The Determinants of Australian Investments Abroad

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dedicated to my beloved grandad and my dog

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CHAPTER ONE

1. INTRODUCTION

Australia is a very interesting country, thanks to its geographical proximity to Asia and its cultural links with Europe and the Western world.
According to CIA (2009)[1] in terms of its GDP per capita, expressed in purchasing power parity, it ranks 26th in the World, above some leading economies like France, the UK and Germany. Moreover, Australia has seen its importance increase both as a destination and as a source of foreign direct investments (from now on called FDI). It is now ranked 14th in both[2].

The Australian experience can be considered, according to Rafferty and Bryan (1998), an "extreme case of FDI growth"[3] with a spectacular increase from the second half of the 1980s, faster than the rest of the world as a whole followed by a rapid contraction between 1988 and 1991 and a second burst of growth from 1992 to the present days. After the Second World War the increasing importance of the phenomenon of FDI seems to be exceeded only by the huge amount of researches about this topic, as it has been pointed out among others by Agarwal (1980). However, the amount of research which has studied outward FDI is relatively small if compared to the amount of work which has focused on inward FDI. Furthermore, looking at the Australian case, it seems that the difference between the two aspects is even greater. This could derive by the fact that inward FDI flows have been for a long time far greater than outwards flows and

[1] See CIA The World Factbook https://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html?countryName=Australia&countryCode=AS&regionCode=au#AS

[2] See CIA The World Factbook https://www.cia.gov/library/publications/the-world-factbook/rankorder/2199rank.html?countryName=Australia&countryCode=AS&regionCode=au#AS

[3] See Rafferty & Bryan (1998), p.3.

the importance of Australian investments abroad has grown only in more recent years.

This research aims at explaining the most important determinants of Australian FDI abroad, focusing on macroeconomics variables that can push Australian firms to prefer direct investment instead of simple trade with a foreign country. Several variables, taken from previous literature and combined in an original way, are used to model the flows, and different econometric techniques are implemented to identify the most robust determinants. The approach takes into account the evolution of the significance of the variables both across countries and time. All the econometric results are linked to the existing theoretical frameworks found in the literature, and in particular to the OLI model (Ownership, Location and Internalization) introduced by Dunning (1977, 2000)[4]; the OLI model has been deeply studied and commonly applied in the past[5] so it is a very useful benchmark for other studies focusing on the drivers of FDI.

The study focuses on the second surge of FDI, and thus our data cover the period from 1992 until 2007. The purpose is to improve the literature making a substantial contribution to the topic of FDI outwards, both in a general context and in a specific one, Australia in our case.

This paper is organized as follows. Chapter Two is divided in two main parts: the first is entirely devoted to provide a theoretical framework in order to comprehend in a better and wider way the reasons that could make a firm opt for a direct investment in a foreign country. It provides a brief description of the various models that have dealt with market entry decisions, especially focusing on the OLI model. The second part reviews the literature on the determinants of outwards FDI; in particular, we discuss in detail previous studies, which have used the same controls we have employed in this research. Chapter three provides a brief historical overview on Australian FDI and multinational activity,

[4] Dunning introduced the OLI model in 1977 in a Nobel Symposium in Stockholm; the model has been updated in the following years by the author himself.

[5] See Zhao & Decker (2004), p. 8.

focusing on the sectors where investments are prominent; a comparison between major trading partners and investment recipients is also done to better understand the reasons behind the different choices of market entry. Chapter Four explains the methodology followed in the paper, provides detailed information on the econometric approach implemented and illustrates the variables selection process; Chapter Five describes the variables utilized in the research, especially paying attention on how they are defined and constructed. The regression results, with all the related interpretations, are presented in section six. The last chapter includes concluding remarks.

CHAPTER TWO

2. LITERATURE REVIEW

The literature dealing with FDI can be classified in two main branches, as pointed out by Agiomirgianakis, Asteriou and Papathoma (2003): the first explains the effect of FDI on the process of economic growth while the second one goes deep through the study of the determinants of the FDI. In this work we are not concerned with the link between FDI and growth, and as a result, we focus on the second strand of literature and it try to summarize how it answers the following question: why would a firm -- in our case an Australian one -- want to locate its production in a foreign country?

2.1 Theoretical background

2.1.1 FDI analysis models

Many authors have tried to find a reasonable answer to this question. One of the earliest works dealing with that is a pioneering contribution of Mundell (1957): his approach focuses on the relative endowments and costs of factor of production. Its conclusions suggest that capital flows are positively correlated with big differences between capital-rich and capital-poor country; also high barriers to trade and migration are found as factors that facilitate FDI. Obviously these determinants are not sufficient to explain all the reasons of direct investments. A general theory of direct investments abroad can be found in the so-called OLI theory. John Dunning introduces his “Eclectic Paradigm” (1977)

and asserts that firms choose FDI market entry to obtain three different advantages[6]:

- ownership advantages
- location advantages
- internalization advantages

The first ones derive from specific assets, tangible or intangible, owned by the firm and that grant an advantage over the other enterprises; ownership advantages permit the firm to afford the cost brought by foreign environment (for example the costs of dealing with foreign administrations and regulatory framework) and to compete with local firms. Internalization advantages could come from retaining control over the firm-specific assets[7], instead of licensing to firms already based in the foreign country. Location advantages make it more profitable to invest in a country instead of only trading with it, if the firm uses some inputs located abroad. The OLI model has been supported by several empirical studies and this is really important, as it permits to use it as a benchmark for comparison and to give a strong theoretical background to our work. For example[8], the ideas from the OLI model have been applied by Deichmann (2004) in explaining FDI in Poland and by Nakos and Brouthers (2002) in a study about entry market decisions in Central and Eastern European countries. The limitations of the model lie in the fact that in the attempt to explore all the factors determining the entry mode it "ignores the impact of the firm objective, the decision maker, and the situational contingency surrounding the decision maker when the entry mode decision choice is made" (Zhao &

[6] The 1977 work has been extended in further studies by Dunning with the introduction of other characteristics that have to be considered in the market entry decision, like competition advantages, market failure, dynamic environment and collaboration.

[7] For firm-specific assets are intended the quality of a brand name, managerial skills or process that provide an advantage to the firm over the others; licensing them would diminish this advantage.

[8] In the literature there are other several examples of empirical studies on the OLI like Agarwal and Ramaswami (1992) and Tarzi (2005).

Decker, 2004)[9]. To better understand the decision of MNEs of becoming international, extensions of the OLI model can be found in the more recent literature: Guisinger (2001), for example, develops an "evolved eclectic paradigm" also called OLMA model. In this case the "M" stands for a group of factors representing the mode of entry; the "A" represents, on the other hand, the adaptation that the firm has to carry out when it has to deal with the business environment of the foreign country where the investment takes place[10].

The OLI theoretical framework, with its extensions, is not the only model that tries to capture the determinants of different market entry decisions; in their already cited paper, Zhao and Decker (2004), in fact, end up in finding five different models that take into account different determinants[11]. The "stage of development" (SD) model, which was proposed by Johanson and Paul (1975), considers the internalization plans of multinationals as a process depending on the stage of a firm's development. Another model identified is called OC and it takes into account the organizational capacity of a firm in the choice of market entry: the firm will chose to become international if this decision is supported by a possibility of future development and deployment of the firm's capabilities[12]. Differently, Anderson and Gautignon (1986) assert that a firm wants, as a primary goal, to maximize the overall efficiency of the production process by minimizing the transaction costs. For this reason their model is known as Transaction Costs Analysis (TCA); like for the OLI model, there are a lot of studies on the TCA model and it can count on a lot of theoretical extensions and support. On the other hand, these works have shown the weakness of the model: the two most important of these weak points is surely the fact that the

[9] See p.27.

[10] In his explanation of this modified OLI model, Guisinger also investigates the differences between domestic and foreign investment in order to capture the peculiar characteristics of FDI.

[11] The OLI model is included and studied with these five different models. For a quick comparison between them see table 1, p. 27. Since most of the previous studies about FDI relate to the OLI model and since this work focuses mainly on the location determinants, the other models are only briefly described.

[12] The model was introduced by Aulakh and Kotabe (1997) and developed by Madhok (1998). For further information see these two studies.

transaction costs of a firm are really hard to measure and that there is no clear relationship between them and the firm's corporate governance. The last model that Zhao and Decker (2004) specify is the so-called DMP[13] model: in this case the market entry decision is seen as a decision making process consisting of different stages that consider several factors as costs, risk, existing business environments and so on. The model has been sistematically studied and empirically tested (Kumar and Subramaniam, 1997; Pan and Tse, 1999 for example) and from the empirical studies, it emerged a lack of accuracy in the role of the decision maker and the organization.

2.1.2 Types of FDI

Now that we have briefly explored the theoretical models we provide an overview on the different types of FDI which reflect why a firm would want to become a multinational. Armstrong (2009), considering a view widely accepted and found in literature, suggests two main reasons: to better serve the local market and to exploit lower input-costs.

The first choice implies the so-called "horizontal FDI" (also denoted as "market-seeking"), which aim at developing and building new plants for the production similar to the one based at home. The motive of these investments is reducing the costs of supplying the local market, by skipping in some way the transport costs and the tariffs but especially by the use of cheap labour, often in developing countries. Horizontal FDI tend to be more attracted by larger host economies because a big market implies more competition of local firms and a subsequent product at a lower price. For this reason it is more convenient to invest directly in the foreign country instead of serving its market through exports which carry on higher costs. Furthermore, larger markets are characterized by lower plant-specific fixed cost per unit of output.

[13] DMP stand for Decision Making Process and it was proposed by Root in the 1994.

The second important reason defines the commonly called "vertical FDI" also known as "production-cost minimizing" since they are meant to relocate part of the production chain, either upstream (or backward, towards the source of raw materials) or downstream (or forward, towards the sale of the final product) in low cost countries. It is clear that the so-called "raw materials seeking FDI" can be classified among the vertical FDI: they aim at exploiting the natural resources of the host country in order to secure a continual supply of raw materials for its production[14]. Vertical investments are basically export-oriented to the market of the investor's home market so they are not usually affected by the size of the host economies.

It is interesting to note that horizontal and vertical FDI are both stimulated by agglomeration (clustering) effects and other two types of FDI are found in Eitemann, Stonehill and Moffett (1995): "knowledge seeking" investments, aiming at accessing technology located abroad, and "political safety seeking", which are strongly influenced by political risks of the possible location".

2.2 Determinants of FDI

After having shown the basic theoretical framework, that helps to better understand the reason of investing, we can turn to the study of the single determinants used in the analysis and links them to previous empirical econometric studies.

Surveying the FDI literature, Lim (2001) identifies seven particularly important factors: as first determinant, found in almost every research, he puts the market size of the FDI recipient country. Another important determinant is found in the production factor costs, and economic distance (proxied often by transportation costs) is also widely recognised as important factor in the market entry choice.

