev
GeoTAX	0.984	0.402	1.257	0.196	0.757	0.487	1.131	0.189
GeoMKP	-1.788	-4.033	0.213	1.004	-4.153	-5.204	-2.429	0.787
GeoULC	1.454	0.475	2.093	0.494	0.351	0.155	0.674	0.170
GeoNET	4.650	0.415	48.481	11.432	0.505	0.053	1.054	0.327
Freeness	1.650	0.816	3.337	0.729	1.368	0.744	1.811	0.347

members. These differences are particularly large for labour costs and network.

The differences between "old" and "new" member states is less clear-cut interms of taxation. On average, weighted tax variables are close to one another and standard deviations are relatively small ; this tends to support recent findings concerning the homogenisation of tax rates accross European countries (Bénassy-Quéré *et al.* (2005)).

The case of the estimated "Freeness" variable is also interesting. Figure 1.3 shows the level of "freeness of trade" for each country. We see that central European countries have a higher index than peripherical countries. Owing to their central geographic position, the former are easily reachable through trade. Interesting exceptions are Slovakia, Czech Republic and Poland ranging 5th, 6th and 7th respectively, coming ahead of the Netherlands (9th).

Figure 1.3 : Freeness of Trade in 2003



Source : Author's calculations

1.4 Econometric specifications

1.4.1 Baseline specification

We intend to explain the share of country i in firm f's FDI portfolio ($SFDI_{fit}$) by the corporate income tax (CIT_{it}), unit labour costs (ULC_{it}) and the geographical data, such as distance between origin and destination country i ($DIST_i$), network effect (NET_{it}), and country i's market potential (MKP_{it})[7] :

[7] As we are estimating logs of shares, the sum of the dependent variable within firm-year no longer sums to unity. However, in order to check for model singularity we randomly take out one observation per firm per year, which does not change the results. We account for the dependence between countries in the construction of the relative variables. As an example, if country A's CIT rate increases, its relative CIT rate increases

$$\begin{aligned}\log SFDI_{fit} &= \beta_1 \log CIT_{it} + \beta_2 \log ULC_{it} + \beta_3 \log MKP_{it} \\ &+\beta_4 \log DIST_i + \beta_5 CONTIG_i + \beta_6 COMLANG_i \\ &+\beta_7 \log NET_{it} + \beta_8 \log FREENESS_{it} \\ &+\delta_t + \gamma_{fi} + \epsilon_{fit}\end{aligned} \tag{1.14}$$

In (1.15) we replace variables CIT, ULC, MKP and NET by their "relative" versions written with the prefix "GEO" :

$$\begin{aligned}\log SFDI_{fit} &= \beta_1 \log GEOCIT_{it} + \beta_2 \log GEOULC_{it} + \beta_3 \log GEOMKP_{it} \\ &+\beta_4 \log DIST_i + \beta_5 CONTIG_i + \beta_6 COMLANG_i \\ &+\beta_7 \log GEONET_{it} + \beta_8 \log FREENESS_{it} + \delta_t + \gamma_{fi} + \epsilon_{fit}\end{aligned} \tag{1.15}$$

The estimation uses a time dummy δ_t in order to take into account the global business cycle.

We also include a firm-country specific random effect γ_{fi}. The latter not only accounts for heterogeneity between firms but also states that each firm behaves specifically with respect to each country. Indeed, each firm may have a particular historical background with a particular country leading to different investment strategy compared to other countries. ϵ_{fit} is a normaly distributed residual with mean zero[8]. We do not use country-dummies as the model already contains country-specific time-invariant variables such as the distance and the contiguity.

It is worth noting that the DIST, CONTIG and COMLANG variables are not colinear with the FREENESS variable as the former three connect France to the FDI host-country while the later connects the host country to its neighbours. Results are presented in Table 1.2.

(everything else being equal) and its share in the firm's FDI distribution may decrease. At the same time, country B's relative CIT rate decreases (due to country A's CIT rate increase) and its share will go up.

[8] In order to account for within-firm dependency, residual are clustered by firms

1.4.2 Non-linear analysis

Using results from Table 1.2 as baseline results, we can now turn to more specific questions. In Eq. (1.6) and (1.7), we see that not only does taxation have a negative impact on the location of capital, but as freeness of trade increases, the impact of tax rates should become greater. We test this relation by interacting the CIT rate with a qualitative dummy stating that the level of freeness of trade for country i is lower or higher than the average at time t (Eq. 1.16).

$$\begin{aligned} \log SFDI_{fit} &= \beta_1 \log GEOCIT_{it} \times LOWER_{it} \\ &+\beta_2 \log GEOCIT_{it} \times HIGHER_{it} \\ &+\beta_3 \log ULC_{it} + \beta_4 \log GEOMKP_{it} + \beta_5 \log DIST_i \\ &+\beta_6 CONTIG_i + \beta_7 \log GEONET_{it} + \beta_8 \log FREENESS_{it} \\ &+\delta_t + \gamma_{fi} + \epsilon_{fit} \end{aligned} \tag{1.16}$$

The theoretical model also shows that as the "freeness" of trade decreases, the impact of the market size, or the Home Market Effect, decreases as well. In (1.17), we interact market potential with the same dummy as previously.

$$\begin{aligned} \log SFDI_{fit} &= \beta_1 \log GEOCIT_{it} + \beta_2 \log GEOMKP_{it} \times LOWER_{it} \\ &+\beta_3 \log GEOMKP_{it} \times HIGHER_{it} \\ &+\beta_4 \log ULC_{it} + \beta_5 \log OPEN_{it} \\ &+\beta_6 CONTIG_i + \beta_7 \log NET_{it} + \delta_t + \gamma_{fi} + \epsilon_{fit} \end{aligned} \tag{1.17}$$

The third theoretical finding we want to test empirically is the presence of location rents for large countries. Baldwin & Krugman (2004) find that in the case of location rent, the government could increase the CIT rate without dissuading firms from investing in the country. We test the interaction between the CIT variable and the centered Market Potential $MKP_{.t}$

TAB. 1.2 – Baseline specification

			With "relative" variables		
Variable	β	S.E.	Variable	β	S.E.
$Log\mathbf{FREENESS}_{it}$	$-.6634^{***}$	.0216	$Log\mathbf{FREENESS}_{it}$	$-.6905^{***}$	.0202
$Log\mathbf{CIT}_{it}$	$-.0284$	.0234	LogGEO$\mathbf{CIT}_{it}$	$-.1041^{***}$	.0310
$Log\mathbf{ULC}_{it}$	$-.2368^{***}$	.0151	LogGEO$\mathbf{ULC}_{it}$	$-.1106^{***}$	.0143
$Log\mathbf{MKP}_{it}$	$.4855^{***}$	.0106	LogGEO$\mathbf{MKP}_{it}$	$.4339^{***}$	.0122
$Log\mathbf{DIST}_{i}$	$-.4216^{***}$	.0284	$Log\mathbf{DIST}_{i}$	$-.5899^{***}$	.0280
$\mathbf{CONTIG}_{i}$	$.7181^{***}$	.0260	$\mathbf{CONTIG}_{i}$	$.7750^{***}$	.0275
$\mathbf{COMLANG}_{i}$	$.3567^{***}$	.0503	$\mathbf{COMLANG}_{i}$	$.5031^{***}$	.0488
$Log\mathbf{NET}_{it}$	$-.0358^{***}$	.0099	LogGEO$\mathbf{NET}_{it}$	$-.0140^{***}$	.0013
-2LL	737850		**-2LL**	736660	

as shown in (1.18).

$$\begin{aligned} \log SFDI_{fit} &= \beta_1 \log GEOCIT_{it} + \beta_2(\log GEOCIT_{it} \times \log MKP_{.t}) \\ &\quad +\beta_3 \log ULC_{it} + \beta_4 \log MKP_{it} + \beta_5 \log DIST_i \\ &\quad +\beta_6 CONTIG_i + \beta_7 \log NET_{it} \\ &\quad +\delta_t + \gamma_{fi} + \epsilon_{fit} \end{aligned} \tag{1.18}$$

1.5 Results

1.5.1 Baseline specification

The baseline specification provides results in line with the empirical literature, whether absolute or "relative" explenatory variables are used (Table 1.2). Specifically, market potential appears with a positive sign and unit labour cost has a negative impact on FDI. Sharing borders and common language encourages FDI while geographic distance deters it. The use of "relative" variables does not change the qualitative impact of the exogenous indicators except for *CIT* variable, that becomes significantly negative in the second specification. These results show that an increase in the relative CIT rate by 10% reduces the country's share in FDI distribution by 1%. The unit labour costs also has a negative impact on the

location of investment, a 10% increase in the relative unit labour cost reduces the share by about 1%. The major determinant being the relative market potential, an increase of $GEOMKP$ by 10% would increase the country share in FDI distribution by more than 4%. Distance, contiguity and common language have the expected signs. Specifically, the share of direct neighbours as host countries in firms investment portfolio is 70% greater than other countries. Finally, the results on the "freeness" variable show that the more countries can be served through trade thanks to low trade costs, the less firms will invest in the country. This tends to support theoretical results from Section 1.2.

The network effect represents the possible presence of positive externalities linked to the former location of French firms in the same country. Market access is shown to be easier when firms from the same country are already set up (See Head & Mayer (2004) concerning the network built by Japanese firms in Europe). In the present results, the negative impact of network is not the one we expected, but is relatively small compared to other determinants. A 10% increase in our relative network index lowers the country's share in FDI distribution by 0.1%.

Turning to non-geographical variables, we see that labour cost has a negative impact on capital location in all specifications. This goes beyond Baldwin's paper where factor prices equalise across countries. We show that factor prices do matter for the location of productive capital. Finally, the results on tax variables confirm the theoretical intuition : we find a negative impact of relative tax rates on the dependent variable.

1.5.2 Further analysis

In more advanced specifications, our aim is first to test the "freeness" effect on CIT we presented in Section 1.2. Refering to Table 1.3, we actually find that tax does have a negative impact but only for countries that are sufficiently (above average) open to trade. As trading goods becomes more expensive due to trade costs, firms tend to discentralise their production and locate multiple plants close to the markets. In this case, the tax level becomes less decisive in the location decision. Thus, we are able to confirm one of Baldwin & Krugman's theoretical results.

The second test emphasises the relative impact of trade costs on the effect of market size.

TAB. 1.3 – Interaction between CIT and freeness

	β	S.E.
Log**FREENESS**$_{it}$	$-.3315^{***}$	.0129
LogGEO**CIT**$_{it}\times$LOWER$_{it}$	.0471	.0317
LogGEO**CIT**$_{it}\times$HIGHER$_{it}$	$-.0814^{***}$	.0312
LogGEO**ULC**$_{it}$	$-.1155^{***}$	.0144
LogGEO**MKP**$_{it}$	$.4211^{***}$	.0122
Log**DIST**$_i$	$-.4987^{***}$	.0275
CONTIG$_i$	$.8383^{***}$	.0277
COMLANG$_i$	$.4441^{***}$	.0487
LogGEO**NET**$_{it}$	$-.0145^{***}$	.0013
-2LL	736361	

In the baseline specification we find that market potential is a significant driver of investment. In Section 1.2, as trade cost decreases (Φ increases) the impact of potential demand (e) is magnified. We do not find any empirical evidence when looking at the data (Table 1.4). The relation between FDI and Market Potential is found linear with respect to freeness of trade. This shows that in the case of free trade, firms will not necessarily locate in the largest market but will be driven by other factors such as taxation or labour cost.

The third test sheds lights on the existence of rents of size. Baldwin & Krugman (2000) show that in the presence of rents of size, large countries may increase tax rates even on the mobile base without discouraging investors. Indeed, we show in Table 1.5 that the market potential reduces the impact of relative tax level on FDI. As market size increases, the impact of taxation on capital location decreases. This confirms the ability for large countries to slightly increase CIT rates without been less attractive.

1.6 Conclusion

Using firm-level FDI data, we empirically test the impact of taxation on the distribution of French firms' productive capital across the European Union and in other OECD countries. This study is carried out within Baldwin's (1999) "Footloose Capital" framework. Our results

TAB. 1.4 – Interaction between Market Potential and Freeness

	β	S.E.
Log**FREENESS**$_{it}$	$-.6843^{***}$	.0208
LogGEO**CIT**$_{it}$	$-.1040^{**}$	.0310
LogGEO**MKP**$_{it}$*LOWER$_{it}$	$.4387^{***}$	.0122
LogGEO**MKP**$_{it}$*HIGHER$_{it}$	$.4374^{***}$	.0125
LogGEO**ULC**$_{it}$	$-.1127^{***}$	.0142
Log**DIST**$_{i}$	$-.5893^{***}$	.0278
CONTIG$_{i}$	$.7753^{***}$	.0275.
COMLANG$_{i}$	$.5169^{***}$	.0484
LogGEO**NET**$_{it}$	$.0141^{***}$	.0013
-2LL	743154	

TAB. 1.5 – Interaction between CIT and Market Potential

	β	S.E.
Log**FREENESS**$_{it}$	$-.6630^{***}$	.0204
LogGEO**CIT**$_{it}$	$-.4736^{***}$	.0603
LogGEO**CIT**$_{it}$*GEO**MKP**$_{.t}$	$.2911^{***}$	.0407
LogGEO**ULC**$_{it}$	$-.1186^{***}$	.0144
LogGEO**MKP**$_{it}$	$.5603^{***}$	.0214
Log**DIST**$_{i}$	$.5681^{***}$	.0282
CONTIG$_{i}$	$.8384^{***}$	.0289
COMLANG$_{i}$	$.4707^{***}$	.0490
LogGEO**NET**$_{it}$	$.0142^{***}$	.0013
-2LL	736959	

confirm the theoretical findings of the model in terms of the general impact of both taxation and trade costs. Increasing trade costs encourages production to disaggregate and locate close to the market for the final good. Taxation reduces attractiveness for foreign capital. We then turn to the interaction between taxation and trade costs. We show that as trade costs increase, the level of taxation becomes less influent in location decision. Besides, results confirm the ability of large countries to increase CIT rates without deterring investment as the market potential reduces the impact of taxation on FDI.

Our results yield several policy implication since we find that : first, competition may be stronger between small countries than between small and large countries and there may be no point for the later to compete with small neighbours. Second, countries with large market potential may have room for increasing CIT rate and government revenue without reducing the tax base. Thirs, the effectiveness of tax policies in order to attract foreign capital also depends on the country's trade freeness. Thus, corporate tax cuts must be implemented concurrently to trade liberalisation, improvement in transport infrastructures and the normalisation of goods regulation.

Although we have not paid much attention to the effect of labour costs, this factor has a negative impact on the distribution of firms' FDI. In our results, the negative effect is as high as the tax effect. It is of particular interest, in the context of enlarged European Union to low-wage new members, to deepen the question of "social competition" between countries. Two main reasons would justify looking closer at labour market's role in international investment distribution. First, the issue has hardly been discussed in the light of both the recent international economic context and the appearence of robust theoretical economic geography foundations. Second, economic policies proposed by most developped countries' governement tend to put pressure on high-social-standard labour market regulations on the motive that strong competition comes from countries with low standards of regulation. In the following chapter we aim at bringing a clear view on the effects of labour market regulations on multinationals locations decisions.

A The Footlose capital model

In the 1999 paper, Baldwin considers two countries (north and south), two sectors (agricultural (A) and manufacturing (M)) and two productive factors (labour (L) and capital (K)). In this model, labour is immobile, capital is perfectly mobile but capital owners are immobile. This assumption implies that capital reward is not necessarily spent where capital is used. The agricultural sector is characterised by constant returns to scale and perfect competition. Moreover, the agricultural good is traded freely. The manufacturing sector is characterised by Dixit-Stiglitz monopolistic competition and increasing returns to scale. We assume that fixed costs involve only capital and the variable cost involves only labour. Thus, the cost function in the M sector is :

$$K\pi + w_L a_m x;$$

where a_m is the amount of L needed to produce 1 unit of output. π is the cost of capital, w the cost of labour and x is the firm level output. Consumer Cobb-Douglas preferences depend on the consumption of both the agricultural good and the differentiated good :

$$\begin{aligned} U &= C; \\ C &\equiv C_M^{\mu} C_A^{1-\mu}; \\ C_M &= \left(\sum_{i=0}^{n^w} c_i^{1-1/\sigma} \right)^{1/(1-1/\sigma)}; \\ 0 &< \mu < 1 < \sigma; \end{aligned}$$

where C_M is the consumption of manufactured differentiated goods, C_A is the consumption of the agricultural good and μ is the expenditure share on manufactured goods. n^w is the number of manufactured varieties (which we assume is the same as the number of firms) and σ is the constant elasticity of substitution between differentiated manufactured goods. The indirect utility function associated with the consumer preferences is :

$$\begin{aligned} V &= \frac{E}{P}; \\ P &\equiv p_A^{1-\mu}\left(\frac{\sum_{i=0}^{n^w} p_i^{1-\sigma}}{n^w}\right)^{\mu/(\sigma-1)}; \end{aligned}$$

where E is the northern expanditure, p_A is the price of the A good and p_i is the price of the i variety of differentiated good.

A.1 Short-run equilibrium

Utility optimisation leads to optimal demand function :

$$\begin{aligned} c_j &\equiv \frac{p_j^{-\sigma}\mu E}{\sum_{i=0}^{n^w} p_i^{1-\sigma}}; \\ E &= \pi K + wL; \end{aligned}$$

In the Dixit-Stiglitz model, instantaneous entry of firms drives pure profit to 0. Then E contains only factor income. With this settings, the "mill pricing" is optimal for all firms, and the ratio of the price of a northern variety in the export and local market is τ :

$$\begin{aligned} p &= \frac{w_L a_m}{1-1/\sigma}; \\ p^* &= \frac{\tau w_L a_m}{1-1/\sigma}; \end{aligned}$$

Profit in north depends on the total economic size E^w, the elasticity of substitution between varieties σ, the share of expenses for the manufactured good μ, and B which measures the extent to which home variety's sales exceed the world average of per-variety sales (which is $\mu\frac{E^w}{K^w}$) :

$$
\begin{aligned}
\pi &= \frac{\mu}{\sigma}\frac{E^w}{K^w}B; \\
B &= \left[\frac{e}{n+\phi(1-n)} + \frac{\phi(1-e)}{\phi n+(1-n)}\right]; \\
\pi^* &= \frac{\mu}{\sigma}\frac{E^w}{K^w}B^*; \\
B^* &= \left[\frac{\phi e}{n+\phi(1-n)} + \frac{(1-e)}{\phi n+(1-n)}\right];
\end{aligned}
$$

$$
\begin{aligned}
e &= \frac{E}{E^*} \\
n &= \frac{N}{n^w} \\
\phi &= \tau^{1-\sigma}
\end{aligned}
$$

Here, e represents the share of northern expenditures in the total expenditure. In the same way, n is the share of capital used in the north and the share of all varieties made in the north. ϕ represents the "freeness" of trade, with no trade costs when $\phi = 1$ and prohibitive trade costs when $\phi = 0$.

A.2 Long-run equilibrium and location decision

As capital is perfectly mobile, profit in all countries will equalise and the location of production e and $(1-e)$ will be given by :

$$
\begin{aligned}
\pi &= \pi^*; \\
n &= \frac{1}{2} + \left(\frac{1+\phi}{1-\phi}\right)\left(e - \frac{1}{2}\right);
\end{aligned}
\tag{A.1}
$$

In (A.1), we see that the number of varieties produced in the north (i.e. the size of capital invested in the north) depends positively on the level of northern expenditures e. The level of

trade costs emphasise the impact of the market size. This is the "Home Market Effect". As trade costs decrease, firms prefer to agglomerate in one location and export to other countries in order to benefit from increasing returns. Conversly, if trade costs are high, firms will tend to locate in each region and serve the local market directly avoiding trade costs.

$$\frac{\delta n}{\delta e} = \frac{1+\sigma}{1-\sigma} > 1;$$

The lower the trade costs, the greater impact of the market size on the location of investment. If transport costs are low, the change in the location of capital is more than proportional to the change in the market size.

B List of countries

TAB. B.1 – List of Countries

EU16	Country	*EU10*	Country
AT	Austria	CY	Cyprus
BE	Belgium	CZ	Czech Republic
DE	Germany	EE	Estonia
DK	Denmark	HU	Hungary
ES	Spain	LT	Lithuania
FI	Finland	LV	Latvia
GB	United Kingdom	MT	Malta
GR	Greece	PL	Poland
IE	Ireland	SI	Slovenia
IT	Italy	SK	Slovakia
LU	Luxembourg		
NL	Netherlands		
PT	Portugal		
SE	Sweden		
CH	Switzerland		
NO	Norway		

C Distinguishing between horizontal and vertical FDI

The literature aiming at distinguishing horizontal and vertical FDI uses information on intra-firm trade between the parent and the subsidiary. If trade occurs then it is assumed that FDI is vertical (Brainard (1997), Braconier *et al.* (2005), Beugelsdijk *et al.* (2008)). Unfortunatly we do not have such information in the FDI database we use. Instead, we base our assumptions on the difference between the parent and the affiliate industries. We assume that if they are both in the same industry, FDI is horizontal (HFDI), conversly, if they are in different industries, FDI is vertical (VFDI). We use the same method as Gao (2003), we confront these assumption to factors that have been clearly identified in the literature as having an impact on either horizontal or vertical investment (Markusen & Maskus (2002)). If we find the same results, then our assumption would be suitable.

We use the sum of home and host country current GDP (SUM_GDP_{ij}), the current GDP differential ($DIFF\_GDP_{ij}$) and the current GDP per capita differential ($DIFF\_GDPpc_{ij}$) as explanatory variables in our regression to explained the assumed horizontal or vertical FDI. Data are taken from Eurostat. The following equation is estimated through a logit model on the 26 countries covered in Chapter 1.

$$\begin{aligned} FDI\_type &= \alpha + \beta_1 SUM\_GDP_{ij} + \beta_2 DIFF\_GDP_{ij} + \\ &\quad \beta_3 DIFF\_GDPpc_{ij} + \gamma_t + \delta_k + \eta_h + \varepsilon_{ij} \end{aligned} \tag{C.2}$$

γ_t is a time dummy, δ_k is a region dummy, countries belong to the Euro 15 (minus France, plus Switzerland and Norway), or to the Euro 10 2004 new member states. η_h controls for holding companies which may have particular investment patterns. ε_{ij} is a normal random residual. The dependent variable is a binary indicator taking the value 1 if the investment is horizontal. Results are displayed in Table C.2.

The sum of GDPs is expected to have a positive sign on both types of FDI as in increases both investment and absorption capacity. GDP differential should have a negative impact on

TAB. C.2 – Estimation based on Gao (2003)

Variables	β	S.D.
$Intercept$	-.189	.579
SUM_GDP_{ij}	.085	.142
$DIFF\_GDP_{ij}$	.086	.181
$DIFF\_GDPpc_{ij}$	-.101	.083
Pseudo R^2	.295	

horizontal FDI as this type of FDI occurs between countries of comparable sizes. Finally, per capita GDP differential should increase vertical FDI as the variable proxies for diffences in factor endowment. We observe that none of the variables have a significant impact on the type of FDI.

