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ABSTRACT

The paper uses macro panel data on US FDI in developed countries during 1982-2010 to empirically investigate the influence of host country characteristics on FDI. Differing from earlier panel data studies on FDI determinants which often impose the standard restrictions of the homogeneity of slope coefficients on the observed variables and the homogeneity of the factor loadings on the unobserved common factors in the empirical specification, this paper allows the effects of observed variables and unobserved common factors to vary across countries by using recently-introduced estimators. In this research, the data seem to support the empirical specification allowing for slope heterogeneity across countries rather more than the standard ones imposing the restrictions of slope homogeneity. Empirical results indicate that the stock of US FDI in a given FDI recipient is likely to be significantly determined by market size, lower relative tax rates, and risks in terms of the investment climate, corruption and the legal environment of the host country.

Keywords: Foreign Direct Investment (FDI), Determinants of FDI, US FDI.

JEL Classification: F21, F23.

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"*As long as a branch of science offers an abundance of problems, so long is it alive*" – David Hilbert, 1900

I. INTRODUCTION

The aim of this paper is to investigate the influence of host country factors on foreign direct investment (FDI) from the United States (US) to developed countries in the Organisation for Economic Co-operation and Development (OECD) from 1982 until 2010.

There are two major problems relating to the empirical estimation in the FDI-determinant literature using aggregate panel data at the country level. Firstly, earlier studies often use standard panel estimation methods such as Pooled OLS (POLS) or Fixed Effects (FE). In these cases, the slope parameters for the observed explanatory variables are typically constrained to be constant across recipients. This restriction can be too strong since the impact of a given factor on FDI may be different for different recipients. Given that the observed panel samples have a long time series dimension in this study, it could be more informative to allow the parameters to be heterogeneous across recipients.

Secondly, previous macro-panel studies have often controlled for unobserved common factors with the restriction that the effect of the common factors is homogeneous across FDI recipients. However, common factors are likely to be diverse. For example, they may be global events such as the recent financial crisis. Additionally, in the context of investigation of the determinants of FDI from an investing country to a cross-section of host countries, the common factors could also be related to advanced knowledge, technological expertise or superior managerial systems of the investing country's firms. Those factors may affect FDI[1] and thus they should be accounted for. Using aggregate

[1] For example, see Hymer (1976) and Kindleberger (1969).

country-level panel data, it may be difficult to correctly measure the common factors, but failing to control for them could lead to misleading inference. Furthermore, since common factors are diverse, it is reasonable to believe that the impact of them could be heterogeneous across different host countries.[2]

There are three reasons why a panel sample of US FDI in developed OECD countries is used here. Firstly, according to statistical data from the UNCTADstat database of the United Nations, the US has been the world's largest investing country, in terms of FDI, for several decades. Secondly, developed OECD countries are the largest recipients for total global FDI. Data from the UNCTADstat database show that the stock of FDI in OECD countries accounts for approximately seventy percent of the total FDI stock of the world over the last thirty years. As for the overseas direct investment of US firms, OECD countries are also the largest destination, accounting for more than two-thirds of the total stock of outbound US FDI for the last three decades according to the US Bureau of Economic Analysis (BEA). Thirdly, annual data on variables in our model are likely to be more reliable and available consecutively for the developed countries in comparison with developing countries.

The focus of this study is the analysis of the determinants of US FDI to OECD countries rather than a two-way study. The reasons are as follows. Firstly, one of the limitations of such a two-way study is that the parameters for a given recipient country are likely to vary across investing countries, and hence in practice, a flexible approach to a two-way study is likely to require that models are estimated separately (investing) country-by-country. By focusing on just

[2] For example, the average advantage of technology of US firms over German firms may be different from those of US firms over Greek firms or Portuguese firms. Thus, the impacts of the advantage of the technology on FDI from the US to the host countries such as Germany, Greece and Portugal may be heterogeneous.

FDI from the US to host countries, this study can examine that case in more depth and allow for slope parameter heterogeneity in the estimates. Also, the focus on US FDI to a cross-section of countries enables us to control for factors such as the (average) relative knowledge or technology advantages of the investing country's firms as unobserved common factors in the analysis.

The remainder of the paper is organized as follows. Section two presents the literature review. Section three discusses the model, data and empirical methods used in this study. Section four reports empirical results and, finally, section five provides the conclusion of the research.

II. LITERATURE REVIEW

There are a number of theories of FDI. For example, the database of the Research Papers in Economics (RePEc) lists over eight thousand references for foreign direct investment. Therefore, this literature review can be only selective. Before the 1960s, most theories such as Iversen (1935) and Markowitz (1959) explained overseas investment based on the assumption of perfect markets. However, Hymer (1976) and Kindleberger (1969) argued that in a perfectly competitive market, all firms compete equally and have no advantages over each other, so that FDI has no reason to exist. In his doctoral thesis of 1960, later published in 1976, Hymer showed that firms operating in foreign markets often face a variety of disadvantages compared to indigenous firms, for example language differences or lack of customer tastes. Faced with these disadvantages, for a firm to engage in investment in foreign markets, it must possess specific ownership advantages such as knowledge or technology to balance the disadvantages of operation in a foreign country. Specific-ownership advantage is a source of market power to help a firm to expand its operation into foreign markets. This is a reason for foreign direct investment.

Despite pointing out the importance of the ownership advantage for FDI, Hymer (1976) and Kindleberger (1969) do not explain how multinational firms (MNFs) may benefit from such an advantage (Agarwal, 1980; Rugman, 1986). This point is addressed in the theory of internalisation proposed by Buckley and Casson (1976) which will be discussed below. However, firstly, this study reviews some major theoretical approaches to the debate on the theory of FDI.

Apart from the theory of market power proposed by Hymer and by Kindleberger, Vernon (1966, 1971) used the concept of the product life cycle to explain FDI. Vernon suggested that the production of a commodity goes through three distinct stages, including the 'new', then the 'mature', and finally to the 'standardised' commodity. In the first stage when the product is new, it is firstly designed and manufactured in home developed markets whose infrastructure and market conditions can facilitate the innovation of new products. The second stage is when the product is maturing, the designs of new products become accepted and the production process is stabilised. At that time, demand would develop for the product in overseas markets where high-income customers welcome innovation and are willing to pay a high price for it. Therefore, firms should expand their sales by exporting their commodities to other developed countries whose consumers have similar purchasing power to that of the home country.

Finally, when the product is standardised in its production, technological inputs and market knowledge are not very important. At that time, firms search for lower-cost locations abroad, particularly in less developed countries, in order to obtain cost advantages. At this stage, the product is manufactured in the less developed countries to serve their domestic consumers and to export back to the home countries and other developed countries. The firm may thus be able to increase its market share.

However, the theory of a product life cycle is mainly restricted to industries characterised by a high level of innovation (Solomon, 1978). In addition, this theory most likely addresses the position of US firms in the 1950s and 1960s when they were leaders in production innovation. Today new products are introduced at the same time in many different countries and production facilities can be located in many countries right from the beginning, because the technology and income gap between the US and other countries has narrowed since the 1970s (Moosa, 2002). Therefore, this theory is likely to be of lesser importance in the explanation of FDI activities of firms today (Giddy, 1978; Clegg, 1987).

Closely related to the product-life-cycle theory suggested by Vernon is the oligopolistic-reaction theory proposed by Knickerbocker (1973) which considers FDI as the response of a mature firm in an oligopolistic market to its competitors' decision to carry out direct investment overseas. In an oligopolistic environment, firms follow each other into foreign markets as a defensive strategy, because the firm that takes the first step in a new market exploiting any business opportunity draws the attention of similar firms that may exploit the same opportunities. However, the theory is sometimes said to be limited in explaining FDI, because it can only explain why oligopolistic firms invest defensively to counter the FDI of the initiating firm, but cannot explain the investment made by the initial firm.

A theory of currency area explains FDI based on the role of fluctuations of the exchange rate. This theory gives two different explanations of the effect of the exchange-rate fluctuations on FDI. The first argues that the exchange rate is often volatile, thus firms seek FDI to avoid the volatility of the exchange rate (Aliber, 1970; Cushman, 1985). A country with a high variation of its exchange rate may see an increase in inward FDI. In contrast, Kohlhagen

(1977) and Benassy-Quere *et al.* (2001) argue that a host country with large fluctuations of the exchange rate may deter inward FDI because investors worry that these fluctuations may lead to uncertainty over the economic environment of that country.

Differentiating from the theory of currency area, Rugman (1976) and Lessard (1976) put forward another theory based on risk diversification. FDI in this theory is explained as a way for firms to spread risk from solely producing domestically. However, Caves (1996) asserts that the diversification of MNFs is more likely to result from investments that were propelled by other motives.

Unlike the theories above, Kojima (1977) argues that FDI is a means to exploit factor endowments in the host country. He states that the flow of FDI should target countries which can be assisted by the inputs of the investing firm in industries where the home country is disadvantaged. Using the case of Japan, he argues that Japanese firms tend to launch FDI in industries such as textiles, iron and steel, and assembly of motor vehicles and electronics which are less well-suited for manufacturing in Japan because of the lack of labour and resources, and strict policies on pollution. Petrochilos (1989) criticises this theory in that it is mainly relevant to the Japanese context. Thus it does not provide a general explanation of FDI. However, to some extent, Kojima's theory seems to be within the notion of locational advantages in the eclectic theory which will be discussed below.

The differences in endowments between the investing country and the host country are also stressed as important motives for FDI in the theory of vertical FDI by Helpman (1984). In the theory, firms can separate their activities geographically to exploit the differences in endowments (e.g. labour costs). Differentiating from the theory of vertical FDI, Markusen (1984) puts forward a theory of horizontal FDI. According to this theory, MNFs conduct FDI to serve the local market of the host country from local production in order to save on trade costs. In this theory, the important motivation for the horizontal FDI is the host country's market size and trade costs. These motives could be considered as locational factors in the eclectic theory.

Another theoretical approach to explain FDI is the theory of internalisation as suggested by Buckley and Casson (1976). Whereas Hymer (1976) and Kindleberger (1969) emphasise the importance of ownership advantages, Buckley and Casson stress internalisation advantages as an explanation of overseas investment of MNFs. The idea of internalisation theory originated from Coase (1937) who used the concept to explain the growth of multi-plant domestic firms. He argued that if transaction costs in external markets - for instance, contractual obligations or contract prices - were high, firms would internally conduct these transactions within the firm at a lower cost.

Applying Coase's internalisation approach to explain FDI, Buckley and Casson (1976) argue that firms prefer to exploit their ownership advantages such as knowledge or technology by transferring them within an internal structure (e.g. from its headquarters to subsidiaries). When the internalisation is undertaken across national borders, FDI occurs. According to Buckley and Casson (1976), the internalisation process helps investors to be able to ensure product quality as well as to keep their ownership-specific advantages within their internal firms. In addition, through the internalisation, MNFs may avoid time lags and high transaction costs.

In general, along with the theory of market power suggested by Hymer and Kindleberger, internalisation theory offers an insight into the operations of MNFs. However, it cannot explain fully the aspects of FDI as a general theory (Parry, 1985; Dunning, 1988). Theories of market power and internalisation seem to be able to explain only why a firm seeks FDI (because it possesses one or some ownership-specific advantages) and how it can exploit ownership advantages (by internalisation), but cannot fully explain why the distribution of FDI varies across countries. In other words, the theories are likely to be unable to provide an 'explicit' explanation regarding the location of FDI. This is addressed by the eclectic theory suggested by Dunning (1981, 1988) which is presented below.

The eclectic theory combines ownership, internalisation advantages and locational advantages within a single paradigm in order to interpret the main influences on FDI. According to the eclectic theory, for a firm to engage in FDI activities, the decision problem needs to satisfy the three following conditions. Firstly, a firm must possess certain advantages that provide it with comparative advantages in the host market. These advantages largely take the form of intangible assets (e.g. knowledge or technology) that are exclusive or specific to the firm possessing them, which are called ownership-specific advantages. Secondly, assuming a firm possesses one or some ownership-specific advantages, it must be more efficient for the firm to internally exploit its specific ownership advantages overseas by itself, rather than to sell them to foreign firms through market transactions. This is called an internalisation advantage, which explains how a MNF can exploit the profitability from their ownership-specific advantages. Thirdly, the host country must possess location-specific advantages that help firms to be able to make profits when operating there. The locational advantages can explain the location of FDI.