[14] These investments are often located in developing countries but there are examples of developed countries rich in natural resources that are big recipient too; for example, US, Canada and Australia (Deng, 2003).

Between the other factors, the author mentions agglomeration effects, fiscal incentives, business (investment) climate and moreover trade barriers (or openness of trade). There are also other determinants which have been found to play an important role in several existing works[15] and we will try to provide a brief description of the most commonly used. Since our study build a model using the same variables indicated by Lim (2001) as "traditional variables" and adding others ("non-traditional"), we follow here the same denomination.

2.2.1 Traditional Variables

Market size

The size of the host country's local economy is undoubtedly one of the most commonly used variables in FDI empirical studies; Lim (2001) argues that horizontal FDI are encouraged by bigger market size, thanks to economies of scale, and vertical FDI are indifferent[16]. In several works the market size determinants is proxied by the GDP of the recipient country and the expected effect is positive. For example, Shatz and Venables (2000), Padilla and Richards (1999), Brainard (1997) and Kravis and Lipsey (1982) find a highly positive correlation between FDI and GDP. For our research, a study by Edwards and Buckley (1996) on the determinants of FDI from Australia for the 80s and the first half of the 90s is particularly important: in fact, they have shown that this factor is among the most important for Australian investments (which are found to be basically "market seekers" in their study).

Production factor costs

Cost advantages, according to Wezel (2003), are relevant and important especially for efficiency-seeking FDI. Lim (2001) argues that both vertical and

[15] As already explained when discussing about the different types of FDI we could mention political safety reason or knowledge seeking investments.

[16] See section 2.1.2.

horizontal FDI are positively affected by a decrease of production factor costs even if in a different proportion[17]. An experiment run by Buckley, Devinney and Louviere (2007), surveying the decision of the managers of firms that face the decision of investing abroad[18], find that almost 50% of the last investments made, show a tendency towards foreign markets that grant at least a reduction of production costs of 5%.

Most of the empirical studies analysing the importance of factor of production costs usually consider labour costs instead of other cost drivers such as capital or intermediate goods: Wezel (2003), referring to Turner and Golub (1997), justifies this choice asserting that labour is largely immobile and hence not affected by price-equalizing effects while the other production factor are. Furthermore, it is harder to quantify the costs deriving from capital than wage or unit labour costs[19]. Also in the choice of proxies for labour costs there are several different approaches varying from wage (monthly, PPP-adjusted, productivity-adjusted and so on), unit labour cost, with different definitions[20], and GDP per capita, whenever data limitations make this necessary (for example, Majocchi and Strange, 2007). However, it seems that the strength of the positive effect on FDI of labour costs differ from country to country: Feenstra and Hanson (1997), investigating US FDI in Mexico[21], find a highly positive influence. A weaker effect, but still positive and significant, can be found in the study of Wheeler and Mody (1992) on US manufacturers worldwide. In another study, by Bevan and Estrin

[17] See Lim (2001) p.12. The author asserts that "production cost-minimizing vertical FDI will be stimulated by lower factor cost. Lower factor cost should also be viewed favourably by horizontal FDI. The net impact of lower factor cost on FDI is positive". In section 2.1.2 we also deal with this topic.

[18] The subjects surveyed by the authors are active managers, with both and no experience in FDI location choice, of firms with headquarters in different countries all over the world. However, the 29% of the sample is headquartered in Australia (Denmark and US are the other two most represented) so the survey is highly significant for our study.

[19] See Lipsey (2002), p.36.

[20] See Wezel (2004), p. 12 for some examples of unit labour cost proxy.

[21] The authors investigate the case of maquiladoras, American owned plants set in Mexico to take advantage exactly from lower labour costs.

(2004), on the determinants of FDI in Eastern European countries, low labour costs are found to be the most important factor. On the other hand, Mody, Dasgupta and Sinha (1999), show that in the case of Japanese FDI in Asia there is no significant relationship between cheap labour and FDI. In the work of Edwards and Buckley (1996), useful for a comparison, Australian FDI seems not to be driven by the desire to exploit cheap labour[22].

Economic distance / transport costs

With regard to the role of transportation costs and economic distance between the investor and the recipient country, the effect is definitely not unambiguous and depends on the purpose of FDI. In fact, as discussed in Lim (2001), horizontal FDI are antagonist of trade: if transportation costs are too high, and hence the access to the foreign market through export is not favourable, the multinational will tend to produce directly in the host country. So, a greater distance between the two countries will imply higher transportation costs and a subsequent increase in horizontal FDI. On the other hand, if we consider vertical FDI, which require transport costs of components and final products (as shown in section 2.1.2), it is quite obvious that a great physical distance will affect negatively the decisions of multinational to invest directly. The final effect of distance is defined by the prevalence of horizontal or vertical investments, since they are influenced in an opposite way.

In the literature there are several examples of this ambiguity: in the already cited study, Brainard (1997) has found a positive relation, suggesting that in this case the FDI taken into consideration could be more horizontal than vertical[23]. This relation is not particularly robust. A very weak relation has in fact been found by

[22] However, we must take into consideration that the authors investigate only three recipient countries: UK, Thailand and Malaysia.

[23] The analysis of the author mixes developed countries with developing countries FDI so it is not possible to identify a specific basic trend that can be taken as "rule" for further studies. Probably, in this study there is a greater number of multinational that opted for the horizontal investment than vertical one.

Ekholm (1998) exploring Swedish FDI. Furthermore, another study by Labrianidis on the importance of geographical distance for Greek investments seems to show a negative relationship: almost all these investments are directed to neighbouring countries, like Bulgaria, Albania and Romania and, still more interesting, a within-country analysis shows that the regions closer to Greece are the biggest recipient. It seems Greek FDI to be heavily affected by geographical distance so a raise of investments can be expected if transportation costs decrease[24].

Agglomeration effect

The effect of agglomeration on FDI is quite predictable even if there are two different ways of capturing what agglomeration really is. Some authors focus on the size of existing FDI stock in a specific place, which makes clustering attractive while others take into consideration the quality of the infrastructure of the recipient country.

In the first case, a great cluster of FDI should attract new investments; this is known as the theory of the "follow-the-leader" effect and it is well explained in Wezel (2003)[25]: once a multinational decides to invest in a determined location, gaining, in this way, competitive advantages as a "first mover", it puts the other firms in a position where they should invest as well in the same country to capture the productivity advantages that would be lost in case of a late investment. If they don't do it, or do it too late, they could incur in a big welfare loss. Furthermore, the best choice for the firms would be to move simultaneously. Wheeler and Mody (1992) confirm this theory in their empirical study: they find a highly significant positive relation both for developing and developed countries. Mody and Srinisvan (1998), bring further evidence showing the correlation between the amount of past FDI and the present ones.

[24] A possible explanation is that Greek FDI in these countries (with very low labour costs) are merely vertical.

[25] See p. 21-22 for a more exhaustive explanation.

The second case includes, as a proxy for quality-of-infrastructure, different examples: Loungani, Mody and Razin (2002) investigate whether telephone density in developing countries has an effect on attracting FDI. A significant and positive relationship is found. Khadaroo and Seetanah (2007), studying the FDI in Sub Saharan Africa, find transport infrastructures to be the most significant drivers followed by other infrastructure determinants[26]. Among the first scholars who dealt with this topic we must mention Root and Ahmed (1979). In all the cases they consider, the better the infrastructures are, the higher the level of direct investments.

Fiscal incentives

Fiscal incentives in the recipient country tend to stimulate FDI flows, both of the horizontal and of the vertical type. Lim (2001) argues though that horizontal FDI is more affected by other policies that affect the viability of the host markets, like for example protectionist policies. Fiscal incentives have of course a positive effect on the cost structure, so cost reducing FDI flows are positively affected. In fact, a positive effect is found in Woodward and Rolfe (1993). However, it is important to mention the study of Reuber and others (1973)on the drivers of FDI both in developed and developing countries: the empirical findings seem not to be significant and the explanation could be that multinationals expect these incentives to be only temporary and be followed by a future increase in taxes because they are totally controlled by the governments of the host country. Furthermore, Oman (2000) indicates the existence of a two-stage investment decision process: investors consider at first stage a set of possible locations on the basis of economic and political factors but here fiscal incentives play no role. Only when the best locations are chosen that fiscal incentives are taken into consideration. So, it seems fiscal incentives to play a secondary role.

[26] For example communications network is taken into consideration in the analysis.

Business climate

Multinationals usually find it more profitable to invest in a friendlier environment: in fact in such a climate the cost of operating in a foreign country are lower and so are the risks. With "friendlier" environment we mean similar regulatory, bureaucratic and judicial climate; both horizontal and vertical FDI will benefit from less restrictive requirements. In general, countries that share greater similarities with the investing country are considered better recipients than countries that show larger differences.

Again, it is not easy to predict a positive or negative relationship and the empirical work seem to justify this uncertainty; the problem lies in the fact that different proxies are used to test the theory. Lim (2001) classifies the possible variables in two categories: economic (like different labour regulations, performance and technical requirements, difficult enforceability of contracts and so on) and political risks (among the others, unstable democracies, governments instability and possible wars). We prefer to analyse political risk as a separate dimension, in order to capture the peculiarity of this proxy[27]. For economic environment proxies, the level of inflation of the host country and the balance of payments are widely used (Schneider and Frey, 1985). In their study, Edwards and Buckley (1996) find similar business practice and legal system to be very important for Australian multinationals.

Openness of trade (trade barriers)

FDI react in an opposite way to an increase in openness (same as a decrease of trade barriers) depending on their nature: horizontal FDI, which are meant to skip tariffs on trade, are subject to a decrease while vertical FDI, which imply a massive flows of goods between the multinational's home market and the host economy in the form of trades (as explained in section 2.1.2), will surely benefit from a more liberal environment. Furthermore, we must take into account that lower tariffs can improve the quality of the business climate and increase the

[27] In this approach we follow for example Wezel (2003), Mody and Srinivasan (1998) and Duncan (2000).

level of FDI. For this reasons, the effect of greater openness of trade on FDI can not be easily predicted.

Another problem in assessing the effect of trade policies on FDI flows is represented by the choice of the measure of openness: widely accepted as the ordinary proxy is the ratio of import or export (in several studies the sum between the two) to GDP but another possible proxy is also the level of average tariffs imposed by the host country. More sophisticated indices of openness are also found in the literature[28]. The first type can be found in several works like Dees (1998), Kandiero and Chitiga (2003) and Hausmann and Fernandéz-Arias (2001) with different results and significance, depending on the nature of FDI and host countries. Tariff proxy can be found in the already mentioned study by Brainard (1997).

2.2.2 Non-traditional variables

Now that we have explained the characteristic of the most common determinants of FDI in this section we give an overview of additional drivers that can help us in our analysis.