Although the first analysis shows that the method we use to differentiate horizontal and vertical FDI is not reliable, we try to use these indicators in the estimations from Chapter 1 and Chapter 3.

In Table C.3, we implement an estimation based on the Chapter 1 methodology. The dependent variable is the share of country i in the firm's FDI portfolio, we are thus working on FDI stocks. We interact the freeness of trade, the market potential and the labour cost variables with a categorical variable indicating what type of FDI the firm executed during the period : horizontal (hor), vertical (ver) or mixed (mix).

We obtain mixed results in Table C.3. First, the effect of freeness of trade is not the one expected. From theory, we know that increasing trade costs should encourage horizontal FDI and deter vertical FDI. Indeed, in the later case, intermediate output produced by the affiliate shall be re-exported for further processing. We do not find any evidence of this in our results. Second, we know that vertical FDI is "efficiency seeking" and that production costs matter more in the case of VFDI. Indeed we find that unit labour cost has more than twice a greater impact on VFDI than on HFDI. This result tends to confort us in our discriminating method between FDI types. Third, horizontal FDI is "market seeking" and thus, market potential

TAB. C.3 – Estimation with interaction variable based on Chapter 1 method

Variables	Interaction	β	S.D.
Intercept		-3.312***	.031
$Log\mathbf{Freeness}_{it}$	*mix*	-.677***	.035
	hor	-.668***	.024
	ver	-.708***	.049
$Log\mathbf{ULC}_{it}$	*mix*	.040***	.020
	hor	-.128***	.015
	ver	-.284***	.025
$Log\mathbf{MKP}_{it}$	*mix*	.431***	.013
	hor	.421***	.012
	ver	.411***	.014
$Log\mathbf{CIT}_{it}$		-.106***	.031
$Log\mathbf{DIST}_{i}$		-.588***	.028
$\mathbf{CONTIG}_{i}$		.775***	.028
$\mathbf{COMLANG}_{i}$		.468***	.049
$Log\mathbf{AGGLO}_{it}$		-.013***	.001
-2LL		721473	

should have a greater impact on horizontal than on vertical FDI. The result obtain here is not so clear.

Again the results can neither confirm nor invalidate our assumptions on the distinction between HFDI and VFDI.

We implement a third set of estimations based on the methods used in Chapter 3. The dependent variable is a binary variable indicating firms' initial FDI to a given set of countries. The approach is then different as in Chapter 1 and could lead to different results in the present investigation. Furthermore, we differentiate between holding and non-holding parent firms. Results are shown in Table C.4.

Results displayed in Table C.4 bring the same conclusions as the previous ones. We do not find any particular differences between what we assume to be HFDI and VFDI. The reason is that either we are not able to distinguish both of them or we face little heterogeneity in FDI directions.

As a result, all estimations run in this thesis are made without distinction between the two

TAB. C.4 – Estimation with interaction variable based on Chapter 3 method

		(A)		(B)	
		All firms		Non-Holding	
Variables	Interaction	β	S.D.	β	S.D.
Intercept		-27.656***	2.941	-26.536***	3.346
STR_{it}		4.784***	1.559	4.09***	1.799
$STR^2{}_{it}$		-.683***	.225	-.057***	.260
MKP_{it}	*mix*	1.000***	.034	1.012***	.042
	hor	1.029***	.028	1.039***	.033
	ver	1.103***	.046	1.085***	.059
LAB_{it}	*mix*	-.716***	.082	-.771***	.099
	hor	-.545***	.063	-.623***	.072
	ver	-.733***	.120	-.694***	.156
$AGGLO_{it}$		1.006***	.034	1.001***	.040
Pseudo-R^2		.262		.273	

types of investment. Unfortunatly, to date, very few datasets allow one to separate market seeking and efficiency seeking motivations, appart from relying on strong assumptions.

Bibliographie

[1] Anderson, F., Forslid, R., (2003). Tax competition and economic geography. Journal of Public Economic Theory, 5(2), 279-303.

[2] Baldwin, R., (1999). Agglomeration and endogenous capital. European Economic Review, 43,253-280.

[3] Baldwin, R., Forslid, R., Martin, P., Ottaviano, G., Robert-Nicoud, F., (2003). Economic Geography and public policy. Princeton University Press, Princeton, UK.

[4] Baldwin R., Krugman P., (2004). Agglomeration, integration and tax harmonization. European Economic Review, 48-1, 1-23.

[5] Brainard S.L., (1997). An empirical assessment of the proximity-concentration trade-off between multinationals sales and trade. American Economic Review, 87, 520-544.

[6] Buch C.M., Kleinert J., Lipponer A., Toubal F., (2005). Determinants and effects of FDI : Evidence from German Firm-level data. Economic Policy, 41, 51-110.

[7] Buettner T., Ruf M., (2007). Tax incentives and the location of FDI : evidence from a panel of German multinationals. International Tax and Public Finance, 14 , 151-164.

[8] Clark K.B., (1984). Unionization and firm performance : the impact on profit, growth and productivity. American Economic Review, 74(5), 893-919.

[9] Devereux, M., Griffith, R., (1998). Taxes and the location of production : evidence from a panel of US multinationals. Journal of Public Economics, 68, 335-367.

[10] Devereux, M., Griffith, R., (2002). The impact of corporate taxation on the location of capital : A review. Swedish Economic Policy Review, 9, 79-102.

[11] Devereux, M., Lockwood, B., Redoano, M., (2002). Do countries compete over corporat tax rates ? CEPR Discussion Paper 3400

[12] Hanson G., Mataloni R., Slaughter M., (2001). Expansion strategies of U.S. multinational firms. NBER Working Paper 8433.

[13] Harris, C., (1954). The market as a factor in the localization of industry in the United States. Annals of the Association of American Geographers, 64, 315-348.

[14] Hartman, D., (1981). Tax Competition and foreign direct investment. NBER working paper, 689.

[15] Head K., Mayer T., (2004). Market potential and the location of Japanese investment. The review of Economics and Statistics, 86(4), 959-972.

[16] Head K., Ries J.C., Swenson D.L., (1999). Attracting foreign manufacturing : investment promotion and agglomeration. Regional Science and urban Economics, 29, 197-218.

[17] Javorcik, B.S., Spatareanu, M., (2005). Do foreign investors care about labour market regulations ? CEPR, Discussion Paper 4839.

[18] Krugman, P., (1991). Increasing returns and economic geography. Journal of Political Economy, 99, 483-499.

[19] Krugman P., Venables A.J., (1995). Globalization and the inequality of nations. Quarterly Journal of Economics, 110, 857-880.

[20] Ludema, R.D., Wooton, I., (2000), Economic geography and the fiscal effect of regional integration. Journal of International Economics, 52, 331-357.

[21] Markusen, J.R., Maskus, K.E., (2002). Discriminating among alternative theories of the multinational enterprise. Review of International Economics, 10(4), 694-707.

[22] Markusen, J.R., Morey E., Olewiler, N.,(1996). Competition in Regional Environmental Policies When Plant Locations Are Endogenous. Journal of Public Economics 56, 55–77.

[23] Venables A.J., (1996). Equilibrium location of vertically linked industries. International Economic Review, 37, 341-359.

[24] Wilson, J.D., (1999). Theories of Tax Competition. National Tax Journal, 52(2), 263-304.

Chapitre 2

Social competition and firms'location choices

2.1 Introduction[1]

Like tax policies, labour market policies have been left to national governments' responsabilities in the European Union. Still, factor mobility puts a constraint on the design of labour policies. For instance, generous unemployment benfits may raise the cost of labour and thus have a detrimental effect on the attractiveness of one member state.

In this chapter ; we focus on the way labour market institutions (LMI thereafter) affect FDI, using a database describing French firms' investments abroad over the 1992-2002 period. The analysis of production patterns and firms' location decisions in an international setting is implemented in an economic geography framework *à la* Krugman (1991). Despite the growing strand of papers in that literature, the role of labour market institutions has hardly been explored. In the theoretical field, some recent contributions suggest that labour market rigidities may reduce the incentive to locate in a country.[2] Some papers recently tackled the

[1] This chapter is based on a paper jointly written with Isabelle Méjean (Ecole Polytechnique and CREST) and Lise Patureau (THEMA, University of Cergy-Pontoise).

[2] See Haaland et al.(2002) for a link between the degree of employment protection and location choices and Mejean & Patureau (2007) on minimum wages. Regarding the role of trade unions, Clark (1984) and more recently Munch (2003) and Leahy & Montagna (2000) suggest that powerful trade unions increase the negotiated wage, thereby reducing both firm profits and the appeal to foreign investments. However, the loss in attractiveness may be mitigated through indirect mechanisms like improvement in productivity (Clark (1984)) or an aggregate demand effect (Munch (2003)). Last, Haaland & Wooton (2007) study a model of

question empirically as well, using either aggregate, sectoral or firm-level data (see Golub *et al.* (2003), Betts & Odgers (1997), Görg (2005), Dewit *et al.* (2003), or Javorcik & Spatareanu (2005) among others). Most papers reach a similar conclusion, that flexible employment protection laws exert a positive influence on inwards FDI flows. Moreover, Betts & Odgers (1997) obtain a negative impact of unionisation on FDI, as long as the union share is not too high.[3]

We use a firm-level dataset describing French firms' expansion strategies abroad to study the impact of various dimensions of labour market regulation on FDI flows. Firm-level analysis is of particular interest, as it makes use of heterogeneity of investment decisions across firms and countries, without putting strong weight on the time-variability dimension of the data. In that respect, it is immune from one important caveat of macro-data papers, where identification is mainly based on time variability, which is weak in LMI data. While most related empirical studies capture labour market institutions in the single dimension of employment protection, the originality of the present work is to enlarge analysis to various dimensions of labour market regulations, notably minimum wage legislation and the wage bargaining process.

Following Head & Mayer (2004), the determinants of French firms' FDI decisions are estimated 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. The set of potential determinants used in the regressions is explicitly derived from a model inscribed in the new economic geography literature. Furthermore, we include features borrowed from the labour market literature, so as to explicitly relate labour market institutions to location decisions. As in Belot & VanOurs (2004), the country-specific wage entering the marginal cost of producing in a given location results from a bargaining process between firms and employees. As a consequence, it can be expressed as a combination of various dimensions of the host country's labour market regulations. The theoretical setting therefore delivers useful insights on the direction of the effects of labour

policy competition to attract FDI combining wage bargaining, whether at the national or firm level, and exit costs for multinational firms facing uncertainty on their investment return.

[3] That is, the share of workers that are union members. The threshold value is of 50% for unions share. The authors obtain a slightly positive effect above.

market institutions on FDI decisions.

We test the model's predictions using firm-level data covering French firms' FDI in 76 countries over the 1992-2002 period. Our results can be summarised as follows. First, the design of labour market institutions does affect the attractiveness of a country from the firm's viewpoint. Stringent employment protection laws, high labour tax rates, a generous unemployment benefits system, strong minimum wage constraints, powerful trade unions and a highly-centralised wage-bargaining process significantly reduce the propensity of firms to locate in a country. Second, the estimated effects depend on the sample of countries considered as potential locations. French firms are found to be much more sensitive to the design of labour market institutions when only OECD countries are included in the country choiceset.

The "OECD-country group" effect may be interpreted in two ways. First, it is likely that labour market institutions are correlated with other determinants of FDI, notably institutional ones, that are omitted from our regressions while having a potential role in FDI decisions, particularly in less-developed countries. Second, the "OECD-country group" effect may be the result of heterogenous FDI motivations being correlated with the spatial distribution of investments. The robustness of our results to other institutional variables leads us to favor the second interpretation. In a heterogeneous sample, labour market institutions –even though they matter– are dominated by other variables influencing FDI choices (such as market potential or supply access). Within the more homogenous sample of OECD countries, labour market regulation enters with a stronger weight in the location choice function.

The results deliver an interesting message with regards to the design of labour market policy, notably for OECD policy makers. The globalisation process at work over the last decades has weakened welfare-state institutions in industrialised countries. The rising competition from low-wage emerging countries strengthens case for labour market deregulation, in particular in European countries. Our results put this view into perspective. They suggest that implementing labour market reforms to tackle social competition from emerging countries would likely fail to attract FDI. What matters the most to attract investors is less the labour market situation relative to that of emerging countries, than the one relative to other OECD countries. However, social competition could be a successful strategy in attracting

foreign investors that contemplate settling within OECD countries. As a corollary, maintaining ambitious welfare-state institutions, notably in Europe, calls for coordination between countries.

The rest of the chapter is organised as follows. Section 2 derives the equation at the root of the estimation using tools of the new economic geography and the labour market literatures. Section 3 presents our dataset and the variables used to proxy the determinants of location choices underlined in Section 4. Section 5 presents estimation results. Section 6 concludes.

2.2 The estimated equation

2.2.1 Main assumptions

To derive the equation explaining the determinants of location choices, we follow Head & Mayer (2004) and adopt a new economic geography framework à la Krugman (1991). Conditional on investing abroad (a decision which is taken as granted here), each firm decides the country where to settle its affiliate among multiple possible locations. In that decision process, the only relevant information is the ordering of profits between the various countries of the choiceset. Assuming that the fixed cost of investing abroad is not destination-specific, the firm operating in industry k chooses the location i offering the highest operating profit among all possible locations. Calling π_{ik}^{op} the operating function in country i, the probability for country i to be chosen as location is :

$$P(\pi_{ik}^{op} > \pi_{jk}^{op}) \quad \forall j \neq i \tag{2.1}$$

The new economic geography literature focuses on two major determinants of operating profits : producer costs and aggregate demands. In its reduced form, the (log of the) operating profit in country i can be written as :

$$\ln \pi_{ik}^{op} = a + b \ln MC_{ik} + c \ln RMP_i + \varepsilon_{ik} \tag{2.2}$$

where a, b and c are coefficients to be estimated, MC_{ik} is the marginal cost of production in country i and industry k. Higher marginal costs negatively affect the firm's operating

profit, hence the probability for country i to be chosen as location. Operating profits are also positively influenced by country i's "real market potential", denoted RMP_i in Equation (2.2). In the new economic geography literature, this variable summarises the potential demand addressed to the firm that decides to locate in country i. According to Krugman's (1992) definition, it sums national real demands over all countries attainable from i, weighted by accessibility from country i. Last, ε_i in Equation (2.2) is a random term capturing the effect of unobserved components of marginal cost or market potential, that are specific to location i.

In the following, Equation (2.1) is estimated using a discrete choice model, with a univariate extreme value marginal distribution of the ε_i errors. Investment decisions are assumed to be independent from one another in this setting. This allows using the conditional logit model to derive the probability for each potential location within the country set to receive the French firm's investment. The estimation strategy assumes a structure of errors correlation that is specific to each affiliate and identifies coefficients using the cross-country variability for each considered investment. Multiple investment decisions made by the same French firm are thus treated as independent from one another. As a result we assume no substiability nor complementarity across locations. As this is probably a strong assumption, we make sure that the possible dependence between investments made by the same firm does not give rise to bias in our estimations. We consequently run regressions imposing that residuals are clustered by firms, hence allowing for correlation within firms (while assuming independence between them). Standard errors are thus robust to this possible within-subject dependence.

The representation of firms' location choices based on Equation (2.2) is commonly used in the literature that estimates the determinants of FDI decisions using individual data (Head & Mayer (2004) among others). The originality of our work lies in the introduction of a sub-set of explanatory variables related to labour market institutions. In what follows, we accordingly focus on that aspect. This requires a detailed modelling of the determinants of marginal costs.

2.2.2 Determinants of marginal costs

The modelling of production costs is guided by several concerns. First, as underlined by Dolado *et al.* (2000) and Dickens *et al.* (1999), minimum wages are an important feature of a large number of national labour markets. Furthermore, Picard & Toulemonde (2004) and Méjean & Patureau (2007) obtain contrasted theoretical results when they investigate location decisions in a new economic geography framework with minimum wage. These elements lead us to investigate its role empirically. To that aim, production in country i is assumed to use workers paid at the minimum wage level $\underline{w}_i$ (say, unskilled workers). Second, we want to enlarge the set of labour market institutions beyond the 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 labour (say, skilled labour). The skilled equilibrium wage w_i^q results from a negotiation between firms and unions. As such, it is notably affected by the set of labour market institutions in place. Third, previous empirical papers have put forward other cost determinants that may influence firms' location choices, notably the price of intermediate goods incorporated in the production process (Amiti and Javorcik (2005)) and various transaction costs (Head and Mayer (2004)). Such elements are taken into account by including a third production factor, whose price z_i is proxied by several indicators detailed in Section 2.3.

The three elements of marginal costs are modelled as follows. Once settled in country i, the firm is assumed to produce using a Cobb-Douglas technology combining both types of labour and the third production factor. Total cost minimisation under some given production constraint yields the following equation for the expected optimal marginal cost faced by firms in country i (see details in Appendix A) :

$$MC_{ik} = \frac{1}{\alpha^{\alpha}\chi^{\chi}\gamma^{\gamma}} A_i^{-1} \left[w_i^q\right]^{\alpha} \left[\underline{w}_i\right]^{\chi} \left[1 + \tau_i + \rho f_i\right]^{\alpha+\chi} \left[z_{ik}\right]^{\gamma} \tag{2.3}$$

α, χ and γ denote the share of each factor in the value added. They are defined over the interval $[0;1]$, with $\chi = 0$ in countries that do not legislate on minimum wages. Equation (2.3) is derived under the assumption of constant returns to scale in the production technology (*i.e.*, $\alpha + \gamma + \chi = 1$). Unit labour costs are made of the skilled and unskilled wages, w_i^q

and $\underline{w}_i$, plus other labour costs detailed below. z_i is the price of the third factor, including intermediate goods. Last, A_i is the total factor productivity in country i.

Employment protection is introduced through firing costs (f_i in Equation (2.3)). As in Haaland & Wooton (2007), firms are assumed to face a catastrophic shock with probability ρ, that results in a plant's closure and all workers being fired. Should the firm be forced to close down its factory, it has to pay compensation to each worker[4]. Besides, firms face various taxes on labour (such as social security contributions or payroll taxes), which are captured by the inclusion of the labour tax rate τ_i in Equation (2.3).[5]

In Equation (2.3), w_i^q is the negotiated wage for skilled workers, that results from a Nash-bargaining process. We retain Belot & Van Ours's (2004) version of the right-to-manage model of wage bargaining, that we adapt in a setting with multiple production factors (see details in Appendix A). Wages are set by a Nash-bargaining process between unions and firms, so as to maximise the relative surplus of both players. Firms are assumed to be in monopolistic competition on the good-market side. In that setting, when negotiations are fully centralised (that is, Nash-bargaining takes place at the aggregate national level), the equilibrium negotiated wage of skilled workers can be expressed as :

$$w_i^q = \left[1 + \frac{\mu\beta_i}{1-\mu}\right] \frac{b_i}{1+\rho f_i} \tag{2.4}$$

Equation (2.4) delivers an expression of skilled-labour wage as a function of the labour market institutions in place in country i. b_i denotes unemployment benefit, f_i denotes firing costs and β_i the union's bargaining power ($0 < \beta_i < 1$). $\mu = 1 - \alpha\frac{\sigma-1}{\sigma}$ is interpreted by Belot & Van Ours (2004) as the effective degree of firms' monopoly power, with $\sigma > 1$ the price-elasticity of demand in the monopolistic setting.

According to Equation (2.4), 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) reduces

[4] In Haaland & Wooton (2007), the firing cost is discounted and it is its present value that enters the cost of employment. We assume here without loss of generality that the discount rate is equal to one.

[5] As shown in Equation (2.3), we suppose identical labor tax rates on both types of labor. This assumption is made to be consistent with our empirical analysis, given the absence of any available data on the specific labor tax rates paid by firms for each type of workers in the various countries in the choiceset.

it. All three elements thus affect labour costs paid by the affiliate in country i and are likely to intervene in the firm's investment decision. While high values of b_i and β_i always increase marginal costs, the effect of firing costs f_i is ambiguous. On the one hand, high firing costs reduce the negotiated net wage w_q^i (Equation (2.4)). On the other hand, they exert an upward pressure on the skilled labour cost (Equation (2.3)). The final effect on marginal costs, and location decisions, is thus uncertain. Last, heavy labour taxes (τ_i) raise the marginal cost of production, as reported in Equation (2.3). As a consequence, high social taxes reduce the firm's propensity to settle in.

The degree of bargaining centralisation does not enter the wage equation but equation (2.4) is obtained under the assumption of fully centralised bargaining. Thus, we cannot directly observe the effect of centralisation on the nagociated wage. However, the labour market literature extensively discusses the link between the degree of bargaining centralisation, wages and employment performances. Calmfors & Drifill's (1988) seminal paper suggests a non-linear relationship between the centralisation degree and the negotiated wage. In their setting, either fully centralised (national-level) or fully decentralised (firm-level) bargaining lead to a lower wage and a higher employment level, than semi-centralised negotiations (industry-level). However, the robustness of the inverse "U-shape" is far from being the object of a consensus. A review of the labour market literature, in both empirics and theory, does not yield some clear-cut result on the "good" level of (de)centralisation with regards to labour market performances.[6] Our contribution on that point slightly differs, as the impact of the wage bargaining centralisation degree in one country is not only analysed in terms of wage and employment performances, but also from the point of view of foreign firms contemplating to settle in. Indeed, at the macro level, a high degree of centralisation can lead to optimal wage with respect to unemployment. In such a case however, at the micro level, the firm as very little bargaining power compared to other locations with decentralised negociations.

Incorporating the log-linearised version of Equations (2.3) and (2.4) into the operating profit function (2.2) leaves us with a model explaining firms' location choices by i) the real market potential in each location, ii) the cost of immobile factors and iii) various aspects of

[6] Clamfors (2001) find that over 10 papers reviewed, only 3 strictly confirm the non-monotonic relation. See also Driffill (2006).

the labour market functioning. The next section describes the way these determinants are measured empirically.

2.3 Data description

2.3.1 French firms' FDI decisions

The dataset describing French firms' foreign expansion strategies comes from two different sources.

We use data from "LIFI"[7], a survey conducted by the French official statistics institute (the INSEE). The dataset describes the creation of foreign affiliates by French firms, including the location of the new production unit and the year of investment over the 1985-2004 period. This first database is then merged with the "Enquête Annuelle d'Entreprises" also conducted by INSEE, available to us over the 1984-2002 period. The survey complements the previous dataset with information on investing firms (sector of activity, number of employees, etc.)

After merging the datasets, we have at our disposal a single table containing detailed information about 18,115 French investments (foreign affiliates). Here, the analysis is restricted to firms that operate in the manufacturing sector over the 1992-2002 period (due to data scarcity before 1992), and we eliminate islands as a geographical zone of settlement.