Among the theories of FDI, the eclectic theory is widely accepted as a general theory of FDI because it synthesises different theories of FDI (Dunning, 1992; Moosa, 2002). The eclectic theory encompasses ownership advantages in Hymer (1976) and Kinderberger (1969), the process of internalisation in Casson and Buckley (1976) and location-specific advantages including FDI determinants suggested in Kojima's theory, theory of currency area and theories of vertical and horizontal FDI. Therefore, it can give a comprehensive explanation for many aspects of FDI activities. In terms of determinants of FDI, it can be seen that the 'original' factors determining FDI in the perspectives of ownership advantages and internalisation advantages are likely to be similar. They often are ownership-specific factors such as advanced technology or superior managerial systems, whereas locational advantages refer to factors relevant to the host countries' characteristics, for instance, market size or labour costs.

In the empirical literature on FDI determinants, macro-panel analyses often include location-specific factors, or more specifically host-country factors, rather than ownership-specific factors, to explain the variation of FDI across countries. This is so because the characteristics of the host country play key roles in the location of FDI. Hence, the current research concentrates on locational factors to explain the variation in US FDI across OECD countries. The focus on locational determinants also arises from the difficulty in measuring correctly ownership-specific factors at the country level. In the eclectic theory, though there are many locational factors that may determine FDI, which ones are important remains an empirical matter. Given a number of potential locational determinants of FDI, the research in this study focuses on factors which are widely included in empirical studies. The factors that are used in this study are as follows.

Market size

The size of the host country's market is generally considered as a potential locational factor determining FDI. Multinational firms often choose to invest in a country whose market is large enough, so that their turnover can exceed, at least, various costs of operating in an unfamiliar market (Davidson, 1980; Nigh

1985). A large market size of the host country can provide investors with the opportunity to capture economies of scale and to increase their profit (Scaperlanda and Mauer, 1969). However, evidence in some studies such as Yang *et al.* (2000) indicates an insignificant association between the host country's market size and FDI. Therefore, the hypothesis of a significant and positive association between the size of the host country's market size and FDI is not always supported in the empirical literature. This study includes market size in the model to test its effect on US FDI to OECD countries in the period 1982-2010.

Relative tax rates

Along with the size of the market, the taxation of a country commonly appears as a potential factor that may impact on FDI. A country with high tax rates may deter investors from locating their FDI there because the high tax rates can increase their costs and decrease their after-tax profits. Thus, the tax rates of the host country are expected to influence FDI negatively. However, evidence in some empirical works such as Wheeler and Mody (1992) and Swenson (1992) does not support the hypothesis of a negative relationship between tax rates and FDI. The model in this study takes relative tax rates between the host country and the US into account to test the impact of relative tax rates on FDI from the US to the host country for 1982-2010.

Relative labour costs

Labour costs frequently play an important role in determining FDI. Lower labour costs can help a firm to reduce its operation costs and production costs and thereby increase its profit. Therefore, higher labour costs in the host country relative to the investing country may lead to a decrease in FDI from the investing country to the host. Empirical evidence, however, does not always support the hypothesis of a negative relationship between labour costs and FDI in recipient countries. For example, works by Koechlin (1992) and Loree and Guisinger (1995) find an insignificant relationship between labour costs and US FDI. This study controls for relative labour costs between recipient countries and the US in the model and examines its influence on US FDI to the recipients.

Relative skilled labour

Along with labour costs, the availability of skilled labour is commonly suggested as a potential factor that may determine the location of FDI. When MNFs establish affiliates in a foreign location they often bring knowledge and technology, which may require skilled labour in the location where they operate. Therefore, a country with skilled labour in abundance may attract more inflows of FDI, other things equal. In the empirical literature, labour skills are often measured by the gross secondary school enrolment rate or the literacy rate. Empirical studies such as Narula (1996) and Noorbakhsh *et al.* (2001) show a significant and positive relationship between the skilled labour endowment and inward FDI, while other studies, for instance, Schneider and Frey (1985) and Wei (2000), find that this relationship is insignificant. In this study, we take account of the skilled labour abundance of the recipient country relative to that of the US to investigate its impact on FDI from the US to the recipient.

Openness

Besides market size, tax rates, labour costs and skilled labour abundance, the openness of the host country is frequently mentioned as a potential factor that may affect the FDI decision-making of MNFs. Openness here is often a measure of the degree of openness of a country to international business. In empirical studies, the influence of openness on overseas direct investment seems to be ambiguous. Studies such as Culem (1988) and Moosa and Cardar (2006) find that the effect of openness on FDI is significant and positive while other studies such as Schmitz and Bieri (1972) and Wheeler and Mody (1992) find that this effect is insignificant. In this current study, we try to investigate the influence of the openness of the host country on US FDI to OECD countries. In view of the mixed results of the existing literature, the study tries to shed light on the significance of openness in the US-OECD context.

Fluctuations of the exchange rate

Another factor often considered as a potential factor which may influence FDI is the fluctuations of the exchange rate. Yet the empirical literature provides mixed results on the association between exchange rate fluctuations and FDI. Some empirical studies, for example those by Cushman (1988) and Goldberg and Kolstad (1995), find that the effect of exchange rate variability on FDI is significantly positive, while other studies, for instance those by Itagaki (1981) and Benassy-Quere *et al.* (2001), find that the fluctuation of the exchange rate has a significantly negative influence on FDI. Some other studies, such as those by Gorg and Wakelin (2002) and Crowley and Lee (2003), report an insignificant association between exchange rate variability and FDI. The inclusion of the fluctuations of the exchange rate as a driver for FDI is also controversial from a theoretical point of view. FDI is a long-term investment while exchange rate fluctuations are short-term. Furthermore, over the last thirty years or so, financial markets have become quite sophisticated in that exchange rate risk can often be hedged at relatively low cost. Thus, whether exchange rate variation is still an important variable in determining FDI is largely an empirical matter. This study controls for the fluctuation of the exchange rate by including a measure of exchange rate variability in the model to check for its effect on FDI.

Trade costs

Apart from the factors above, trade costs may be another factor affecting FDI. This is because if trade costs between the investing country and the host country are high, firms may switch from exports to FDI to serve the host country's market from local production. Hence, trade costs are included in the model to investigate their effect on FDI from US to the host countries.

Political risks

Additional factors such as political risks are likely to be a potential factor which investors consider carefully before making a FDI decision. These risks are commonly related to the investment climate, corruption, internal conflicts, ethnic or religious tensions, external conflicts and the legal environment in the host country. Since firms tend to avoid uncertainty and risks, a host country with a high extent of political risk may discourage investors. Based on different proxies, some empirical studies, for example those by Schneider and Frey (1985), Nigh (1985), Lee and Mansfield (1996) and Janicki and Wunnava (2004), provide evidence that political risks significantly influence FDI, while some others, such as those by Bennett and Green (1972), Wheeler and Mody (1992) and Bevan and Entrin (2004), find little evidence for a correlation between political risks and FDI. In this study, since we are interested in FDI in developed countries where risks relevant to major ethnic or religious tensions, and severe external or internal conflicts are comparatively rare, these particular factors are excluded from the model. Nevertheless, there may remain some political risks, and the model takes account of the investment climate, corruption and the legal environment of the recipient country in order to check the effect of these risks on FDI from the US.

Above, this study discussed the FDI determinants to be investigated in the empirical analysis. The next section presents the model, data and estimation methods of the research.

III. MODEL, DATA AND EMPIRICAL METHODS

This section discusses the model, data and empirical methods used in this study. The first presents the model and data sources while the second discusses the main empirical methods used in this research.

III.1. The empirical model and data

The discussion of the determinants of FDI in the previous section suggests the following possible relationship:

$$\mathrm{FDI}_{\mathrm{it}} = f(\mathrm{GDP}_{\mathrm{it}}, \mathrm{TAX}_{\mathrm{it}}, \mathrm{COST}_{\mathrm{it}}, \mathrm{SKILL}_{\mathrm{it}}, \mathrm{OPEN}_{\mathrm{it}}, \mathrm{FER}_{\mathrm{it}}, \mathrm{TC}_{\mathrm{it}}, \mathrm{RISK}_{\mathrm{it}}) \quad (1)$$

where *i* and *t* denote FDI-recipient country and time indexes respectively. FDI denotes US foreign direct investment in each recipient country; GDP proxies for the recipient country's market size, measured as total output. TAX, COST and SKILL denote the relative tax rates, relative unit labour costs and relative skilled labour abundance between the recipient country and the US respectively. TC denotes trade costs between the US and the recipient country. OPEN, FER and RISK denote the recipient country's openness, fluctuations of the exchange rate and political risks respectively.

Model (1) is conventionally expressed in multiplicative form as:

$$\mathrm{FDI}_{\mathrm{it}} = \mathrm{GDP}_{\mathrm{it}}^{\beta_{1i}}\mathrm{TAX}_{\mathrm{it}}^{\beta_{2i}}\mathrm{COST}_{\mathrm{it}}^{\beta_{3i}}\mathrm{SKILL}_{\mathrm{it}}^{\beta_{4i}}\mathrm{OPEN}_{\mathrm{it}}^{\beta_{5i}}\mathrm{FER}_{\mathrm{it}}^{\beta_{6i}}\mathrm{TC}_{\mathrm{it}}^{\beta_{7i}}\mathrm{RISK}_{\mathrm{it}}^{\beta_{8i}}\exp(\varepsilon_{\mathrm{it}})$$

where the βs denote elasticities and $\varepsilon_{\mathrm{it}}$ denotes the error term. (2)

Taking the natural logarithms of equation (2) yields a log-linear form as follows:

$$\ln \mathrm{FDI}_{\mathrm{it}} = \beta_{1\mathrm{i}} \ln \mathrm{GDP}_{\mathrm{it}} + \beta_{2\mathrm{i}} \ln \mathrm{TAX}_{\mathrm{it}} + \beta_{3\mathrm{i}} \ln \mathrm{COST}_{\mathrm{it}} + \beta_{4\mathrm{i}} \ln \mathrm{SKILL}_{\mathrm{it}}$$
$$+\beta_{5\mathrm{i}} \ln \mathrm{OPEN}_{\mathrm{it}} + \beta_{6\mathrm{i}} \ln \mathrm{FER}_{\mathrm{it}} + \beta_{7\mathrm{i}} \ln \mathrm{TC}_{\mathrm{it}} + \beta_{8\mathrm{i}} \ln \mathrm{RISK}_{\mathrm{it}} + \varepsilon_{\mathrm{it}} \quad (3)$$

where ln denotes natural logarithm. This log-linear form allows us to interpret the coefficients as elasticities. In addition, it could help to reduce the potential problem of heteroscedasticity in the error variance.

Model (3) is a static model. However, information on FDI determinants often becomes available with a lag relative to the time of the investment decision. In addition, there may be an additional lag from the decision-making process to actual FDI. Therefore, the effects of explanatory variables in the model (3) could be expected to appear with a delay. For example, in year t investors intend to invest overseas while the available information is from the previous year. Furthermore, the decision making process and the preparation for FDI such as the mobilization of funds, the building of partners, negotiations with the host country, etc., will take additional time. Overall, it may take two years or more before FDI is carried out in the host country. Hence, we experiment with two possible lag lengths, of one and two years. It is thought that a two-year lag is likely to be sufficient, considering that the data are annual and the sample size is relatively small. Even though there may be common-sense reasons for the variables to have delayed effects, there is no formal theory of dynamic adjustment in the literature and the determination of the appropriate lag length is an empirical matter. Further, lag specifications for the explanatory variables would also be useful in order to avoid the potential simultaneous influence of the dependent variable on the explanatory variables.

