Master Thesis

Spring 2010

Department of Economics

The Effect of Property Rights on Foreign Direct Investment

A panel data study of the period between 1970 and 2005

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ABSTRACT

This paper studies the importance of property rights when investigating the determinants of foreign direct investment. Property rights are difficult to measure and its relation to foreign direct investment has not been examined that much in previous researches. This paper examines the effect of some independent variables and property rights on foreign direct investment by using panel data for 127 countries, between 1970 and 2005. Several models are used in order to investigate the correlation between the dependent and the independent variables. In nearly all models, property rights show a significant positive correlation with foreign direct investment.

Keywords: property rights, foreign direct investment, panel data, fixed effects model.

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1. INTRODUCTION

Investment is seen as an important factor in economic growth, and when it comes to foreign direct investment (FDI) and its benefits such as the spread of new technologies, management skills, access to international markets, capital investments; it surely plays an important role in the developing countries. Since the 1990's foreign direct investment has become the biggest source of external finance for developing countries, and at the end of the millennium it accounted for about a half of the private capital flows to developing countries (Aitken 1999).

Theory often states that foreign direct investment is supposed to have a positive effect on economic growth, mainly because of technology transfer, however it is necessary to point out that previous studies has resulted in dissimilar conclusions. Apergis et al. (2008) present a comprehensive overview of recent studies on this subject, and nonetheless surprisingly foreign direct investment will not by itself guarantee economic growth, but under the right circumstances, or let us rather say in complement with other factors, recent assumptions could likely be confirmed by the empirical evidence. Under the assumption that foreign direct investment encourages economic growth, then it is of further interest to investigate what determines foreign direct investment.

This paper will study these underlying determinants. In the section "Theory" we will present some of the previous contributions by economic researchers investigating the determinants of foreign direct investment. Consequently leading to the question; if it is necessary to do more research on this subject? Why the answer is "yes" is essentially because of when studying the developing countries, or the world in general, we can see that many of the previous researches consider somehow Western-style circumstances. In the developed world the institutional framework is quite often of high-quality and steady over time, whereas among developing countries this framework should not be taken as for granted. This is where things such as contracts, laws and property rights – broadly speaking the rules of the game - matters.

Property rights are an institutional factor or a formal rule that is often considered as important when dealing with investments. Better property rights are likely to increase the incentives to invest, and for foreign direct investment the home country investor want its return from

investments in the host country to be as safe and secure as possible. In this sense we see the relevance of an inclusion of property rights when searching for the determinants of foreign direct investment. In our estimation we will use panel data on up to 127 countries between 1970 and 2005, and we will make use of a property rights index from the Economic Freedom Network to investigate whether it seems to stand to any significance or not. In the upcoming section we will discuss more around the importance of property rights.

2. THEORY

If we want to be clear about our subject; the effect of property rights on foreign direct investment, we should consider the following questions: what is property rights and foreign direct investment? Why are they important? How are they related? These questions will be discussed in this section. First, we begin by introducing the implications of property and property rights.

2.1. Property rights

Hundreds of years ago in our ancestor's time, property rights were not needed in the same way as it is today. For property rights in land, it is only when the land gets scarce the demand and benefits of the rights will overwhelm the costs of maintaining such laws. Actually property rights define the usage limitation of a good, or a way that a good can be used. It explains someone's rights for holding or earning money from a good, or transfers it to others. There are different classifications of properties, and they could be divided into different sub-groups; such as real property, personal property and intellectual property. Real property generally includes land, personal property roughly means movable physical items, and intellectual property can be defined as rights for artistic creations, inventions and so on.

Feder et al. (1991) divides property rights into four categories; none (open access), communal property, private property and state property. None or open access means that there aren't any rights assigned to anyone, like as the air we all breath. In a communal property the rights are assigned to several individuals in a group. The more individuals that owns the property, the more similar it becomes to an open access property. Demsetz (1967) use the same type of distinction, except that he doesn't make any difference between a communal and an open access property. He explains communal ownership as the right to walk a city sidewalk, or that every person has the right to hunt, till or mine the land. State property means that the property is owned by the state and is managed by the public sector. The state might exclude individuals from using the state property, as long as it uses accepted political procedures. Finally, there is private property or ownership which Demsetz (1967) defines as "*the community recognizes the right of the owner to exclude others from exercising the owner's private rights*". This

means that the individual has the right to exclude others from the property, and it is somehow the same for intellectual property patents that instead give someone an exclusive right to make use of an idea. When calculating the present value, the owner will also take future benefits and costs into consideration, which usually is not to be the case with a communal or an open access property. Instead the present generation will be weighted an economically too large part when valuing the property. Individuals acts where each person tries to maximize its own utility out of its communal right (or from the open access). This regularly leads to over-hunt or the use of more resources than necessary of the land. The individual gets the benefits while the costs are shared with others. This is called *the tragedy of the commons* and there is a degradation of the scarce resources. A solution to this problem could be that two individuals make an agreement of sharing the benefits and costs. All individuals concerned about the property could therefore make agreements, but the negotiation costs are usually too high for reaching such an optimal behavior (Demsetz 1967, Feder et al. 1991).