At this stage, the dataset covers 3,936 investments in 76 foreign 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 a dummy variable equal to one if subsidiary s is located in the corresponding country and zero otherwise (we dropped the firm, sector and time subscripts for clartity purpose) :

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

[7] Liaisons Financières Internationales

2.3.2 The set of explanatory variables

The dependent variable fdi_{ijs} equals 1 if the database mentions the opening of a subsidiary s in country i over j alternatives. We evaluate the determinants of such a decision, relying on the theoretical FDI motives included in Equation (2.2). Strictly speaking, firms' location decisions should be related to a cross-country comparison of expected profits. Nevertheless, we assume static expectations and determinants of FDI decisions are considered the year of investment. This assumption is usually retained in the literature. Moreover, as the identification of parameters mainly uses the cross-country variability, it is sufficient to assume that determinants observed the year of investment are correlated with the variables entering the expectation function.

Real market potential

Several market potential indicators can be found in the empirical literature. We retain the structural measure proposed by Redding & Venables (2004), so as to be the closest to Krugman's (1992) definition of the market potential.[8] We thus build a "real market potential" variable based on the following definition :[9]

$$RMP_{it} = \sum_j I_{jt} P_{jt}^{\sigma-1} \phi_{ijt} \tag{2.5}$$

I_{jt} is the nominal expenditure in country j (for all j countries attainable from i), P_{jt} is the aggregate price level that reflects the extent of competition and ϕ_{ijt} is a measure of the "freeness" of trade between i and j. (ϕ_{ijt} increases from zero to one when trade becomes easier (Baldwin et al. (2005)). In accordance with Krugman's definition, this expression for country i's market potential takes into account aggregate demand in each country j attainable from i, as well as the degree of competition captured by the price index and the remoteness of each

[8] We would like to thank Thierry Mayer for giving us the Stata programs, used in Head & Mayer (2006) to compute market potential in a related way.

[9] Following Head & Mayer (2006), we thus use the term "real" for the market potential measure, to underline the importance of discounting expenditures by the aggregate price level that reflects the extent of competition. As noted by Head & Mayer (2006), unlike nominal market potential, real market potential integrates the notion that a large market that is well-served by existing firms may offer less potential profits for an entering firm, than a smaller market with fewer competitors.

location.

As in Redding & Venables (2004), the model estimated to get the market potential variable is a gravity-type equation explaining nominal bilateral trade between country i and j (X_{ij}) by exporter- and importer-specific fixed effects (respectively called E_i and M_j in what follows) and various measures of bilateral trade barriers (vector Φ_{ij}) :

$$\ln X_{ij} = \theta + E_i + M_j + \delta\Phi_{ij} + \epsilon_{ij} \tag{2.6}$$

As detailed in Redding & Venables (2004), the gravity Equation (2.6) is derived from a new economic geography framework. Its explanatory variables can thus be related to theoretical ones. Exporter-specific fixed effects (E_i) account for the number of producers in country i as well as their price competitiveness, called by Redding and Venables the "supply capacity" of country i. Secondly, importer fixed effects (M_j) capture the $I_j P_j^{\sigma-1}$ term entering the real market potential expression, i.e. the size of each market. The real market potential RMP_i is the sum of these "market capacities" weighted by the ease of access. From the estimation of Equation (2.6), one can thus restore a measure of real market potential (expressed in current US dollars) as :

$$\widehat{RMP}_i = \sum_j \left(exp(M_j)\right)^{\hat{\lambda}_j} \left(exp(\Phi_{ij})\right)^{\hat{\delta}}$$

This variable is built annually between 1992 and 2002 for 76 countries (list in appendix). Following Head & Mayer (2006), the variables entering Φ_{ij} are the distance between both countries and a set of binary variables specific to the country-pair, that indicate the existence of a common border, past colonial links, the use of a common language and their involvement into trade agreements and monetary unions. In the conditional logit, the real market potential is taken in logarithm and denoted "ln market potential". According to Equation (2.2), we expect a positive sign for the coefficient associated to it.

Labour costs

We control for country i's current GDP per capita (converted at nominal exchange rate in US Dollars and taken in log). This variable is commonly used in the empirical literature on FDI determinants. As underlined by Javorcik & Spatareanu (2004) or Bénassy-Quéré *et al.* (2007), it notably captures high labour costs in the host country. In our setting, it is aimed to capture the various elements of wage costs beyond labour market institutions. We thus expect a negative sign associated with this variable. Besides, including this control is of particular interest when willing to properly identify the effect of institutional variables on FDI, since they are likely correlated with GDP per capita (Bénassy-Quéré *et al.* (2007)).

In our theoretical framework, the labour cost variable is made up of four elements, the minimum wage $\underline{w}_i$ remunerating low-skilled workers in country i, the negociated wage w_i^q paid to skilled workers, firing costs f_i and social taxes τ_i. Moreover, the equilibrium wage resulting from the Nash-bargaining process itself depends on the union's bargaining power β_i, unemployment benefits b_i, the firing cost f_i and the degree of centralisation of the wage-bargaining process. These various dimensions of labour market regulation thereby affect the operating profit expected from country i, hence location decisions.

Labour market institutions variables are captured using different sources.

With regard to the whole sample of countries. We use information respectively provided by the World Bank *Doing Business* database (DB for short), the *Economic Freedom* database (EF) provided by the Fraser Institute (Gwartney and Lawson (2006)) and the *Institutional Profiles* database (IP) built in the French Ministry of Finance[10]. Labour market institutions variables provided by *Doing Business* and *Institutional Profiles* have no time dimension ; they are 2005 or 2006 values. On the contrary, LMI variables coming from the Fraser Institute are yearly values covering the period studied. From an econometric point of view, the use of explanatory variables in place the same year or even after location decisions take place, may arguably give rise to simultaneity issues. We do not view this as a serious concern here. As we consider individual binary choices of investment from a single country (France), there is little chance that endogeneity emerges between labour market institutions,

[10] See http ://cepii.fr/francgraph/bdd/institutions.htm

which are long-run and low time-variant indicators, and location decisions occurring at the firm level.

Given these three datasets, we are able to capture the labour market institutions intervening in the model as follows (see Appendix B for further details).

- The *Economic Freedom* database provides us with a synthetic index of labour market regulations. It takes values over $[0; 100]$, increasing with the degree of labour market flexibility. As detailed in Appendix B, it sums up the following dimensions of the labour market functioning : 1°) the hiring and firings practices, 2°) the degree of centralisation of wage bargaining, 3°) the unemployment benefits system, 4°) the minimum wage legislation, and 5°) the use of conscripts to obtain military personnel. Except for the last dimension, these are precisely the labour market institutions we are interested in. As such, using the "Synthetic LMI Index, EF" (as denoted in the tables) in the regressions helps evaluating the effects of the overall degree of labour market flexibility on FDI decisions.

  We then investigate the role of each particular dimension of labour market institutions, which is encompassed in the synthetic index. To this aim, we rely on the following labour market variables.

- Firing costs (f_i) are approximated by the Difficulty-of-Firing Index provided by *Doing Business*, which is defined over $[0; 100]$ and increases with the difficulty of firing. The indicator is denoted "Diff. of firing index, DB" in the tables. We also use the Hiring-and-Firing Practices index provided by *Economic Freedom*. It is defined over $[0; 100]$, decreasing with the difficulty of hiring and firing workers. It is denoted "Hir. & Fir. Index, EF" in the tables. Last, the *Institutional Profiles* database provides us with an alternative measure of the degree of labour contract protection (LCP for short). It is a discrete indicator taking values between 1 and 4, 1 being the degree of strongest protection. It is used to build 3 level-specific binary variables indicating a low, medium and strong degree of employment protection.
- The degree of centralisation of the wage bargaining process is captured using the "Bargaining level for blue-collar workers" variable coming from the *Institutional Profiles* database. This index takes discrete values decreasing from 4 to 1 when the degree of

centralisation of wage bargaining increases. This information is used to construct level-specific binary variables introduced in the regressions. They are denoted "Bargaining level=i, IP", with i= $1, 2, 3$ or 4.

- The generosity of the unemployment benefit system is captured by the "Unemployment Benefits" variable provided by *Economic Freedom*. It measures the extent to which the unemployment benefit system preserves the incentive to work. As such, it does not strictly match the unemployment benefit level (b_i). A low value of the indicator can be interpreted as capturing a generous unemployment benefits system. By raising the worker's outside option in the Nash-bargaining, this exerts an upward pressure on the negotiated wage. Since the variable is scaled over [0 ;100], it can be interpreted as a ratio comparing the actual generosity of the unemployment benefit system relative to a theoretical one featured by no unemployment indemnity.
- The minimum wage legislation is captured by the "Minimum wage impact" provided by the *Economic Freedom* database. This variable evaluates the impact of minimum wage policy on wages. It is thus considered as a proxy for $\underline{w}_i$. The variable takes values over the range $[0; 100]$, decreasing with the strictness of the minimum wage legislation (i.e. with the magnitude of its impact and the strength of enforcement). It is denoted "Min. Wage Impact, EF " in the tables.
- The extent of mandatory contributions (τ_i) is measured using the "Non wage labour costs" variable of *Doing Business*. The indicator measures all social security payments (including retirement fund ; sickness, maternity and health insurance ; workplace injury ; family allowance ; and other obligatory contributions) and payroll taxes associated with hiring an employee. The cost is expressed as a percentage of the worker's salary. The variable introduced in regressions is the logarithm of one plus non-wage labour costs. This variable is denoted "ln(1+labour tax), DB" in the tables.

Depending on the labour market variable considered, this dataset covers 54 to 76 countries. We complement the database with labour market indicators provided by the OECD.

With regard to OECD countries. Labour market institutions intervening in FDI decisions are also captured by the following variables, taken from OECD's Labour Statistics

database, completed with data provided by Nickell (2006).

- The gross benefit replacement rate captures the generosity of the unemployment system (b_i). It is expressed in percentage points and labelled "Ben. repl. ratio (%), OECD" in the following tables.
- The employment protection legislation index (EPL) is used to approximate firing costs (f_i). We consider the degree of employment protection for all workers.[11] This variable is defined over the $[0; 100]$ interval and denoted "EPL, OECD".
- The unions' bargaining power (β_i) is captured by two variables, union density and union coverage. Union density is defined as the share of labour force which is member of a labour union. Union coverage is the share of labour force covered by collective agreements. Depending on national legislations, it may be the case that workers that are not union members nevertheless benefit from collective agreements signed by unions (as in France for instance). As a result, a low share of workers that are unionised is not necessarily the sign of a low bargaining power for unions. Union density only tells one part of the story, leading us to consider union coverage as our preferred measure of bargaining power. The variables are respectively denoted "Union Density (%), OECD" and "Union Coverage (%), OECD" in the regression tables.
- We alternatively use the "Degree of centralisation" and the "Degree of coordination" of wage bargaining, to get information about the organisation of the bargaining process. As they take discrete values in the OECD database, they are introduced through binary variables in the following tables. Both indices are increasing in the degree of centralisation and coordination.
- We use the ratio of minimum over median wage to approximate $\underline{w}_i$. Beyond minimum wage per se, it can be considered as measuring the degree of constraint that the minimum wage legislation introduces. It is denoted "Min. wage ratio (%), OECD".[12]

Depending on the LMI variable considered, this dataset covers between 20 and 27 OECD countries. Details on the construction of the LMI variables are provided in Appendix B. Table

[11] As robustness check we also considered the degree of employment protection for regular and for temporary workers respectively. Results, available upon request, were not very different from those obtained with the EPL index for all workers.

[12] The OECD database is restricted to countries fixing a minimum wage at the national level. For countries with branch-specific minimum wages, we use data provided by the International Labor Organization from the United Nations. See Appendix B for details.

B.1 in Appendix B sums up the list of countries in each database.

Other production costs

The other elements affecting the firm's marginal cost are captured using the following additional variables.

Supply access : Following Amiti & Javorcik (2005), the empirical literature has reached the conclusion that intermediates are a key element of location choices, and all the more in the current decades as productive processes are becoming more fragmented. The inclusion of intermediate goods in the production function creates an incentive for firms to locate where they are the cheapest, i.e. near intermediate good suppliers. As Amiti & Javorcik (2005), we capture intermediate goods availability by a so-called "supply access" variable, that measures the access to intermediates that investing in country i gives to a firm operating in sector k. The supply access indicator enters the z_i parameter in Equation (2.3). We build the corresponding country- and sector-specific variable using information about the actual matrix of inter-industry linkages. The rationale behind its construction is the following. The incentive for a firm in sector k to locate in i increases in *i)* country i's supply of intermediate goods, relative to the rest of the world, and *ii)* sector k's use of intermediate inputs. We capture these two dimensions of the supply access as follows, relying on several assumptions. First, intermediate goods are assumed to be either locally produced (in country i) or imported from neighbour countries from i (the country set adj_i hereafter, with $j \in adj_i$). Second, we identify the intermediate goods supply using the information on French affiliates. From this, we get the geographical distribution of French suppliers of inputs. We then assume this distribution to be representative of the world distribution of the production in each sector k. This is obviously a strong assumption, that is however convenient given the lack of data on production at the disaggregated level. Third, an affiliate abroad is assumed to use intermediate inputs in the same proportion as firms in the same industry operating in France. This allows us using the French Input/Output tables to obtain the technical coefficients (denoted θ_{kt} and a_{klt} in what follows).

Based on these assumptions, the "supply access" measure for a firm operating in sector

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

$$SA_{ikt} = \theta_{kt} \sum_{l} a_{klt} \sum_{j \in adj_i} \frac{empl^{j}_{lt}}{empl^{world}_{lt}} \frac{1}{dist_{ij}}$$

where θ_{kt} is the share of intermediate goods in the production of sector k, a_{klt} is a technical coefficient that measures the factor intensity in input l of the production of sector k. The employment level of industry l in country j ($empl^{j}_{lt}$) is used as a proxy for output of sector l in country j. Consequently, $\frac{empl^{j}_{lt}}{empl^{world}_{lt}}$ represents the share of country j in the world-wide production of intermediate good l. As it is weighted by 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 lagged 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.

Other controls : As standard in the related literature, we control for transaction costs related to various determinants of the "easiness" for investing in a specific country. First, we control for information and communication costs using the distance between France and the host country (taken in log and denoted "ln distance"). We expect a negative sign associated with distance from France.

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. Head & Mayer (2004) notably point 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 already settled. The spillover effects are approximated by a variable measuring the cumulated number of French subsidiaries of the same industry that have settled in the past in country i (in log, labelled "ln(# of same ind. firms -1)"). 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.

Robustness analysis

One possible weakness of our results may be that labour market institutions may capture the influence of other institutional variables such as tax policy or the quality of governance, whose role in FDI decisions may be of particular importance in developing countries. Consequently, we check that our results are robust to the inclusion of several variables.

We control for the impact of taxation on FDI location choices. Extending the theoretical model of Section 2.2, one would get that the higher the corporate tax rate, the lower after-tax profit, hence the lower the incentive to locate. The link between tax policy and international capital flows has been largely studied in the literature, as surveyed by Devereux (2007). One notable difficulty is to obtain series of effective tax rates with a sufficient country coverage given our sample size. We use the effective average tax rate series used in Devereux & Griffith (2002) and provided on the IFS website. The rate is the base case rate assuming investment in plants and machinery and financed by equity or retained earnings. The dataset is only available on a sub-sample of 18 OECD countries. We take the log of 1 minus the tax rate in the regressions (denoted "ln(1-tax rate), DG" in the tables), and we expect a positive sign associated with this variable.

We then control for the quality of governance on FDI decisions. As underlined by Moskalev (2007), there is no unique way of defining governance. Wei (2000) and Javorcik & Wei (2000) focus on the role of corruption, while Daude & Stein (2007) and Moskalev (2007) study a wider range of governance indicators (competence of the bureaucracy, quality of contract enforcement, etc.). Moskalev (2007) uses the governance indicators provided by Kaufmann, Kray & Mastrizzi (2005) (denoted KKM hereafter). Daude & Stein (2007) capture governance using data coming from the *World Bank Environment Survey* (denoted WBES hereafter). The robustness analysis is made using information from both sources. As in Moskalev (2007), information provided by the six indicators proposed by Kaufmann *et al.* (2005) is aggregated in an average indicator (denoted "Quality of governance, KKM" in the tables). Similarly, we build a synthetic quality of governance index as the mean value of the five indicators used by Daude & Stein (2007), coming from WBES data (denoted "Quality of governance, WBES" in the tables). Both indicators take values between 0 and 100. The KKM index is

increasing with the quality of governance, while the WBES index is decreasing with it. Details are given in Appendix B. One notable difference between the two governance indicators is related to their country coverage. The governance indicator built using WBES data only covers 36 countries of our sample, while we get information for all the 76 countries with the KKM variable. Accordingly, the KKM indicator is our favorite measure of the quality of governance. We nevertheless refer to the WBES indicator as a robustness check, as detailed later. Wei (2000) and Javorcik & Wei (2000) obtain that increased corruption reduces FDI inwards. This is consistent with Moskalev's (2007) result, that an improvement in the host country's governance regime is associated with larger FDI inflows. In light of these results, we expect a positive sign associated with the KKM variable, and a negative one with the WBES governance indicator respectively.

2.3.3 Summary statistics

Do cross-country differences in labour market institutions affect French firms' FDI decisions ? Before turning to the econometric analysis, it is necessary to check that there is some heterogeneity in labour market institutions data. Table 2.1 reports a summary of the cross-country distribution of our measures of labour market regulation (covering a different number of countries depending on the source of data). It confirms a substantial degree of heterogeneity in labour market institutions, as shown by the strong dispersion around the mean for each LMI variable.

Given this cross-sectional variance, next section investigates how these discrepancies in national labour market institutions affect the propensity of French firms to settle in.

2.4 Estimation

This section estimates the role of labour market institutions on French firms' FDI decisions. We proceed as follows. In a first step, we estimate the baseline specification, focusing on the impact of a standard set of explanatory variables found in the related literature and

TAB. 2.1 – Cross country dispersion of labour market institution variables

Variable	Nb countries	Year	Mean	Std dev.	Min	Max
Doing Business database						
Diff. of firing index	73	2005	35.62	25.91	0	100
Non-wage labour costs	76	2006	20.16	10.68	1	55
Institutional Profiles database						
labour Contract Protection	59	2006	2.58	0.80	1	4
Bargaining Level	59	2006	2.66	0.91	1	4
Economic Freedom database						
Hirings & Firings Index	64	2002	40.57	15.61	10	76.66
Centralisation Index	64	2002	61.26	17	18.33	86.67
Unemployment benefits	50	2002	48.58	14.47	16.54	85.23
Min. wage impact Index	54	2002	39.78	7.47	19	51
Synthetic LMI Index	64	2002	48.83	11.64	23.88	72.76
OECD database						
Employment protection	27	2002	38.77	16.70	4.16	74.51
Union density	26	2002	32	19.22	11.32	79.42
Union coverage	18	2000	65.78	28.11	14	98
Centr. degree	21	2002	2.29	1.16	1	5
Coord. degree	21	2002	2.92	1.40	1	5
Min. wage ratio	23	2002	0.43	0.11	0.19	0.70
Benefit repl. Ratio	20	2002	30.23	12	8.5	53

Note : In the case of time-varying variables, statistics are calculated using 2002-values.

excluding labour market variables. This allows us to check the consistency of our data. In a second step, labour market institutions are included in the estimated equation. All estimations include time and regional dummies (see details in Appendix B for more details).

2.4.1 Baseline specifications

We now run several sets of estimations of the probability that country i is chosen over J location possibilities.

$$\Pr(FDI_{ikt} = 1) = \frac{\exp(\pi_{ik}^{op})}{\sum_J \exp(\pi_{jk}^{op})} \tag{2.7}$$

Table 2.2 reports the results of the conditional logit in the baseline specification, without labour market institutions. All regressions include regional dummies.[13] Results provided in column (A) are obtained on the large sample of countries, while columns (B) and (C) report regression results when the country choiceset is restricted to the sub-sample of OECD countries. We then evaluate the role of governance on FDI decisions, including the KKM governance variable in the regression, run on both large and restricted samples (columns (D) and (E)). In column (F), the WBES indicator is alternatively used in the regression, over a sub-sample of 36 countries (OECD and non-OECD countries). Last, column (G) reports regression results when including the average effective tax rate (on the OECD sample).

As expected, the market potential variable enters with a positive sign in the regression, whatever the country sample : firms are attracted by large markets with high purchasing power. A 10% increase in market potential increases the probability of attracting French investors by around 5%.[14] The magnitude of the effect is sizeable, and in line with usual findings in the literature.

With regards to variables capturing production costs, results are also consistent with the literature. The incentive to invest in a given country is negatively correlated with its GDP per capita. Moreover, vertically-linked agglomeration forces are found to have a significant

[13] See appendix for regions definition.

[14] As detailed by Train (2003), with large number of location choices, when the exogenous variables are taken in logs the coefficients are very close to the elasticity of the mean probability of choosing a country with respect to the explanatory variable. In addition, if the exogenous variables are taken in levels, coefficients can be interpreted as semi-elasticities.

TAB. 2.2 – Benchmark estimation

	Dependent Variable : Chosen Country						
Model :	(A)	(B)	(C)	(D)	(E)	(F)	(G)
ln Real Market Potential	0.469^a	0.493^a	0.489^a	0.466^a	0.488^a	0.518^a	0.547^a
	(0.021)	(0.027)	(0.026)	(0.021)	(0.026)	(0.036)	(0.031)
ln distance	-0.196^a	0.054		-0.202^a		-0.164	
	(0.055)	(0.091)		(0.054)		(0.107)	
ln GDP per capita	-0.369^a	-0.526^a	-0.543^a	-0.339^a	-0.466^a	-0.087	-0.783^a
	(0.028)	(0.077)	(0.074)	(0.038)	(0.093)	(0.063)	(0.083)
ln (# same ind. firms -1)	0.336^a	0.134^a	0.135^a	0.334^a	0.133^a	0.169^a	0.092^c
	(0.048)	(0.051)	(0.051)	(0.048)	(0.048)	(0.042)	(0.049)
ln (supply access -1)	0.145^a	0.172^a	0.168^a	0.144^a	0.163^a	0.114^a	0.192^a
	(0.010)	(0.016)	(0.013)	(0.010)	(0.014)	(0.016)	(0.014)
Qlty governance, KKM				-0.003	-0.006		
				(0.002)	(0.004)		
Qlty governance, WBES						-0.011^c	
						(0.006)	
ln(1-eff.tax rate), DG							1.540^a
							(0.330)
Observations	299,136	74,925	74,925	294,910	74,925	87,336	41,256
Countries	76	27	27	76	27	36	18
Sample	All	OECD	OECD	All	OECD	All	OECD
FDI occurrences	3,936	2,775	2,775	3,933	2,775	2,426	2,292
Pseudo-R^2	0.133	0.101	0.101	0.131	0.101	0.153	0.106

Note : Observation clustered by firms. Robust standard errors in parentheses
with ***, ** and * respectively denoting significance at the 1%, 5% and 10% levels.

impact on firms' location choices. The positive sign associated with the supply access variable means that firms are more likely to move close to suppliers, as it reduces transportation costs on intermediate inputs. This result holds whatever the sample used.