It may also be argued that leads (i.e., forward-looking variables) could be included to extend the dynamics in order to account for the role of expectations. For instance, it is reasonable to assume that investors may decide to invest in a country not only on the basis of past growth, but perhaps even more so based on future expected growth, since the latter may be regarded as more important for the success of the investment. However, including expectations of future growth is difficult in this setting due to the lack of availability of data on expected values of variables in the model for the entire group of countries over the period. Including leads, instead, may approximate expectations to some degree. However, the implication of the lead is perfect foresight which appears to be a rather strong assumption for the variables within the model. For instance, forecasts for GDP can be unreliable, particularly at long horizons, which are relevant for FDI decisions. Therefore, no experiment with the use of leads was attempted. This is also consistent with most of the existing literature on FDI.

In this study, the dependent variable is measured by the real US FDI stock in each recipient country.[3] Data on the nominal US FDI stock are from the BEA, and are converted into constant 2005 US dollars (in millions) using the GDP deflator. The latter is from the International Financial Statistics (IFS) provided by the International Monetary Fund (IMF). Data on the US FDI stock from the BEA are available from 1982 onwards, only.

Real gross domestic product is used as a measure of the size of the host country's market. Data on GDP are collected from the World Economic

[3] Strictly speaking, the dependent variable should be FDI flow. However, US FDI stock is used here because a fairly large part of data on US FDI flow is unavailable. In addition, available data on US FDI flow are inconsecutive. Besides, data on US FDI flow have negative values, and thus it could not take log of those [as in model (3) above].
Note that the value of FDI stock of US in a given recipient country in year t is not always larger than that in year t-1 because of the disinvestment.

Outlook of the IMF, and then are converted into constant 2005 US dollars (in millions) by using GDP deflators and corresponding exchange rates. Exchange rates are collected from the IFS.

We use the corporate income tax rate as a proxy for the tax rate in order to construct the relative tax rates between the host country and the US. Data on corporate income tax rates of the US and host countries were collected from the Centre for Tax Policy and Administration of the OECD.

The variable COST measures unit labour costs of the host country relative to those in the US. Data on unit labour costs were collected from the statistics database of the OECD. The relative skilled labour is proxied by the ratio of the secondary gross enrolment rate of the host country to that of the US in this study. Data on the secondary gross enrolment ratio of the US and recipients were collected from the WDI. The openness of the host country is measured by the ratio of exports to gross domestic product. Data on openness were obtained from the WDI.

We use the standard deviation of the real exchange rate as a proxy for the extent of exchange rate fluctuations. Data on the nominal exchange rate of the recipient country's currency against the US dollar were collected from the IFS, and then converted into a real exchange rate using GDP deflators. For Euro-area countries, exchange rates before 1999 were calculated based on the conversion rate between the Euro in 1999 and the country's currency. For example, for France, the exchange rate of the Euro against the US dollar in, say, 1990 is calculated by the 1990 Franc/USD exchange rate divided by the fixed conversion rate of Francs to Euros in 1999.

To find a proxy to measure trade costs is a challenge for the research. In the literature, some studies use the distance between the investing country and the host country whereas some others use freight rates as proxies for trade costs. However, the distance between the investing country and the host country does not vary over time[4] while freight rates are only a component of trade costs. Several other studies use the CIF/FOB ratio reported in the Direction of Trade Statistics of the IMF as a proxy for transport costs (for example, Limao and Venables, 2001; UNCTAD, 2006). This ratio gives the value of imports including costs, insurance and freight (CIF) relative to their free on board (FOB) value. However, Anderson and Wincoop (2004) and Jacks, Meissner and Novy (2006) indicate that trade costs includes not only transport costs but also costs relevant to tariff[5] and non-tariff barriers.[6] To address the challenge, we construct a measure of trade costs[7] between the US and countries in the sample based on the recent works by Jacks, Meissner and Novy (2008) to control for the effect of trade costs in the regression models.[8]

With respect to political risks, this research constructs an index as the sum of ratings of the investment profile, corruption, and law and order provided by the International Country Risk Guide (ICRG). In the ICRG, the rating of investment profile of a country is scaled from 0 (very high risk) to 12 (very low risk), the rating of corruption from 0 (very high risk) to 6 (very low risk),

[4] Therefore, the use of distance as a proxy for trade costs seems to be only applicable in cross-sectional data studies.
[5] Some cross-sectional data studies, for example Brainard (1997), use freight rates and tariffs to control for the effect of trade costs in the regression model. However, data on freight rates and tariffs are limited, especially for panel samples (of countries) with large N and T.
[6] This leads to a difficulty in measuring trade costs by direct methods due to the limitation of data on tariffs and non-tariff barriers (for example, see Anderson and Wincoop, 2004).
[7] In their works, Jacks, Meissner and Novy (2006, 2008) present a micro-founded measure of trade costs, which is capable of measuring transport costs, tariffs, and all other macroeconomic friction that impede international trade costs. In this research, we construct trade costs (between the US and the countries in the sample) as expression (3) in Jacks, Meissner and Novy (2008). The constructed data are available on request.
[8] This study also uses the CIF/FOB ratio as an alternative. However, the measure of trade costs constructed based on Jacks, Meissner and Novy (2006, 2008) is the preferred in this study.
The regressions using CIF/FOB ratio as a proxy for trade costs are presented in appendices.

and the rating of law and order from 0 (very high risk) to 6 (very low risk). We give equal weights to the investment profile, corruption, and law and order in the index by converting their ICRG ratings into a scale from 0 (very high risk) to 10 (very low risk) before taking the sum. This leads to an index ranging from 0 (very high risk) to 30 (very low risk). This index is used as a proxy of risks relevant to FDI decisions.

It is worth noting that some of the literature analyses additional (locational) variables that are not included in the model (3). These could be cultural differences, geographic distance and language differences between the host country and the investing country, all of which may affect FDI. These long-term factors are likely to be constant or approximately constant over time and will be treated as time-invariant, country-specific (fixed) effects in the empirical analysis.

This study uses a sample comprising twenty one developed OCED countries covering the period from 1982 to 2010. The countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. In some cases in the sample where data are missing, missing data were interpolated based on available data.

III.2. Empirical methods

Before discussing estimation methods, this study discusses three distinct unit root tests that will be applied in the empirical analysis to check for stationarity. This is necessary because the time-series dimension, T, of the sample used in this research is fairly large. The problem with thin and long panel data sets is that regression results may be spurious when variables are non-stationary. Therefore, as a first step, variables need to be tested for stationarity and, should they be non-stationary, the relationship between them needs to be tested for cointegration. Only when there is cointegration can inferences reliably be made. Otherwise, the results may be spurious.

There are various panel unit-root tests in the econometric literature, of which the LLC test proposed by Levin and Lin (1992) and Levin, Lin and Chu (2002) is a popular one (Baltagi, 2008). The null hypothesis in this test is that all panels have a homogeneous unit root versus the alternative hypothesis that all panels are stationary. In comparison with other homogeneous panel unit-root tests such as the one by Harris and Tzavalis (1999), the LLC test is likely to be more appropriate for this research because it requires the time-series dimension of the dataset to be larger than the cross-section dimension.

The potential disadvantage of the LLC test is that it restricts all autoregressive coefficients to be homogeneous across all panels. This assumption may be too strong. Maddala and Wu (1999) propose a panel unit-root test (henceforth the M-W test) that allows the autoregressive coefficients to vary across panels. In particular, this test combines the significance levels of individual Phillips-Perron or ADF unit-root tests for each cross-section *i* to construct an overall test statistic based on a test suggested by Fisher (1932):

$$\lambda = -2\sum_{i=1}^{N} \ln \varphi_{\mathrm{i}} \qquad (4)$$

where φ_{i} is the p-value of a unit root test for country *i*.

This is used to test the null hypothesis that all panels have a unit root versus the alternative hypothesis that at least one panel is stationary. Since $(-2\ln \varphi_{\mathrm{i}})$ is distributed as χ^2 with two degrees of freedom, λ has a χ^2 distribution with 2*N* degrees of freedom where *N* denotes the number of panels.

Note that both the LLC and M-W tests are based on the potentially restrictive assumption that individual time series in the panel are cross-sectionally independent. Pesaran (2007) suggests a test that relaxes this assumption (henceforth the CIPS test) which controls for the possible presence of cross-section dependence. The null hypothesis in this test is that all panels (here, countries) have a unit root against the alternative hypothesis that a fraction of panels are stationary. In particular, the method of this test is based on augmenting the usual ADF regression with the cross-section averages of lagged levels and first-differences of the individual series to capture cross-sectional dependence. Pesaran calls this a cross-sectionally augmented Dickey-Fuller (CADF) test. The simple CADF regression is:

$$\Delta z_{it} = a_i + \rho_i z_{i,t-1} + b_0 \bar{z}_{t-1} + b_1 \Delta \bar{z}_t + \varepsilon_{it} \tag{5}$$

where $\bar{z}_t$ is the cross-section average of z_t at time *t*. The presence of the lagged cross-section average and its first-difference can account for cross-section dependence. In the case that there is serial correlation in the errors, the regression is additionally augmented with the lagged first-differences of both z_{it} and $\bar{z}_t$ to control for serial correlation, which leads to

$$\Delta z_{it} = a_i + \rho_i z_{i,t-1} + b_0 \bar{z}_{t-1} + \sum_{j=0}^{p} b_{j+1} \Delta \bar{z}_{t-j} + \sum_{k=1}^{p} c_k \Delta z_{i,t-k} + \varepsilon_{it} \tag{6}$$

After performing the CADF regression for each cross section, the CIPS test averages the *t*-ratio of the lagged value (henceforth $CADF_i$) to construct the *CIPS*-statistic as follows:

$$CIPS - \text{statistic} = \frac{1}{N} \sum_{i=1}^{N} CADF_i \tag{7}$$

Pesaran (2007) also shows that the CIPS panel unit-root test has satisfactory size and power even for relatively small values of the cross-section dimension N and time-series dimension T. Along with the LLC and M-W tests, the CIPS test is used to check for unit roots in the variables used in this study. Since the data on each variable used are yearly (not daily or monthly) and the time series dimension, T, is not very large, the maximum lag length is chosen to be three. Among the three unit-root tests, the CIPS approach is preferred because it allows for the heterogeneity of autoregressive coefficients across panels and can address cross-sectional dependence.

Next, we turn to the discussion of the estimation methods. In this section, estimation methods are discussed that address major potential problems of this study. Firstly, the panel data set has a reasonably long time dimension and thus non-stationarity of the variables in the model needs to be addressed. In addition, since this is a macroeconomic panel data study on FDI, where many of the determinants (as discussed in the literature review) cannot be included due to data availability, these effects need to be controlled for to avoid omitted variable bias. Also, we discuss methods to allow the effects of explanatory variables and unobserved common factors to vary across countries to fulfil the aims of this study.

Consider a form of an FDI model as follows:

$$y_{it} = \beta_i^{'} x_{it} + \varepsilon_{it} \tag{8}$$

where y is the dependent variable, x is a vector of observed explanatory variables and β are the slope parameters for the elements of x. In this study, the explanatory variables are assumed to be exogenous.

In order to account for common factors such as a global financial crisis, this study introduces unobserved common factors (w_t) into the model (8). In the context of investigation of FDI from the US to a cross-section of OECD countries, w_t is also assumed to include the (average) ownership advantages of US firms such as advantages in technology, innovation or superior managerial skills which may affect US FDI to a cross section of OECD countries. The model is:

$$y_{it} = \beta_i' x_{it} + \gamma_i' w_t + \varepsilon_{it} \tag{9}$$

where w_t is assumed to be one or more latent factors capturing the effect of unobserved common factors, and γ_i are the factor loadings which may vary across countries.

The formulation in (9) is sometimes called an interactive fixed effects specification, and it generalizes conventional country-specific (fixed) effects and conventional time dummies (e.g. if one of the w_t factors is constant over time, that yields a set of country-specific effects; and if one of the factors has the same coefficients, that yields time effects, given that the time path of w_t is not restricted). Therefore, model (9) can control for country-specific effects (e.g. cultural differences, geographic distances) and conventional time dummies, but is more general than either.