Real Exchange rate

The impact of real exchange rate on FDI it is not clear since there are opposing views. Kosteletou and Liargovas (2000) an upward movement of the real exchange rate of the host country can warn foreign firms about a possible future increase of protectionism and hence encourage further investments in order to prevent the possible tariff growth[29]. The opposite effect comes from the relative

[28] For example Leamer (1988) builds an index of openness that considers also the deviations from trade flows while Pritchett (1996) proposes to adjust openness measure with country-specific determinants like geographic size or per-capita income.

[29] See Kosteletou and Liargovas (2000), p. 139. In brief, if the host country real exchange rate moves upwards, its balance of trade worsens because it is more convenient import from other countries. For this reason the host country could increase tariffs and level the balance of trade.

enrichment of foreign investors when facing a depreciation of the host country's currency: the depreciation makes relatively cheaper for foreign firms to buy assets located in the host country[30] (Froot & Stein, 1991) and hence attracts FDI. As we have seen, an opposite movement of the exchange rate of the host country can attract FDI and this is why the effect is not easily predictable. Empirically, Kyiota and Urata (2003) find, studying Japanese and US FDI, that a depreciation in the currency of the host country positively affects the level of foreign investments.

Literature shows different results, confirming how difficult it is to find a significant trend. Another variable which has been often studied is the change of real exchange rate over time instead of just its level: further attention is paid to the volatility of exchange rates even if the literature, both theoretical and empirical, on its impact on FDI is quite limited. Furthermore, there are two approaches and they seem to reach contradicting conclusions. Brzozowski (2003) analyses theoretically and empirically both the approaches known as "production flexibility" and "short-run risk aversion". The first approach basically asserts that the effect of exchange rate volatility depend on sunk costs in capacity, competitive structures and convexity of the profit function in prices. Since higher expected profits, which attract FDI, are linked with low volatility of employment and production, a fixed exchange rate system (or however characterized by low exchange rate volatility) is preferred because it is more capable to isolate them (employment and production) from monetary shocks[31]. The same idea is developed by Darby *et al* (1999) but in a different way and with opposite results: both negative and positive relationship is found[32]. The second

[30] For example, let's say an Australian firm wants to invest in China and has to face an expense of 50 millions yuan (Chinese currency) to buy a plant located there; the firm has one million A$ available. If the exchange rate is 25 yuan/A$ the firm can not buy the plant but if the exchange rate depreciates till 50 yuan/A$ the investment can take place.

[31] See Brzozowski (2003) p. 8-9 and Aizenman (1992).

[32] The authors develop a model that takes into account the possibility of waiting instead of investing now: in this way, waiting time is linked to costs. They find two relationships: the exchange rate volatility depresses the investment when the expected revenue, the value of

approach mainly focuses on risk aversion and suggests that the time lag between investment and profit in foreign currency plays a fundamental role. Empirically Brzozowski (2003), studying FDI flows for emerging country, finds a negative impact of host country's exchange rate volatility. Differently, Goldberg and Kolstad (1995) assert that the share of investment abroad unambiguously increases with high foreign exchange rate volatility.

Country Risk

In this study we decide to deal with country risk separately from business climate trying to capture its features. However, also among the empirical and theoretical studies, there are several different factors that have been taken into account concerning country-specific risks that can discourage investments. The choice of adding political risk variables to our analysis is justified by the work of Beyer (2002) and Stevens (2000): the former, using the Economic Freedom Index[33], shows an improvement of his regressions and the latter, investigating the US investments in Argentina, Brazil and Mexico, sees an increase of the R-squared for the specifications concerning Argentina. In measuring political risk we can distinguish between several variables, but often it is measured using corruption indices, due to the devastating effect that corruption can have on administrative efficiency. Literature provides proofs of how corruption may deter direct investment. Smarzynska and Wei (2000) and Everhart and Sumlinski (2001), for example, find that corruption has a negative effect on FDI. A limitation of these studies lies in the fact that they do not take into account that corruption may affect FDI in different ways, depending on the nature of FDI. Hakkala, Norbäck and Svaleryd (2008), using firm-level data on Swedish multinationals, try to fill this gap and they find that the probability of investing is

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waiting, is at least the value of the entry sunk costs but the opportunity cost of waiting is also increased by exchange rate volatility and so investments grow.

[33] The Economic Freedom Index, provided by the Freedom House, is an average index of 10 variables: business, trade, fiscal, monetary, investment, financial and labour freedom, government size, property rights and freedom from corruption. These variables are scaled from 1 to 100.

still reduced by high corruption but vertical FDI seem to increase in its presence while horizontal does not. Other studies show the absence of a significant effect (Henisz, 2000 and Hines, 1995). Another proxy that can be found in the literature is the number of strikes occurring in a determined host country: examples are the study by Singh and Jun (1995) and, more importantly for our work, by Tcha (1997). The latter finds that labour disputes are a fact important for Australian multinational in the decision of investing abroad. When there is a lack of data available a possible proxy is the presence of democracy as shown in the study by Narayan (2008). The results show that FDI are more likely attracted in countries where working democracies are in place.

Free Trade Agreement

Many countries have entered into preferential trading arrangements, and several scholars have studied the existence of Free Trade Agreement (FTA) separately from openness of trade proxies, trying to explain all the possible distinctions. The results are controversial and depend on the "quality" of the agreement, meaning the grade of integration between the countries involved. Some empirical examples are Velde and Bezemer (2006) and Kang and Park (2004).

Social determinants

In this category several variables can be taken into account; as explained by Dunning (1980), cultural proximity represents an important intangible asset for multinational firms. Different proxies have been used to study the effect on FDI: cultural proximity, migration flows, language affinity and so on[34]. All these proxies have in common the fact that the more similarities the host country share with the investing country, the bigger will be in amount of FDI.

[34] For an exhausting review of social determinants see Bandelj (2002).

CHAPTER THREE

3. OVERVIEW ON AUSTRALIAN FDI

The following section is structured in two parts: the first provides a brief historical overview of Australian FDI, capturing the reasons behind the international position of Australia as an investor rather than just as a receiver of foreign capital, also highlighting the role played by the historical context may help in interpreting the data. The second part deals with statistical data, especially for the last available years, and investigates the international position of Australia paying great attention to the comparison between its favourite trading partners and the destination of its FDI flows. The use of tables and graphs is meant to help the understanding of the economic statistics.

3.1 Historical background

The last two-three decades have been a time of great and increasing mobility of capitals and finance. Many firms have turned themselves into multinationals and investments have spread all over the World in a process of growing globalization. Governments have changed their approach towards direct investments, shifting from a hostile view before the 1970s to an active-seeking position through incentives for investments[35]. In such a pattern, Australian FDI has experienced a period of spectacular growth and it is really interesting and peculiar for several reasons: first of all, differently to other investing countries, Australia has emerged in the international scene as investor and not only as recipient from the second part of the 1980s when its investments started to grow fast. Another important characteristic of Australian FDI is that the bulk of these investments has the U.S., Europe, especially the U.K. and New Zealand as favourite

[35] For incentives we mean relaxation of barriers to FDI, integration of legal framework, use of agencies, often national ones, which promote investments and so on.

destinations. Furthermore, these FDI have taken the form of M&A activity and have been mainly funded through international capital markets. The latter two features are in common with global FDI flows, but for Australia they are extremely clear (Rafferty and Bryan, 1998).

As already mentioned, Australia has been mainly a FDI recipient country until the second half of the 1980s, when its investments started a growth stronger than global trend. Extremely interesting is the rapid contraction that characterized Australian direct investment abroad from 1988 onwards and brought to a negative sign of its flows in 1991[36]. Starting from this point a new period of growth defined Australian FDI, but growth took a different shape. The first period of growth was characterized by a small group of companies that borrowed funds on international capital markets and operated through merger and takeover activities. These companies were then strongly exposed and vulnerable to possible downturns of the stock market (Rafferty and Ham, 2004).

The second "wave" was driven by the return as strong investors of some firms that were part of the first growth burst, like News Corporation and BHP Billiton, but also by the emergence of some financial service company; among these, we may mention National Australia Bank and AMP[37]. These companies changed their way of obtaining funds, starting to borrow through international banks and not only directly from financial markets. Especially, funds were provided by Australian banks which decided to internationalise their own strategy. The openness of direct investment to further funding possibilities, and the evolution of market opportunities, totally changed the sectoral subdivision of Australian direct investment: the massive investments in the mining sector, typical of the 1980s, starts to decrease whereas the manufacturing and especially the financial sectors expanded their operations. Again, the presence of few and strong

[36] This change in the trend is still more important if compared to the other OECD countries during those years: in fact they still experienced a growth, even at a slower pace, while Australia saw its investments falling rapidly.

[37] These financial-service firms operate in crucial sectors like life insurances, pension funds and retail banking.

companies characterized this surge of investments[38] and the favourite locations remained the United States, the United Kingdom and generally Europe, New Zealand and in minor part Papua New Guinea. Starting from the second half of the 1990s, China, India and especially Canada, started to play a prominent role as recipients of Australian FDI.

3.2 Australian FDI – data and statistics

Table 1: Foreign Direct Investment (FDI) Overview, selected years

Country	Type	FDI Stocks (millions of $)					as a percentage of GDP			
		1990	1995	2000	2006	2007	1990	2000	2006	2007
Australia	Inward	73 644	104 074	111 139	249 331	312 275	23.2	28.6	32.9	34.4
	Outward	***30 507***	***53 009***	***85 385***	***226 039***	***277 917***	***9.6***	***22.0***	***29.9***	***30.6***
China	Inward	20 691	101 098	193 348	292 559	327 087	5.1	16.2	10.5	10.1
	Outward	4 455	17 768	27 768	73 330	95 799	1.1	2.3	2.6	3.0
NZL	Inward	7 938	25 728	24 894	63 358	71 312	18.1	47.3	60.2	55.6
	Outward	4 422	7 676	8491	12 382	14 169	10.1	16.1	11.8	11.0
USA	Inward	394 911	535 553	1 256 867	1 843 885	2 093 049	6.8	12.8	14.0	15.1
	Outward	430 521	699 015	1 316 247	2 454 674	2 791 269	7.4	13.4	18.6	20.2
EU	Inward	761 987	1 146 970	2 190 397	5 675 258	6 881 625	10.6	25.9	39.0	40.9
	Outward	810 472	1 322 742	3 050 580	6 547 536	8 086 111	11.3	36.1	44.9	48.1
Developed economies	Inward	1 412 605	2 051 355	3 987 624	8 766 020	10 458 610	8.1	16.2	24.9	27.2
	Outward	1 640 405	2 607 460	5 265 116	10 837 952	13 042 178	9.5	21.3	30.8	33.9
World	Inward	1941 252	2 914 356	5 786 700	12 470 085	15 210 560	9.1	18.1	25.5	27.9
	Outward	1 785 267	2 941 198	6 148 211	12 756 149	15 602 339	8.5	19.4	26.3	28.9

Source: UNCTAD World Investment Report 2008. Country Fact Sheet: Australia

A look at Table 1, taken from UNCTAD WIR (2008) shows the stock levels of direct investment abroad for the year 2007: Australia accounted for 277917 millions of dollars. If considered as share of the total of world investment this number could seem low, as it represents only around 2 per cent but three other different comparisons may have a greater importance. Looking at the level of

[38] Between these companies it is worth mentioning BHP Billiton Group, CRA, News Corp, CSR, National Bank of Australia, Bond Corp, Elders Limited and Foster's Group

Chinese investments, which are growing really fast in importance all over the world, and comparing them to Australian ones, we can see that the latter are far above the former: this can imply that, also taking into account the dimension of both economies, the importance of Australia as investor it is not so irrelevant as its share in overall world investment might suggest. Furthermore, an analysis over time and a comparison with inwards FDI[39] show a consistent growth from year 1990, both for outwards and inwards, but especially stronger for the former.