Distance enters with the expected sign in column (A) : The further the host country, the lower the propensity of French firms to invest. However, this effect no longer holds when assessing its impact on OECD countries (column (B)). In column (C), we thus run the same equation without the distance variable. Results on the other variables remain stable. Consequently, the set of control variables included in the subsequent regressions is given by the baseline specification in column (C) for the restricted sample of OECD countries.

In Table 2.2, the coefficient associated with "ln (# of same ind. firms -1)" is significantly positive. This suggests the presence of externalities among French investors, such as better market knowledge, easier administrative procedures and more broadly, production externalities. However, the magnitude of the spillover effect is sensitive to the country coverage. A 10% increase in the number of same-industry firms raises the propensity to locate in the country by 3.4% when contemplating the large sample of countries. When restricting the sample to OECD countries, the rise is only 1.7%. A possible explanation would be that agglomeration of firms compensates the lack of infrastructure and transparency in business activity in less-developed countries.

Results displayed in Table 2.2 confirm that most standard results obtained in the literature regarding the determinants of FDI decisions remain relevant using this new dataset. Besides, they show that the FDI function is sensitive to the country coverage (whether restricted to OECD or including less-developed countries). While market potential and production costs variables remain major determinants of FDI decisions, transaction costs variables (gravity variables and spillover effects) are found to have a much lesser impact on FDI decisions within OECD countries. In light of this result, further analysis will systematically distinguish the large sample and the sub-sample of OECD countries. Note that 70% of FDI in our dataset are made in direction of OECD countries, which makes results robust even if the sub-sample is reduced to 27 countries. This confirms the widespread view that most FDI flows take place between industrialised countries (Markusen and Maskus, (2002)).

Columns (D) to (F) report regression results when controlling for the quality of governance. In columns (D) and (E), governance is captured by the KKM indicator. Whatever the set of countries considered as potential locations, the associated coefficient is estimated insignificant. This a priori surprising result is notably tied to the presence of continental dummies in the regression. A deeper investigation indicates that governance is highly correlated to regional dummies.[15] This consequently allows us interpreting the inclusion of continental dummies in further regressions as capturing various dimensions of institutional features, notably the quality of governance. This has notable implications regarding the role of labour market institutions on FDI. If they turn out significant despite the presence of continental dummies, we can be confident in the robustness of the link between labour market institutions and FDI to other institutional features, such as the quality of governance.

Unlike the KKM indicator, the WBES governance variable is found to significantly matter in FDI decisions in spite of the inclusion of continental dummies (see column (F)). The negative sign indicates that better governance exerts a positive effect on the incentive to locate, a result in line with the large bulk of the literature (Daude & Stein (2007) or Javorcik & Wei (2000) among others). In further analysis, we consequently pay attention to the robustness of the link between labour market institutions and FDI to the inclusion of the WBES governance variable as well as continental dummies. However, it is worth noticing that in this case, the country coverage is quite limited, as the WBES indicator covers only 36 countries of our sample.

Column (G) reports regression results when the inverse tax variable is included in the benchmark regression. The coefficient is estimated significantly positive, consistently with expectations. Every thing else equal, a higher average effective tax rate reduces the incentive for firms to locate in the host country.

[15] For sake of space saving, these results are not reported. They are available upon request to the authors. Besides, the KKM governance variable appears to be highly correlated with GDP per capita (in log), as shown in Table C.2. It is hence not surprising that both variables cannot be simultaneously estimated significant.

2.4.2 Labour market flexibility

We now turn to the analysis of the role of labour market institutions on FDI decisions. Before starting analysing the results, let us formulate remarks of methodological order. In the following, LMI variables that can be interpreted as percentage shares (such as OECD EPL and Economic Freedom) are introduced in level in the conditional logit (countinuous bounded variables). As such, the coefficients are interpretable as semi-elasticities, i.e. measuring the effect of a one percentage point increase in the indicator on the probability for the country to be chosen as location. As for discrete LMI indicators (such as those provided by the *Institutional Profiles* database), they are converted into as many dummies as the number of categories of the indicator. In this case, estimated coefficients can be interpreted in relative terms.[16]

We start considering the role of the overall degree of labour market flexibility on FDI decisions. To this aim, we include the synthetic LMI index (*Economic Freedom*) in the regression. Results are reported in Table 2.3, columns (A) (large sample of countries) and (B) (OECD countries). Two main results emerge. First, labour market flexibility is found to exert a significant positive impact on FDI decisions, in both the large and reduced country samples. With respect to the baseline specification (Table 2.2), coefficients associated with the other control variables remain of same order and sign. The estimated coefficients on the labour market index are quantitatively small, notably relative to the other FDI determinants : a 10 percentage point increase in the synthetic LMI indicator raises the probability to be chosen as location by less than 0.1%. This suggests that labour market institutions are not the main FDI determinant, which we do not view as a disappointing nor even a surprising result.

[16] As an example, take the Labor Contract Protection (LCP) indicator provided by the French ministry of Finance. It is converted into three dummies : $LCP = low$ which is equal to 1 if the country has an LCP indicator higher than 3, $LCP = Medium$ for LCP indicators between 2 and 3 and $LCP = High$ for LCP indicators lower than 2. Denoting $\hat{\beta}_{low}$ and $\hat{\beta}_{mid}$ the coefficients obtained for the corresponding dummies, the ratio $\exp(\hat{\beta}_{low})/\exp(\hat{\beta}_{mid})$ measures the relative probability that a representative country, featuring mean values for other explanatory variables, with a low level of labor contract protection is chosen as location, in comparison with the same country with a medium level of labor contract protection.

TAB. 2.3 – Synthetic LMI

	Dependent Variable : Chosen Country			
Model :	(A)	(B)	(C)	(D)
ln Real Market Potential	0.435^a	0.481^a	0.416^a	0.503^a
	(0.023)	(0.026)	(0.037)	(0.032)
ln distance	-0.204^a		-0.237^b	
	(0.066)		(0.117)	
ln GDP per capita	-0.399^a	-0.639^a	-0.088	-0.843^a
	(0.030)	(0.077)	(0.061)	(0.094)
ln (# of same ind. firms -1)	0.347^a	0.122^a	0.216^a	0.070
	(0.047)	(0.051)	(0.050)	(0.056)
ln (supply access -1)	0.140^a	0.191^a	0.170^a	0.209^a
	(0.012)	(0.014)	(0.020)	(0.015)
Synthetic LMI indicator, EF	0.003^c	0.011^a	0.012^a	0.013^a
	(0.002)	(0.002)	(0.003)	(0.003)
Quality of governance, WBES			-0.015^b	
			(0.007)	
ln(1-eff.tax rate), DG				0.582
				(0.365)
Observations	172,616	72,990	59,911	41,256
Countries	64	27	34	18
Sample	All	OECD	All	OECD
FDI occurrences	3,615	2,761	2,349	2,292
Pseudo-R^2	0.101	0.102	0.120	0.108

Note : Observation clustered by firms. Robust standard errors in parentheses with ***, ** and * respectively denoting significance at the 1%, 5% and 10% levels.

Second, the effect of labour market flexibility is more sizeable, and more significant, when FDI decisions are taken within the set of OECD countries, than over the large sample of 64 countries. The associated coefficient is thus three times larger when the estimation is run on the OECD sub-sample than on the whole sample.

Results reported in columns (C) and (D) indicate that the significant role of labour market institutions on FDI is robust to the inclusion of other institutional variables. Neither the quality of governance in the host country nor its corporate tax policy are able to cancel out the impact of labour market institutions on FDI decisions. Quality of governance measured by the WBES indicator is found to significantly matter as well, the effect being of expected sign.[17] Besides, tax policy is found to be insignificant in explaining FDI decisions, once other determinants are accounted for. Although this result may be disappointing in the light of Chapter 1, it should be considered cautiously. Indeed this chapter focuses on labour market more than taxation, and the role of CIT rates is not deeply investigated. Nevertheless, a whole set of estimations using Devereux & Griffith (2002) effective average tax rates is presented in Table **??** in Appendix C. All but one coefficients associated with the inverse tax variable are significantly positive, hence, corporate tax rates have a negative impact, even when accounting for labour market characteristics.

The result that labour market institutions matter in FDI decisions, and matter more within OECD countries, deserves to be investigated into more details. As previously mentioned, the synthetic LMI index encompasses many dimensions of labour market regulations, which do not have necessarily the same importance on FDI decisions. In the following, we go deeper into the analysis and successively study the role of employment protection (Table 2.4), of the wage bargaining process (Table 2.5), of minimum wage policy and of unemployment benefits (Table 2.6), and of the labour tax rate (Table 2.7).

[17] However, when introducing the WBES indicator, GDP per capita becomes non significant. This is not necessarily a surprising result, in light of the strong correlation between quality of governance variables and GDP per capita in the data (see Table C.2, Appendix B). The difficulty of obtaining both variables significant simultaneously is confirmed in Table C.3, where the effect of GDP per capita becomes very unstable when introducing the WBES indicator. This result is in line with the literature's findings (Bénassy *et al.* (2007)). This, however does not change the results on the LMI variables.

2.4.3 Detailed labour market institutions

Employment protection

The first set of sub-indicators refers to employment protection laws.Table 2.4 reports regression results when the variables capturing employment protection laws are included in the estimated equation. Columns (A) to (C) report regression results over the large sample of countries. Columns (D) to (G) display results when the country choiceset is restricted to OECD countries. Two main results emerge. First, stringent employment protection laws reduce the propensity of French firms to locate in the country.cThe result is obtained on both samples. Except in column (C), the effect is highly significant. According to our theoretical model, firing costs can have either positive or negative effect on FDI inflows. Here, as wages are controlled for through GDP per capita, only the negative effect is captured by the firing costs variable.

Second, employment protection matters more when FDI decisions are taken within the set of OECD countries. Estimated coefficients associated with OECD specifications are always larger than in the large sample. The effect can be evaluated in quantitative terms, by notably comparing the results obtained with labour Contract Protection dummies (columns (A) and (D)). The relative probability that a representative country with a low level of labour contract protection is chosen as location, as compared to the same country with a medium level of employment protection, amounts to 1.09 ($\exp(0.391)/\exp(0.308)$) on the large sample. It rises to 4.96 when only OECD countries are considered as potential location choices. French firms are more responsive to the strictness of employment protection when they contemplate to settle within the restricted set of OECD countries. This is in line with the "OECD-country" group effect obtained with the overall labour market flexibility index (Table 2.3). We pay a particular attention to the robustness of this result, when coming to analyse the role of other labour market institutions.

TAB. 2.4 – Employment Protection Legislation

	Dependent Variable : Chosen Country						
Model :	(A)	(B)	(C)	(D)	(E)	(F)	(G)
ln Real Market Pot.	0.468^a	0.468^a	0.434^a	0.484^a	0.502^a	0.502^a	0.490^a
	(0.026)	(0.022)	(0.023)	(0.037)	(0.027)	(0.027)	(0.025)
ln distance	-0.556^a	-0.185^a	-0.236^a				
	(0.075)	(0.056)	(0.061)				
ln GDP per capita	-0.351^a	-0.405^a	-0.369^a	-0.579^a	-0.641^a	-0.625^a	-0.785^a
	(0.031)	(0.030)	(0.031)	(0.086)	(0.080)	(0.082)	(0.089)
ln (# same ind. firms -1)	0.310^a	0.330^a	0.329^a	0.089^c	0.120^b	0.125^b	0.107^b
	(0.049)	(0.048)	(0.047)	(0.055)	(0.052)	(0.051)	(0.050)
ln (supply access -1)	0.123^a	0.145^a	0.132 ^{a}	0.150^a	0.162^a	0.179^a	0.190^a
	(0.010)	(0.010)	(0.011)	(0.015)	(0.014)	(0.014)	(0.014)
LCP=low, IP	0.391^a			0.589^a			
	(0.068)			(0.145)			
LCP=medium, IP	0.308^a			0.363^a			
	(0.063)			(0.137)			
Diff. Firing Index, DB		-0.002^a			-0.004^a		
		(0.001)			(0.001)		
Hir. & Fir. Index, EF			-0.001			0.004^b	
			(0.001)			(0.002)	
EPL, OECD							-0.009^a
							(0.002)
Obs.	192,222	286,452	177,680	40,622	74,925	74,925	74,925
Countries	59	73	64	19	27	27	27
Sample	All	All	All	OECD	OECD	OECD	OECD
FDI occurences	3,258	3,924	3,635	2,138	2,775	2,775	2,775
Pseudo-R^2	0.139	0.129	0.101	0.115	0.101	0.101	0.102

Note : Observation clustered by firms. Robust standard errors in parentheses with ***, ** and * respectively denoting significance at the 1%, 5% and 10% levels.

Results obtained with the Doingbusiness, Economic Freedom and OECD variables, though significantly negative, show very little impact of employment protection on FDI. A 10 percentage point increase in EPL would reduce the probability of FDI by less than 0.1%.

Wage Bargaining process

We now turn to the impact of the bargaining process on firms' location choices. Results are displayed in Table 2.5. We first analyse the role of trade unions' bargaining power. To that aim, we successively include union density and union coverage in the regression. Both variables only cover OECD countries. Results are displayed in columns (A) and (B). In both cases, the coefficient is estimated significantly negative, meaning that a strong bargaining power for unions reduces the firms' incentive to locate in the country. The effect is quantitatively non-negligible, as a one standard deviation shock on the union coverage of the "mean" country reduces its probability to be chosen as location from 5.6 to 4.2%.[18] This result is in line with our theoretical predictions. As a strong bargaining power exerts an upward pressure on the negotiated wage, it reduces firms' incentive to locate in the country. Unfortunately given the lack of data, we cannot test the robustness of this result over the larger set of countries.

Columns (C) to (H) report results regarding the degree of centralisation and coordination of wage bargaining. In column (C) and (D), the estimation is run on the large sample, while only OECD countries are included in columns (E) to (H). In each case, the reference group is the one with the highest degree of centralisation/coordination of wage bargaining. As previously mentioned, the labour market literature devotes a lot of attention to the link between the wage bargaining process and labour market performances. In a seminal contribution, Calmfors & Driffill (1988) obtain a non-linear effect of the degree of centralisation on wages and unemployment. As wages monotonically affect marginal costs, hence location decisions, the propensity to settle in a host country may inherit the non-linear relation with respect to the degree of wage bargaining as well. Results reported in Table 2.5 do not support this view. Rather, our regression results bring up another conclusion : The more centralised the wage

[18] This result relies on simulation exercises. We build an artificial "mean" country, with values of the explanatory variables equal to the means of the country sample. We then evaluate the probability to locate in this mean country, before and after the one standard-deviation shock.

TAB. 2.5 – Bargaining process

	Dependent Variable : Chosen Country							
Model :	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
ln RMP	0.449^a	0.490^a	0.510^a	0.423^a	0.457^a	0.519^a	0.430^a	0.476^a
	(0.026)	(0.028)	(0.029)	(0.023)	(0.036)	(0.027)	(0.031)	(0.030)
ln distance			-0.293^a	-0.236^a				
			(0.086)	(0.062)				
ln GDP per cap.	-0.399^a	-0.995^a	-0.288^a	-0.398^a	-0.122	-0.664^a	-0.967^a	-0.678^a
	(0.073)	(0.089)	(0.033)	(0.030)	(0.081)	(0.076)	(0.101)	(0.102)
ln (# firms -1)	0.142^a	0.021	0.261^a	0.347^a	-0.006	0.112^b	0.027	0.015
	(0.051)	(0.055)	(0.049)	(0.047)	(0.056)	(0.051)	(0.053)	(0.052)
ln (supply ac. -1)	0.160^a	0.194^a	0.138^a	0.137^a	0.155^a	0.193^a	0.206^a	0.215^a
	(0.013)	(0.015)	(0.010)	(0.011)	(0.015)	(0.013)	(0.020)	(0.018)
U.dens. (%), OECD	-0.010^a							
	(0.002)							
U.cov. (%), OECD		-0.011^a						
		(0.001)						
Bargaining=2, IP			0.548^a		0.590^a			
			(0.117)		(0.148)			
Bargaining=3, IP			0.800^a		1.126^a			
			(0.116)		(0.146)			
Bargaining=4, IP			0.137		1.198^a			
			(0.132)		(0.185)			
Centr.Index, EF				0.000		0.015^a		
				(0.002)		(0.002)		
Centr=1, OECD							1.619^a	
							(0.306)	
Centr=2, OECD							0.907^a	
							(0.307)	
Centr=3,OECD							0.798^b	
							(0.310)	
Centr=4, OECD							0.571^c	
							(0.320)	
Coord=1, OECD								1.080^a
								(0.117)
Coord=2, OECD								-0.001
								(0.247)
Coord=3, OECD								0.615^a
								(0.093)
Coord=4, OECD								0.229^a
								(0.079)
Observations	70,304	40,842	192,222	167,815	40,622	72,990	53,697	53,697
Nb of countries	26	18	59	64	19	27	21	21
Sample	OECD	OECD	All	All	OECD	OECD	OECD	OECD
FDI occurences	2,704	2,269	3,258	3,594	2,138	2,761	2,557	2,557
Pseudo-R^2	0.107	0.118	0.144	0.10	0.124	0.104	0.10	0.107

Note : Observation clustered by firms. Robust standard errors in parentheses
with ***, ** and * respectively denoting significance at the 1%, 5% and 10% levels.

bargaining, the less incentives for firms to locate. This result holds strongly and significantly whatever the country coverage. The relative probability to be chosen as a location, when the country adopts bargaining procedures at the branch-level ("Bargaining Level, IP=2"), rather than at the national level ("Bargaining Level, IP=1", the reference group) amounts to 1.72 on the large sample (Column (C)) (1.80 on the OECD sample, column (E)). The estimated gain to adopt more decentralised procedures is thus sizeable.

Results reported in Table 2.5 also supports the existence of an OECD-group effect. The estimated coefficients are larger and more significant when FDI decisions occur within the set of OECD countries. The effect is quantitatively non-negligible. Thus, switching from the branch-level to the firm-level ("Bargaining Level, IP"=2 to 3) raises the relative probability to be chosen as location from 1.29 in the large sample, to 1.71 within OECD countries. Adopting more decentralised wage bargaining procedures is thus found to have a larger quantitative effect on the propensity to locate within the choiceset restricted to OECD countries.

The result that a highly-centralised wage-bargaining process strongly and significantly reduces the incentive to locate, may be rationalised as follows. A highly centralised setting implies that each individual firm does not have much control on the wage level in place in the country. This may be particularly costly for foreign firms that settle in, as their weight in the bargaining is likely to be overwhelmed by that of national firms. The lack of control on the local workforce's wages may explain the strong aversion that French firms have for highly-centralised bargaining procedures. This relation can be formally obtained in a model with firm-specific risks of failure and a fix cost of exiting the market, like the one in Halaand & Wooton (2007).

Minimum wage legislation and unemployment benefits

Table 2.6 presents results related to the impact on investment decisions of minimum wage policy (columns (A) to (C)), and of unemployment benefits (columns (D) to (F)). Consider first the role of minimum wage policy. As reported in column (A), minimum wage policy has

TAB. 2.6 – Minimum wage policy and unemployment benefits

	Dependent Variable : Chosen Country					
Model :	(A)	(B)	(C)	(D)	(E)	(F)
ln Real Market Potential	0.460^a	0.523^a	0.509^a	0.433^a	0.501^a	0.488^a
	(0.023)	(0.027)	(0.029)	(0.023)	(0.026)	(0.027)
ln distance	-0.234^a			-0.272^a		
	(0.064)			(0.064)		
ln GDP per capita	-0.393^a	-0.585^a	-0.419^a	-0.415^a	-0.575^a	-0.686^a
	(0.030)	(0.075)	(0.081)	(0.030)	(0.068)	(0.080)
ln (# of same ind. firms -1)	0.340^a	0.120^b	0.155^a	0.369^a	0.151^a	0.076
	(0.049)	(0.052)	(0.053)	(0.036)	(0.043)	(0.048)
ln (supply access -1)	0.135^a	0.181^a	0.162^a	0.141^a	0.201^a	0.182^a
	(0.012)	(0.014)	(0.014)	(0.012)	(0.014)	(0.013)
Min. wage Impact, EF	0.002	0.005^a				
	(0.002)	(0.002)				
ln Minimum Wage ratio, OECD			-0.567^a			
			(0.103)			
Unemployment benefits, EF				0.007^a	0.013^a	
				(0.002)	(0.002)	
Unempl.Ben.Repl.Ratio (%), OECD						-0.014^a
						(0.002)
Observations	164,971	70,698	60,752	146,070	69,616	46,500
Nb of countries	54	26	23	50	27	20
Sample	All	OECD	OECD	All	OECD	OECD
FDI occurences	3,526	2,728	2,642	3,456	2,720	2,325
Pseudo-R^2	0.106	0.102	0.096	0.093	0.102	0.121

Note : Observation clustered by firms. Robust standard errors in parentheses with ***, ** and * respectively denoting significance at the 1%, 5% and 10% levels.

no significant role on FDI decisions when all countries are considered as potential locations. Conversely, the coefficients associated with minimum wage policy are significant when FDI occurs among OECD countries (columns (C) and (D)). In that case, they have the expected sign : a more stringent minimum wage policy reduces the host country's attractiveness. The effect is quantitatively important : a 10% increase in the minimum to median wage ratio (in log) reduces the probability to be chosen as location by 5.6% (column (C)).

These results go along the lines of an "OECD-country group" effect. Minimum wage policy is found to have a larger significant effect on FDI decisions within the set of OECD countries, than among the large sample –where it virtually plays no role. This result may sound surprising, notably in light of the consensus view that FDI to low-developed countries are driven by vertical motives in the search of low production costs (Navaretti and Venables (2004)). However as wages are already controlled for with the GDP per capita variable, it is probable that the minimum wage is more constraining in developped countries than in less developped countries.

Consider next the role of unemployment benefits (columns (E) to (G)). Columns (E) and (F) report estimation results using the Unemployment Benefit variable (from *Economic Freedom*) on the large and the reduced samples, respectively. In both cases, the coefficient is significantly positive, meaning that a more generous unemployment benefits system reduces the propensity to locate. Similarly, we get that the unemployment benefit ratio exerts a significant negative impact on FDI decisions among OECD countries (column (G)). The effect may be rationalised using the theoretical framework of Section 2.2. A generous unemployment benefit system rises the negotiated wage, hence production costs, thereby reducing the incentive to locate for foreign investors. A one standard-deviation negative shock on the unemployment benefit index (EF) of the mean country (i.e., towards a more generous unemployment system) reduces its probability to be chosen as location from 2% to 1.77% considering the large sample of countries. The downward effect is more severe on the sub-set of OECD countries, as the probability to be chosen reduces from 3.7% to 3.1% in that case.

Mandatory contributions

In this section, we evaluate the role of labour taxes on FDI decisions. Results are summarised in Table 2.7, with column (A) referring to the regression run on the whole sample, column (B) run on the whole sample less China and column (C) run on the OECD sample.