There are however negative externalities from private property as well; that the owner doesn't have any direct incentives to think about the consequences on other's properties. For example; an individual's factory could create devastation to its neighbors' environment. Although Demsetz (1967) among others argues that the private property rights has an advantage in creating optimal economic performance over the alternatives (Demsetz 1967). It might sometimes be difficult to distinguish the categories from each other. For example, if a private property right is not rightly enforced and juridical protected it could be viewed as an open access instead of a private property. As well as, if there are a large number of individuals under communal property, it might be hard to distinguish it from an open access property (Feder et al. 1991).

A society may include all or some of these categories. For example, in some areas there could be private property rights and at the same time in another area there are land owned by the state. The same land or area may sometimes not only contain one property right but also exclusive rights to use the land. For example, that state owns the land, but at the same time exclusive use rights are given to specific individuals. The distinction between use rights and property rights are not always that obvious. Especially when the use right contracts are on a long-term basis and the transferability of the contracts contains few limitations (Feder et al. 1991).

Feder et al. (1991) discusses the need of different property rights structures depending on the stages of economic development. In a rural economy where the main sector is agricultural, there may be a combination of use rights and property rights. An individual has the right to use the land, which can be during a long period and that is also inheritable, but the transferability of the use rights are restricted by the community. In this case, when the property rights are assigned to the community it could minimize social tensions, and hence keeping the incentives of the individuals to invest and take care of the property. However, when technology advances and an economy enters a new stage of development, Feder et al. (1991) argues that there will be a need for changes in both constitutional order and institutional arrangements relating to land rights. Technological development generates larger differences in productivity between households, and because of transferability restrictions, productivity losses will increase relative to social tensions (Feder et al. 1991). The differences in productivity may come from that the economy, and also each households alone, more and more specialize its production, prefer scale economies, but also that growth itself implies that some households grows faster than others.

Another perspective is that private property rights have become more important since the scarcity of land has increased. Population growth and an increased use of land pressures for more secure land rights. Feder et al. (1991) says when there were plenty of land and labor scarce the property rights in labor was relatively better defined than the property rights in land. In their article they investigate the history of Thailand and they argue that in the early nineteenth century, slaves rather than land played a more important role as collateral in the financial market. The laws were better defined for labor commitments than the land rights.

Improved terms-of-trade in the agricultural sector and technological change, as a result of an increased population density, made investment in land more profitable and thus created stronger incentives for improving land rights. This was the case in Thailand and in the development of the western world. Population pressure and increased productivity in farming, and hence a demand for better defined property rights which is the case in many of today's developing countries as well (Feder et al. 1991).

Going through the institutional structure, Feder et al. (1991) mentioned three kinds of institutions; constitutional order, institutional arrangements and normative behavioral codes. The first one, the constitutional order, refers to the fundamental rules about how a society is

organized. The institutional arrangements, which includes laws, regulations, contracts (such as property rights) and associations, are the rules under the constitutional order. The first two categories are formal institutions. The normative behavioral codes are informal, and refer to different traditional and cultural values in a society (Feder et al. 1991). Feder et al. (1991) points out that these three categories of institutions have to coordinate with each other, and especially in developing countries, undergoing changes in the structure of the institutions; there might be conflicts between laws and cultural norms. Even if there are rights and laws present people could have a harder time to adjust to and accept them due to informal institutions. For example, a land property right might formally be for sale for anyone, but informally only people from the same ethnical group as the buyer would be accepted. If a country's government decides to adopt new laws for improving property rights, it will usually take some time to change the normative behavioral codes of the people, especially in developing countries (Feder et al. 1991). Taking all this into consideration would most likely improve the results of the study, but practically it would be difficult to measure data such as normative behavior. We will limit our study to the institutional arrangements; which means the importance of contracts and laws concerning property rights.