Now we discuss the estimation of model (9) by using different estimators. Firstly, it can be seen that the Pooled OLS (POLS) estimator uses a conventional least squares regression based on pooling all the observations without considering country-specific effects, which could lead to biased estimates. In addition, in the POLS estimates, the effects of the explanatory variables (x) are restricted to be constant across countries ($\beta_i = \beta$). Unobserved common factors (w_t) might be taken into account by introducing time dummies into the POLS regression model. However, the time dummies can only capture common shocks to FDI that have the same effects across countries, and thus the effects of w_t on FDI are constrained to be homogeneous across countries ($\gamma_i = \gamma$) in the POLS estimates.

In the Fixed Effects (FE) and Random Effects (RE) estimators, time-invariant country-specific effects are taken into account and treated as fixed and random in the regression respectively. To decide between the FE and the RE estimator, we can run a Hausman test where the null hypothesis is that the preferred model is RE versus the alternative being FE. However, in the FE and RE estimators, the slope parameters of x are constrained to be identical across countries ($\beta_i = \beta$). In addition, as in Pooled OLS estimation, w_t may be taken into account by including time dummies in the FE and RE regression models, and thus the influence of w_t on FDI is restricted to be constant across countries ($\gamma_i = \gamma$) by both the FE and RE estimators.

Apart from the POLS, FE and RE estimators, the more recent Mean Group (MG) estimator, proposed by Pesaran and Smith (1995), relaxes the assumption of homogeneity of explanatory variables' parameters. The MG estimator allows the effects of explanatory variables to vary across countries by firstly estimating country-specific OLS regression models and then averaging the estimated parameters across countries to obtain an average effect. In addition, this estimation can capture country-specific effects as an intercept in each of the individual regression models (one per country). Unobserved common shocks (w_t) may be controlled for by introducing a time trend in the regression model for each country, and thus the effect of w_t is allowed to vary across countries (Eberhardt and Bond, 2009; Eberhardt, 2011). However, the use of the country-specific time trend will restrict the unobserved common factors to be (smoothly) increasing or decreasing over time. Note that we cannot use a full set of time dummies (as in the POLS and FE estimators) in the regression model for each country because they would explain the dependent variable perfectly.

Recent work by Pesaran (2006), extended to non-stationary variables by Kapetanios, Pesaran and Yamagata (2011), suggests the use of Common Correlated Effects (CCE) estimators with cross-section averages of the dependent variable $(\bar{y}_t)$ and independent variables $(\bar{x}_t)$ to account for the presence of unobserved common factors (w_t) with heterogeneous effects (Pesaran, 2006; Coakley, Fuertes and Smith, 2006; Kapetanios, Pesaran and Yamagata, 2011; Pesaran and Tosetti, 2011); then the model (9) becomes

$$y_{it} = \beta_i^{'} x_{it} + c_i \bar{y}_t + d_i^{'} \bar{x}_t + \varepsilon_{it} \tag{10}$$

In CCE estimates, the estimated country-specific parameters on $\bar{y}_t$ and $\bar{x}_t$ are not interpretable in a conventional way: their presence is only to control for the biasing effects of the unobserved common factors. There are two alternative methods to estimate model (10), namely the Common Correlated Effects Pooled (CCEP) and Common Correlated Effects Mean Group (CCEMG) estimators. Pesaran (2006), Stock and Watson (2008), Kapetanios, Pesaran and Yamagata (2011) and Pesaran and Tosetti (2011) show that the CCE estimators are robust to heteroskedasticity and serial correlation and to the presence of structural breaks. The CCEP estimator is a fixed effects regression where each country has a separate parameter for each of the cross-section averages. Therefore, the CCEP allows unobserved common factors to have heterogeneous effects across countries. However, in CCEP estimation, the parameters of the main explanatory variables (here, the *x*'s) are restricted to be identical across countries $(\beta_i = \beta)$. Alternatively, we can relax the restriction of the homogeneity of the slope parameters by using a CCEMG estimator. The

CCEMG estimator, which is based on an MG estimation of model (10), can permit the observed explanatory variables' parameters to be varying across countries. As with CCEP, it also allows the unobserved common factors to have different effects on different countries.

It is worth noting that if variables are non-stationary, regression results could be spurious. However, this is not the case when the variables are cointegrated. Normally, when variables are non-stationary, their linear combination is also non-stationary which undermines inference and leads to spurious regression results. However, non-stationary variables may move together over time even though individually they are random walks. In other words, cointegration is a specific result which may occur in the presence of variables with unit roots. As a result of cointegration, the error term is stationary. An empirical indicator of cointegration is when a regression produces stationary residuals. As discussed, the current study accounts for unobserved common factors in the estimation, and thus they could be a part of a cointegrating vector. Since the way to control for unobservable common factors varies across estimators, this study will first estimate the model with the inclusion of unobserved common factors, and then check for the stationarity of the residuals. If observed explanatory variables (and unobserved common factors) are cointegrated, we can establish a long-run economic relationship between the variables which can be interpreted in relation to the economic theories of FDI presented in the literature review above.

Another problem is that the observed explanatory variables and unobserved common factors may have effects on US FDI to recipient countries to different degrees. The restrictions that those effects are homogeneous across countries may cause cross-section dependence among regression errors, leading to biased estimates, especially in a panel data analysis with long *T*. Therefore, this study will check the cross-section independence of the residuals by using a cross-section dependence (CD) test suggested by Pesaran (2004). In this study, we use the unit-root and CD tests to choose the preferred empirical model.

In summary, this section provided a discussion of the model, data sources and empirical methods used in this study to investigate the influence of the host country factors on FDI from the United States (US) to developed OECD countries in the period 1982-2010. The empirical results will be presented in the next section.

IV. EMPIRICAL RESULTS

This section presents the empirical results of the research. In order to check the stationarity of the variables, this study plots variables and their first differences over time (see appendix 2 and appendix 3). This is because the appropriate critical values of the unit root test statistics depend on the deterministic terms that are included. If the unit root test does not specify the deterministic terms correctly, then this may lead to an over- or under-rejection of the null hypothesis. A straightforward way to decide on what deterministic terms should be included in the unit root test is to look at the graphs of the individual series.

The graphs in appendix 2 show that the variables of foreign direct investment, $\ln \mathrm{FDI}$, market size, $\ln \mathrm{GDP}$, relative tax rates, $\ln \mathrm{TAX}$, relative skilled labour, $\ln \mathrm{SKILL}$, openness, $\ln \mathrm{OPEN}$, transport costs, $\ln \mathrm{TC}$, and political risks, $\ln \mathrm{RISK}$, are likely to be trended while the variables relative labour costs, $\ln \mathrm{COST}$, and fluctuations of the exchange rate, $\ln \mathrm{FER}$, are not likely to be trended. Therefore, this study adopts LLC, M-W and CIPS unit-root tests with a trend for the former and adopts those with a constant only for the latter. The p-values of the unit-root tests of all variables are reported in Table IV.1. We can see from Table IV.1 that the results of the LLC test reject the null hypothesis that variables $\ln \mathrm{FDI}$ and $\ln \mathrm{RISK}$ have a unit root while those of the M-W and CIPS tests do not reject the null hypothesis.

With respect to the variables $\ln \mathrm{TAX}$, $\ln \mathrm{COST}$, $\ln \mathrm{OPEN}$ and $\ln \mathrm{TC}$, the results of the LLC and M-W tests reject that these variables are non-stationary at conventional levels of significance. However the use of the CIPS test does not reject the null hypothesis that they are non-stationary. Table IV.1 also shows that all three tests reject a unit root for the variable $\ln \mathrm{FER}$ but they do not reject for variables $\ln \mathrm{GDP}$ and $\ln \mathrm{SKILL}$. Among the three unit-root tests, the results of the CIPS are preferred because this test allows for the heterogeneity of autoregressive coefficients across panels and can control for cross-sectional dependence. Therefore, it can be seen that, apart from the variable $\ln \mathrm{FER}$, the other variables in the model are likely to be non-stationary.

Table IV.1 here

Variables that are integrated of order one can be made stationary by taking first differences. Since the more reliable CIPS test suggests that all the variables except for fluctuations of the exchange rate, ln FER, may be non-stationary, the second step of the testing procedure is to find out whether the first differences are stationary. If this is the case, then the variables are integrated of order one, conventionally denoted as I(1). Since unit root tests above indicate that ln FER is stationary, there is no need to test the first difference of ln FER for stationarity.

Table IV.2 here

The graphs in appendix 3 show that all the first differences of variables seem to be un-trended, and thus this study runs the tests with no trend for the first differences of variables. We can see that all the results of LLC, M-W and CIPS tests in Table IV.2 reject that the first-differences of the variables have a unit root at the one or five percent levels of significance, indicating that the first-differences of the variables are stationary. Therefore, from the results in Tables IV.1 and IV.2, it is likely that the variable for exchange-rate fluctuations, $\ln \text{FER}$, seems to be stationary while the others in the model are potentially I(1).

Next, estimates of the model for FDI are reported. All the models assume that the explanatory variables are exogenous. This may be too strong an assumption. For instance, GDP is likely to be endogenous in a model that explains FDI. The consequence of including endogenous variables in the model will be biased and inconsistent coefficient estimates. However, as discussed in section 3, the use of lagged values of the explanatory variables as instruments (for the current values) in the model could help to reduce this potential problem. This study, in turn, experimented with one- and two-year lags as instruments.[9] The POLS, FE, MG, CCEP and CCEMG results from the model using one-year lagged values for the explanatory variables are reported in Table IV.3 while those from the model using two-year lagged values are reported in Table IV.4.

The choices of the lag length and the estimation method have a strong impact on the estimation results. Turning to the results with the one-year lagged values depicted in Table IV.3 first, none of the variables are significant across all estimates. There is some indication that market size, relative tax rates, relative labour costs, openness and the volatility of the exchange rate may be determinants of FDI. The results vary depending on the estimation method used. Turning to Table IV.4, there is evidence that relative tax rates, relative labour costs, relative skilled labour, openness and political risks are associated

[9] See pp.16-17 in section III for a discussion of the choice of the lag.

with FDI. Again, the significance of the estimated coefficients on these variables seems to vary. However, the influence of market size and the fluctuations of the exchange rate on FDI are found to be significant when using most of the estimators.

Table IV.3 and table IV.4 here

In order to discriminate between the one and two-year lagged models, this study compares the root mean square error (RMSE) of the two models. Except for POLS, the RMSE of all other regressions for the model with two-year lags is smaller than that of the model with one-year lags. Thus, the fit of the model is better in the two-year lagged form. The result suggests FDI may be best explained by two-year lagged information rather than one-year lagged information. The section below concentrates on discussing estimation results for the models using two-year lagged values of the explanatory variables in Table IV.4.

In POLS estimation with assumptions on the homogeneity of slope parameters and factor loadings for unobserved common factors, the coefficients on the variables of market size, $\ln \mathrm{GDP}_{t-2}$, the relative tax rates, $\ln \mathrm{TAX}_{t-2}$, the relative labour costs, $\ln \mathrm{COST}_{t-2}$, the host country's openness, $\ln \mathrm{OPEN}_{t-2}$, and trade costs, $\ln \mathrm{TC}_{t-2}$ are significant; the elasticities are 1.45, -0.72, -1.98, 1.67 and -0.54 respectively. This result implies a one-percent increase in the market size and openness of the host country, on average, increases the level of the US FDI stock in the host country by 1.01 and 1.67 per cent, respectively, while a one-percent increase in relative tax rate, relative labour costs and trade costs, on average, decreases the level of the US FDI stock in the host country by 0.72, 1.98 and 0.54 percent, respectively. Other variables - the relative skilled labour, $\ln \mathrm{SKILL}_{t-2}$, the fluctuations of the exchange rate $\ln \mathrm{FER}_{t-2}$, and the host country's political risks, $\ln \mathrm{RISK}_{t-2}$, are found to be insignificant in the OLS estimation. Note that the POLS estimator does not control for unobserved country-specific effects, for example, cultural differences or geographic distance between the investing country and host countries, which may influence US FDI to the host country. In addition, the results of the CIPS, M-W and LLC tests (see Table IV.5) show that the residuals estimated by POLS may contain a unit root. The implication is that the variables are not cointegrated and that the regression may be spurious. A further point is that the result of Pesaran (2004)'s cross-section dependence (CD) test (see Table IV.6) indicates that the POLS residuals are cross-sectionally dependent. Therefore, the POLS estimation results are likely to be biased.