Considering first results on the whole sample (column (A)), we get that the labour tax variable enters significantly but with an unexpected positive sign. This would suggest that firms are more likely to locate where social security payments and payroll taxes are higher. However, this result is not robust. As reported in column (B), when deleting China from the sample of potential locations, the impact of non-wage labour costs turns out insignificant.[19] Social security contributions and other payroll taxes are not found to be significant FDI determinants on the large sample of country choiceset. This is no more the case when only OECD countries are considered (column (C)). In this case, the estimated impact of the variable is significant and negative, as expected. This is in line with previous evidence of the OECD group effect. For French firms deciding to create an affiliate in the OECD, high social taxes are viewed as an impediment to FDI.

Overall results reported throughout Section 2.4 show evidence that labour market institutions do matter in affecting French firms FDI decisions. As previously mentioned, the presence of regional dummies in the regressions makes us confident that these results are robust to the inclusion of governance as an alternative institutional determinant of FDI choices. We investigate this point further by also including the WBES governance indicator in the regression. Results are reported in Table C.3, Appendix C.2. It is worth remembering that in this case, the country coverage is limited. However, the results further confirm the robustness of our results, as the coefficients associated with the various labour market institutions remain significant and of expected sign. We also evaluate their robustness when controlling for tax policy in the OECD sample. Results are reported in Table **??**, Appendix C.2. The role

[19] Further investigation on our database indicates that China is an important recipient of FDI flows (around 6%), while also amongst the countries with the highest labor tax rate. Since this is likely to bias the results, we exclude China from the country choiceset. Results are reported in Table 2.7, column (B).

TAB. 2.7 – Mandatory contributions

	Dep. Var. : Chosen Country		
Model :	(A)	(B)	(C)
ln Real Market Potential	0.456^a	0.444^a	0.486^a
	(0.021)	(0.021)	(0.026)
ln distance	-0.149^a	-0.154^a	
	(0.056)	(0.055)	
ln GDP per capita	-0.325^a	-0.247^a	-0.599^a
	(0.029)	(0.031)	(0.077)
ln (# of same ind. firms -1)	0.318^a	0.256^a	0.132^a
	(0.048)	(0.049)	(0.051)
ln (supply access -1)	0.131^a	0.147^a	0.189^a
	(0.011)	(0.011)	(0.015)
ln(1+labour tax), DB	0.986^a	0.211	-0.696^a
	(0.190)	(0.188)	(0.230)
Observations	299,136	278,475	74,925
Countries	76	75	27
Sample	All	All	OECD
FDI occurences	3,936	3,713	2,775
Pseudo-R^2	0.134	0.136	0.101

Note : Observation clustered by firms. Robust standard errors in parentheses with ***, ** and * respectively denoting significance at the 1%, 5% and 10% levels.

of labour market institutions on FDI decisions is robust to the introduction of the average effective corporate tax rate. In addition, in most specifications the coefficient associated with the tax variable is significantly positive, in line with theoretical predictions and the large bulk of empirical papers covering OECD countries (Devereux (2007)).

Our results also indicate that French firms are more responsive to labour market features within the sub-sample of OECD countries. This result holds for the various dimensions of the labour market regulations considered here. The OECD group effect could arise from various reasons. Firms may be better informed on the labour market functioning of OECD countries. This could also reveal some hierarchy of FDI determinants, which varies with potential host countries. Labour market institutions may have more impact when the country choiceset is limited to countries that are closer to France with regards to other FDI determinants, like market potential. When FDI decisions are contemplated over the large sample, including developing countries, labour markets regulations may be of lesser importance or correlated

with other omitted determinants of location decisions.[20] It may also be the case that location choices obey a two-stage process, according to which French firms first determine the region where to locate (OECD or non-OECD area), before deciding the precise country where to settle in. Country-specific labour market features are likely to enter in the second step of such a nested decision tree. Labour market institutions would therefore be weakly significant when considering the whole sample of countries, while having a much more significant role conditional on the chosen region.[21]

2.5 Conclusion

In this chapter, we evaluate the empirical effects of labour market institutions on FDI decisions. To this aim, we use a dataset describing French firms expansion strategies abroad over the 1992-2002 period. We study the effects of various dimensions of labour market regulation onto FDI decisions. Our database includes information regarding employment protection, trade unions' bargaining power, the centralisation degree of wage bargaining, the generosity of unemployment benefits and minimum wage legislation, for each country eligible as recipient for French foreign investments.

Following Head & Mayer (2004), we estimate the determinants of French firms FDI decisions using 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, combining elements of the new economic geography and the labour market literatures.

[20] This led us to add country fixed effects in the regressions to control for country-specific unobserved determinants of FDI inflows. This amounts to identifing the coefficients of the logit estimation using the time variability of explanatory variables only. However, this makes most coefficients to lose their significativeness. This is not a surprising result given the low volatility of national laws regulating the labor market, as mentioned in the introduction.

[21] One might investigate this interpretation further by running a nested logit, with the first stage consisting in deciding the area to locate, OECD or non-OECD. However, specifying a relevant nested-logit structure is not necessarily an easy task in our case. According to Barba-Navaretti & Venables (2004), investments in OECD and less-developed countries are intrinsically different : North-North investments are market-seeking horizontal investments, while North-South investments are cost-seeking vertical investments. The choice between these types of FDI is the most likely intrinsic to the firm and cannot be estimated with a logit structure where identification is made firm by firm.

Two main results emerge. First, we show that labour market institutions do matter in French firms FDI decisions. Labour market rigidity exerts a negative impact on countries' attractiveness for (French) foreign investors. This conclusion emerges when studying the role of a synthetic index of labour market regulations. It is confirmed and deepened by the use of more disaggregated indicators. Stringent employment protection laws, high labour tax rates, generous unemployment benefits, strong minimum wage constraints, powerful trade unions and a more centralised wage-bargaining process significantly reduce the propensity of firms to locate in the country. These findings can be rationalised using predictions of a partial-equilibrium model of firms' location decision. All these elements tend to increase marginal costs, thus reducing expected profits and the probability of investment. We show that these results are robust to other institutional determinants of FDI choices, such as corporate tax policy or the quality of governance.

Second, our results indicate that French firms are more responsive to labour market features conditional on the decision to invest within the sub-sample of OECD countries. This result holds for the various dimensions of labour market regulations considered. In our view, this "OECD group effect" may be interpreted as the outcome of an heterogeneity of FDI motives correlated with the spatial distribution of investments. In a heterogeneous sample, labour market institutions –even though they matter– are dominated by other variables influencing FDI choices (such as market potential or supply access). However, once the firm has decided to locate in an OECD country, labour market regulation enters with a stronger weight in the location choice function.

These results deliver an interesting message with regard to the design of labour market policy. They notably suggest that engaging labour market reforms in order to convince firms to invest in one specific OECD country rather than in emerging markets is misleading. However, the social competition strategy could be successful in attracting foreign investors that seek to locate in OECD countries. As a corollary, maintaining ambitious welfare-state institutions, notably in Europe, calls for increased coordination between countries.

A The model : elements of derivation

The model underlying Equations (2.3) and (2.4) in Section 2.2 is based on Belot and Van Ours' (2004) version of the right-to-manage model of wage bargaining, that we adapt in a framework with multiple production factors. In many aspects, our modelling of the wage bargaining process is similar to their's. We consequently present here the main building blocks and equations of the model, stressing mostly the differences with Belot and Van Ours's (2004) model. The interested reader can refer to their paper (notably the appendix) for technical details of the program.

In the right-to-manage model, wages are set by a bargaining between firms and trade unions, and employment is determined by firms alone (according to their labour demand) after wages are set. The program is solved by backward induction. In a first step, we determine (for given wages) optimal inputs demand functions and the marginal cost expression. We then solve the Nash-bargaining process that determines the negotiated wage value.

A.1 The firm's program

The production function is assumed to be Cobb-Douglas with constant returns to scale :

$$y_i = A_i k_i^{\gamma} l_i^{\chi} h_i^{\alpha}, \quad \alpha + \gamma + \chi = 1 \tag{A.1}$$

with y_i production of a firm settled in country i, l_i and h_i unskilled and skilled labour, and k_i the third production factor. Equation (2.3) is derived from a standard program of total cost :

$$\min_{h_i, k_i, l_i} TC_i = (1 + \tau_i + \rho f_i) \left[\underline{w}_i l_i + w_i^q h_i\right] + z_i k_i$$

under technological constraint (Equation (A.1)). Where τ denotes social contributions, f is the firing costs occuring in the case of job destruction with probability ρ, $\underline{w}$ is the minimum wage, w^q is the negociated wage (payment to qualified workers) and z is the cost of the third production factor. Solving this program yields the optimal marginal cost MC_i (Equation

(2.3)), and the optimal demand functions for each production factor :

$$k_i = \frac{\gamma}{z_i} MC_i y_i \tag{A.2}$$

$$l_i = \frac{\chi}{\underline{w}_i(1+\tau_i+\rho f_i)} MC_i y_i \tag{A.3}$$

$$h_i = \frac{\alpha}{w_i^q(1+\tau_i+\rho f_i)} MC_i y_i \tag{A.4}$$

Firms assumed to produc differentiated varieties, are distributed over the continuum $[0;1]$ (within a country), and to sell these varieties on a monopolistic competition market. We denote by p_i the price of one variety (in country i), relative the entire bundle of varieties available to consumers. The second step of the firm's program is to determine the optimal value of the pair (y_i, p_i), so as to maximise its profit given the demand function it faces :

$$y_i \geq p_i^{-\sigma} \overline{C}_i \tag{A.5}$$

Here, we assume standard CES preferences. $\sigma > 1$ is the elasticity of substitution across varieties, and $\overline{C}_i$ is an exogenous constant term. Solving this program yields the optimal price :

$$p_i = \frac{\sigma}{\sigma - 1} MC_i \tag{A.6}$$

The firm in monopolistic competition sets its sale price by applying a constant mark-up rate over the marginal cost. Combining Equations (A.4) and (A.6) yields the optimal skilled labour demand function :

$$h_i = \left[\frac{(1-\mu)\delta_i^{\frac{\sigma-1}{\sigma}} \overline{C}_i^{\frac{1}{\sigma}}}{w_i^q(1+\tau_i+\rho f_i)} \right]^{\frac{1}{\mu}} \tag{A.7}$$

with $\delta_i \equiv A_i k_i^{\gamma} l_i^{\chi}$ and $\mu \equiv 1 - \alpha(1 - \frac{1}{\sigma})$.

A.2 The wage bargaining process

We solve the Nash-bargaining process under the assumption of a fully centralised process. Unlike Belot & Van Ours (2004), we explicitly model three production factors, notably skilled and unskilled labour. This drives us to make further assumptions with regard to the wage bargaining set-up. Only the skilled-labour wage is subject to negotiations, in a completely

segmented labour market. As a result, the representative trade union only considers the well-being of skilled workers. The total size of skilled workers is normalised to 1.

The union's rent Following Belot & Van Ours (2004), the rent obtained by the union representative of skilled workers (in country i) is determined by the difference between utilities of skilled workers in case of agreement, and in case of failure. In case of failure of the bargaining process, nobody is hired. All skilled workers receive the unemployment benefit b_i. The union's rent (denoted UR_i) can be expressed as :

$$UR_i = H_i \left[w_i^q (1 + \rho f_i) - b_i \right] \tag{A.8}$$

where H_i represents the share of skilled workers that is employed.[22] If the job is destroyed (with the probability ρ), workers perceive firing costs in addition to wage ($w_i^q f_i$).

The firm's rent Following the same reasoning, the firm's rent is given by the difference in profits in case of agreement and of failure. If no agreement is reached, no skilled worker is hired, hence no production occurs under the Inada conditions of the production function. In case of agreement, the firm's gain is given by its profit expression :

$$\pi_i = p_i A_i k_i^{\gamma} l_i^{\chi} h_i^{\alpha} - z_i k_i - (1 + \tau_i + \rho f_i) \left[\underline{w}_i l_i + w_i^q h_i \right] \tag{A.9}$$

As shown by Equation (A.9), the amounts of unskilled labour l_i and of the third factor k_i affect the expression of the rent, hence potentially the Nash-bargaining process. We discard this dimension of the problem, by simply assuming that the players take the amounts of l_i and k_i as given, and exogenous to the negotiation process. Say otherwise, firms do not take into account the degree of substitutability between skilled labour and the two other factors when bargaining upon the skilled wage. This is obviously a strong assumption, that we nevertheless retain as it substantially simplifies the analytical solving of the problem. Given symmetry across firms, the firms' rent can thus be expressed as :

[22] Since firms are assumed to be symmetric and distributed over $[0; 1]$, it comes that $H_i = h_i$, with h_i the firm's optimal labor demand (Equation (A.7)).

$$FR_i = p_i \delta_i H_i^{\alpha} - w_i^q (1 + \tau_i + \rho f_i) H_i \tag{A.10}$$

Sharing the surplus As in Belot & Van Ours (2004), the Nash-bargaining criterion that is solved in the process is given by :

$$\max_{w_i^q} [UR_i]_i^{\beta} [FR_i]^{1-\beta}$$

where $0 < \beta < 1$ is the relative bargaining power of the union (in country i). The first-order condition is given by :

$$\beta \frac{\partial UR_i}{\partial w_i^q} \frac{w_i^q}{UR_i} + (1 - \beta) \frac{\partial FR_i}{\partial w_i^q} \frac{w_i^q}{FR_i} = 0 \tag{A.11}$$

Consider the first term of Equation (A.11). Relying on Equations (A.7) and (A.8), it can be expressed as :

$$\beta \frac{\partial UR_i}{\partial w_i^q} \frac{w_i^q}{UR_i} = -\frac{\beta}{\mu} + \beta \frac{w_i^q (1 + \rho f_i)}{w^q (1 + \rho f_i) - b_i} \tag{A.12}$$

Consider now the second term of Equation (A.11). Making use of Equations (A.4) and (A.6), Equation (A.10) can be expressed as :

$$FR_i = \frac{\mu}{\mu - 1} w_i^q H_i (1 + \tau_i + \rho f_i)$$

The second term of Equation (A.11) can then be expressed as :

$$(1 - \beta) \frac{\partial FR_i}{\partial w_i^q} \frac{w_i^q}{FR_i} = -(1 - \beta) \frac{1 - \mu}{\mu} \tag{A.13}$$

Combining Equations (A.12) and (A.13) with Equation (A.11) yields the value of the negotiated skilled-labour wage in Equation (2.4).

B Data appendix : definitions and sources

B.1 Labour Market Institutions

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.

The **Difficulty of firing index** takes values between 0 and 100, with 100 indicating more rigid regulation. Its construction accounts for 8 components of firing practices : *i)* whether redundancy is disallowed as a basis for terminating work ; *ii)* whether the employer needs to notify a third party (such as a government agency) to terminate one redundant worker ; *iii)* whether the employer needs to notify a third party to terminate a group of more than 20 redundant workers ; *iv)* whether it needs approval from a third party to terminate one redundant worker ; *v)* whether the employer needs approval from to terminate a group of more than 20 redundant workers ; *vi)* whether the law requires the employer to consider retraining options before redundancy termination ; *vii)* whether priority rules apply for redundancies ; and *viii)* whether rules apply for reemployment. Data are 2005 values and cover 73 to 76 countries of our whole set of 76 countries (see Table B.1).

The **Non wage labour costs** indicator is expressed in percentage of the workers' salary. It measures all social security payments (including retirement fund ; sickness, maternity and health insurance ; workplace injury ; family allowance ; and other obligatory contributions) and payroll taxes associated with hiring an employee in fiscal 2006. All 76 countries are covered.

From the Fraser Institute

Data coming from the Fraser Institute are available on the website `http ://www.freetheworld.com`. We use the 2005 edition of the *Economic Freedom of the World* Annual report. Original data take values over the range $[0, 10]$ but have been rescaled over $[0, 100]$ before introducing this variable in level in the conditional logit. This allows us to interpret coefficients as the probability change attributable to a one percentage point increase in the indicator. Definition of the LMI variables is the following :

- The **Synthetic LMI Index :** it sums up various sub-indices, that are related to different dimensions of the labour market functioning : *1)* the "minimum wage impact", *2)* the "unemployment benefits" variable, *3)* the "Hiring and firing practices" index, *3)* the "Centralisation" index, and *4)* an indicator of the use of conscripts to obtain military personnel.
- **Minimum wage impact :** This component is based on two survey responses obtained from the *Global Competitiveness Report* of the World Economic Forum. The first question asks about the overall "impact of the minimum wage". The second question asks about the strength of enforcement of the minimum wage law. Countries receive higher ratings if the survey respondents indicated the minimum wage had a small impact and / or was not strongly enforced. Countries received lower ratings if the impact was deemed to be great and / or if the law was strongly enforced. Countries with no minimum wage were given a rating of 100.
- **Unemployment Benefits :** The indicator is constructed using data from the *World Competitiveness Yearbook* published by the International Institute for Management Development. It indicates whether the unemployment benefits system preserves the incentive to work, with low values meaning that the unemployment benefit system has pernicious effects.
- **Hiring and Firing Practices :** The indicator is constructed using data from the *Global Competitiveness Report* published by the World Economic Forum. It indicates whether hiring and firing practices of companies are determined by private contract, with low values meaning that firing and hiring laws are more constraining.
- **Centralisation Index :** The indicator is also constructed using data from the *Global Competitiveness Report*. It measures the share of labour force whose wages are set by centralised collective bargaining.

Note that the interpretation of the coefficients signs associated with these variables is reversed with respect to the difficulty of firing index 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 missing years. The treatment for the "Minimum wage impact" variable slightly differs, as data are not available for 1990. Preliminary treatment relying on interpolation

delivering some weird results on particular countries, we discard interpolation. Rather, we assume the 1995-value for the whole 1990-decade. Inspection of raw data comforts us in this choice, as the database reports no temporal variation between 2000 and 2003 for this variable. The country coverage is detailed in Table B.1.

From the *Institutional Profiles* database, French Ministry of Finance

Data have been taken from the CEPII's website, `www.cepii.fr/ProfilsInstitutionnelsDatabase.htm`. Variables are discrete indicators and are thus introduced in the regressions using dummy variables. The country coverage is detailed in Table B.1.

- The **labour Contract Protection** (LCP) takes 11 discrete values between 1 and 4, 1 being the degree of strongest protection. As we use dummy variables to account for this indicator in the regressions, it is (somewhat arbitrarily) rescaled into three levels, the low level of labour contract protection corresponding to values higher than three, the medium level is values of LCP between 2 and 3 and the high level corresponds to LCP values lower than 2.
- The **Bargaining Level Index** for non-managerial staff is equal to 1 if negotiations take place at the national level, 2 at the branch-level, 3 at the firm-level, and 4 individually.

From OECD sources

We collect data on various LMI for OECD countries, over the period 1992-2001. The coverage varies between 20 and 27 countries, depending on the LMI variable considered ; it is detailed in Table B.1. We focus on the following set of labour Market Institutions variables :

- **Employment Protection Laws :** We consider the EPL indicator provided by the OECD, for all workers. Data are available on `http ://stats.oecd.org/`. The original index takes values in the range [0 ;5], increasing with strictness of employment protection. We rescale it over [0 ;100] for its introduction in level in the conditional logit estimation to be interpretable in terms of a semi-elasticity. Data are given for 1990, 1998 and 2003. They are interpolated over the period 1992-2002 (own calculations).

- **Union Density :** Percentage of union membership in employment, computed as the ratio of the number of unions members over 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.
- **Union Coverage :** Union coverage refers to the number of workers covered by collective agreements normalised on employment. Data are annual values over the period 1960-2000. They are taken from the database provided by Nickell (2006). We use the series denoted "uc-oecd" in Nickell's database. We conserve the 2000-value for 2001 and 2002.
- **Centralisation Degree of Bargaining :** This is an index of bargaining centralisation taken from OECD (2004). It ranges between 1 and 5 and is increasing in the degree of centralisation : 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 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 and 2002.

– **Benefit Replacement Ratio :** We consider the gross replacement rates provided by the OECD's Social and Welfare Statistics. 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.

– **Minimum Wage Legislation :** The ratio of minimum wage to median wage is taken from the OECD labour Force Statistics database. Precisely, it corresponds to the minimum relative to median wages for full-time workers. It is available on a yearly frequency for 19 OECD countries. [23]

We complete information using data from ILO Bureau of Statistics, labourSTA. This database contains legal and negotiated minimum wages in national currency and international US$ in 2003. This information is used to reconstitute series of minimum wages for countries in which minimum wages are negotiated at the sector level, that are not included in OECD data (precisely, Switzerland, Germany, Finland and Italy). For these 4 countries, we build the series of minimum-to-median wage ratio as follows. First, 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, calculated on consumption-price indices obtained from national statistic institutes. Second, we calculate the ratio of minimum to median wages by using OECD Earnings data on gross median wages.

[23] Available on the period 1980-2000 for Australia, Belgium, Canada, Czech Republic (1991-2000), Spain, France, United Kingdom (1999-2000), Greece, Hungary (1991-2000), Ireland (2000), Japan, Korea (1988-2000), Luxembourg, Mexico, the Netherlands, Poland (1991-2000), Portugal, Turkey, the United States. Before 1999, the United Kingdom had no legal minimum wage and the ratio of minimum on median wages is set to zero. The same is true for Ireland before 2000 and Korea before 1988.