A last interesting information we can take from the table is represented by the share of investments to GDP: the growth from 10 to 30 per cent in almost 30 years is almost the same growth taken by the world investments considered as a whole: in this field, then, we can say that Australia has mirrored very closely a global trend.

Table 2: Cross-border merger and acquisition overview, 1990-2007

Country	**Sales**				**Purchases**			
Year	**1990-2000**	**2005**	**2006**	**2007**	**1990-2000**	**2005**	**2006**	**2007**
Australia	***6 756***	***17 154***	***19 071***	***59 940***	***4 021***	***42 712***	***51 014***	***36 949***
China	558	10 131	11 452	12 185	297	5 599	15 384	4 529
NZL	2 167	5 336	5 331	4 911	1 250	1 519	2 412	5 237
USA	45 361	143 140	229 993	439 993	34 873	173 575	209 185	370 378
EU	75 313	539 490	530 040	734 550	68 135	477 530	509 018	847 882
Developed economies	142 124	774 191	921 784	1 424 211	130 113	784 411	937 747	1 414 753
World	159 269	929 362	1 118 068	1 637 107	159 269	929 362	1 118 068	1 637 107

Source: UNCTAD World Investment Report 2008. Country Fact Sheet: Australia

Table 2 provides other important information on the weight of merger and acquisition (M&A)[40] operations in the FDI taken as a whole. The data are

[39] On the UNCTAD report, investments abroad and into the country are called respectively Outward and Inward.

[40] With M&A we refer to a corporate strategy that mainly consists in the buying, selling and combining of different companies. A peculiarity of M&A is the absence of the creation of a new

recorded and expressed in flows FDI and we have to look on the purchases column to capture the acquisitions performed by Australian firms. For the year 2007 the M&A purchases of Australian multinationals amount for 36949 millions of dollars representing an important part of FDI outward. The data for the years 2005 and 2006 show a greater amount but this difference lies in the nature of M&A itself: some year could be characterised by a large number of this kind of operations taking into consideration that this does not depend only upon the strategy of the firms but also, and sometimes moreover, upon the opportunity offered by the market[41].

Furthermore, as reported in UNCTAD (2008), Australia improved its importance, captured by an FDI Performance Index[42] as international investor from year 2006 to 2007, passing from the 109th position to the 63rd out of 142 economies analysed. Another interesting information is given by the presence between the world's top 100 non-financial Transnational Corporations (TNCs) of an Australian firm: the BHP Billiton Group.

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business and it permits an industry to grow faster. The other form of FDI is represented by greenfield investments, which create a new business.

[41] For these reasons Table 2 should not be considered as the most important economic data about direct investment abroad.

[42] The FDI Performance Index captures the relative success of a country in investing globally. Outward FDI performance index "is calculated as the share of a country's outward FDI in world FDI as a ratio of its share in world GDP"
(UNCTAD, 2008. http://www.unctad.org/templates/WebFlyer.asp?intItemID=3242&lang=1)

$OND_i = (FDI_i / FDI_w) / (GDP_i / GDP_w)$

Where OND is the Outward FDI Performance Index of the *i*th country (*w* stands for world)

Table 3: Australia's direct investment by activity[43]

Industry	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Agriculture, forestry and fishing	n.p.	41	n.p.	n.p.	n.p.	n.p.	n.p.
Mining	8.907	7.356	6.293	6.508	11.380	27.293	25.532
Manufacturing	126.871	111.280	126.516	154.120	99.594	114.401	142.924
Electricity, gas and water	1.162	n.p.	n.p.	n.p.	n.p.	n.p.	3.610
Construction	14.521	4.135	3.852	5.349	5.894	3.556	4.480
Wholesale & Trade retail	5.543	5.455	6.410	5.996	5.623	6.226	6.078
Accommodation, café, restaurant	n.p.	n.p.	9	n.p.	n.p.	n.p.	n.p.
Transport & Communication	15.505	8.024	10.053	12.218	13.723	8.046	8.286
Finance and insurance	47.984	52.338	57.681	67.688	90.436	107.238	116.526
Property and business service	1.434	1.514	1.921	3.309	4.637	8.584	10.683
Other Services	1.385	1.490	1.740	2.322	3.033	3.896	4.651
Unallocated	207	10.116	435	n.p.	n.p.	n.p.	n.p.

Source: ABS cat. no. 5352.0 International Investment Position, Australia: Supplementary Statistics, 2007, Table 17a. 322770

Table 3 provides information on the sectoral dimension of Australian investment abroad by sector between 2001 and 2007, expressed in stock levels, and two interesting pieces of information can be obtained from it. First of all, the manufacturing and financial sectors seem to dominate the scene, accounting together for 80 per cent of the overall FDI volumes, and they are followed in importance by the mining one. Furthermore, the weight of the finance and insurance sectors followed an impressive growth path along the years, as already seen in the first part of this chapter: the second wave of Australian direct investment is pushed by the growth of the financial sector.

[43] On the original table the level of FDI Outwards is negative, as chosen by the ABS, but here it is preferable to show a positive sign in order to facilitate consultation and comparisons. N.p. stands for "not available for publication" and everything is expressed in Australian dollars.

Really interesting is also the comparison between the major recipients of Australian direct investments and the top export markets for trade in goods and services. Table 4 provides an overview on this great difference on 2007, the latest year considered in this study.

Table 4: Australia's major FDI recipients and export markets

Country	**FDI Outward (%)**	**Country**	**Export share (%)**
United States of America	26%	Japan	15.0%
New Zealand	18%	China	12.8%
European Union*	12%	United States of America	7.3%
Canada	8%	Republic of Korea	7.1%
United Kingdom	7%	New Zealand	6.0%
Singapore	3%	United Kingdom	5.4%
Japan	1%	India	5.2%
Others	24%	Singapore	3.3%

* EU 26, excl. United Kingdom
Source: ABS cat. no. 5352.0, Tables 1,2,4,5; DFAT STARS Database & ABS cat. no. 5368.0.

As we can see, there are huge geographical differences between trade partners and favourite locations to invest in: among the recipients of Australian FDI the "Western World" seems to be preferred to other locations; furthermore, Australian multinationals prefer to deal with similar cultural background in the choice of where to invest. For obvious reasons the Anglo-Saxon culture and economic system is seen as the most attractive by Australian firms, which share it. On the other hand, the physical distance, with all the economic problems related[44], seems to play a fundamental role in the selection of the export markets: only the United States and the United Kingdom can be found between the top trading partners that are not located in the Asian continent (and Oceania for New Zealand).

[44] See section 2.2.1

CHAPTER FOUR

4. METHODOLOGY

This section illustrates the model built for the study; since the approach followed is of a "general-to-specific" type, it also describes the improvements of the general model and the tests applied to it. A description of the econometric procedures in the choice of the most robust variables is also found in the chapter.

4.1 Variables selection process

As already discussed in section 2, previous studies have assessed the role played by several different variables in the attempt to explain the reasons for FDI. This study tries to include all the variables frequently used in econometric modelling and especially the list of crucial factors suggested by Lim (2001) is taken into consideration. The problem of transforming a theoretical model into a testable model arises due to the scarcity of economic data, especially in the developing countries[45]. To overcome this problem, many authors had to proxy variables rather than the needed variables; obviously this approach generates simpler models with a consequent loss of significance. In this section we show the variables chosen to build our models. The next chapter will provide a full explanation of the determinants included in our model.

The choice of the variables is never easy but we first focus on building a general model including most of the determinants highlighted in chapter two: the proxy chosen for *market size* is called GDP while *production factors* are represented by

[45] Problems with lacking data can also occur in developed countries; en example lies in the collection of FDI that it isn't equal for all the countries and in different years, both in the definition and collection system. Tcha (1999, p. 90) finds a different definition in Australian Bureau of Statistics between years before and after 1985.

GDPCAP (the variable WAGE is specific only for some country so implies a further analysis). *Openness of trade* and *distance* proxies are named respectively OPEN and DIST while *agglomeration effects* with AGGLO. RER, RERVOL and LANG stand respectively for *real exchange rate, real exchange rate volatility* and *social determinants*. In the end DEMO gives the effects of *country risk* variable on Australian direct investment. AIA represents the amount of Australian direct investments abroad. It is worth mentioning that data are ordered in a panel in order to capture the two-dimensional nature of the observations[46].

4.2 Estimation method

4.2.1 Econometric models

With this choice of explanatory variables the general model takes the form of:

$$AIA_{jt} = \alpha GDP_{jt} + \beta GDPCAP_{jt} + \gamma DIST_{jt} + \delta OPEN_{jt} + \varepsilon RER_{jt} + \zeta RERVOL_{jt} + \eta LANG_{jt} + \theta AGGLO_{jt} + \lambda DEMO_{jt} + C$$

where *j* stands for the host country and *t* represent the year the investment takes place.

Employing this general model a first analysis is made, with the help of the econometric software Eviews: we decided to run a first and basic pooled analysis using the technique known as the ordinary least squares (OLS) however conscious that other approach could be taken[47].

[46] We must take into account that two variables, LANG and DIST, do not change over years. They will be fully analysed in the next chapter.

[47] From Wezel (2003) we know that such an econometric tool is not the most appropriate because of the particular nature of the subject analysed and a more technical problem: in fact the geographical proximity of the host countries (South American countries) suggests the SUR estimation method to be preferable because it corrects for correlation of the error terms (see p. 26). In principle, we do not have to face such a problem because Australian investments recipients are located all over the World. Furthermore, the SUR technique requires the number of

According to Tcha (1999) then, we apply the OLS and we use these results as the basis of our analysis; after we discuss the preliminary results, paying attention to all the possible problems they could carry (serial correlation and heteroscedasticity for example), we can run a Hausman specification test to see if we may apply a random effects model or we have to use a fixed effects model. Again, the improved model is studied and the possible tests and correction applied. The last analytical technique we use is known as *extreme bounds analysis*, widely explained in the next paragraph, and permits our model to get rid of the less significant variables and construct a new model that takes into account only the most robust determinants. A final and stronger model is then obtained.