In order to control for country-specific effects, we can use FE and RE estimators where country-specific effects are taken into account and treated as fixed and random parameters in the regression respectively. To decide between the FE and the RE estimator, this study runs a Hausman test where the null hypothesis is that the preferred model is RE versus the alternative being FE. The result of the Hausman test rejects the null hypothesis at the one percent level of significance, implying that the FE model should be preferred over the RE model.

The results of FE estimation in Table IV.4 show that the coefficients on variables for the host country's market size, $\ln \mathrm{GDP}_{t-2}$, the host country's openness, $\ln \mathrm{OPEN}_{t-2}$, and the variability of the exchange rate, $\ln \mathrm{FER}_{t-2}$, are significant and the elasticities are approximately 2.29, 1.44 and -0.05 respectively. These results imply that a one percent increase in the host country's market size and openness, on average, increases the level of the US FDI stock in the host country by 2.29 and 1.44 percent respectively while a one percent increase in fluctuations of the exchange rate, on average, decreases the level of the US FDI stock in the host country by 0.05 per cent. The coefficients on the other variables including relative tax rates, $\ln \mathrm{TAX}_{t-2}$, relative labour costs, $\ln \mathrm{COST}_{t-2}$, relative skilled labour, $\ln \mathrm{SKILL}_{t-2}$, trade costs, $\ln \mathrm{TC}_{t-2}$, and political risks, $\ln \mathrm{RISK}_{t-2}$, are found to be insignificant. However, similar to the POLS estimation, the result of the CIPS test (see Table IV.5) does not reject the hypothesis of the presence of a unit root in the FE residuals at conventional levels, implying that the FE regression may be spurious. In addition, the residuals estimated from the FE estimator are found to be cross-sectionally dependent on the basis of Pesaran's CD test (see Table IV.6). Thus, the FE coefficients are likely to be biased.

In the MG estimation which allows the effects of the observed explanatory variables to vary across countries, the coefficients on the variables for market size, $\ln \mathrm{GDP}_{t-2}$, is significant at the one percent level with values 1.48 whereas those on the variables for relative labour costs, $\ln \mathrm{COST}_{t-2}$ and the fluctuations of the exchange rate, $\ln \mathrm{FER}_{t-2}$ are approximately -0.42 and -0.03, and are significant at the one and five percent level respectively. In contrast to the results in the POLS and FE estimates, the coefficient on the variable for the host country's political risks, $\ln \mathrm{RISK}_{t-2}$, in the MG estimates is found to be significant at the ten percent level and approximately 0.57. These results imply that a one percent increase in the market size and the risk index of the host country, on average, increases the US FDI stock by 1.48 and 0.57 percent respectively, while a one percent increase in relative labour costs and the fluctuations of the exchange rate, on average, decreases the FDI stock by 0.42 and 0.03 percent respectively. Other variables, including relative tax rates, $\ln \mathrm{TAX}_{t-2}$, relative skilled labour, $\ln \mathrm{SKILL}_{t-2}$, the host country's openness, $\ln \mathrm{OPEN}_{t-2}$ and trade costs, $\ln \mathrm{TC}_{t-2}$, are found to have an insignificant effect on US FDI stock to the host country. Unlike the POLS and FE cases, all three unit-root tests suggest that the MG residuals are likely to be stationary (see Table IV.5). This implies that there exists a cointegrating long-run relationship between the variables in the model. The CD test does not reject the null hypothesis of the absence of cross-section dependence in the MG residuals (see Table IV.6). However, the p-value in the CD test is just 0.20, and thus the absence of cross-section dependence in the MG residuals seems not to be safely confirmed. Note that, in the MG estimation, unobserved common factors are controlled for by introducing a time trend in the regression model for each country, and thus the effect of unobserved common factors is allowed to vary across country. However, the use of the country-specific time trend restricts the unobserved common factors to be (smoothly) increasing or decreasing over time.

Table IV.5 here

Next, this study uses the CCEP estimator in which the effects of unobserved common factors are permitted to be heterogeneous although the parameters of the explanatory variables are constrained to be identical across countries (as in POLS, RE and FE, but not MG). In the CCEP estimates, the variables for relative labour costs, $\ln \mathrm{COST}_{t-2}$, trade costs, $\ln \mathrm{TC}_{t-2}$, and the political risks of the host country, $\ln \mathrm{RISK}_{t-2}$, are found to be insignificant while the variables for relative tax rates, $\ln \mathrm{TAX}_{t-2}$, the host country's openness, $\ln \mathrm{OPEN}_{t-2}$, and the exchange-rate variability, $\ln \mathrm{FER}_{t-2}$, are significant with their coefficients being approximately -0.46, 0.57 and -0.02 respectively. The variables for the host-country market size, $\ln \mathrm{GDP}_{t-2}$, and relative skilled labour, $\ln \mathrm{SKILL}_{t-2}$, are found to be significant at the ten percent level with their coefficients being roughly 0.72 and 0.50. The results indicate that a one percent increase in the relative tax rate and the fluctuation of the exchange rate, on average, reduces the US FDI stock by 0.46 and 0.02 per cent respectively, whereas a one-percent increase in the host country's market size, relative skilled labour and the host country's openness, on average, raises the US FDI stock by 0.72, 0.50 and 0.57 per cent respectively. Like the MG estimation, the results of LLC, M-W and CIPS unit-root tests indicate that the residuals estimated from the CCEP estimation are potentially stationary. However, the result of the CD test rejects the null hypothesis, implying that the CCEP residuals are potentially cross-sectionally dependent. Therefore, it is likely that the CCEP results could also be biased.

Table IV.6 here

This study continues to attempt to improve on the estimation approach by using the recently-developed CCEMG estimator, which allows the effects of the observed explanatory variables and the factor loadings on unobserved common factors to vary across individual countries. The CCEMG regression shows that the coefficients on the variables of the host country's market size, $\ln \mathrm{GDP}_{t-2}$, and relative tax rates, $\ln \mathrm{TAX}_{t-2}$, are found to be significant at the five percent level, with values approximately 1.47 and -0.50 respectively, whereas that on the host country's political risks, $\ln \mathrm{RISK}_{t-2}$, is found to be significant at the ten percent level with a value of 0.68. These estimation results imply that a one percent increase in the market size and the risk index of the host country will, on average, increase the level of the US FDI stock in the host country by 1.47 and 0.68 per cent respectively, while a one percent increase in the relative tax rates between the host country and the US will, on average, decrease the level of the US FDI stock in the host country by 0.50 per cent. Other explanatory variables including relative labour costs, relative skilled labour, the host country's openness, the fluctuations of the exchange rate and trade costs are found to have insignificant effects on the level of the US FDI stock in the host country in the CCEMG estimation. In addition, this study runs an F-test to test the joint significance of cross-section averages of variables which are used to capture the heterogeneous effects of unobserved common factors in the CCEMG estimator. The result of the F-test shows that the cross-section averages are jointly significant at the one percent level.

The results of the LLC, M-W and CIPS unit-root tests (see Table IV.5) indicate that the estimated residuals from the CCEMG estimation are potentially stationary. This means that variables (including unobserved common factors) are likely to be cointegrated, implying the existence of a long-run relationship in the data. In addition, the result of the CD test does not reject the null hypothesis with the p-value being 0.88 (see Table IV.6), implying that the hypothesis that the CCEMG residuals are cross-sectionally independent is not rejected at conventional levels. These results indicate that the CCEMG estimation is to be preferred to the previous ones, because the POLS, FE and CCEP residuals may be non-stationary and/or cross-sectionally dependent. Although CD tests do not reject the presence of cross-sectional dependence in the residuals estimated from the CCEMG and MG estimators, the p-value of the CD test for the CCEMG residuals (equal to 0.88) is much larger than that of the MG (equal to 0.20). Moreover, the RMSE of the CCEMG estimator is found to be smaller than that of the MG estimator, implying that the fit of the model estimated by CCEMG is better than that of the model fitted by the MG estimator. Therefore, the CCEMG estimator is preferred in this research.

When using CIF/FOB ratio as an alternative measure of trade costs in the regressions, the empirical results are similar (see appendix 4). Data also support the empirical specification allowing for heterogeneity of slope coefficients on the observed variables and the heterogeneity of the factor loadings on the unobserved common factors in the CCEMG estimation rather than other ones. The CCEMG regression (see column 5 in appendix 4) indicates the effects of the host country's market size and political risks to be positive and significant at the five percent level while the effect of relative labour costs, relative skilled labour, the host country's openness and trades costs to be found to be insignificant. These results are similar to those in the CCEMG estimation using a measure of trade costs based on Jacks, Meissner and Novy (2006, 2008) above. However, unlike the results of the CCEMG using a measure of trade costs based on Jacks, Meissner and Novy (2006, 2008), the impact of the relative tax rates is found to be insignificant while the impact of exchange-rate fluctuations is found to be negative and significant at the ten percent level in the CCEMG estimation using CIF/FOB ratio as a proxy for trade costs. A negative and (weakly) significant effect of exchange-rate fluctuations on FDI seem to support the theory of currency area, in that a host country with large fluctuations of the exchange rate deters inward FDI because investors may worry that those large fluctuations can lead to instability in the economic environment in that country. In the two CCEMG using different measures of trade cost (see columns 5 in Table IV.4 and appendix 4), it can be seen that the coefficient on the host country's market size and political risks are found to be positive and significant, implying that the effects of the host country's market size and political risks on the level of US FDI stock are robust; whereas the coefficient on trade costs is found to be insignificant in the two CCEMG estimations, indicating that trade costs between the US and the host country seem not to significantly impact the level of US FDI stock in the host country. It is noteworthy that in this research the regressions using a measure of trade costs constructed based on Jacks, Meissner and Novy (2006, 2008) is preferred than those using CIF/FOB ratio as a proxy for trade costs.[10]

[10] See the discussion in pp.18-19 in section III.

V. CONCLUSION

This study has used aggregate macro-panel data to investigate empirically the effects of market size, relative tax rates, relative labour costs, relative skilled labour, openness, fluctuations of the exchange rate, trade costs and political risks on US foreign direct investment to OECD countries in the period 1982-2010. In the study, we experimented with two groups of models, of which the first group consists of models using one-year lagged values of the explanatory variables and the second consists of models using two-year lagged values of the explanatory variables. This is because the explanatory variables are argued to react to FDI with a lag of one or two years. In addition, the use of lagged values could help to reduce the problem of a simultaneous effect of FDI on these variables. Empirical results in this study suggest using the models with two-year lags for explanatory variables, and thus the conclusion below is based on the estimation results from these models.

The empirical findings seem to reject the inferences from the POLS, FE and CCEP estimators because the estimated residuals achieved from these estimations are found to be cross-sectionally dependent and/or possibly non-stationary. It is possible that the cross-section dependence and/or non-stationarity of the residuals are potentially caused by the restrictions of the homogeneity of the slope coefficients on the observed explanatory variables, and the homogeneity of the factor loadings on the unobserved common factors. Unlike the POLS, FE and CCEP residuals, the MG and CCEMG residuals are found to be stationary and do not show serious evidence of cross-section dependence. In the MG estimation, which allows for the heterogeneity of the slope parameters on the observed explanatory variables, the market size of the host country was found to have a significant effect on US FDI stock to the host country in the period 1982-2010, and relative labour costs, fluctuations of the exchange rate and the host country's political risks were also found to have significant effects on the US FDI stock. Although the CD test does not reject the null hypothesis of the absence of cross-section dependence in the MG residuals at conventional levels, the p-value in the CD test is 0.20; and thus the absence of cross-section dependence in the MG residuals seems not to be safely confirmed.[11] Note that in the MG estimation, unobserved common factors are controlled for by introducing country-specific time trends, and thus the factor loadings on unobserved common factors are allowed to vary across countries. However, the use of the country-specific time trend restricts the unobserved common factors to be (smoothly) increasing or decreasing over time.