Tab. B.1: Country coverage for LMI indicators

Country	Data Source								
	DB	EF	IP	OECD					
				EPL	Union density	Union cov.	Centr. Coord.	Min. wage	Unempl. ben. ratio
United Arab Emirates	Yes								
Argentina	Yes	Yes	Yes						
Austria	Yes	Yes		Yes	Yes	Yes	Yes		Yes
Australia	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Belgium	Yes	Yes			Yes	Yes	Yes	Yes	Yes
Burkina Faso	Yes		Yes						
Bulgaria	Yes	Yes	Yes						
Bolivia			Yes						
Brazil	Yes	Yes	Yes						
Belarus	Yes								
Canada	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Central African Republic									
Switzerland	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Ivory Coast	Yes		Yes						
Chile	Yes	Yes	Yes						
Cameroon	Yes	Yes	Yes						
China	Yes	Yes	Yes						
Colombia	Yes	Yes	Yes						
Costa Rica	Yes	Yes							
Czech Republic	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Germany	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Denmark	Yes	Yes		Yes	Yes	Yes	Yes		Yes
Algeria	Yes	Yes	Yes						
Estonia	Yes	Yes	Yes						
Egypt	Yes	Yes	Yes						
Spain	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Finland	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Gabon			Yes						
United-Kingdom	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ghana	Yes	Yes	Yes						
Greece	Yes	Yes	Yes	Yes	Yes			Yes	
Croatia	Yes	Yes							
Hungary	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Indonesia	Yes	Yes	Yes						
Ireland	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Israel	Yes	Yes	Yes						

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Tab. B.1: Country coverage, continued

Country	Data Source								
	DB	EF	IP	OECD					
				EPL	Union density	Union cov.	Centr. Coord.	Min. wage	Unempl. ben. ratio
India	Yes	Yes	Yes						
Italy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Japan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Korea (Rep. of)	Yes	Yes	Yes	Yes	Yes			Yes	
Lebanon	Yes		Yes						
Lithuania	Yes	Yes	Yes						
Latvia	Yes	Yes							
Morocco	Yes	Yes	Yes						
Madagascar	Yes	Yes	Yes						
Mauritius	Yes		Yes						
Mexico	Yes	Yes	Yes	Yes				Yes	
Malaysia	Yes	Yes	Yes						
Nigeria	Yes	Yes	Yes						
Netherlands	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Norway	Yes	Yes	Yes	Yes	Yes	Yes			Yes
New Zealand	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Panama	Yes	Yes							
Peru	Yes	Yes	Yes						
Philippines	Yes	Yes	Yes						
Pakistan	Yes	Yes	Yes						
Poland	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Portugal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Romania	Yes	Yes	Yes						
Russian Federation	Yes	Yes	Yes						
Saudi Arabia	Yes		Yes						
Sweden	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
Singapore	Yes	Yes	Yes						
Slovenia	Yes	Yes							
Slovakia	Yes	Yes		Yes	Yes		Yes	Yes	
Senegal	Yes	Yes	Yes						
Chad	Yes		Yes						
Thailand	Yes	Yes	Yes						
Tunisia	Yes	Yes	Yes						
Turkey	Yes	Yes	Yes	Yes	Yes				
Ukraine	Yes	Yes	Yes						
United-States	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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Tab. B.1: Country coverage, continued

Country	Data Source								
	DB	EF	IP	OECD					
				EPL	Union density	Union cov.	Centr. Coord.	Min. wage	Unempl. ben. ratio
Uruguay	Yes	Yes							
Venezuela	Yes	Yes	Yes						
Vietnam	Yes		Yes						
South Africa	Yes	Yes	Yes						
Total	73	64	59	27	26	18	21	23	20

B.2 Other explanatory variables

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).
- **The GDP per capita** is obtained by dividing current GDP series (converted at nominal exchange rate in US Dollars) by the population level of the country, based on the "*World Developments Indicators*", World Bank.
- **Distance** from France ("ln distance") is built using the CEPII "*Distance*" database.
- **The supply access** variable is built as in Mayer *et al.* (2007) using data from the French *Input/Output Tables* and the *Enquête Annuelle d'Entreprises* for employment data.
- **The average effective tax rate** series are taken from Devereux & Griffith (2002), that provide their data on the IFS website (`www.ifs.org.uk/ publications.php ?publication_id=3210`). Series are yearly values, available over the period 1979-2005. We take the log of 1 minus the tax rate in the regressions ("ln(1-tax rate), DG"). We get data for the 18 following OECD countries : Austria, Australia, Belgium, Canada, Finland, Germany, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United-Kingdom, United-States.

– **Governance indicators** are constructed using two sources.

- We use the governance indicators defined and measured by Kaufmann et al. (2005). Data are available through the World Bank web site `http ://www.govindicators.org`. The indicators measure six dimensions of governance : (1) Voice and Accountability measures political, civil and human rights ; (2) Political Instability and Violence measures the likelihood of violent threats to, or changes in, government, including terrorism ; (3) Government Effectiveness measures the competence of the bureaucracy and the quality of public service delivery ; (4) Regulatory Burden measures the incidence of market-unfriendly policies ; (5) Rule of Law measures the quality of contract enforcement, the police and the courts, as well as the likelihood of crime and violence ; (6) Control of Corruption measures the exercise of public power for private gain, including both petty and grand corruption as well as state capture.
  Data are available for the years 1996, 1998, 2000 and 2002. All countries in the sample are covered. For the years 1992-1995, we use the same value than in 1996. For the year 1997, 1999 and 2001, we take the average of the two yearly adjacent values, as in Moskalev (2007). All variables are transformed so that they take values between 0 and 100. Similarly as Moskalev (2007), the average indicator is built as a simple arithmetic mean of the 6 dimensions of governance. The larger the variable, the better the quality of governance.
- We also use the governance indicators provided by the World Business Environment Survey. The survey is administrated by the World Bank to firms in 80 countries, in 2000. From this comprehensive data survey, we collect data on governance. Data is available on the following web site `http ://info.worldbank.org/governance/wbes/`. We retain the same variables as Daude & Stein (2007) to capture the quality of governance, that are : (1) the overall quality of justice ; (2) the overall quality of government ; (3) the degree of constraint exerted by corruption ; (4) the predictability of changes in regulation ; (5) the predictability of changes in economic activity. Each variable is rescaled to take values over $[0; 100]$. A larger value indicates a lower quality of governance. Data is 2000-values. Similarly as for the KKM indicator, we build the synthetic WBES governance variable as the arithmetic average of the 5 pre-cited

variables.

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 76 countries) :

- Africa and Middle East : Algeria, Burkina Faso, Central African Republic, Chad, Egypt, Gabon, Ghana, Israel, Ivory Coast, Cameroon, Lebanon, Madagascar, Mauritius, Morocco, Nigeria, Saudi Arabia, Senegal, South Africa, Tunisia, United Arab Emirates ;
- North America : Canada, United States ;
- Central and South America : Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Mexico, Panama, Peru, Uruguay, Venezuela ;
- Asia : China, Japan, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Singapore, Thailand, Vietnam ;
- Oceania : Australia, New Zealand ;
- Eastern Europe : Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia, Turkey, Ukraine ;
- Western Europe : Austria, Belgium, Denmark, Finland, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, United-Kingdom, Sweden, Switzerland.

The reference zone is West Europe.[24]

C Robustness checks

C.1 Multicollinearity issue

We check for potential multicollinearity problem, that may arise from the correlation between LMI variables and GDP per capita and between quality of governance and GDP per capita. To this aim, we report in Table C.2 the correlation coefficient between each LMI

[24] 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.

Tab. C.2 – Correlation with lnGDP per capita

Table Correlation			
Diff. of firing, DB	-0.3973	Bargaining Level, IP	-0.1000
ln(1+labour tax), DB	-0.040	EPL, OECD	-0.3106
Hiring & Firing Index, EF	0.0229	Union density, OECD	0.1187
Centralisation Index, EF	-0.3816	Union coverage, OECD	-0.1357
Unempl. Benefits Index, EF	-0.3971	Centr. Degree, OECD	0.2682
Min. wage Impact, EF	-0.0461	Coord. Degree, OECD	0.5446
Synthetic LMI Index, EF	-0.0829	ln Min. wage ratio, OECD	0.2427
labour Contract Protection, IP	0.2592	Ben. Repl. Ratio, OECD	0.1151
Quality of governance, KKM	0.8505	Quality of governance, WBES	0.4598

and ln GDP per capita as well as between quality of governance indicators from WBES and KKM and ln GDP per capita. The low or reasonable value obtained in most cases allows us to exclude the collinearity issue as a serious concern. One exception is the KKM indicator, which appears highly (negatively) correlated with GDP per capita. This comforts us in our choice of not including it in the estimated equation, as exposed in Section 2.4.

C.2 Robustness to governance

Table C.3 reports regression results when controlling for the quality of governance, as captured by the WBES synthetic indicator. In columns (A) and (B), we evaluate the robustness of variables capturing employment protection laws. In column (C), we do the same exercise with regards to the degree of centralisation of wage bargaining process. In columns (D) and (E), we evaluate the robustness of minimum wage policy and that of the generosity of the unemployment benefits system respectively. In column (F), the quality of governance is introduced in the regression asking for the impact of non wage labour costs.

C.3 Robustness to corporate taxation

Table C.4 and C.5 report regression results when controlling for corporate taxation policy. In columns (A) and (B), we evaluate the robustness of variables capturing employment protection laws. In column (C), we do the same exercise with regards to the trade unions'

TAB. C.3 – Robustness to governance, WBES indicator

	Dependent Variable : Chosen Country					
Model :	(A)	(B)	(C)	(D)	(E)	(F)
ln Real Market Potential	0.461^a	0.482^a	0.530^a	0.538^a	0.427^a	0.681^a
	(0.032)	(0.033)	(0.032)	(0.042)	(0.037)	(0.039)
ln distance	-0.141	-0.535^a	-0.177	-0.401^a	-0.344^a	-0.314^a
	(0.105)	(0.118)	(0.127)	(0.132)	(0.116)	(0.112)
ln (# of same ind. firms -1)	0.166^a	0.132^a	0.118^a	0.167^a	0.226^a	0.129^a
	(0.049)	(0.049)	(0.049)	(0.053)	(0.052)	(0.050)
ln (supply access -1)	0.138^a	0.111^a	0.119^a	0.153^a	0.151^a	0.061^a
	(0.016)	(0.015)	(0.015)	(0.020)	(0.019)	(0.017)
ln GDP per capita	-0.191^a	0.051	-0.012	-0.178^b	-0.011	-0.070
	(0.058)	(0.061)	(0.062)	(0.070)	(0.065)	(0.055)
Diff. of Firing Index, DB	-0.007^a					
	(0.001)					
LCP=low, IP		0.210^b				
		(0.115)				
LCP=medium, IP		0.318^a				
		(0.108)				
Bargaining level=2, IP			1.124^a			
			(0.367)			
Bargaining level=3, IP			1.412^a			
			(0.359)			
Bargaining level=4, IP			0.929^b			
			(0.375)			
Min. wage Impact, EF				0.009^a		
				(0.002)		
Unemployment benefits, EF					0.010^a	
					(0.003)	
ln(1+labor tax), DB						3.219^a
						(0.425)
Quality of governance, WBES	-0.003	-0.025^a	-0.009	-0.031^a	-0.031^a	-0.032^a
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Observations	84,805	68,904	68,904	54,723	51,019	87,336
Countries	35	29	29	30	29	36
Sample	All	All	All	All	All	All
FDI	2,423	2,376	2,376	2,256	2,273	2,426
R^2	0.155	0.143	0.145	0.130	0.105	0.162

Note : Observations clustered by firms. Robust standard errors in parentheses with ^{a}, ^{b} and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.
In column (B), the reference dummy is associated with the higher degree of labor contract protection.
In column (C), the reference dummy is associated with the most centralized degree of wage bargaining, *i.e.* equal to 1.

bargaining power (captured by union density). Column (D) focuses on the degree of centralisation of wage bargaining. Note that the reference dummy is associated with the highest degree of centralisation of wage bargaining (i.e., equal to 5). In columns (E) and (F), we evaluate the robustness of minimum wage policy to the inclusion of the average effective tax rate, that of the generosity of the unemployment benefits system in columns (G) and (H) and that of the non wage labour costs in column (I).

TAB. C.4 – Robustness, fiscal policy

	Dependent Variable : Chosen Country			
Model :	(A)	(B)	(C)	(D)
ln Real Market Potential	0.555^a	0.499^a	0.529^a	0.434^a
	(0.032)	(0.032)	(0.032)	(0.034)
ln GDP per capita	-0.937^a	-1.173^a	-0.690^a	-1.018^a
	(0.099)	(0.121)	(0.094)	(0.110)
ln (# of same ind. firms -1)	0.069	0.061	0.086^c	0.003
	(0.056)	(0.055)	(0.055)	(0.056)
ln (supply access -1)	0.179^a	0.222^a	0.188^a	0.207^a
	(0.015)	(0.016)	(0.015)	(0.022)
Diff. of Firing Index, DB	-0.006^a			
	(0.001)			
EPL, OECD		-0.012^a		
		(0.002)		
Union density (%), OECD			-0.006^a	
			(0.002)	
Centr.=1, OECD				1.607^a
				(0.310)
Centr.=2, OECD				1.009^a
				(0.318)
Centr.=3, OECD				0.871^a
				(0.315)
Centr.=4, OECD				0.557^c
				(0.322)
ln(1-eff.tax rate), DG	1.317^a	0.467	1.476^a	0.460
	(0.313)	(0.358)	(0.305)	(0.341)
Observations	41,256	41,256	41,256	35,888
Countries	18	18	18	17
Sample	OECD	OECD	OECD	OECD
FDI	2,292	2,292	2,292	2,243
R2	0.107	0.108	0.107	0.101

Note : Observations clustered by firms. Robust standard errors in parentheses with ^{a}, ^{b} and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.
In column (D), the reference dummy is associated with the highest degree of centralization, *i ;e.* equal to 5.

TAB. C.5 – Robustness, fiscal policy Cont'd

	Dependent Variable : Chosen Country				
Model :	(E)	(F)	(G)	(H)	(I)
ln Real Market Potential	0.582^a	0.564^a	0.539^a	0.601^a	0.552^a
	(0.033)	(0.036)	(0.032)	(0.034)	(0.032)
ln GDP per capita	-0.853^a	-0.767^a	-0.752^a	-0.767^a	-0.898^a
	(0.097)	(0.113)	(0.091)	(0.096)	(0.098)
ln (# of same ind. firms -1)	0.075	0.125^b	0.083^c	0.028	0.080
	(0.057)	(0.059)	(0.056)	(0.054)	(0.055)
ln (supply access -1)	0.209^a	0.191^a	0.222^a	0.221^a	0.229^a
	(0.015)	(0.016)	(0.016)	(0.015)	(0.018)
Min. wage Impact, EF	0.007^a				
	(0.002)				
ln Min. W. Ratio, OECD		-0.324^a			
		(0.122)			
Unempl. benefits, EF			0.013^a		
			(0.002)		
Unempl. Ben. ratio, OECD				-0.020^a	
				(0.003)	
ln(1+labor tax), DB					-1.124^a
					(0.273)
ln(1-eff.tax rate), DG	1.194^a	1.145^a	1.026^a	2.461^a	1.655^a
	(0.341)	(0.384)	(0.323)	(0.315)	(0.298)
Observations	38,216	32,780	40,693	41,256	41,256
Countries	15	18	18	18	18
Sample	OECD	OECD	OECD	OECD	OECD
FDI	2,248	2,186	2,287	2,292	2,292
R2	0.106	0.100	0.107	0.110	0.107

Note : Observations clustered by firms. Robust standard errors in parentheses with ^{a}, ^{b} and ^{c} respectively denoting significance at the 1%, 5% and 10% levels.

Bibliographie

[1] Amiti, M. and Javorcik, B. S. (2008), 'Trade Costs and Location of Foreign Firms in China', Journal of Development Economics 85(1-2), 129–149.

[2] Baldwin, R., Forslid, R., Martin, P., Ottaviano, G. and Robert-Nicoud, F. (2005), The Footloose Capital Model, in 'Economic Geography and Public Choice', Princeton University Press, chapter 3.

[3] Belot, M. and Van Ours, J. (2004), 'Does the recent sucess of some OECD countries in lowering their unemployment rates lie in the clever design of their labour market reforms ?', Oxford Economic Papers 56(4), 621–642.

[4] Betts, J. and Odgers, C. (1997), 'Do Unions Reduce Investment ? evidence from Canada', Industrial and Labor Relations Review 51(1), 18–36.

[5] Bénassy-Quéré, A., Coupet, M. and Mayer, T. (2007), 'Institutional Determinants of Foreign Direct Investment', The World Economy 30(5), 764–782. 39 CEPII, Working Paper No 2008-12

[6] Cahuc, P. and Zylberberg, A. (2004), Labor Economics, MIT Press. Calmfors, L. (2001), 'Wages and Wage-Bargaining Institutions in the EMU – A Survey of the Issues', Empirica 28.

[7] Calmfors, L. and Driffill, J. (1988), 'Bargaining Structure, Corporatisme and Macroeconomic Performance', Economic Policy 6, 13–61. Clark, K. B. (1984), 'Unionization and Firm Performance : The Impact on Profits, Growth and Productivity', American Economic Review 74(5), 893–919.

[8] Daude, C. and Stein, E. (2007), 'The Quality Of Institutions And Foreign Direct Investment', Economics and Politics 19(3), 317–3449.

[9] Devereux, M. (2007), The Impact of Taxation on the Location of Capital, Firms and Profit : A Survey of Empirical Evidence, Working Paper 0702, Oxford University Centre for Business Taxation.

[10] Devereux, M., Griffith, R. and Klemm, A. (2002), 'Corporate Income Tax Reforms and International Tax Competition', Economic Policy 35, 451–495. Dewit, G.,

[11] Holger, G. and Montagna, C. (2003), Should I stay or should I go ? A note on employment protection, domestic anchorage, and FDI, Discussion paper 248, Institute for the Study of Labor (IZA).

[12] Dickens, R., Machin, S. and Manning, A. (1999), 'The Effects of Minimum Wages on Employment : Theory and Evidence from Britain', Journal of Labor Economics 17(1), 1–22.

[13] Dolado, J., Felgueroso, F. and Jimeno, J. (2000), The Role of the Minimum Wage in the Welfare State : An Appraisal, CEPR Discussion Paper 2452, CEPR.

[14] Driffill, J. (2006), 'The Centralization of Wage Bargaining Revisited : What Have We Learned ?', Journal of Common Market Studies 44(4), 317–372.

[15] Golub, S., Hajkova, D., Mirza, D., Nicoletti, G. and Yoo, K. (2003), 'The Influence of Policies on Trade and Foreign Direct Investment', OECD Economic Studies (36).

[16] Görg, H. (2005), 'Fancy a Stay at the "Hotel California" ? the Role of Easy Entry and Exit for FDI', Kyklos 58(4), 519–535.

[17] Gwartney, J. and Lawson, R. (2006), Economic Freedom of the World : 2006 Annual Report, Vancouver : The Fraser Institute. 40 Social competition and firms' location choices

[18] Haaland, J. and Wooton, I. (2007), 'Domestic Labour Markets and Foreign Direct Investment', Review of International Economics 15(3), 462–480.

[19] Haaland, J.,Wooton, I. and Faggio, G. (2002), 'Multinational Firms : Easy Come, Easy Go ?', FinanzArchiv : Public Finance Analysis 59(1), 3–.

[20] Head, K. and Mayer, T. (2004a), The Empirics of Agglomeration and Trade, in 'Handbook of Regional and Urban Economics Vol.', Henderson, V. and J.F. Thisse, chapter 59.

[21] Head, K. and Mayer, T. (2004b), 'Market Potential and the Location of Japanese Investment in the European Union', The Review of Economics and Statistics 86, 959–972.

[22] Head, K. and Mayer, T. (2006), 'Regional wage and employment responses to market potential in the EU', Regional Science and Urban Economics 36(5), 573–594.

[23] Javorcik, B. S. and Spatareanu, M. (2005), 'Do Foreign Investors Care About Labour Market Regulations ?', Review of World Economics (Weltwirtschaftliches Archiv) 127(3), 375–403.

[24] Javorcik, B. and Wei, S. (2000), Corruption and composition of foreign direct investment : firm-level evidence, Working Paper 7969, NBER.

[25] Kaufmann, D., Kraay, A. and Mastruzzi, M. (2005), Governance matters IV : governance indicators for 1996-2004, Policy Research Working Paper 3630, World Bank.

[26] Krugman, P. (1991), 'Increasing Returns and Economic Geography', Journal of Political Economy 99(3), 483–99.

[27] Krugman, P. (1992), A Dynamic Spatial Model, Working Paper 4219, NBER. Leahy, D. and Montagna, C. (2000), 'Unionisation and Foreign Direct Investment : Challenging Conventional Wisdom ?', Economic Journal 110(462), C80–92.

[28] Markusen, J. and Maskus, S. (2002), 'Discriminating among Alternative Theories of the Multinational Enterprise', Review of International Economics 10(4), 694–707.

[29] Mayer, T., Méjean, I. and Nefussi, B. (2007), The location of domestic and foreign production affiliates by French multinational firms, CEPII Working Papers 2007- 07, CEPII. 41 CEPII, Working Paper No 2008-12

[30] Méjean, I. and Patureau, L. (2007), Minimum Wages and Location Decisions, CEPII Discussion Papers 2007-16, CEPII.

[31] Moskalev, S. (2007), Governance and Foreign Direct Investment, Mimeo, Adelphi University, School of Business.

[32] Munch, J. (2003), 'The Location of Firms in Unionized Countries', Scandinavian Journal of Economics 105(1), 49–72.

[33] Navaretti, G. B. and Venables, A. (2004), Multinational Firms in the World Economy, Princeton University Press.

[34] Nickell, W. (2006), The CEP - OECD Institutions Dataset (1960-2004), Discussion Paper 0759, Centre for Economic Performance.

[35] OECD (2004), Employment Outlook, Technical report, OECD, Paris.

[36] Picard, P. M. and Toulemonde, E. (2004), 'The Impact of Labor Markets on Emergence and Persistence of Regional Asymmetries', Journal of Urban Economics 55(3), 458–477.

[37] Redding, A. and Venables, S. (2004), 'Economic Geography and International Inequality', Journal of International Economics 62(1), 53–62.

[38] Train, K. (2003), Discrete Choice Methods with Simulation, Cambridge University Press.

[39] Wei, S.-J. (2000), 'How Taxing is Corruption on International Investors ?', The Review of Economics and Statistics 82(1), 1–11.

Chapitre 3

"Marginal Dependent Logit" : an alternative to marginal and conditional logit for firms location studies ?

3.1 Introduction

In Chapter 2, we estimate our model through a conditional logit method. Although a common tool used in location choice studies, this method suffers from some drawbacks due to restrictive assumptions. Inspired by bio- and psychometrics quantitative analysis, this chapter proposes an alternative to marginal and conditional logits commonly used in FDI location empirical studies. While the former does not handle the dependence between the different binary alternatives, the later cannot account for individual unobserved characteristics.

With the estimation methods introduced in this chapter, we can both assume non-independence between alternatives and still benefit from the richness of individual data using subject-specific effects. We find that the different estimation methods tested lead to quite similar results but it is clear that the marginal dependent logit fits better the data than other methods. Finally, this should be a valuable tool for studies focusing on subject characteristics,

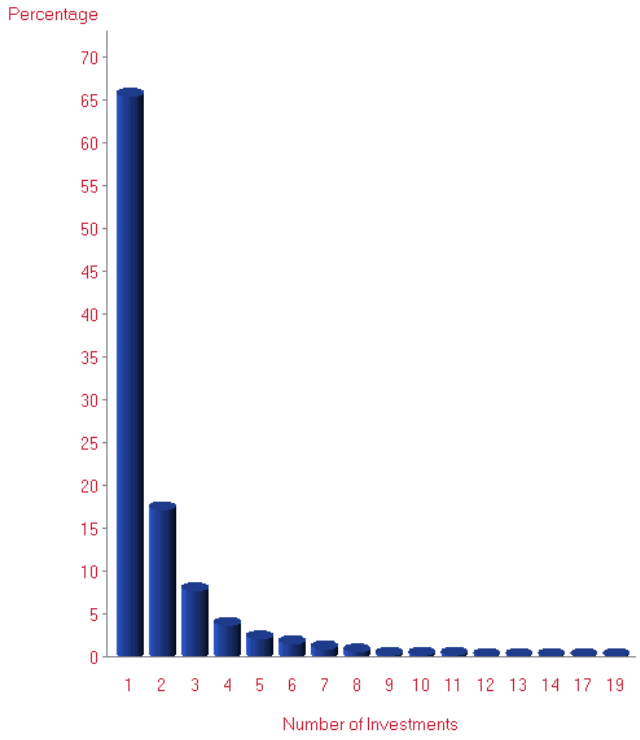
on the dependence between alternatives or on the heterogeneity between subjects.