A further step in our research is made when a new model is built with the introduction of a more specific variable, WAGE, instead of the generic one GDPCAP as proxy of *production factor costs*. The same tests already run on the original model are performed to see the reactions this change can bring. However, we need to be aware of the fact that the number of countries included in the research abruptly decreased from 32 to 15 and the years from 16 to 15.

4.2.2 The extreme bounds analysis

Furthermore, general models are often improved by getting rid of the variables found less robust and the literature offers different approaches to this "filtering" operation: for example Deichmann (2004) refines a general model, including ten explanatory variables, and ends up having a model that takes into consideration the possible correlation problems between these variables by using a simple correlation matrix. The same operation can be found in Majocchi and Strange (2007). A different approach is taken by Levine and Renelt (1992): they test

periods to be greater than the countries we want to analyse and this is definitely not our case (because we analyse 32 countries and 16 years whereas Wezel studies 8 countries and 10 years).

their simple model through a process based on the Extreme Bounds Analysis (EBA)[48] to include in the final model only the most robust variables.

The EBA tests the robustness of each variable using a regression of the form:

$$\gamma = \alpha_j + \beta_{yj} * y + \beta_{zj} * z + \beta_{xj} * x_j + \varepsilon$$

where z is the variable tested, y is a vector of variables taken as fixed (so they are always included in each regression) and x_j a vector of three variables, changing at every regression and taken from the pool of variables the model wants to test.

For example, being N a pool of 9 independent variables[49] (so N equal to 9), defining them VAR1, VAR2, VAR3 and so on till VAR9, taking a generic variable DEP as dependent variable, the EBA checks the robustness of every single variables in the following way:

$$\begin{aligned} DEP = \alpha + \beta_1 VAR1 + \beta_2 VAR2 + \beta_3 VAR3 + \beta_4 VAR4 + \beta_5 VAR5 + \beta_6 VAR6 \\ + \beta_3 VAR3 + \beta_4 VAR4 + \beta_5 VAR5 + \beta_7 VAR7 \\ + \beta_3 VAR3 + \beta_4 VAR4 + \beta_5 VAR5 + \beta_8 VAR8 \\ + \beta_3 VAR3 + \beta_5 VAR5 + \beta_6 VAR6 + \beta_7 VAR7 \\ \dots \\ + \beta_3 VAR3 + \beta_7 VAR7 + \beta_8 VAR8 + \beta_9 VAR9 \end{aligned}$$

In this case, x_j is a vector of three variables taken from VAR4 to VAR9 and y is the couple VAR1 and VAR2. The variable tested, the z of the EBA regression, in this case is VAR3 and can be defined as robust if it is always found significant when combined with all the other variables; to check the significance the lower and the

[48] The EBA process was introduced by Leamer (1983, 1985).

[49] The choice of N equal to 9 in this example makes easier to understand the process because in this research 9 independent variables are used to explain the determinants of the dependent variable FDI.

upper extreme bounds[50] have to be compared: if they are both negative or both positive the variable is robust. Obviously, the same procedure has to be applied to all the other variables (VAR4 till VAR9). The test is really strong and it has been criticized by Sala-i-Martin (1997) for being too selective; for this reason he suggests a different version of the EBA. Another problem of the EBA lies in the fact that the choice of the "fixed" variables doesn't follow a predetermined path; in the literature, in fact, there are different examples: Wezel (2003) uses GDP and a variable that captures the risk (political, economical) of investing in a country[51], Mauro (1995) on the other hand opts for GDP, population growth and secondary education. A possible way to choose the fixed variables is to run the EBA regressions with the determinants of interest and find a robust variable, then run again with this variable taken as fixed and so on.

In this study the variable GDP, according to the already mentioned previous literature, is one of the two fixed variable; the other fixed variable is OPEN and is decided through the running of a preliminary EBA with GDP as *y*.

[50] The bounds are defined as the slope parameter minus (in the case of the lower bound) and plus (in the case of the upper) two times the standard deviation). Basically, expressed in formulas, it is β_{zj}-(+)$2*\sigma_{zj}$.

[51] See Wezel (2003), p. 16-21.

CHAPTER FIVE

5. VARIABLES

In chapter 2 we have reviewed the existing literature and the theory behind it supporting the choice of the explanatory variables we plan to analyse in our empirical work; now, our study focuses on the illustration of the variables we decided to use in building the econometric model depicted in chapter four. In doing this, we first present the dependent variable and then we turn to the explanatory variables.

5.1 Endogenous variable

In the literature there is no unanimously accepted method of measuring FDI; different authors chose to work with different measures (Wezel, 2003; Tcha, 1999). Therefore, the choice between using FDI stocks or flows as dependent variable is not an easy one, as both carry advantages and disadvantages; for example Wezel (2003) prefers to deal with flows in his study and enounces a list of distorting factors implied in the choice of stock. These disadvantages, however, are found to be mostly country specific[52]. In our analysis stocks are used rather than flows. In doing so, we follow the large majority of the analyses on the determinants of inward and outward FDI and as a result, a comparison with previous studies[53] is possible; furthermore, stocks are a better indicator of the activity in the foreign location because they show the overall amount of

[52] For example, German FDI stocks are recorded in the form of balance-sheet book values and this implies differences, in case of takeovers, between these values and the transaction data which are recorded at market values in the balance of sheet. Furthermore, individual recipient abroad are not listed in the Bundesbank's statistics and this prevents a sectoral analysis from being done. For an exhaustive explanation, see Wezel (2003), p. 4-5.

[53] See among the others Tcha (1999) and Deichmann (2004).

capital invested. Another reason for this choice is that flows can massively differ across years making it very difficult to carry out any specific analysis over time.
We use the stock level of Australian investment abroad collected by the Australian Bureau of Statistics (ABS 2001, 2007) and our study covers a time period of 16 years, from 1992 to 2007, and 32 countries[54] representing almost 90% of the total Australian outward FDI. The ABS defines the direct investment following the recommendation of the IMF *Balance of Payments Manual* so "the concept of direct investment is based on an investor resident in one economy – known as the direct investor – obtaining a lasting interest in an enterprise resident in another economy – the direct investment enterprise"[55] (OECD, 2004). Lasting interest means that the relationship between the investor, which has to exert a significant influence in the decision making process, and the enterprise must be of long time. The ownership by the investor, to play a significant influence, must be of ten per cent or more of the ordinary share or voting stock.

5.2 Exogenous variables

In this section we describe the variables used to build the model of our work and we go through the determinants of FDI analysed in chapter 2. We also try to show why some variables have not been included in the econometric models.

5.2.1 Variables included in the analysis

Market size

To capture market size we decide to follow the examples of the studies mentioned in section 2.2.1 and we collect data on GDP for the 32 countries

[54] For the list of the list of the countries analysed in this study, see Appendix A, Table A-1. Among the important recipients only Taiwan is not considered because of the lack of several data, especially due to Chinese agreement with the World Bank.

[55] See p. 387-388 of OECD (2004). *International Direct Investment Statistics Yearbook 1992-2003*. For a more exhaustive explanation of definitions and methods followed by ABS look at ABS (1998).

recipients of Australian direct investment and for the 16 years considered in our analysis. The data are taken from the World Bank website, in particular from the World Development Indicators (WDI) database. The advantage of using this proxy is that all the countries and time periods are fully recorded so there are no missing data.

Production factor costs

Production costs play a fundamental role in several studies; in our research we have to face an important data shortage regarding the wages of the recipient countries. For this reason we choose, following Majocchi and Strange (2007), to take GDP per capita as proxy of production factor costs[56]. As for GDP, data are taken from the World Bank (WDI). However, as explained in section 4.2.1 we also build a model using the data on wages taken from the Occupational Wages around the World (OWW) database, derived from ILO October Inquiry database[57]; unfortunately there are data only available for 15 years, from 1993 to 2007, and for 15 countries (listed in Appendix A, Table A-1) where Australian investments are prominent. As a result, this additional analysis can count on better indicators but has less observations than the previous model.

Economic distance / transport costs

The choice of the most suitable proxy for economic distance has not been difficult since we decide to follow Deichmann's (2004) example and consider the geographical distance between Australia's most important economic centre (Sydney), and the leading economic centers of the recipient countries (for

[56] We know that the assumption that all the costs of production are given by labour wages and that all the wealth of a person, represented by GDP per capita, comes only from the wage is definitely a really strong assumption but we prefer to lose some accuracy for an increase of the number of observations.

[57] The OWW database includes data taken from ILO (http://laborsta.ilo.org Table 01), they are turned into a normalized wage rate for each occupation and male worker. The database can be found at http://www.nber.org/oww/.

example New York for the United States, London for the United Kingdom, Paris for France and so on; Appendix A, Table A-2). Distances are expressed in kilometres and calculated as air distance. Obviously, distance does not change over time, so the fixed period analysis can not take into account this variable.

Agglomeration effect

The agglomeration variable we use here is defined as suggested by Wezel (2003, p. 22) so we take the moving-three year average of contemporary and lagged total FDI inwards stocks relative to respective host country GDP. It is important to notice that total FDI means that not only Australian direct investments have to be considered but also the investments coming from other countries. Levels of FDI inflows and GDP of the host countries are taken from the World Bank (WDI).

Openness of trade (trade barriers)

Our study tries to capture the characteristics of the openness of trade variable choosing as a proxy the widely accepted ratio of the sum of export and import to GDP. The choice permits the study to be highly related to previous researches. A lack of data prevents us from using the *Freedom to trade with foreigners index*, from the Fraser Institute or the *Trade Freedom Index* from the Freedom House website. Import and export data, like for GDP, are available from the World Bank.

Real exchange rate (and exchange rate volatility)

In this study we decided to test both the effects of the real exchange rate level and of its volatility on the direct investment. The nominal exchange rate has been collected from the Reserve Bank of Australia archives and the real exchange rate has been computed following its recommendations (RBA, 2001). For what may concern exchange rate volatility, our research follows the study of Hubert and Pain (1999) and as a result, volatility is defined as a "two-year moving average of past real exchange rate fluctuations"; technically it is constructed as a variance of the logarithm of real exchange rate over past years:

$$RERVOL = [(1/2) \sum_{i=1}^{2} ((\log RER_{i,t-k} - \log RER_{i,t-k+1})/\log RER_{i,t-k+1})^2]^{1/2}$$

Where RERVOL stays for real exchange rate volatility, RER is the real exchange rate between Australia and the i^{th} country in a year.