In the CCEMG estimation, which allows for the heterogeneity of the slope parameters on the observed explanatory variables and in the factor loadings on the unobserved common factors, in order to fulfil the research aims set out in the introduction, the host country's market size and a political risk index of the host country were found to have significant effects on US FDI stock to the host country in the period 1982-2010. These results are likely to be similar to those of the MG estimation. However, in the CCEMG estimation, relative labour costs were found to have an insignificant impact on the FDI stock while relative tax rates between the host country and the US were found to have a negative and significant effect on the US FDI stock. The result differs from MG estimation where the relative labour costs were found to be significant. The influences of other variables, including relative tax rates, relative skilled labour, the host country's openness and transport costs on the US FDI stock were also found to be insignificant in the CCEMG estimation. In addition, the

[11] With respect to the MG estimation using the ratio CIF/FOB as a measure of trade costs, the p-value in the CD test of the residuals calculated from the MG estimation is just 0.12 (see column 3 in appendix 4).

result of the F-test rejects the exclusion of the cross-section averages of variables which are used to capture the unobserved common factors with heterogeneous impacts on FDI from the CCEMG regression. Unlike the POLS, FE and CCEP cases, the inference from the CCEMG estimates should not be rejected because its estimated residuals were found to be stationary and cross-sectionally independent. Moreover, the inference from the CCEMG estimator is likely to be preferred over that of the MG because the p-value of the CD test for CCEMG residuals is larger than that for the MG residuals and additionally the fit of the CCEMG model was found to be better than that of MG.

In brief, the empirical results from the preferred CCEMG estimates indicate that US FDI seems to be attracted to host countries with a large market size, low relative tax rate and little risk in the investment climate, corruption or the legal environment. The CCEMG regression can allow for common shocks, for example the global financial crisis, and/or average ownership-specific advantages of US firms such as advanced technology or superior managerial systems that could affect FDI from the US to OECD countries. This could be reasonable because US firms are known as leading firms in innovation, knowledge and ways to efficiently operate. The significance of the variable for political risks may also reinforce this, because the FDI motivated by these factors may tend to attach importance to the host countries which have high transparency and efficiency in the investment and business environment, and are known for the impartiality of the legal system and the observance of the law (e.g. commercial dispute regulations, assets and property or intellectual property laws).

In terms of theory, the evidence that the host country's market size, relative tax rates and the host country's risks of investment climate, corruption and legal environment have significant effects on FDI in this study supports the perspective of locational factors in the eclectic theory. On the other hand, although trade costs are found to be insignificant, the finding of the significance of the host country's market size for FDI is likely to support the theory of horizontal FDI to some extent. Variable of exchange-rate fluctuations is insignificant in the preferred estimation in this research, but it is found to be significant and negative in the estimation using CIF/FOB ratio as a measure of trade costs. The finding of the negative effect of exchange-rate fluctuations on FDI may support the theory of currency area, in that a host country with large fluctuations of the exchange rate discourages inward FDI because investors may worry that those large fluctuations can lead to uncertainty or instability in the economic environment in that country. Vertical FDI theory and Kojima's theory seem not to be supported, because of the finding of insignificance for relative labour costs and relative skilled labour variables.

It is worth noting that the significance of the host country's market size is robustly positive throughout all estimators (including the POLS, FE, MG, CCEP and CCEMG) while that of relative tax rates is robustly negative in all estimators, excepting the FE and MG. Conversely, the effect of trade costs on the US FDI stock is robustly insignificant in all estimators, excepting the POLS.

This study makes the following contributions to the panel literature on determinants driving FDI from a country to a cross-section of host countries. Firstly, the empirical literature tends to apply standard panel data estimators that constrain the observed explanatory variables' parameters to be homogeneous across recipients. This assumption can be too strong, because the influence of a factor on FDI may be heterogeneous for different countries. In this research, the data seem to reject empirical specifications which impose homogeneity of the slope parameters.

Secondly, the empirical results in this study show that the exclusion of unobserved common factors, or a constraint of the homogeneity of the factor loadings for the unobserved common factors, may potentially produce serious biases in the findings. It is noteworthy that, in the context of the investigation on FDI from an investing country to a cross-section of host countries, besides global shocks, common factors could include the time-varying average advanced knowledge, technology or innovation of the investing country's firms. Those factors seem to be likely to be relevant to ownership/internalization advantages that may influence FDI, as suggested in Hymer (1976), Kindleberger (1969), Buckley and Casson (1976) and Dunning (1977, 1981). Therefore, they should be carefully addressed in the estimation. This study adopted a new approach to address these two issues of the previous literature by employing the recent CCEMG estimator, in order to take unobserved common factors into account and permit heterogeneous effects of both observed variables and the unobserved common factors across recipients in the empirical estimation. The empirical results seem to support this approach rather than more standard ones and thereby indicate that this approach should be considered for future empirical analyses of the determinants of FDI.

In addition, this study used CIF/FOB ratio and a measure based on recent work by Jacks, Meissner and Novy (2006, 2008) to control for the effect of trade costs in regressions. We find little support for the view that trade costs is an important determinant of US FDI stock.

This study has the following limitations. Firstly, it does not deal with dynamics in detail. This is because the theoretical CCEMG set-up in Pesaran (2006) and Kapetanios, Pesaran and Yamagata (2011) does not allow for dynamics in the model. The CCEMG estimator was chosen because it allows for the heterogeneity of observed variables and unobserved common factors across countries. Standard dynamic panel estimators such as Anderson-Hsiao, Arellano-Bond[12] or dynamic FE do not allow for the heterogeneity of the effects of the observed variables and unobserved common factors across countries. A second limitation is that the assumption of the exogeneity of regressors in CCEMG could be too strong. The use of two-year lagged values for independent variables in this study may help to reduce the effect of the dependent variables on independent variables to some extent; however, this may not avoid the problem completely. There is a recent working paper by Chudik and Pesaran (2013) which extends the CCEMG estimator to weakly exogenous regressors and allows for dynamics in the model. However, the theoretical results of the CCEMG in that paper are currently only for the case when the dependent variable and regressors are stationary. In our case, since the dependent variable and most regressors appear to be I(1), the existing results are not applicable, and otherwise the theoretical properties of the CCEMG estimator applied to dynamic models are not yet known. Future progress in this area will help to ensure that empirical work on the determinants of FDI will be increasingly informative.

[12] Also, the Anderson-Hsiao and Arellano-Bond estimators are intended for short-T panels and may be inappropriate for the sample with $T > N$ as in the case of this study (Baltagi, 2008).

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TABLES

Table IV.1: Unit root tests for variables

	LLC (p-value)	M-W (p-value)	CIPS (p-value)
ln FDI	0.04	0.65	0.64
ln GDP	0.42	0.80	0.72
ln TAX	0.01	0.01	0.47
ln COST	0.01	0.01	0.43
ln SKILL	0.43	0.99	0.84
ln OPEN	0.01	0.01	0.85
ln FER	0.01	0.01	0.03
ln TC	0.01	0.03	0.97
ln RISK	0.01	0.62	0.31

Note: The lag length of the unit root tests is three. This study experimented with different lag lengths up to order three: the results did not change significantly.

Table IV.2: Unit root tests for the first difference of variables

	LLC (p-value)	M-W (p-value)	CIPS (p-value)
Δ ln FDI	0.01	0.01	0.01
Δ ln GDP	0.01	0.01	0.02
Δ ln TAX	0.01	0.01	0.01
Δ ln COST	0.01	0.01	0.01
Δ ln SKILL	0.01	0.02	0.01
Δ ln OPEN	0.01	0.01	0.01
Δ ln TC	0.01	0.01	0.01
Δ ln RISK	0.01	0.01	0.01

Note: The lag length of the unit root tests is three. This study experimented with different lag lengths up to order three: the results did not change significantly.

Table IV.3:

The estimation of the models using one-year lagged values for explanatory variables

	(1) POLS	(2) FE	(3) MG	(4) CCEP	(5) CCEMG
$\ln \mathrm{GDP}_{t-1}$	1.09 (0.18)	2.26 (0.71)	0.82 (0.32)	0.66 (0.42)	0.41 (0.77)
$\ln \mathrm{TAX}_{t-1}$	-0.70 (0.21)	-0.14 (0.22)	-0.31 (0.12)	-0.16 (0.12)	-0.08 (0.17)
$\ln \mathrm{COST}_{t-1}$	-1.56 (0.69)	0.81 (0.43)	0.06 (0.15)	0.40 (0.23)	0.22 (0.50)
$\ln \mathrm{SKILL}_{t-1}$	0.70 (1.18)	0.62 (0.52)	0.11 (0.37)	0.25 (0.31)	-0.39 (0.50)
$\ln \mathrm{OPEN}_{t-1}$	1.34 (0.54)	1.35 (0.63)	-0.01 (0.21)	-0.02 (0.27)	0.15 (0.36)
$\ln \mathrm{FER}_{t-1}$	-0.06 (0.08)	-0.05 (0.02)	-0.04 (0.01)	-0.01 (0.01)	-0.02 (0.52)
$\ln \mathrm{TC}_{t-1}$	-1.62 (0.45)	1.24 (0.93)	0.10 (1.51)	-1.19 (0.49)	0.03 (0.65)
$\ln \mathrm{RISK}_{t-1}$	1.17 (0.93)	-0.21 (0.54)	0.24 (0.43)	-0.36 (0.26)	0.72 (0.40)
Observations RMSE	588 0.8127	588 0.3528	588 0.1330	588 0.1650	588 0.0822

Note: Standard errors are reported in parentheses. In POLS and FE regressions, the reported standard errors are heteroskedasticity-robust and clustered by country. Hausman test suggests choose the FE estimator over the RE estimator (p-value=0.01). GDP denotes the host country's market size, TAX relative tax rates, COST relative labour costs, SKILL relative skilled labour, OPEN the host country's openness, FER fluctuations of the exchange rate, TC trade costs, RISK the host country's political risks. RMSE is root mean squared error.

Table IV.4:

The estimation of the models using two-year lagged values for explanatory variables

	(1) POLS	(2) FE	(3) MG	(4) CCEP	(5) CCEMG
$\ln \mathrm{GDP}_{t-2}$	1.45 (0.17)	2.29 (0.79)	1.48 (0.48)	0.72 (0.38)	1.47 (0.53)
$\ln \mathrm{TAX}_{t-2}$	-0.72 (0.17)	-0.21 (0.23)	-0.14 (0.18)	-0.46 (0.11)	-0.50 (0.21)
$\ln \mathrm{COST}_{t-2}$	-1.98 (0.73)	0.75 (0.47)	-0.42 (0.16)	0.22 (0.21)	0.15 (0.58)
$\ln \mathrm{SKILL}_{t-2}$	0.99 (1.17)	0.59 (0.61)	-0.04 (0.45)	0.50 (0.27)	0.46 (0.42)
$\ln \mathrm{OPEN}_{t-2}$	1.67 (0.54)	1.44 (0.66)	-0.34 (0.34)	0.57 (0.25)	-0.07 (0.60)
$\ln \mathrm{FER}_{t-2}$	-0.07 (0.09)	-0.05 (0.02)	-0.03 (0.01)	-0.02 (0.01)	-0.02 (0.02)
$\ln \mathrm{TC}_{t-2}$	-0.54 (0.46)	1.39 (0.95)	0.44 (0.45)	-0.02 (0.45)	-0.96 (0.62)
$\ln \mathrm{RISK}_{t-2}$	1.99 (1.15)	0.01 (0.54)	0.57 (0.33)	0.28 (0.23)	0.68 (0.37)
Observations RMSE	567 0.8733	567 0.3491	567 0.1268	567 0.1331	567 0.0608

Note: Standard errors are reported in parentheses. In POLS and FE regressions, the reported standard errors are heteroskedasticity-robust and clustered by country. Hausman test suggests choose the FE estimator over the RE estimator (p-value=0.01). GDP denotes the host country's market size, TAX relative tax rates, COST relative labour costs, SKILL relative skilled labour, OPEN the host country's openness, FER fluctuations of the exchange rate, TC trade costs, RISK the host country's political risks. RMSE is root mean squared error.