In order to assess the determinants of the location of productive capital also known as Foreign Direct Investment (FDI thereafter), many researchers have undertaken empirical studies covering a large range of economic policies that could be involved in the choice of firms' FDI location.

Empirical studies based on aggregate data handle time series analysis, cross-section analysis or longitudinal data analysis on either stocks or flows of FDI. However aggregate data cannot dinstinguish between initial and marginal FDI. Indeed, initial FDI (the creation of a new affiliate abroad) can only be observed at the firm level.

Since the late 1990's firm level data have been made available for scientific use. This is the case in the US, Germany, Japan, Italy, France and more recently Taiwan, and for some industries in China. To date, studies based on individual data covering greenfield investments have been using methodologies that do not allow firms to invest in more than one country at the same time (see Section 3.2 for a review of the different methods used in location choice studies). However, when looking at the data, it appears that multi-location investment strategies are not negligible.

Figure 3.1 : Simultaneous Investments per Firm per Year



Source : Banque de France

Figure 3.1 shows that when considering French firms FDI between 1999 and 2003, in almost 35% of investment cases, firms invest in more than one country at the same time. By restricting data to firms that invest in only one country, or by modifying the data to observe only one location by firm, one might lose precious information concerning either the firm, the location, or both.

We can investigate further in French firms' location decision patterns. Table 3.1 shows the first 15 highest correlations between pairs of countries and the number of occurences. Interestingly, we see that the most recurrent patterns include France's direct neighbours, Spain, Italy, the UK, Germany and Belgium. This may be due to home country (or firm) characteristics. Indeed, investing in both Spain and Italy might be better explained by the fact that the two countries share a border with France than by other host countries characteristics. However, some other patterns that occur fewer times, such as Lithuania-Estonia, Slovakia-Czech repu-

blic or Sweden-Denmark are of particular interest. Those pairs of countries may indeed be better explained by production "geo-strategy" motivations than proximity to France. These three particular patterns also give a first insight on the concept of network. As explained in Chapter 1 of this thesis, the network of firms can have two advantages. First, it allows firms to get closer to their suppliers and eases vertical production process by reducing transport costs. Second, as more firms from the same home country (or industry) locate close to one another, fixed establishment costs tend to decrease due to better market knowledge.

Here, the fixed cost explanation may also hold for some pairs of countries. The cost of market research and establishment in order to move to a new location is the threshold above which the firm may prefer to reach the market through trade. When two neighbour countries are similar in terms of administrative procedures, language and distance, economies of scale may appear. The fixed cost associated to the moving to both countries simultaneously being lower than twice the fixed cost in one country, the firm has an advantage in openning two subsidiaries in two neighbour countries rather than in only one. Although, this analysis does not necessarily hold in case of vertical investment, the examples presented in Table 3.1 include Northern and Eastern Europe countries, the former being considered by the literature as potential recipients of horizontal FDI, and the later recipients of vertical FDI.

In light of these stylized facts we can see that simultaneous multiple location choices is no marginal phenomenon. Here we propose a methodology derived from bio- and psychometrics, Item Response Method (IRM thereafter) that allows firms to locate in more than one country. Using this "Marginal dependent logit" we are able to use observed as well as unobserved firm- and country characteristics as determinants of location choices. To date, the methods used in such studies could not rely on individual unobserved characteristics.

When comparing different estimation methods, we show that using marginal dependent logit leads to results close to those obtained with the conditional and the marginal logit concerning the effect of country specific variables. However, this method fits much better the data. Besides, it would better suit studies focusing on the role of subject-specific characteristics.

TAB. 3.1 – Partial correlations between locations 1999-2003

Country 1	Country 2	Correlation	Nb obs of pair	Nd obs country 1	Nb obs country 2
Spain	Italy	.31	157	477	417
Lithuania	Estonia	.29	1	4	3
Spain	Great Britain	.23	134	477	479
Germany	Spain	.23	133	469	477
Germany	Italy	.21	115	469	417
Germany	Great Britain	.20	123	469	479
Slovakia	Czech Republic	.20	13	42	97
Italy	Great Britain	.18	105	417	479
Hungary	Czech Republic	.18	19	99	97
Sweden	Denmark	.17	12	78	56
Spain	Portugal	.17	53	477	147
Belgium	Spain	.17	94	390	477
Belgium	Italy	.16	82	390	417
Belgium	Portugal	.14	41	390	147
Belgium	Great Britain	.14	84	390	479

Source : Banque de France, author's calculation.

The chapter is structured as follows. Section 3.2 makes a short review of the different estimation methods used in location choices studies. Section 3.3 introduces the item response methodology as an alternative to the methods currently in use. Section 3.4 presents the data used in the estimations in section 3.5, while section 3.6 concludes.

3.2 Review of estimation methods

Up to date, studies covering firms' location decisions using individual data have used different econometric methods, each of them having their advantages and drawbacks.

The most common method used in firm location studies is the *conditional* (or multinomial) *logit* (McFadden (1974)). The conditional logit is used when a subject chooses one response amongst n alternatives so that the sum of probabilities is equal to one. The conditional Logit is written as follows :

$$\Pr(Y_{pi} = y_{pi}) = \frac{\exp(V_{pi})}{\sum_j \exp(V_{pj})}, \tag{3.1}$$

where p is the subject, i is the chosen alternative and j stands for all other possible alternatives. With such a methodology, problems can arise in different cases. First, a subject eventually chooses more than one response. In that case, the sum of probabilities is greater than one. Second, estimations may be biased if the independence of irrelevent alternatives (IIA) hypothesis is violated.

Amongst the most recent studies, Mayer et al. (2007) and Delbecque et al. (2008), using a French firms database, make the hypothesis of independence of location choices when a single firm invests in more than one country by treating a firm that invests in two countries as two separate firms. The later paper accounts for possible estimation biais by clustering errors by firms. Aw & Lee (2008) focus on the role of Taiwanese firms productivity on their location choice. In their study, firms have four possible choices : staying in home country, investing in China, in the US, or in both China and the US. In this case, firms can clearly choose more than one location and the model can be dealt with using either multinomial logit or polytomous logit. However this method is only feasible when the number of alternatives is small. Indeed, if a firm can choose amongst n locations, the number of possible outcomes is $n * n$. Devereux & Griffith (1998) study the impact of taxation on German FDI across 18 countries. The authors avoid the problem of multiple locations by selecting only firms with one location choice.

Some other papers use count methods such as *Poisson estimations* where the observed variable follows a Poisson distribution. The endogenous variable is slightly different from the logit case. Indeed, the method estimates the number of subjects choosing a given response.

$$\begin{aligned} \Pr(Y_i &= y_i) = \frac{\exp(-\lambda_i)\lambda_i^{y_i}}{y_i!}, \\ E(Y_i) &= Var(Y_i) = \lambda_i, \\ \ln(\lambda_i) &= V_i \end{aligned} \tag{3.2}$$

Y_i is the number of subjects choosing response i, λ_i is the mean number of subjects choosing response i, and V_i stands for the characteristics of response i.

This method accounts for the non-normality of the dependent variable and the possible

large presence of zeros in the dataset. Wu (1999), and Azemar & Delios (2007) show that Poisson and negative binomial estimations can be used to explain firms location choice. Guimares et al. (2003) demonstrate that in the case of large set alternatives, a Poisson estimation may be more tractable than the conditional logit and be an attractive tool for location issues. However, when using a Poisson method, one is not allowed to use any information on the subject itself, which might in turn be a large drawback when one is interested not only in the alternative but also in the subject characteristics.

As the response variable is necessarily positive, models for truncated data are also used. *Tobit models* are used in Gotlieb (1995) and Ihlanfeldt & Raper (1990) to assess the determinants of new firms offices in given locations. They estimate the number of new firms with respect to locations characteristics. Again, subject-specific factors are unusable with this kind of method. Moreover, the dependent variable is treated as continuous, whereas the number of firms is eventually discrete.

Head & Mayer (2004) and Mayer et al. (2007) apply *nested logit* respectively to Japanese firm data and French Firm data. *Nested logit* is used when responses can be grouped into nests where the alternatives share common characteristics. In such cases, responses within a nest are correlated one to another. This solves the problem of the strong IIA hypothesis imposed by the conditional Logit, but still, each subject can only choose one response within nests. Moreover, it is difficult to define the determinants linked to the different levels of nesting.

The methods described above have the main disadvantage of not being able to deal with subject choosing more than one alternative, unless by tranforming the data. Nevertheless, firms strategies may often lead to the location of activities in multiple places. Büttner & Ruf (2007) and Delbecque (2007) study the impact of taxation on the location decision of respectively German and French firms. Their studies focus on the happening of marginal FDI rather than greenfield FDI ; that is the binary observed variable takes the value 1 when the firm increases FDI. They use *marginal fixed effects logit* models rather than conditional logit due to the inability of the later to account for individual unobserved characteristics. Moreover, marginal logit allows firms to choose multiple alternatives within the choiceset. The main drawback with marginal logit is that it does not account for dependence between

multiple alternatives for a given firm. The following section thus proposes an alternative methodology to marginal logit.

3.3 Proposed alternative methodology

The methods presented in the preceding section are all the field of econometrics offers to researchers in order to model multiple-choice problems. We have seen that these methods account either for dependence between two alternatives (conditional logit, nested logit) or for the actual choice of multiple alternatives (marginal logit, Poisson). To date, no method allowing for dependence between alternatives, multiple choice and unobserved subject-characteristics has been used. This might be due to the fact that studies in economics often focus on only one possible choice over n (for example, transportation modes, political affiliation, exchange rate policies...). However the case of firms location is slightly different because the subjects can choose more than one response.

In other scientific fields, such as biometrics or psychometrics, multiple choice analysis is quite common and in some cases allows for more than one response. Item Response Models (IRM) are used to estimate these types of data (De Boeck & Wilson (2004)). IRM are generally used to study subject behaviour facing particular situations called items. The problem can be of the general following form : what is subject p behaviour (or response) when facing situations (or items) i, with $i = 1, ..., n$. The response can have two alternatives or more. In the former case the response is dichotomous : *did subject p react to item i ?* In the later case, the response is polytomous : *did subject p had response 1, 2 or 3 to item i ?* In the polytomous case, subjects can choose simultaneously more than one alternative (Agresti & Liu (2001)).

In the dichotomous case, items can be treated as independent or not and dependence can be handled in different ways. In the polytomous case when multiple alternatives are chosen, the structure of the response pattern can be treated with or without dependence as well.

IRM can be adapted to our firm location problem either in a dichotomous or a polytomous case. In the first case, each country would be an item to which firms have a binary behaviour. In the second case, each firm would face one item composed of the n possible locations.There

would then exist $n*n$ possible response patterns and the model would ressemble a conditional logit in which the subject chooses one response pattern amongst $n * n$. This case is clearly unfeasible with a large number of alternatives. We will focus only on the dichotomous case as it is better suited to handle models with large numbers of alternatives.

3.3.1 The dichotomous case

The dichotomous case is the case when a subject has only two alternatives for an item. If we take as an example responses to a medical treatment, the observed variable would answer the question : "*did subject p respond to treatment i ?*". If $i = 1, 2, 3$, then it might happen that responses are not independent with one another. This might be due to personal characteristics of the subject (within-person dependence) because each subject has its own health characteristics that may influence the response to different treatments. In turn, it may be due to common characteristics of the treatments (Local Item Dependence, LD thereafter). Indeed, one treatment efficiency might be increased by the use of another treatment. Thus the subject's response depends not only on the treatment characteristics, but also on the interaction between two treatments.

Dependence between responses in bio- and psychometrics are often treated as in the former case : dependence occurs due to personal features. This case can be handled through a person random- or fixed-effect, θ_p (Takane (1999), Agresti & Liu (1999)). However, in many cases, the conditional Local Item Independence (LI thereafter) may not be verified and residual dependencies may not be accounted for by the model.

Tuerlinckx & De Boeck (2004) propose to account for LD (dependence between alternatives) by implementing a logit model with association parameters δ_{ij} accounting for dependence between items. We obtain the conditional probability for subject p to choose response i.

$$Logit(\Pr(Y_{pi} = 1 \mid \mathbf{y}_p^{(i)}) = \theta_p + V_i + \sum_{j \neq i} y_{pj}\delta_{ij} + \sum_{j,k \neq i} y_{pj}y_{pk}\delta_{ijk} + ... \sum_{j_1,...,j_{I-1} \neq i} y_{pj_1}...y_{pj_{I-1}}\delta_{ij_1...j_{I-1}} \tag{3.3}$$

where $y_{pj_1}...y_{pj_{I-1}}$ are the expression of subject p's binary responses to all other items but i. $\delta_{ij_1...j_{I-1}}$ are the bilateral and higher order dependence between items.

$\mathbf{y}_p^{(i)}$ is a vector containing all responses from subject p except the one on item i. δ_{ij} is the association parameter between items i and j. V_i are characteristics of item i.

We see in Equation 3.3 that this method accounts for both within-person dependence with θ_p and local item dependence.

A weaker form of LD can be used when assuming only bilateral dependence and third- and higher-order independence (Stout et al. (1996)) :

$$\delta_{ijk}...\delta_{ij_1...j_{I-1}} = 0 \tag{3.4}$$

The marginal dependent logit model becomes easy to implement.

We now apply this methodology to our very similar firm location problem. This method allows us to estimate the probability of choosing country i as an investment location conditionally on the probability of locating in a third country, without restraining the number of locations. Indeed, the number of locations does not necessarily equals to 1. We now rewrite the marginal logit :

$$P_{pi} = \frac{\exp(\theta_p + \beta X_i + \sum_{j \neq i} y_{pj}\delta_{ij})}{1 + \exp(\theta_p + \beta X_i + \sum_{j \neq i} y_{pj}\delta_{ij})} \tag{3.5}$$

where V_i is decomposed into an unknown coefficient β and known country-specific parameters X_i. y_{pj} are the binary responses of firm p to country j.

3.3.2 Estimated equation

Following Head & Mayer (2004), we derive the estimated equation from the new economic geography theory where the choice of location depends on the expected operational profit. The profit made by a firm depends on the one hand on the marginal cost of production, as we assume fixed costs to be equal across locations, and on the potential demand on the other hand. A reduced form of the (log of the) operational profit made by firm p in country i can be written as follows :

$$\ln \pi_{pi} = \alpha + \beta \ln MC_i + \mu \ln MKP_i + \lambda_p + \varepsilon_{pi} \tag{3.6}$$

MC_i and MKP_i are respectively the marginal cost and the market potential in country i. λ_p is a parameter including firms' specific characteristics.

The ordering of expected operational profits appears to be the most reliable information to firms in order to choose between possible locations. Written in the linear form, the probability for firm p to choose country i as a location depends on the expected profit in coutry i and the simultaneous other location choices j :

$$\begin{aligned} \Pr(FDI_{pit} &= 1) = \gamma + \eta \ln \pi_{pit} + \sum_{j \neq i} \chi_{pijt}; \\ \text{where } \chi_{pijt} &= y_{pjt} \delta_{ij} \end{aligned}$$

3.4 Data

The data used in this chapter are the same as in Chapter 1. However, the treatment is slightly different. We keep only new (or initial) FDI, being either Fusion & Acquisition or Greenfield, by 1925 French firms from 1999 to 2003 in 30 countries. The complete longitudinal dataset used accounts 288750 observations and 4623 events (or occurrence of investment). When implementing the conditional logit however, we duplicate firms that invest in more than one country into as many firms as chosen locations. Moreover, we drop observations in

which firms choose none of the 30 locations. This leaves us with 138690 observations and still 4623 occurrences of investment.

The core of the motivation here is to relax the constraint on the number of alternatives chosen by the subject. When we look at the data, in 34.5% of investment cases firms invest in more than one country. These multi-location strategies shall be taken into account.

In the next section we explain the probability of investment with respect to country-specific variables.

The market potential of country i is defined as the potential demand coming from the country and its neighbours. Indeed, when a firm invests in a given location, not only can it serve the market in which it is located but also adjacent or close countries through exports. Countries demand is approximated by the real GDP, and the market potential is calculated as follows :

$$\begin{aligned} MKP_{it} &= GDP_{it} + \sum_{j=1}^{n} \left(\frac{GDP_{jt}}{DIST_{ij}} \right), \\ \text{with} \quad j &\neq i \end{aligned} \tag{3.7}$$

$DIST_{ij}$ is the geographical distance between country i (the host country) and its (direct and indirect) neighbours j. We expect the MKP variable to have a positive impact on FDI decisions.

One of the main components of the marginal cost is probably the labour cost. As the labour cost rises, the marginal cost rises as well and the operational profit falls everything else being equal. The unit labour cost included in our estimations is expected to have a negative impact on FDI. The LAB variable is the total labour cost including salary, labour taxes, over-time hours paid and paid holidays divided by the number of hours worked. The data is taken from Eurostat.

We use the corporate statutory tax rates as the TAX variable[1]. Although effective tax rates would better suit the study, the availability of such data is quite poor. Statutory tax

[1] Statutory Tax Rate data where kindly provided by Agnès Bénassy-Quéré (CEPII).

rates are taken from different sources, such as Eurostat, KPMG, Devereux & Griffith (1998), and national sources. As high tax rates reduce after-tax profit, we expect a negative impact of the TAX variable.

The estimations also include a network variable. The network of firms can be accounted for as an attractive feature for firms opening subsidiaries. Indeed, the presence of firms in the same industry or from the same home country may reduce establishment costs due to better knowledge of administrative procedures. Besides, the presence of firms from the same industry can reduce the cost of intermediate goods. Network is then perceived as a positive externality. The NET variable is calculated as the number of French subsidiaries established in the host country divided by the country's GDP.

Whereas we used "relative" variables in Chapter 1 in order to account for dependance between alternatives, the dependance here is handelled through the econometric methodology. We are then free to use "nominal" variables.

The association parameter δ_{ij}, represents the link between responses to item i and item j. The inclusion of such a parameter should handle the dependence between alternatives. Practically, it represents unobserved characteristics that would increase the chance of been chosen as a destination country given that the firm also invests in another given country. This link can occur due to complementarity between the two locations. This link can be due to complementarities in factor endowment (for example high- and low-skilled labour countries leading to horizontal and vertical FDI), or in goods market. The other way, a link can occur due to large differences, such has product regulations. If a firm wants to serve two markets with a same product, but the two markets require different production standards, the parent firm might choose to create two subsidiaries, one in each country.

The association parameter can be either model based or calculated. The proper way to measure the dependence between two binary variables would be the log odds ratios (OR) :

$$OR(Y_{pi}, Y_{pj}) = \frac{(\Pr(Y_{pi} = 1, Y_{pj} = 1) \Pr(Y_{pi} = 0, Y_{pj} = 0))}{(\Pr(Y_{pi} = 1, Y_{pj} = 0) \Pr(Y_{pi} = 0, Y_{pj} = 1))}, \tag{3.8}$$

However conceptually simple, computation of odds ratios for 30 possible outcomes becomes unfeasible. Instead, Ip (2001) uses Pearson correlation coefficients :

$$
\begin{aligned}
Corr(Y_{pi}, Y_{pj}) &= \frac{\Pr(Y_{pi}=1, Y_{pj}=1) - \mu_{pi}\mu_{pj}}{\sqrt{\mu_{pi}(1-\mu_{pi})\mu_{pj}(1-\mu_{pj})}}; \\
\mu_{pi} &= \Pr(Y_{pi}=1); \\
\mu_{pj} &= \Pr(Y_{pj}=1)
\end{aligned}
\tag{3.9}
$$

Here we use the Pearson partial correlation coefficient between Y_i and Y_j after controlling for the effect of the subject and the time, so that the association is cleared from the subject and time effects. The covariance and other measures of dependence, such as Kendall's Tau, can also be used as the association parameter but results are very close to the ones obtained with correlation coefficients.

3.5 Estimations and results

We will successively estimate the probability of location through marginal logit, conditional logit and dependent marginal logit accounting for Local Dependence.

The estimated equation using marginal and conditional logit is :

$$
\begin{aligned}
P_{pit} &= \alpha + \beta_1 MKP_{iti} + \beta_2 LAB_{it} + \beta_3 TAX_{it} \\
&\quad + \beta_4 {TAX^2}_{it} + \beta_5 NET_{it} + \mu_r + \lambda_t + \varepsilon_{pit}
\end{aligned}
\tag{3.10}
$$

Results are shown in Table 3.2, column (A) and (D).

λ_t is a time fixed effect. We use a regional fixed-effect μ_r instead of a country fixed-effect because the total variance mainly comes from the cross country dimension. The inclusion of country fixed-effects leads to the non-significance of most of the β coefficients.

Note that we cannot use firm fixed-effect when estimating the model through conditional logit because we assume that subjects invest in only one location.

The equation estimated through the marginal logit including a subject fixed effect (result in column (B)) is :

TAB. 3.2 – Estimation results non-linear effect of TAX

	(A)	(B)	(C)	(D)
	Marg. Logit	*Marg.Logit with* θ_p	*Marg. Logit with* θ_p, δ_{ij}	*Cond.Logit*
$\mathbf{MKP}_{it}$	1.0973***	1.1201***	1.0010***	1.0749***
	(.0238)	(.0240)	(.0258)	(.0235)
$\mathbf{LAB}_{it}$	-.8107***	-.8238***	-.6107***	-.7980***
	(.0542)	(.0548)	(.0581)	(.0536)
$\mathbf{TAX}_{it}$	4.9100***	4.8450***	5.2930***	4.9801***
	(1.5098)	(1.5307)	(1.6163)	(1.4864)
$\mathbf{TAX}^2{}_{it}$	-.6543***	-.6483***	-.7099***	-.6654***
	(.2176)	(.2208)	(.2337)	(.2141)
$\mathbf{NET}_{it}$	.9826***	.9991***	.9713***	.9668***
	(.0295)	(.0298)	(.0317)	(.0292)
Obs	288750	288750	288750	138690
Events	4623	4623	4623	4623
Log.Lik.	-20894	-19303	-17703	-13412
Pseudo $\mathbf{R}^2$	0.118	0.185	0.253	0.147

$$\begin{aligned} P_{pit} &= \alpha + \beta_1 MKP_{iti} + \beta_2 LAB_{it} + \beta_3 TAX_{it} \\ &\quad + \beta_4 TAX^2{}_{it} + \beta_5 NET_{it} + \theta_p + \mu_r + \lambda_t + \varepsilon_{pit} \end{aligned} \tag{3.11}$$

where θ_p is the firm-specific fixed effect. Finally, the "dependent marginal logit" estimates the following equation (results in column (C)) :

$$\begin{aligned} P_{pit} &= \alpha + \beta_1 MKP_{iti} + \beta_2 LAB_{it} + \beta_3 TAX_{it} + \beta_4 TAX^2{}_{it} \\ &\quad + \beta_5 NET_{it} + \sum_{j \neq i} y_{pjt}\delta_{ij} + \theta_p + \mu_r + \lambda_t + \varepsilon_{pit} \end{aligned} \tag{3.12}$$

where $y_{pjt} = 1$ if subject p invested in j at time t. δ_{ij} equals the correlation between simultaneous investment in i and j.