Country risk

The choice of the best proxy for the risk that a firm can face when investing in a certain location was not easy especially because the best indicators, like the Polity IV dataset, show several missing observations for the countries considered in our research. Other rich datasets, like for example the Political Risk Service (PRS), are not freely available, so we have chosen to follow a different approach, suggested by Narayan (2008), and we used the *Polity Score*. It can be found on the Polity IV website and basically it records the political freedom of a country distinguishing between democracies, fully institutionalized autocracies and mixed and incoherent regimes (called "anocracies"); these differences are captured by the *Polity Score*, ranging from -10 to 10, being 10 the most institutionalized democracy[58]. The strength of this dataset is that we can count on observations for all the years and countries included in our analysis.

Social determinants

As for social determinants, we decided to add a proxy that captures the relationships existing between Australian culture and the one of the host country; the choice fell on language similarities, assuming that a more similar language stimulates the willingness of investing in a specific location. The approach is supported in the literature by Deichmann (2004). For language affinity variable we set a scale from 1 to 5 as suggested in McDonald (1997): we assigned 5 points to English speaking countries, 4 to Germanic (German, Dutch,

[58] For more exhaustive information about the Polity Score see: http://www.systemicpeace.org/polity/polity4.htm

etc.) languages, 3 to Romance languages (Italian, French, Spanish, etc.), 2 to Slavonic (Russian, Polish, etc.) and 1 to languages with negligible connections with English.

A list of the variables used in this study, with their sources and explanation, can be found in Appendix A, Table A-4.

5.2.2 Variables excluded from the models

Some of the variables discussed in chapter 2 have been dropped out from the final econometric model and the reasons are different; for the *fiscal incentives* variable we prefer to follow the findings of Reuber and others (1973) and Oman (2000) consider them too country specific and of secondary importance to be included in a general analysis. The *business climate* found in the host countries is tested using two variables: the *country risk* proxy captures the political environment and a *social determinant* proxy, in the form of language affinity, gives an idea of cultural similarities. The decision of excluding a *Free trade agreement* testable variable has for Australia some specific reason. In fact, Australia has only 6 free trade agreements[59] (ASEAN, Singapore, Thailand, United States, New Zealand and Chile) but only the one with New Zealand is totally effective and dated back to 1988. All the others are very recent in time (around 2005) and at the first stages of their implementation so the possible effect on FDI could be fully investigated only by the New Zealand-Australia agreements.

[59] For a complete list of Australian free trade agreements (FTA) see Appendix A, Table A-3.

CHAPTER SIX

6. EMPIRICAL ANALYSIS

The empirical results based on the panel data described in the previous chapter aim at examining the drivers of Australian FDI. In order to simplify the interpretation of our results, Table 5 summarizes the possible effects of the FDI drivers we have reviewed in chapters 2 and 5.

Table 5 – expected sign of independent variables

Variables	**Definition**	**Expected valence**
GDP	Market size	+
GDPCAP	Production factor costs	+
WAGE	Production factor costs	+
DIST	Economic distance	+ for horizontal FDI - for vertical FDI
OPEN	Openness of trade	- for horizontal FDI + for vertical FDI
RER	Real exchange rate	?
RERVOL	RER volatility	?
AGGLO	Agglomeration effects	+
DEMO	Country risk	+
LANG	Language affinity	+

As we can see, and as we have already explained in detail in chapter 2.2.2, the effect of RER and RERVOL is in general ambiguous. Theory suggests clearer sign patterns for all the other variables, and this will make the interpretation of our results easier.

We remember that GDP, GDPCAP, WAGE, DIST, RER and AGGLO are expressed in logarithmic scale in order to interpret their coefficients as elasticity and more easily interpret the marginal effects on Australian investment abroad (AIA).

6.1 Australian direct investment abroad – general model

6.1.1 OLS and Fixed Effects estimation method

The first specification we focus upon is given by:

$$AIA_{jt} = \alpha GDP_{jt} + \beta GDPCAP_{jt} + \gamma DIST_{jt} + \delta OPEN_{jt} + \varepsilon RER_{jt} + \zeta RERVOL_{jt} + \eta LANG_{jt} + \theta AGGLO_{jt} + \lambda DEMO_{jt} + C$$

Where AIA is the stock of Australian FDI in country *i* at time *t*. The regression results, obtained using a basic OLS estimation technique, are reported in Table 6[60].

Table 6 – Australia's investment abroad, panel data 1992-2007, main results

Variables	**Valence & Significance**
GDP	1.165347 (23.95998) ***
GDPCAP	0.187670 (0.190762)
DIST	-2.460428 (-21.11551) ***
OPEN	0.769971 (7.656976) ***
RER	-0.853856 (-0.844730) *
RERVOL	0.009867 (0.402260)
DEMO	0.033332 (1.988899)
LANG	0.446635 (8.323455) ***
AGGLO	0.003863 (0.402504)
C	-4.571541 (-4.281579) ***
Adjusted R-squared[61]	0.776100
Observations	346

Note: *t* statistic in parentheses; *,** and *** significant at 10%, 5% and 1% respectively.

[60] The complete outputs of all the regression made in this study can be found in Appendix B, from Table B-1 to B-9; for ease of consultation we only give the most interesting results in this section.

[61] We consider the adjusted R-squared because it adjusts for the number of explanatory terms in a model; the R-squared, on the other hands, always rise when explanatory variables are added. For more explanations see Pindyck and Rubinfeld (1998), p. 90-92.

First, we can notice that four variables out of nine are strongly significant at the 1% level, and that one is weakly significant, at the 10% level; we could also notice that, looking the F-statistic for the overall significance of the regression, rejecting the null hypothesis lead to consider our regressors as significant so it gives credit to the general model applied. Turning to the effect of each individual variable, we may easily notice how GDP has a strong positive and significant impact on FDI stocks, as predicted by theory. The positive sign may suggest that Australian firms tend to locate their production in order to take advantage of larger markets to exploit scale economies and lower fixed cost per unit of output. Since we are dealing with elasticity, we can easily interpret the coefficient on GDP: A one percentage point increase in the latter will lead to a 1.16 per cent percentage points growth of AIA. A wider discussion deserves the outcomes of the two variables OPEN and DIST: they are strongly significant (1% level) but they show different relationship with AIA, respectively positive and negative. This finding is in accordance with theoretical studies and is consistent with a vertical motivation behind Australian investments: distance negatively affects vertical FDI due to higher transport cost while higher openness of trade has a positive effect on them because of lower barriers (costs) for trades[62]. Again, we are considering elasticities but the effect of OPEN is weaker than GDP (around 0.77) while DIST strongly affects vertical investments reducing them by 2.46 per cent every km farer from Sydney. Also the LANG proxy enters significantly in the decision to invest abroad, but this result is not surprising if we remember that four out of the first five destinations of Australian investments are English speaking countries[63]. Again this result supports the theoretical predictions. A different discussion characterizes RER: the significance is weak (at 10% level) and the negative sign suggests that an appreciation of one unit of the Australian

[62] In our work we consider openness of trade as the simple trade shares of a country so we are conscious our proxy does not perfectly represents the effect of lower trade barriers. Average tariff rates, export taxes and indices of non-trade barriers would be better proxies but we defend our choice because it is the most spread through previous research and because we found lack of data for the above mentioned indicators. For an extensive review of openness proxies see Yannikaya (2003).

[63] See Table 4 in chapter 3.2.

unit leads to a decrease Australian investment by 0.85 per cent. Thus, it appears that Australian companies' decisions to invest in foreign countries are discouraged by the appreciation of the local currency, since locating the production there becomes relatively more expensive, as explained in chapter 2.2.2. Both vertical and horizontal can be reduced by such an appreciation so this finding does not give us further clues about the type of FDI. The adjusted R-squared also deserves attention, as the value of 0.776 shows a satisfactory goodness of fit and gives strength to the model.

The next step in the analysis consists in accounting for unobserved heterogeneity in out model using fixed or random effects methods[64]. To decide which one of the two methods is more appropriate, we run a Hausman specification test[65]: *p* values of 0.0000 and 0.0021, respectively for cross-section random effects and period random effects, make us reject the null hypothesis that the coefficients estimated by random effects estimator are the same as the ones estimated by the fixed effects estimator; the best estimator is then the fixed effects methods. It enables the model to account for unobserved heterogeneity at the country level and over time. Table 7 reports the results of the regression for cross-section fixed effects (FE), period (FE) and both.

Table 7 –Australia's investment abroad, fixed effects 1992-2007, main results

Variables	**Cross-section FE**	**Period FE**	**Both FE**
GDP	1.776797 (4.0015)***	0.559020(8.8784)***	1.480422 (3.5158)***
GDPCAP	-0.157394 (-0.1636)	0.316310(0.2023)	2.866639(2.2794)
OPEN	0.835601 (4.6957)***	0.657754 (1.905)*	0.743196 (3.9115)***
RER	0.026430 (0.0986)	-0.143553 (-4.648)***	-1.965144 (-4.961)***
RERVOL	0.005742 (0.3426)	0.037447 (0.9742)	-0.003630 (-0.2818)
DEMO	-0.007078 (-0.3216)	-0.000349 (-0.0143)	0.001429 (0.0833)
AGGLO	0.027998 (4.2649)***	-0.013138 (-0.8418)	0.014221(2.7065)***
C	-39.08744 (-2.694)***	-9.788195 (-6.605)***	-29.16287 (-5.330)***
Adjusted R-squared	0.923881	0.570821	0.957302
Observation	346	346	346

[64] A description of the two models can be found in Pindyck and Rubinfeld (1998), p 252-256.

[65] The complete results of the Hausman tests in Appendix B, Table B-10, B-11.

Commenting the results, it is worth mentioning that, since LANG and DIST variables do not change over years, they can not be included in the model and this implies the loss of two highly significant determinants. A quick comparison between the three outputs confirms the strong significance of GDP and OPEN (even if in the period FE case the significance is weaker) also when cross-country and period FE are considered. Looking at the magnitude of the coefficient of OPEN we can see that it doesn't change too much from the OLS model and the sign is still positive; greater changes (compared to OLS results) occur for GDP when cross-section FE and period FE are taken into account: stronger positive effect for the first (1.77) and smaller positive effect for the second (0.56). This could suggest that the differences between countries tend to empower the relationship between GDP and AIA, while the effect is mitigated across years. The other variable found significant in the first regression was the RER and Table 7 provides an interesting picture: when cross-section FE are applied the variable loses significance while the opposite happens when corrected with period FE (significant at 1%) level. This fact may suggest that year fixed effects model can better represent the influence (still negative even if weaker) on Australian investment. The last driver found significant, when corrected for FE, is AGGLO and this is an important difference with the OLS output. The sign of the coefficient confirms the theoretical predictions developed in chapter 2, but it can be detected only with cross-country FE; this could mean that agglomeration effects play a role only if heterogeneity across country is considered. Its impact during years seems to be not significant. However, the fact that its effect on AIA is very weak (0.028 for cross-section FE and 0.014 for both the FE) could suggest that Australian investments are only marginally affected by the size of the existing FDI stock. For these reasons the results are similar to the OLS regressions and the corrections applied do not change the situation depicted in the general model analysis.