Table IV.5: Unit root tests for the estimated residuals

	POLS	FE	MG	CCEP	CCEMG
LLC test (p-value)	0.30	0.01	0.01	0.01	0.01
M-W test (p-value)	0.23	0.04	0.01	0.01	0.01
CIPS test (p-value)	0.95	0.93	0.01	0.01	0.01

Note: The lag length of the unit root tests is three. This study experimented with different lag lengths up to order three: the results did not change significantly.

Table IV.6: Cross dependence tests for the estimated residuals

	POLS	FE	MG	CCEP	CCEMG
CD test (p-value)	0.01	0.01	0.20	0.01	0.88

Note: CD test is Pesaran (2004) test with the null hypothesis of cross-section independence.

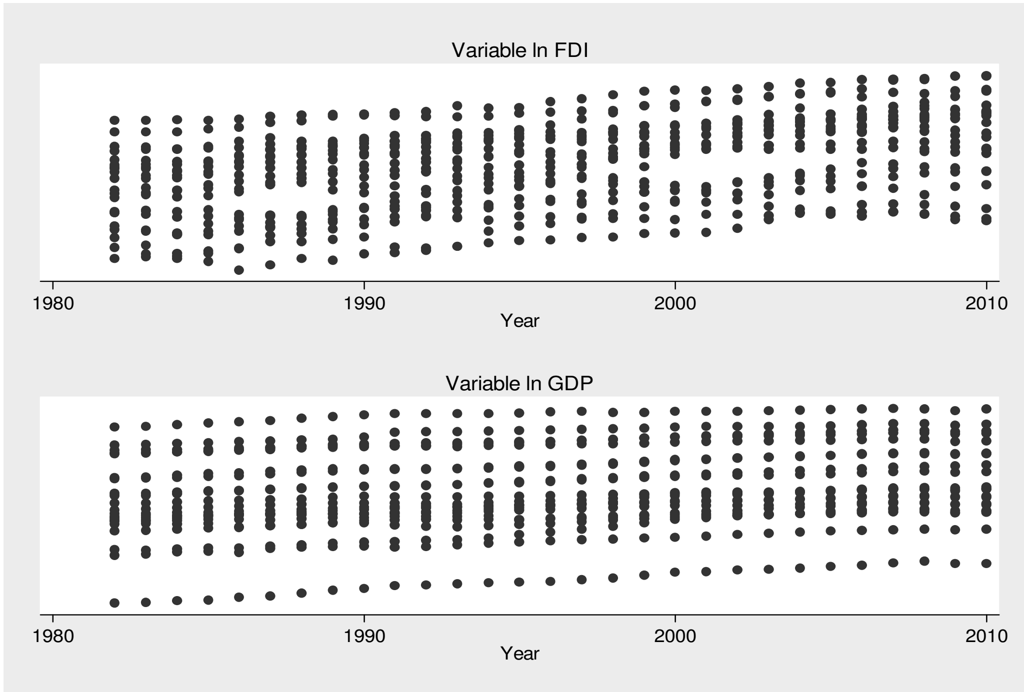
APPENDICES

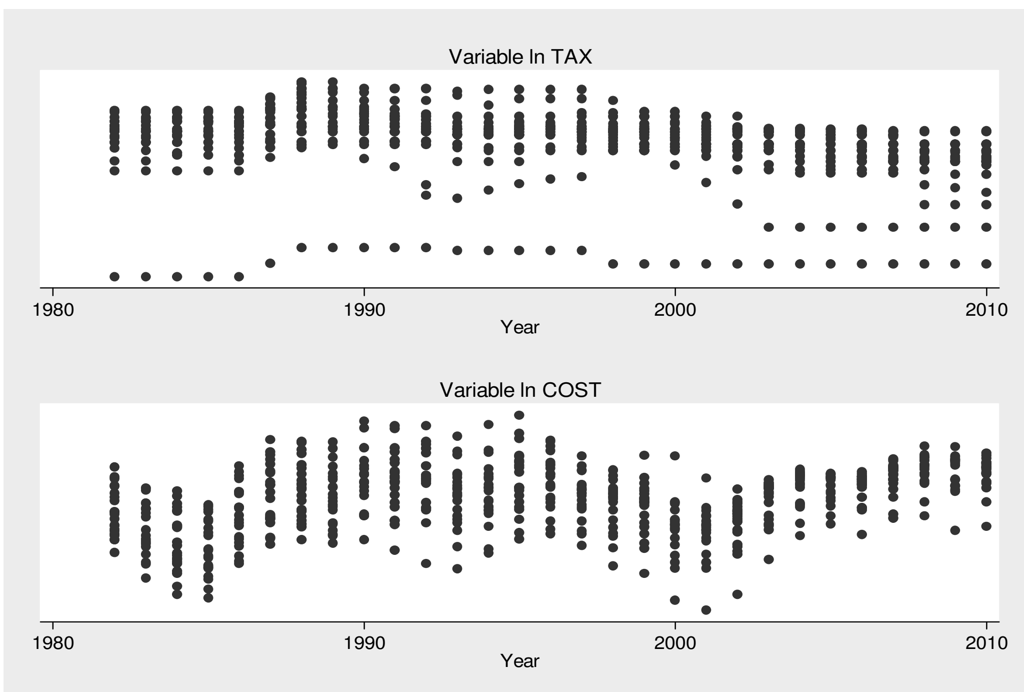
Appendix 1:

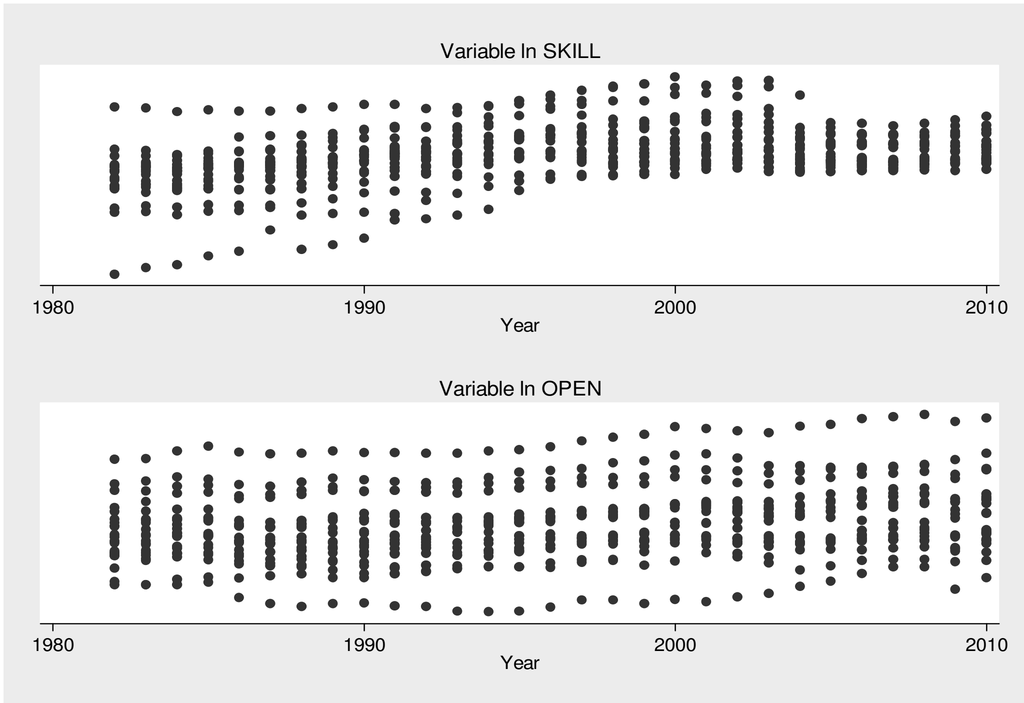
List of countries in the sample

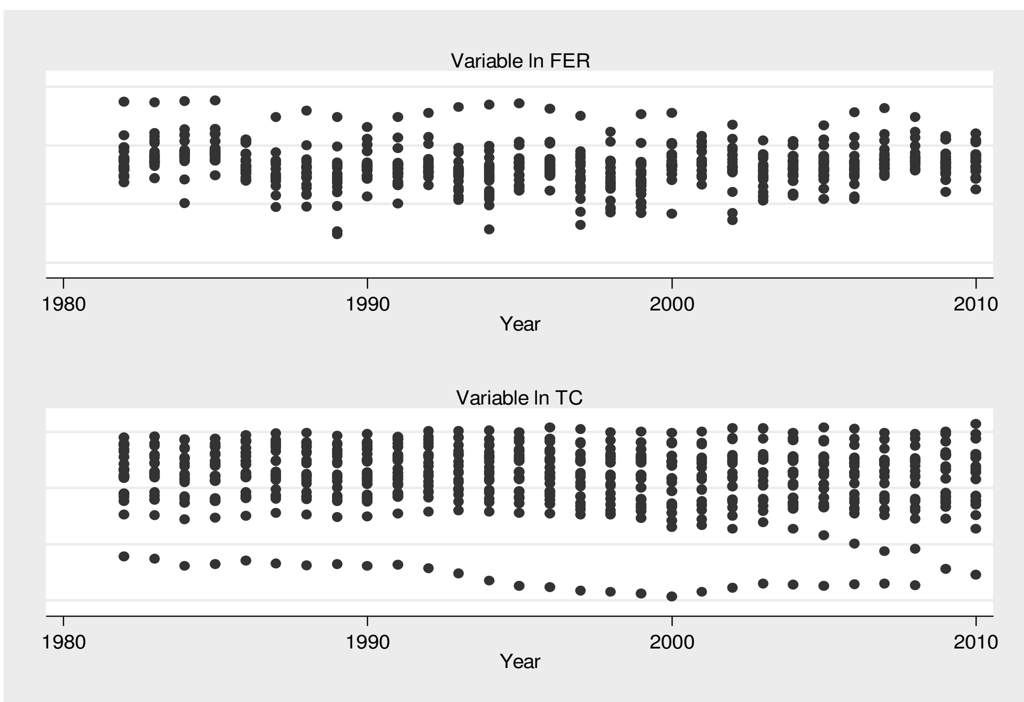
Australia	Germany	New Zealand
Austria	Greece	Norway
Belgium	Ireland	Portugal
Canada	Italy	Spain
Demark	Japan	Sweden
Finland	Luxembourg	Switzerland
France	Netherlands	United Kingdom

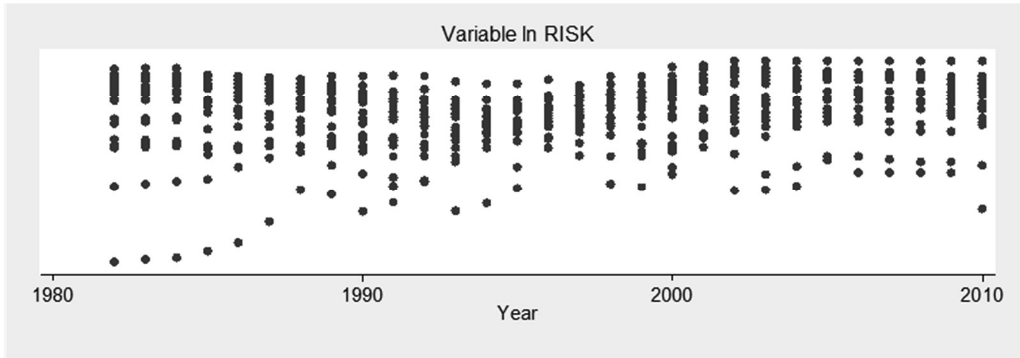
Appendix 2: Plot of variables over time





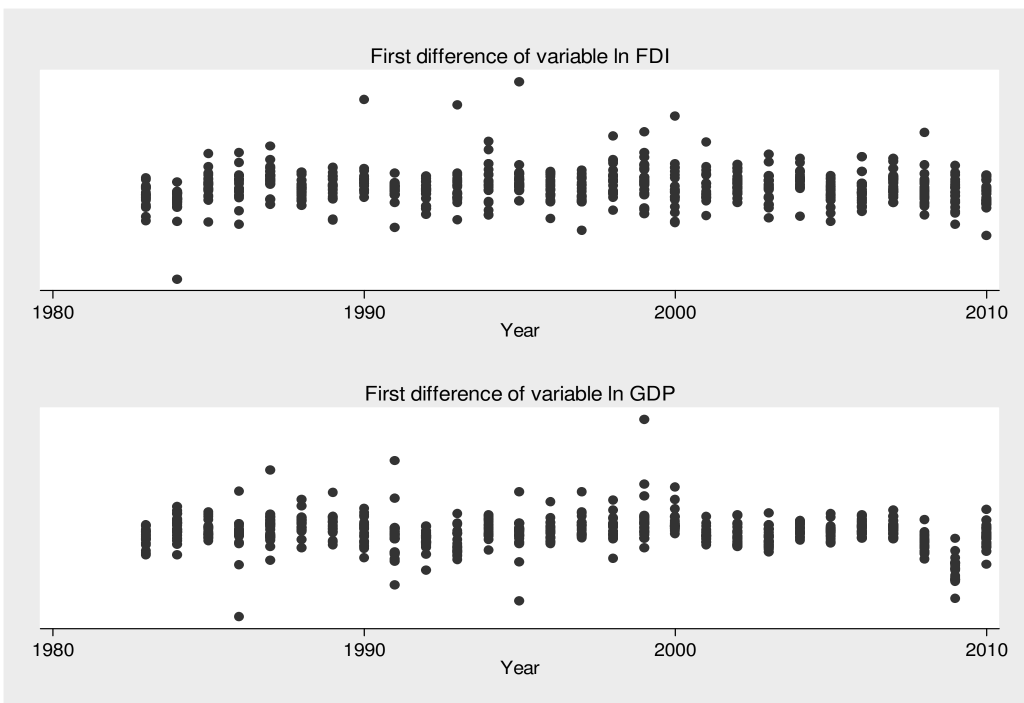

Variable ln SKILL
1980
1990
2000
2010
Year
Variable ln OPEN
1980
1990
2000
2010
Year