First, considering the effect of exogenous variables, the results on Market Potential, Labour costs and network are in line with the literature. As expected, a large market size, including the host country and its neighbours potential demand, increases the chance of been chosen as FDI location. The coefficient associated to the unit labour cost variable has a negative sign. The network of French firms in the country increases the attractiveness for French capital.

Concerning the role of taxation, we test the non-linearity of the effect of the TAX variable on the probability of investment. We find that taxation has a non-linear impact on the location decision. While the relation between corporate tax and FDI is positive with low tax rate, the relation changes as tax rates increase. In further specification we include variables covering public investment stocks and flows. The first is proxied by the road-kilometers per capita, and the second is given by the amount of public growth fixed capital formation (GFCF) relative to GDP. In Table 3.3 the $W\mathbf{TAX}$ variable is the former **TAX** indicator weighted by the GFCF variable. The aim is to observe FDI response to taxation when accounting for public investment in infrastructures financed by the tax revenue.

The results concerning the effect of network, market potential and labour costs are very close to those shown in Table 3.2. The variable ROADS used as a proxy for the level of infrastructures has a positive sign, the larger the availability of infrastructures, the greater the chance of being chosen as investment location for a country. When using the weighted tax variable, again, we find that the relation with FDI is not linear.

When taxes are low, the increase in taxes can be offset, or even overcompensated by an increase in public investment. In that case the marginal benefit due to the rise in public investment is greater than the marginal costs due to tax rise. The other way around, when tax rates are already high, the marginal cost due to a rise in taxes is higher than the marginal benefit due to the rise in public investment. These hypotheses seem to be confirmed by the results shown in Table 3.3.

TAB. 3.3 – Estimation results non-linear effect of TAX

	(A)	(B)	(C)	(D)
	Marg. Logit	*Marg.Logit with* θ_p	*Marg. Logit with* θ_p, δ_{ij}	*Cond.Logit*
$\mathbf{MKP}_{it}$	1.1191***	1.1431***	1.0074***	1.0954***
	(.0273)	(.0277)	(.0295)	(.0270)
$\mathbf{LAB}_{it}$	-.9620***	-.9795***	-.7620***	-.9447***
	(.0638)	(.0644)	(.0674)	(.0631)
$W\mathbf{TAX}_{it}$	8.7988***	8.9649***	8.3159***	8.6484***
	(1.6405)	(1.6668)	(1.7821)	(1.6114)
$W\mathbf{TAX}^2{}_{it}$	-21.3291***	-21.6844***	-18.9866***	-21.0291***
	(4.6352)	(4.7112)	(5.0563)	(4.5502)
$\mathbf{ROADS}_{it}$	.1742***	.1794***	.1364***	.1683***
	(.0519)	(.0524)	(.0568)	(.0514)
$\mathbf{NET}_{it}$	1.0230***	1.0413***	1.0122***	1.0054***
	(.0308)	(.0311)	(.0330)	(.0304)
Obs	288750	288750	288750	138690
Events	4623	4623	4623	4623
Log.Lik.	-20888	-19296	-17698	-13406
Pseudo $\mathbf{R}^2$	0.118	0.185	0.253	0.147

We now turn to the comparison between estimation methods. First, there are no major differences in the estimated coefficients when using any of the four methods we focus on. This result shows that choosing either marginal or conditional logit should lead to the same qualitative conclusions. When looking at the goodness of fit measures (for now, only pseudo-r^2 are displayed), the dependent marginal logit (accounting for LD) using association parameters performs better than the other three methods. In section 3.3, we noticed that within IRM, the local dependence is often treated as due to subject characteristics. If so, accounting for subject unobserved chracteristics should handle the dependence between alternatives. However, using both subject fixed effects and association parameters lead to higher goodness of fit indicator than using subject effects only. Moreover, when comparing the marginal logit with subject fixed effects and the conditional logit, respectively column (B) and (D), we see that the better performs better than the later. The reason for this may be that dependence depends more on subject characteristics than on relative items characteristics.

3.6 Conclusion

When studying firms location decisions, one faces questions concerning the determinants of these locations. First, what are the host country factors that influence FDI. Second, are there inner-firms characteristics that increase the chance of locating in a given countr.y, Third how can one account for firms geostrategies when they locate in more than one country. Indeed, there may be good reasons for firms to split production over several locations, such as complementarities between location alternatives. The multi-location and the dependence between locations are facts that are hardly accounted for in empirical studies. The availability of methods capable to fully handle it is one reason. While marginal logit can include subject unobserved features, it does not include any link between possible locations. Conversely, conditional logit cannot use subject specific effects.

Here, we propose to use the "dependent marginal logit" as an alternative method to marginal and conditional logit. This method, derived from bio- and psychological quantitative analyses, can include both subject fixed-effects and links between alternatives. We compare four different estimation methods to figure out whether the proposed method could lead to an improvement compared the other methods that are currently used in the literature.

When comparing the results, it appears that the different methods lead to close results in terms of parameter estimates. However, the dependent marginal logit offers a higher index of goodness of fit. The first conclusion is that using simple logit without local dependence does not lead to large difference in result compared to more advanced methods. Moreover, treating investment cases as independent (although we know they are not) would provide results close to those obtained with methods with dependence. Although the different quantitative tools are close in terms of results, the use of a marginal dependent logit would be more accurate in terms of actual firms' choices especially when they choose to invest in multiple location at the time.

The marginal dependent logit should be a valuabe tool for firms' location studies, especially when local dependence is due to item characteristics and when the proportion of effective multiple choice is high. Finally, the dependent marginal logit should be a useful al-

ternative when one wants to deepen the study of subjects characteristics or on firm strategies investing in multiple countries.

In order to confirm the new results presented in this chapter and the usefullness of this method, the comparison between methods should be implemented on other firm-level datasets.

3.A Data appendix

3.A.1 Market potential

The market potential is calculated based on countries' current GDP converted in current Euros for the non-Euro zone countries and distance between countries. The market potential non captures the destination-country's, i, potential demand but also the potential demand from other countries, j, that can be attained from i.

$$\begin{aligned} MKP_{it} &= GDP_{it} + \sum_{j=1}^{n} \left(\frac{GDP_{jt}}{DIST_{ij}} \right), \\ \text{with} \quad j &\neq i \end{aligned} \tag{3.1}$$

GDP variables are taken from EUROSTAT http ://epp.eurostat.ec.europa.eu and distance variables are provided by CEPII : http ://www.cepii.fr/francgraph/bdd/distances.htm.

3.A.2 Unit labour costs

Unit labour costs (ULC) account for all costs including wages and salaries, direct remuneration, bonuses, employers' social security contributions and other labour costs. The total costs in current Euros is then divided by the total number of hours worked. ULC data are provided by EUROSTAT. Table 3.1 shows large disparities in ULC across countries with costs ranging from 2.37 to 30.43 Euros in 2003.

3.A.3 Statutory tax rates

The author in indebted to Agnès Bénassy-Quéré who provided the Statutory Tax Rate (STR) data. The data are taken from different sources in order to cover a large geographical scope. We use Devereux & Griffith STR, Eurostat, KPMG and OECD. All sources are checked to be coherent with one another.

TAB. 3.1 – Descriptive statistics in 2003

Variable	Mean	Standard deviation	Min	Max
Market Potential	272860	374157	10540	1421498
Unit labour cost	14.12	9.61	2.37	30.43
Statutory tax rate	0.279	0.069	0.125	0.382
Km roads per capita	12158	5923	5063	25848
Agglomeration	13.3635196	33.8996603	0.4304778	170.6783370

3.A.4 Roads per capita

The km roads per capita intends to capture the stock of infrastructure available in the destination country. It is assumed that good communication network shall reduce transport costs within and between countries and thus reduce marginal production cost. Roads and population variable are taken from World Development Indicators provided by the WOrld Bank.

3.A.5 Agglomeration

The agglomeration is calculated as the number of French firms established in country i divided by country i's GDP. This variable may capture two different effects. First this agglomeration may represent an attraction for firms to locate close to similar firms and thus reduce fixed entry cost. Second it may capture a competition effect between firms.

Bibliographie

[1] Agresti A., Liu I., (1999). *Modelling a categorical variable allowing for arbitrarily many categories*, Biometrics, 55, 936-943.

[2] Agresti A., Liu I., (2001). *Strategies for modelling a categorical variable allowing for multiple category choices*, Sociological Methods an Research, 29, 403-434.

[3] Aw B., Lee Y., (2008). *Firm heterogeneity and location choice of Taiwanese multinationals*, Journal of International Economics, 75, 167-179.

[4] Azemar C., Delios A., (2007). *The tax sparing provision influence : A credit versus exempt investors analysis*, Department of Economics, University of Glasgow, Working Paper 2007-31, Jul. 2007

[5] De Boeck P., Wilson M., (2004). *Explanatory item response models*, Springer, New-York.

[6] Blonigen B., (2005). *A review of the empirical literature on FDI determinants*, NBER Working Papers n°11299, April 2005.

[7] Buttner T., Ruf M., (2007). *Tax incentives and the location of FDI : Evidence from a panel of German Multinationals*, International Tax and Public Finance, 14, 152-164.

[8] Delbecque V., (2007). *Impact de la fiscalité sur les IDE : Application à un panel d'entreprises françaises*, Economix Working Paper 2007-1, January 2007.

[9] Delbecque V., Méjean I., Patureau L., (2008). *Social competition and firms' location choices*, CEPII, Working Paper 2008-12, May 2008.

[10] Devereux M., Griffth R., (1998). *Taxes and the location of production : Evidence from a panel of US multinationals*, Journal of Public Economics, 68, 335-367.

[11] Gotlieb P., (1995). *Residential amenities, firm location and economics development*, Urban Studies, 32-9, 1413-1436.

[12] Guimares P., Figueirdo O., Woodward D., (2003). *A tractable approach to the firm location decision problem*, The Review of Economics and Statistics, 85-1, 201-204.

[13] Head K., Mayer T., (2004). *Market potential and the location of Japanese investment in the European Union*, The Review of Economics and Statistics, 86-4, 959-972.

[14] Ihlanfeldt K., Raper M., (1990). *The intrametropolitan location of new office firms*, Land Economics, 66-2, 182-198.

[15] Ip E., (2001). *Testing for local dependency in dichotomous and polytomous item response models*, Psychometrika, 66-1, 109-132.

[16] Mayer T., Méjean I., Néfussi B., (2007). *The location of domestic and foreign affiliates by French multinational firms*, CEPII, Working Paper 2007-07, May 2007.

[17] McFadden D., (1974). Conditional logit analysis of qualitative choice behavior, P. Zarembka, ed., *Frontiers in Econometrics*, 105-142, Academic Press, New-York.

[18] Navaretti G., Venables A., (2004). *Multinational firms in the world economy*, Princeton University Press, Princeton.

[19] Stout W., Habing B., Douglas J., Kim H., Roussos L., Zhang J., (1996). *Conditional covariance based nonparametric multidimensionality assessment*, Applied Psychological Measurement, 20, 331-354.

[20] Takane Y., (1998). *Choice model analysis of the "pick any/n" type of binary data*, Japanese Psychological Research, 40-1, 31-39.

[21] Tuerlinckx F., De Boeck P., (2004). Model for residual dependencies. In De Boeck & Wilson, ed., *Explanatory Item Response Models*, 343-373, Springer, New-York.

[22] Wu F., (1999). *Intrametropolitan FDI firm location in Guangzhou, China*, The Annals of Regional Science, 33, 535-555.

Conclusion générale

Les politiques d'attraction des entreprises étrangères ont, depuis le début des années 1980, eu un rôle prépondérant, tant en terme de schémas de production internationale que de dynamique de l'emploi. Dans le cadre de la construction européenne, les politiques fiscales et sociales restent du ressort des Etats-membres. Avec la parfaite mobilité des capitaux, de nombreux économistes et politiques se sont inquiétés d'une possible concurrence fiscale et sociale entre états-membres, d'autant que certaines politiques d'attraction peuvent avoir des effets néfastes sur les économies nationales. En effet, si les politiques d'allègements fiscaux peuvent constituer un facteur d'attractivité, les contraintes imposées par de telles politiques pèsent sur l'équilibre budgétaire. De même, un accroissement de la "concurrence sociale" orientant à la baisse les standards sociaux en vigueur pourrait aller à l'encontre de politiques recherchant l'équité sociale. Aussi, il est nécessaire de connaître l'efficacité réelle de telles politiques en terme d'impact sur l'attractivité. Si elles ne permettent pas d'agir efficacement sur l'entrée d'entreprises étrangères dans le pays, l'effet net négatif serait préjudiciable pour l'économie nationale.

Au cours des travaux présentés dans cette thèse, nous nous attachons à déterminer les facteurs incitatifs aux investissements directs entrants. Plus particulièrement, nous observons en détail les effets des politiques fiscales et des politiques de marché du travail dans le cadre des modèles de Nouvelle Economie Géographique (NEG). L'ensemble des travaux quantifiés est effectué sur des données individuelles d'investissements directs d'entreprises françaises à l'étranger.

Bien que les questions de concurrence fiscale aient été largement débattues jusqu'à ce jour, peu de travaux empiriques tirent réellement profit des avancées théoriques de la Nouvelle

Economie Géographique (NEG). Les résultats empiriques obtenus jusqu'à présent sont assez classiques et montrent que l'abaissement des taux d'imposition conduit à une augmentation des investissements entrant. Cependant, ces travaux ne tiennent que partiellement compte des facteurs tels que les coûts liés aux échanges ou le potentiel de marché. Les présents travaux s'inscrivent directement dans le cadre du modèle "Footloose Capital" de Baldwin. Cette base théorique permet de conclure à des résultats nouveaux concernant la concurrence fiscale, notamment à l'existence de prérequis nécessaires à l'efficacité des politiques de réduction de l'impôt sur les sociétés.

L'expertise de l'effet des politiques fiscales conclut à la capacité pour les gouvernements à attirer les capitaux productifs étrangers par le biais d'allègements sur la fiscalité des entreprises sous certaines conditions. En effet, dans un contexte régional intégrant des coûts liés aux échanges et des asymétries de tailles entre pays, nous concluons à des résultats nuancés sur l'existence d'une concurrence fiscale pure. L'efficacité des politiques fiscales se fait conditionnellement au degré de liberté des échanges entre pays. Plus les échanges de biens se font librement entre pays, plus l'effet des politiques fiscales sera fort. Parallèlement, il apparaît que l'effet des politiques fiscales dépend de la taille économique des pays. Les politiques fiscales menées dans les grands pays ont davantage d'inertie que celles menées dans les petits pays.

Ces résultats conduisent à plusieurs implications en terme de politique économique. Premièrement, les gouvernements désireux de mettre en place des mesures fiscales incitatives doivent considérer ces mesures relativement à leur ouverture commerciale. Une diminution de la fiscalité des entreprises appliquée dans un pays faiblement ouvert conduirait à la baisse des recettes fiscales sans augmenter l'attractivité du pays. De même, les pays relativement peu intégrés dans le commerce international ont davantage de liberté quant à la mise en place de leurs politiques fiscales. A la vue de ces résultats, l'outil fiscal utilisé de manière unilatérale dans les pays très intégrés aura un effet très sensible sur le choix de localisation des entreprises. Deuxièmement, l'efficacité des politiques fiscales dépendant de la taille des pays, cet outil semble davantage adapté aux petites qu'aux grandes économies. La conduite d'une politique de faible imposition des sociétés dans une grande économie conduirait à une baisse des recettes fiscales avec une faible création d'activité en contrepartie.

Ces implications en terme de politique économique laissent entrevoir les enjeux de concur-

rence fiscale entre les nouveaux pays membres de l'Union Européenne. Bénéficiant de l'intégration au marché commun, ces pays pourront, dans la limite du respect de l'équilibre budgétaire imposé par les institutions européennes, utiliser l'outil fiscal dans le but d'attirer davantage d'entreprises.

Avec l'accession des Nouveaux Etats-Membres, les problématiques liées aux écarts de standards sociaux et de réglementation de marché du travail prennent une importance de premier ordre. En effet, ces écarts engendrent la crainte de voir les industries des pays développés se relocaliser dans les nouveaux pays européens. Cependant, jusqu'à présent, peu d'études se sont attachées à évaluer l'existence d'une telle concurrence sociale. La plupart des études traitant du sujet considèrent principalement l'effet de la protection de l'emploi sur la localisation des entreprises. Ces études concluent à l'impact négatif de la protection de l'emploi sur les IDE entrant. Ici, nous menons une étude plus générale couvrant, non-seulement l'effet de la protection de l'emploi mais également d'autres facteurs influençant les niveaux de salaires négociés, tels que le pouvoir des syndicats ou les niveaux de salaires minimum. Les résultats obtenus apportent de nouvelles conclusions à la littérature. En effet, si une forme de concurrence sociale existe, elle ne s'effectue pas entre pays développés et pays en développement mais entre pays développés uniquement. L'analyse effectuée sur la réglementation du marché du travail et son impact sur les choix de localisations apporte plusieurs résultats qui permettront de mieux appréhender les politiques menées sur ce marché. Afin d'expertiser précisément les caractéristiques du marché du travail, nous effectuons une analyse en trois temps. Tout d'abord nous évaluons l'impact de la protection de l'emploi sur les investissements direct à l'étranger (IDE). Ensuite, nous nous attachons à mesurer l'effet du niveau de négociation salariale et de la puissance des syndicats sur l'IDE. Enfin, nous étudions l'effet du salaire minimum et des allocations chômage.

Les résultats que nous présentons concluent à l'impact négatif d'une réglementation du marché du travail contraignante. La protection de l'emploi, les coûts et les procédures de licenciements augmentent la rigidité sur le marché du travail. En présence de rigidités, les entreprises patissent d'une faible capacité d'ajustement lors de fluctuations sur le marché des biens. Ce manque de capacité d'ajustement rend le pays considéré moins attractif que ses concurrents. Nous concluons également à l'impact négatif de la centralisation des négo-

ciations salariales et de la couverture des négociations syndicales sur l'attractivité. Plus les négociations sont centralisées, plus le pouvoir de négociation de l'entreprise est dilué. En cas de faible capacité de négociation, l'entreprise est peu encline à investir dans le pays. De même, un fort taux de couverture des négociations syndicales rend le pays peu attractif. Enfin, le salaire minimum et les allocations chômage augmentent le coût du travail, le coût marginal de production et réduisent le profit opérationnel. Ainsi, à mesure que le salaire minimum et les allocations chômage augmentent, la capacité à attirer les investisseurs diminue.

Ces résultats assez classiques concernant le rôle du marché du travail dans les choix de localisations sont toutefois nuancés par d'autres conclusions tirées des présents travaux. Il apparaît, en effet, qu'une réglementation stricte réduit l'attractivité, et qu'ainsi, il peut émerger une concurrence "sociale" entre pays en vue d'accueillir des investisseurs étrangers. Cependant, les investisseurs ne considèrent pas les pays comme homogènes et les critères appliqués aux choix de localisations semblent se faire par groupes de pays. Nous observons en effet des impacts différents selon que les entreprises investissent dans un pays développé ou dans un pays en développement. Les effets du marché du travail sont plus prononcés lorsque l'entreprise investit dans les pays développés. Ainsi, la concurrence sociale se fait davantage entre pays développés qu'entre pays développés et pays en développement. Il apparaît donc que les craintes des gouvernements d'être en concurrence directe avec les pays à très faibles coûts de main d'oeuvre et à faible degré de réglementations ne sont pas fondées. Les gouvernements de pays développés ont ainsi l'opportunité, par le biais d'une coordination multilatérale, de maintenir des standards sociaux élevés sans risquer de réduire leur caractère attractif.

Jusqu'à présent, les différentes méthodologies appliquées aux études de choix de localisations n'ont pas permis de prendre en compte efficacement les décisions de certaines entreprises d'investir dans plusieurs pays simultanément. En effet, ces méthodes nécessitent, soit un traitement des données ne permettant pas l'exploitation totale des caractéristiques individuelles, soit des hypothèses fortes pouvant aisément être remises en question. Ici, nous proposons une méthode permettant de tenir compte du choix des entreprises d'investir simultanément dans plusieurs pays. Les présents travaux empruntent à la bio- et la psychométrie une méthode d'analyse de choix discrets, de type "Logit Marginal Dépendant" (LMD). Sans remettre en question la validité des résultats obtenus à l'aide des techniques couramment utilisées, les ré-

sultats montrent une meilleure capacité du LMD à s'adapter aux données. Par ailleurs, cette nouvelle méthode permet la modélisation de choix de localisations plus complexes, notamment en permettant la prise en compte de localisations multiples simultanées, ce qui n'était pas possible avec les techniques utilisées jusqu'à présent. La mise en place du LMD nécessite cependant d'être confrontée à d'autres études de localisation d'entreprises afin d'en confirmer l'exploitabilité.

Cette méthode pourra notamment permettre l'approfondissement des schémas complexes de localisations. En effet, le choix d'une entreprise de s'implanter dans plusieurs pays ou régions répond à des motivations bien définies par la théorie économique mais manquent d'analyses empiriques sur un grand échantillon de choix possibles. La complémentarité entre les pays incite les investisseurs à multiplier les implantations et ces comportements méritent une attention particulière. Au delà des choix simultanés, cette méthode devrait permettre d'étudier les dépendances dynamiques entre les pays. Quels facteurs incitent les entreprises à se localiser d'abord dans une région donnée puis dans une autre ? Existe t-il des schémas d'implantations récurrents et comment peut-on les expliquer ?

Sur la base des résultats concernant les effets des politiques fiscales, l'analyse conjointe des politiques budgétaires et fiscales dans un cadre NEG permettrait d'apporter un éclairage plus approfondi sur les capacités d'agissements des gouvernements. Comment, dans le respect d'un équilibre budgétaire imposé par les institutions européennes, les pays peuvent-ils utiliser cet outil budgétaire comme facteur d'attractivité ? Ces travaux mettent en avant que les motivations des entreprises sont différentes selon qu'elles décident d'investir dans un pays développé ou dans un pays en développement. Dans la continuité des présents travaux, une étude de l'hétérogénéité des IDE, sur une base individuelle ou sectorielle, offrira une meilleure connaissance des motivations d'investissements en fonction notamment, du type d'IDE, du secteur d'activité et des caractéristiques propres à l'entreprise. Il est par ailleurs apparu que la distinction entre IDE horizontaux et verticaux reste difficile à déterminer et ce, malgré l'emploi de données individuelles. Beaucoup de résultats de la littérature reposent sur l'hypothèse d'une répartition des IDE horizontaux et verticaux entre les pays développés et les pays en développement. Des études utilisant des informations sur la comptabilité de groupe des entreprises devraient permettre d'évaluer plus précisément la structure de ces IDE.