A final look at the adjusted R-squared shows that the model fits the data very well when cross-section FE are considered (0.923) and a little weaker, but still satisfactory, with period FE (0.57). The lower value of period FE adjusted R-squared may suggest that the inclusion of year-specific effects in our research weakens the fit of the regression.

6.1.2 Extreme bounds analysis

So far the analysis of the determinants of Australian investments abroad has shown the importance of two variables: GDP and OPEN and the importance of RER, all tested with fixed effects. Also DIST and LANG are found to be strongly significant, buy unfortunately they can not be added to the fixed effects models.

Following a "general-to-specific" approach, we try now to narrow down the number of variables included in the general model to create a new and more robust one through the econometric technique known as the *extreme bounds analysis* (EBA). The results from this method are reported in Table 8.

Table 8 – Extreme bounds analysis

Variables	Lower bound	Upper bound
GDPCAP	-0.41511	0.226421
DIST	-1.92122	0.395166
LANG*	3325.497	8441.698
RER	-3.14209	6.183354
RERVOL	-1955.69	1206.146
DEMO	-591.796	885.4638
AGGLO	-1045.19	2030.478

Fixed variables: GDP and OPEN[66].
Regressions include the fixed variables plus one of those listed above (variables of interest and three of the pool of remaining variables at a time.
* denotes robust variables as found by EBA.

Only LANG is found robust at the EBA test so we can build a new model including only the three robust variables: GDP chosen following literature examples, OPEN through preliminary EBA and LANG as explained above.

$$AIA_{jt} = \alpha GDP_{jt} + \delta OPEN_{jt} + \eta LANG_{jt} + C$$

[66] The choice of the fixed variables is explained in chapter 4.2.2.

Table 9 – Australia's investment abroad, 1992-2007, main results

Variables	Valence & Significance
GDP	0.661591 (16.09002)***
OPEN	0.642358 (8.076970) ***
LANG	0.402703 (9.536579) ***
C	-11.80753 (-10.35981) ***
Adjusted R-squared	0.535784
Observations	441

Note: *t* statistic in parenthesis; *,** and *** significant at 10%, 5% and 1% respectively

Table 9 shows the results of the regression OLS applied to the robust model; again, the three variables are found highly significant at 1% level so further attention must be paid to the magnitude of the coefficient if compared to results of Table 6. The coefficients of OPEN and LANG are very similar but differences are seen in GDP: in fact, the coefficient of the robust model shows the same signs, but smaller magnitudes and this fact could imply that the general model overestimates it. The robust model is supported also by a good value of adjusted R-squared (0.535). We decided not to apply the FE effects because we could not include LANG in the models and it would reduce the model only at the study of two variables[67].

6.2 Australian direct investment abroad – robustness check for wage variable

As explained in chapter 4.2.1 and 5.2.1 the GDPCAP variable is a weak proxy for production factors costs and the analyses of section 6.1 show that it is also not significant. The non significance might be explained by possible measurement errors. As a result, we build a new model replacing GDCAP with a more precise WAGE. We also must take into account that, to insert this variable in the model,

[67] The behaviour of OPEN and GDP with fixed effects included has been analysed in section 6.1.1 and this is the reason we prefer to study the model with all the robust variables.

we have to reduce the sample and subsequently the number of observations[68]. Table 10 includes the results of the OLS and the FE regressions.

Table 10 – Australia's investment abroad, 1993-2007

Variables	**OLS**	**Cross-section FE**	**Period FE**	**Both FE**
GDP	1.29054(19.238) ***	1.962846 (8.1526) ***	0.519296 (7.1420) ***	1.479300 (2.6311) ***
WAGE	-0.007428 (-0.096)	0.082270 (0.2245)	0.260085 (0.6776)	0.347484 (1.0411)
DIST	-2.300908 (-15.618) ***			
OPEN	0.688378 (4.6671) ***	0.436270 (1.8432) *	0.979021 (5.3320) ***	0.555378 (3.4696) **
RER	-0.305356 (-2.7820) ***	0.659184 (1.2172)	-0.641162 (-6.8257) ***	-0.355091 (-0.6448) ***
RERVOL	-0.035264 (-1.2045)	0.007263 (0.3617)	-0.070290 (-5.6564)	0.010122 (0.7419)
DEMO	0.092836 (1.8469) *	0.164949 (0.981674)	0.286739 (5.8415) ***	0.065443 (0.5906)
LANG	0.078143 (1.7004) ***			
AGGLO	0.024254 (2.4723) **	0.030923 (4.4192) ***	0.046689 (3.078290) ***	0.014663 (2.9945) ***
C	-6.306084 (-3.960357) ***	-48.07001 (-9.0930) ***	-4.768916 (-1.1967) ***	-49.16392 (-3.4313) ***
Adjusted R-squared	0.824758	0.927551	0.694169	0.969796
Observations	197	197	197	197

Note: *t* statistic in parenthesis; *,** and *** significant at 10%, 5% and 1% respectively.

The object of our robustness check is the effect of *labour costs*, proxied by WAGE, on Australian investments and the findings seem to confirm the non significance of such a variable: in fact, like GDPCAP in the previous analysis, WAGE is never found significant. This means that even a more precise measure for labour costs does not make them significant.

Looking at the column of OLS regression we can immediately notice how the variables GDP, OPEN, DIST, RER and LANG still remain significant, even with different level compared to the general model analysis. In fact, RER is now

[68] The modified model reduces the number of country included in the dataset from 32 to 15 and excludes the observations for the year 1992. Luckily, the major destinations of Australian FDI are still included in the analysis.

strongly significant. The coefficients of GDP, OPEN and DIST are very similar to the ones estimated in the model including GDPCAP so the analysis is the same we did in the previous section. The interesting part of this analysis lies in the magnitude of RER and LANG, far smaller than the original model, and moreover in the variable DEMO and AGGLO. DEMO is found significant also when period FE are applied (but not with cross-section FE) showing a positive coefficient: this is not surprising because more points a country has on the democracy scale used in our study, the more attractive for investment it is. Here, an increase of one point in the scale brings an increase of 0.09 and 0.28 per cent (with period FE) of AIA. For AGGLO, there is an important proof of significance because now we do not have to apply the correction for fixed effects (which however confirms) to see its impact on AIA[69]. The high adjusted R-squared (0.824) gives strength to the model and to our findings.

In sum, this further analysis failed in the attempt to introduce a more explicative variable for *labour costs* but the fact that, also in presence of a small sample, the outputs are basically the same of the original model could suggest Australian investments not to be attracted by lower labour costs, regardless of the proxy chosen to study them.

[69] However, it is important to note that the effect of AGGLO on AIA is significant but still very close to zero.

CHAPTER SEVEN

7. CONCLUSIONS

This work investigated the reasons which drive Australian investments abroad and the empirical results suggest that both vertical and horizontal motives play an important role.

Among the determinants found significant, vertical characteristics are shown by the sign of the coefficient of the variable which captures *openness of trade* (*trade barriers*): the positive sign, according to theory, suggests that vertical investments are more likely, since vertical investments imply trade between the FDI source and destination countries. This interpretation is consistent with other findings of our analysis. In particular, Australian firms are more likely to locate their investments in countries which are geographically closer to them. Therefore, *openness of trade* and *distance* findings give a vertical shape to Australian investments.

We found also that Australians companies share some preference for horizontal FDI as well, as indicated by the importance of *market size* for their investments. In fact, as predicted by theory, horizontal investments are strongly attracted by large markets because in larger economies is possible to reduce the cost implied in supplying them and it is easier to adapt to changes in local customs. The importance of horizontal FDI is witnessed also by the preference for countries who share the same language as favourite locations. A closer culture, in fact, increases the possibility to successfully enter the market.

Nothing can be said about the type of investment chosen by Australian firms when we consider the other significant drivers. *Real exchange rate* movements do affect in the same way both vertical and horizontal investments, and in our work we found a negative influence on them deriving from a possible

appreciation of the local currency. Hence, Australian firms found to be sensitive to fluctuations. It is also interesting to note that the presence of other FDI in a region (*agglomeration effect*) can attract Australian multinationals, even if the relationship seems to be really weak. Again, no further information about the nature of the investment can be taken from this variable.

Political risk and especially *production factor costs* do not play a significant role but the reasons behind this fact could be different. For *political risk* the choice of the proxy, in our work represented by the presence of democracy in the host country, could be too generic. We must notice, however, that the sample we used does not include countries which reported important political risks during the period analysed and this could explain the absence of significance. For *production factor costs*, on the other hand, the problem does not lie in the choice of the proxy, as showed by the robustness check we applied. For this reason the non significance can not be explained by a lack of accuracy but more probably, Australian firms tend to consider other factors as main drivers of their investments abroad.

In sum, Australian investments abroad are characterized by some typical vertical feature, like the preference for trade open countries, favourably close to their home market, and some horizontal trait, like the orientation towards large host economies which also share similar cultural roots. The possibilities of cheaper investments, offered by the host country exchange rate movements, also play an important role, and agglomeration effect makes clustering attractive, even if in a very weak way. Labour costs do not significantly affect the choice of investing abroad, like political risks.

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APPENDIX A

Table A-1 – list of countries

Argentina	Fiji	Japan*	Russian Federation
Bahrain	France	Republic of Korea*	Singapore*
Brazil	Germany*	Malaysia	South Africa*
Belgium & Luxembourg*	Greece*	Mexico	Sweden*
Canada*	Hong Kong*	Netherlands*	Switzerland
Centr. America & Caribbean	Indonesia	New Zealand*	Thailand
Chile	Ireland*	Papua New Guinea	United Kingdom*
China	Italy	Philippines	United States*

The countries marked with * are included also in the second model that tests the significance of the wages instead of GDP per capita as *production costs* variable. Caribbean and Centr. America represents Virgin British Islands, Cayman Islands and Bermuda.