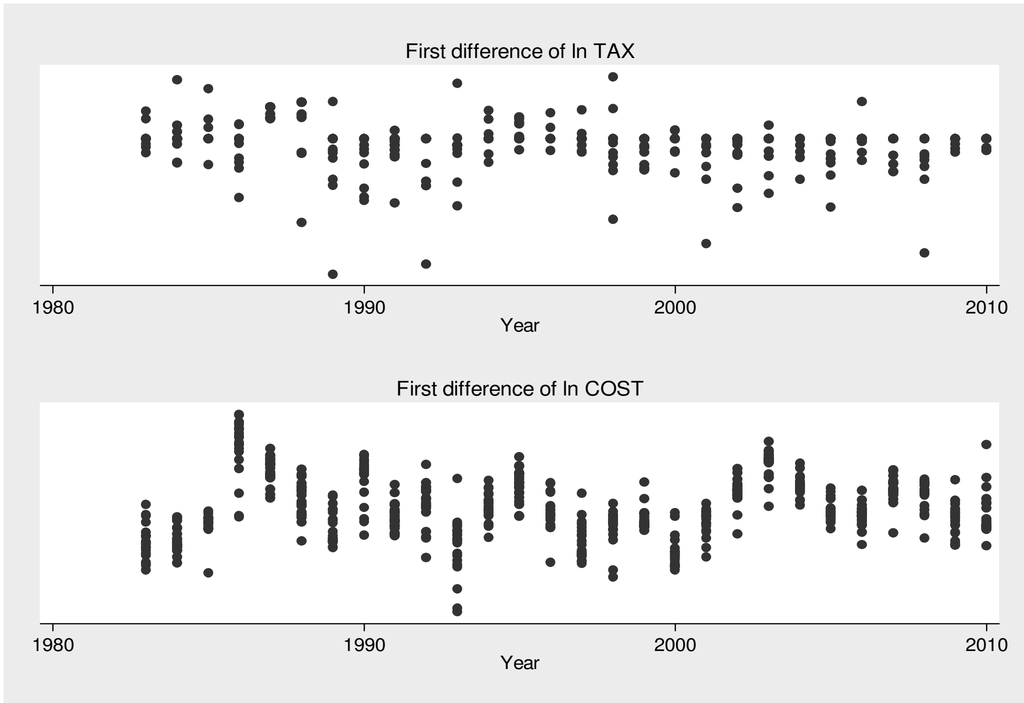

Variable ln FER
1980
1990
2000
2010
Year
Variable ln TC
1980
1990
2000
2010
Year

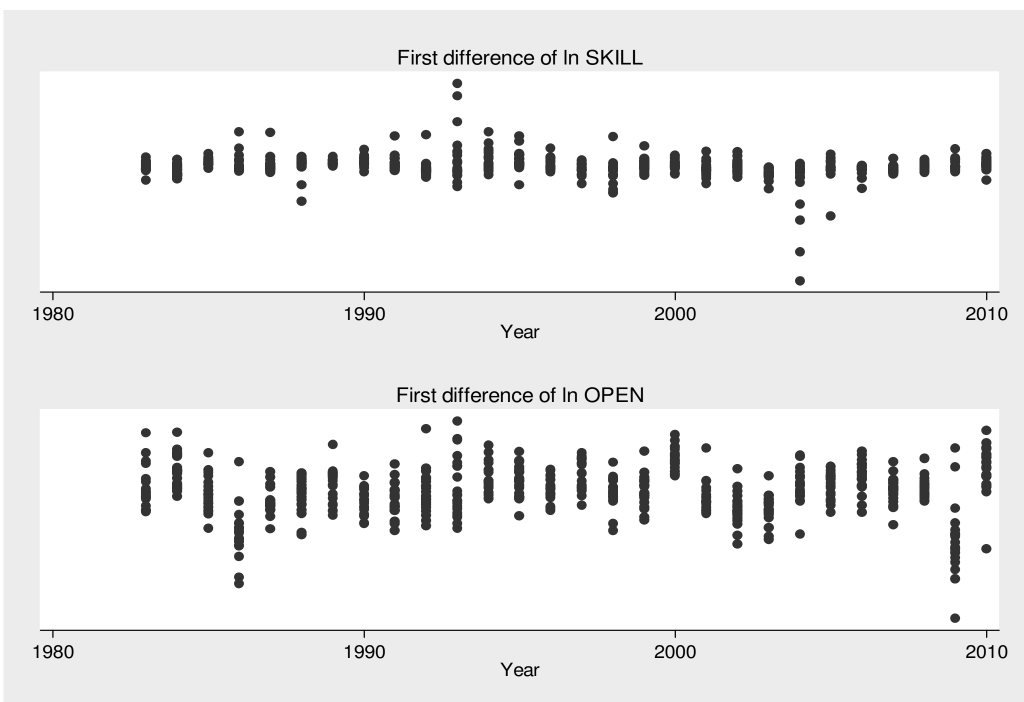


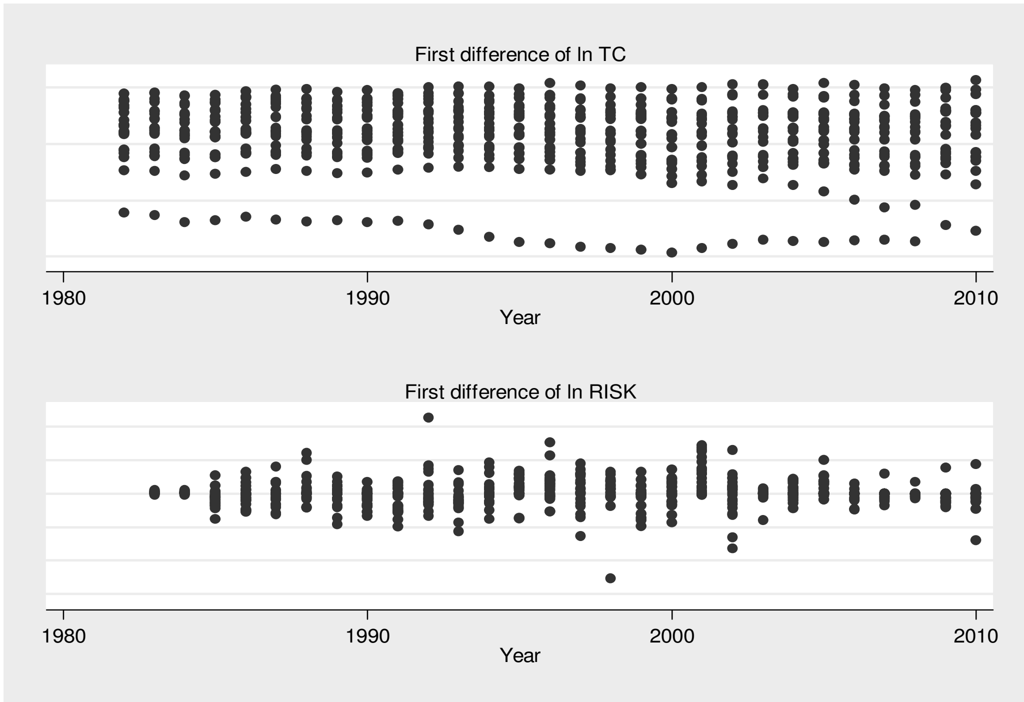
Appendix 3:

Plot of first difference of variables over time




First difference of ln TAX
1980
1990
2000
2010
Year
First difference of ln COST
1980
1990
2000
2010
Year


First difference of ln SKILL
1980
1990
2000
2010
Year
First difference of ln OPEN
1980
1990
2000
2010
Year


First difference of ln TC
1980
1990
2000
2010
Year
First difference of ln RISK
1980
1990
2000
2010
Year

Appendix 4:

The estimation using CIF/FOB ratio as a measure of trade costs

	(1) POLS	(2) FE	(3) MG	(4) CCEP	(5) CCEMG
$\ln \mathrm{GDP}_{t-2}$	1.45 (0.17)	1.97 (0.75)	1.02 (0.61)	0.77 (0.38)	1.53 (0.67)
$\ln \mathrm{TAX}_{t-2}$	-0.72 (0.17)	-0.17 (0.24)	-0.08 (0.15)	-0.34 (0.11)	-0.31 (0.19)
$\ln \mathrm{COST}_{t-2}$	-1.98 (0.73)	0.66 (0.44)	-0.40 (0.18)	0.11 (0.21)	0.30 (0.54)
$\ln \mathrm{SKILL}_{t-2}$	0.99 (1.17)	0.72 (0.68)	0.32 (0.46)	0.58 (0.27)	0.38 (0.47)
$\ln \mathrm{OPEN}_{t-2}$	1.67 (0.54)	1.27 (0.61)	-0.31 (0.33)	0.40 (0.25)	0.12 (0.57)
$\ln \mathrm{FER}_{t-2}$	-0.07 (0.09)	-0.05 (0.02)	-0.04 (0.02)	-0.03 (0.01)	-0.03 (0.02)
$\ln(\mathrm{CIF/FOB})_{t-2}$	-0.54 (0.46)	0.42 (0.29)	0.07 (0.15)	0.03 (0.08)	0.01 (0.10)
$\ln \mathrm{RISK}_{t-2}$	1.99 (1.15)	0.30 (0.41)	0.45 (0.25)	0.27 (0.23)	0.73 (0.35)
Observations RMSE	567 0.8733	567 0.3490	567 0.1236	567 0.1332	567 0.0627
LLC test (p-value) M-W test (p-value) CIPS test (p-value)	0.30 0.22 0.95	0.01 0.11 0.73	0.01 0.01 0.01	0.01 0.01 0.01	0.01 0.01 0.01
CD test (p-value)	0.01	0.01	0.12	0.01	0.59

Note: Standard errors are reported in parentheses. In POLS and FE regressions, the reported standard errors are heteroskedasticity-robust and clustered by country. Hausman test suggests choose the FE estimator over the RE estimator (p-value=0.01). GDP denotes the host country's market size, TAX relative tax rates, COST relative labour costs, SKILL relative skilled labour, OPEN the host country's openness, FER fluctuations of the exchange rate, CIF/FOB trade costs, RISK the host country's political risks. RMSE is root mean squared error. The lag length of the LLC, M-W, CIPS tests is three; this study experimented with different lag lengths up to order three: the results did not change significantly. CD test is Pesaran (2004) test with the null hypothesis of cross-section independence.