Table A-2 – economic centres of the countries in the study

Country	City	Country	City
Argentina	*Buenos Aires*	Rep. of Korea	*Seoul*
Bahrain	*Manama*	Malaysia	*Kuala Lumpur*
Brazil	*Rio de Janeiro*	Mexico	*Mexico City*
Belgium (& Lux)	*Brussels*	Netherlands	*Amsterdam*
Canada	*Toronto*	New Zealand	*Wellington*
Chile	*Santiago de Chile*	Papua New Guinea	*Port Moresby*
China	*Beijing*	Philippines	*Manila*
Fiji	*Suva*	Russian Federation	*Moscow*
France	*Paris*	Singapore	*City of Singapore*
Germany	*Berlin*	South Africa	*Johannesburg*
Greece	*Athens*	Sweden	*Stockholm*
Hong Kong	*Hong Kong*	Switzerland	*Zurich*
Indonesia	*Jakarta*	Thailand	*Taipei*
Ireland	*Dublin*	United Kingdom	*London*
Italy	*Milan*	United States	*New York*
Japan	*Tokyo*		

Table A-3 – Australian Free Trade Agreements

Country	Year	Country	Year
ASEAN – NZL	2009	United States	2005
Singapore	2003	New Zealand	1988
Thailand	2005	Chile	2009

ASEAN members are Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

Table A-4 – List of exogenous variables employed

Variables	Definition	Dimension/Timing	Further explanations	Source
AIA	Level of Australian investments abroad	AUS$ million, 1992-2007		Australian Bureau of Statistics
GDP	Real absolute GDP	Current US$		World Bank WDI
GDPCAP	Real GDP per capita	Current US$	Proxy for wages	World Bank WDI
WAGE	Occupational wages	Uniform calibration US$, 1993-2007	normalized wage rate, male worker	OWW database
DIST	Distance from Sydney to economic centre	In Km		*Atlas of the World*
OPEN	Openness of Trade	(Export + Import)/GDP	Exports (Imports) of goods, services and income (BoP, current US$)	World Bank WDI
RER	Bilateral real exchange rate	RER (host country vs. Australia)		Reserve Bank of Australia
RERVOL	Volatility of real exchange rate	Two-year moving average of squared percentages changes in the bilateral RER	Uses present years and the two previous years	Reserve Bank of Australia
AGGLO	Agglomeration effects	Present and past FDI flows Three-year moving average of total (global) FDI inflows/host country GDP	Uses present year and the two previous years	World Bank WDI
DEMO	Country Risk	Democracy/Anocracy/Democracy	Scale from minus 10 to 10	Polity IV
LANG	Language	Language of host country	Scale from 1 to 5	McDonald (1997), Deichmann (2004)

APPENDIX B

Table B-1 – Regression general model, OLS

Dependent Variable: FDI
Method: Panel Least Squares
Sample (adjusted): 1993 2007
Cross-sections included: 29
Total panel (unbalanced) observations: 346

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.571541	1.067723	-4.281579	0.0000
AGGLO	0.003863	0.009599	0.402504	0.6876
DIST	-2.460428	0.116522	-21.11551	0.0000
GDP	1.165347	0.048637	23.95998	0.0000
GDPCAP	0.187670	0.071067	0.190762	0.2087
LANG	0.446635	0.053660	8.323455	0.0000
OPEN	0.769971	0.100558	7.656976	0.0000
RER	-0.853856	0.028241	-0.844730	0.0989
RERVOL	0.009867	0.024529	0.402260	0.6877
DEMO	0.033332	0.016759	1.988899	0.0475

R-squared	0.782609	Mean dependent var	7.850638
Adjusted R-squared	0.776100	S.D. dependent var	1.838040
Log likelihood	-435.7893	F-statistic	120.2403
Durbin-Watson stat	0.251810	Prob(F-statistic)	0.000000

Table B-2 – Regression *cross-section* fixed effects

Dependent Variable: FDI
Method: Panel Least Squares
Sample (adjusted): 1993 2007
Cross-sections included: 29
Total panel (unbalanced) observations: 346

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-39.08744	14.50399	-2.694945	0.0074
AGGLO	0.027998	0.006565	4.264902	0.0000
GDP	1.776797	0.887701	4.001573	0.0062
GDPCAP	-0.157394	0.961923	-0.163624	0.8701
OPEN	0.865301	0.184274	4.695722	0.0000
RER	0.026430	0.267854	0.098674	0.9215
RERVOL	0.005742	0.016756	0.342652	0.7321
DEMO	-0.007078	0.022007	-0.321645	0.7479

R-squared	0.931847	Mean dependent var	7.850638
Adjusted R-squared	0.923881	S.D. dependent var	1.838040
Log likelihood	-235.7001	F-statistic	116.9785
Durbin-Watson stat	0.682015	Prob(F-statistic)	0.000000

Table B-3 – Regression *period* fixed effects

Dependent Variable: FDI
Method: Panel Least Squares
Sample (adjusted): 1993 2007
Cross-sections included: 29
Total panel (unbalanced) observations: 346

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.788195	1.481721	-6.605964	0.0000
AGGLO	-0.013138	0.015607	-0.841837	0.4005
GDP	0.559020	0.062964	8.878474	0.0000
GDPCAP	0.316310	0.105355	0.202329	0.8029
OPEN	0.657754	0.142640	1.905953	0.0696
RER	-0.143553	0.030883	-4.648349	0.0000
RERVOL	0.037447	0.038439	0.974201	0.3307
DEMO	-0.000349	0.024370	-0.014339	0.9886

R-squared	0.604664	Mean dependent var	7.850638
Adjusted R-squared	0.570821	S.D. dependent var	1.838040
Log likelihood	-577.8500	F-statistic	14.91196
Durbin-Watson stat	0.123009	Prob(F-statistic)	0.000000

Table B-4 – Regression *cross-section* and *period* fixed effects

Dependent Variable: FDI
Method: Panel Least Squares
Sample (adjusted): 1993 2007
Cross-sections included: 29
Total panel (unbalanced) observations: 346

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-29.16287	12.97407	-5.330855	0.0000
AGGLO	0.014221	0.005254	2.706522	0.0072
GDP	1.480422	0.772728	3.515839	0.0001
GDPCAP	2.866639	0.874111	2.279490	0.7012
OPEN	0.743196	0.157085	3.911587	0.0027
RER	-1.965144	0.396060	-4.961727	0.0000
RERVOL	-0.003630	0.012880	-0.281835	0.7783
DEMO	0.001429	0.017148	0.083350	0.9336

R-squared	0.963508	Mean dependent var	7.850638
Adjusted R-squared	0.957302	S.D. dependent var	1.838040
Log likelihood	-127.9458	F-statistic	155.2506
Durbin-Watson stat	0.901688	Prob(F-statistic)	0.000000

Table B-5 – Regression robust model (after EBA analysis)

Dependent Variable: FDI
Method: Panel Least Squares
Sample: 1992 2007
Cross-sections included: 32
Total panel (unbalanced) observations: 441

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.80753	1.139743	-10.35981	0.0000
GDP	0.661591	0.041118	16.09002	0.0000
OPEN	0.642358	0.079530	8.076970	0.0000
LANG	0.402703	0.042227	9.536579	0.0000

R-squared	0.539776	Mean dependent var	7.610377
Adjusted R-squared	0.535784	S.D. dependent var	1.918481
Log likelihood	-756.3239	F-statistic	110.1616
Durbin-Watson stat	0.105151	Prob(F-statistic)	0.000000

Production costs robustness check

Table B-6 – Regression general model, OLS

Dependent Variable: FDI
Method: Panel Least Squares
Sample (adjusted): 1993 2007
Cross-sections included: 14
Total panel (unbalanced) observations: 197

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.306084	1.592302	-3.960357	0.0001
AGGLO	0.024254	0.009810	2.472349	0.0144
DIST	-2.300908	0.147317	-15.61871	0.0000
GDP	1.290548	0.067081	19.23861	0.0000
LANG	0.078143	0.111562	1.700445	0.0086
OPEN	0.688378	0.147494	4.667166	0.0000
RER	-0.305356	0.109760	-2.782025	0.0060
RERVOL	-0.035264	0.029275	-1.204564	0.2300
DEMO	0.092836	0.050266	1.846902	0.0664
WAGE	-0.007428	0.076603	-0.096965	0.9229

R-squared	0.834079	Mean dependent var	8.647526
Adjusted R-squared	0.824758	S.D. dependent var	1.884417
Log likelihood	-217.6869	F-statistic	89.48000
Durbin-Watson stat	0.275907	Prob(F-statistic)	0.000000

Table B-7 – Regression *cross-section* fixed effects

Dependent Variable: FDI
Method: Panel Least Squares
Sample (adjusted): 1993 2007
Cross-sections included: 14
Total panel (unbalanced) observations: 197

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-48.07001	5.286443	-9.093073	0.0000
AGGLO	0.030923	0.006997	4.419238	0.0000
GDP	1.962846	0.240762	8.152647	0.0000
OPEN	0.436270	0.236689	1.843218	0.0671
RER	0.659184	0.541547	1.217224	0.2252
RERVOL	0.007263	0.020078	0.361754	0.7180
DEMO	0.164949	0.168028	0.981674	0.3277
WAGE	0.082270	0.366391	0.224541	0.8226

R-squared	0.935643	Mean dependent var	8.647526
Adjusted R-squared	0.927551	S.D. dependent var	1.884417
Log likelihood	-128.1887	F-statistic	115.6150
Durbin-Watson stat	0.642471	Prob(F-statistic)	0.000000

Table B-8 – Regression *period* fixed effects

Dependent Variable: FDI
Method: Panel Least Squares
Sample (adjusted): 1993 2007
Cross-sections included: 14
Total panel (unbalanced) observations: 197

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.768916	2.313616	-1.196792	0.2331
AGGLO	0.046689	0.015167	3.078290	0.0024
GDP	0.519296	0.072709	7.142095	0.0000
OPEN	0.979021	0.183612	5.332003	0.0000
RER	-0.641162	0.093932	-6.825790	0.0000
RERVOL	-0.070290	0.042435	-5.656404	0.6995
DEMO	0.286739	0.049086	5.841579	0.0000
WAGE	0.260085	0.097131	0.677669	0.4082

R-squared	0.694169	Mean dependent var	8.647526
Adjusted R-squared	0.653637	S.D. dependent var	1.884417
Log likelihood	-275.4758	F-statistic	17.12648
Durbin-Watson stat	0.336843	Prob(F-statistic)	0.000000

Table B-9 – Regression *cross-section* and *period* fixed effects

Dependent Variable: FDI
Method: Panel Least Squares
Sample (adjusted): 1993 2007
Cross-sections included: 14
Total panel (unbalanced) observations: 197

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-49.16392	14.32768	-3.431395	0.0008
AGGLO	0.014663	0.004897	2.994576	0.0032
GDP	1.479300	0.562224	2.631159	0.0094
OPEN	0.555378	0.173773	3.469602	0.0437
RER	-0.355091	0.920503	-0.644844	0.0004
RERVOL	0.010122	0.013643	0.741905	0.4593
DEMO	0.065443	0.110805	0.590612	0.5557
WAGE	0.347484	0.333738	1.041185	0.2994

R-squared	0.975419	Mean dependent var	8.647526
Adjusted R-squared	0.969796	S.D. dependent var	1.884417
Log likelihood	-37.23452	F-statistic	173.4683
Durbin-Watson stat	0.905879	Prob(F-statistic)	0.000000

Hausman tests

Table B-10 – Hausman test on *cross-section* random effects

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	190.285418	7	0.0000

Table B-11 – Hausman test on *period* random effects

Correlated Random Effects - Hausman Test
Equation: Untitled
Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	23.909679	9	0.0044