2.1.1. Further discussion on property rights in land

As it is well-known, property rights in land plays an important role in many of today's developing countries, so therefore we will devote more discussion to this subject. Feder et al. (1991) discusses the benefits and costs of having property rights in land. First, one of the advantages would be - as we have already discussed - the improved incentives to use land efficiently. The benefit comes from the improved incentives, and the costs are connected to the establishment and enforcement of property rights. When scarcity of land appears, the benefit-cost ratio increases which implies a demand for more well-defined property rights. Second, as the demand for better defined property rights increases, it will lead to more asymmetrical information and uncertainty. For example; in a small agricultural economy where land transfers takes place between members of the same community, where most know each other, there aren't really any need for institutions that secure the property rights. But, since technology has become more advanced or land becomes scarcer there will be more land transfers between communities and outsiders. Asymmetric information and uncertainty will increase and therefore lead to demand for institutions that establish and protect the property rights; such as land record offices, courts and polices. Third, land can be used as collateral in

credit transactions. Since land is relatively immune to damage, it is widely used as collateral on loans, as a result of the risky business of lending money. This helps the owners of the property rights to receive loans for their investments. Further, Feder et al. (1991) makes a point of the importance of using public sector resources to promote land security. When the demand for new institutions increases it may increase costs because of the complexity of the property rights system. For example, it requires lawyers to write various types of documents. Therefore it might be a good idea to use public sector resources to support poor farmers with the transaction costs when dealing with property rights. It will then minimize the advantages of the wealthier farmers that are because of high transaction costs (Feder et al. 1991).

The secured ownership that property rights means for individuals leads to increased incentives and willingness to invest in their properties for future gains. Therefore we are expecting to see a positive correlation between property rights and investments.

2.2. Investment

The investment term is used in several economic fields, like as business management, finance and economics. Usually people tend to invest when they save something for future consumption, since they expect the investments to generate further benefits in the future. Investment could be defined as the buying of assets in the purpose of a future gain or return. Dealing with investment, individuals seeks investments with the lowest risk. There are a lot of different variables that affect the level of risk, and one of them is the quality of property rights.

There are mainly two categories of investments in a country - domestic and foreign investment. It is widely known that domestic investment is a kind of investment that is restricted to within a country's own boarders. In this paper we are focusing on foreign direct investment, which will be emphasized more the in next section.

2.2.1. Foreign direct investment

There are a lot of things that have an effect on investment; such as law and order arranged by a country's government. Every government has policies concerning its domestic and foreign direct investment. Some prefer to have local domestic investment for the reason of getting licensing and government procurement. Others, they are positive to let foreign direct investment into their country, and for example, they are doing so by using different taxes and/or credit policies (Feldstein et al. 1995). The country that receives the investments, namely the host country, could see the possibilities of economic growth, while the investing home country has the wish to support, or the hope of high yield and benefits from its investment.

In the present world and in the era of globalization, countries more than ever interact with each other by sharing their knowledge and capital. The capital and resources of developing countries may not be enough for encouraging economic growth. Therefore it is a good idea to attract foreign investment to their country, and many countries tend to search for good relationships, and alliances, with foreign countries for improving their labor and capital resources by sharing investment and knowledge. Foreign direct investment can be defined as flowing capital across international boundaries, capital that is owned by the home country. This kind of investment with one host and one home country could be a mix of economic activities that is controlled by the home country investors. Examples of these economic activities are employment, sales, purchase and use of intermediate goods, fixed capital, and carrying out of research.

In this way there will be worries from both the home and host country. For example, the home country might worry about the protections or future incomes of their investments. On the other hand, the host country who wants to import capital might fear from foreign control of domestic assets or the possibility of macroeconomic instability because of rapid changes of investment levels (Desai et al. 2005).

Aitken and Harrison (1999) say that foreign direct investment has become the largest source of external finance for encouraging economic growth of developing countries. This kind of investment can also generate externalities in the form of technology transfer which could also have an effect on domestic investment; that it encourages and increases the productivity of

domestic firms. It can also lead to labor turnover from foreign to domestic firms (Aitken et al. 1999).

On the other hand in a study by Agosin and Mayer (2000) it is found that foreign direct investment does not always need to have a positive influence on the domestic investment. They investigate if foreign direct investment crowds in or crowds out on domestic investment in developing countries. Their panel data contained countries in the regions of Africa, Asia and Latin America between the time period of 1970 and 1996. From their regression results they draw the conclusion that there has been a crowding in effect in Asia and Africa. In Latin America there has rather been a strong crowding out effect on domestic investment, which means that increased foreign direct investment affects domestic investment negatively. The authors discuss the differences between the regions, and explain that the crowding in effect may be because of policies that encourage foreign direct investment that has larger impact on total investment (Agosin et al. 2000). It could therefore be rational to think about a positive correlation between domestic and foreign direct investment, but with wrong policies it might not be the case.

Frey et al. (1985) discuss the determinants of foreign direct investment. In their study they separated the determinants into economical and political factors. Our variables will also be divided into these categories. Their report further investigates if both factors play an important role in attracting foreign direct investment, and their regression results shows that is actually the case. We will therefore explain these results to give the reader a hint about which underlying factors that seems to matter, starting off with the economical ones. First, a country's income level (for example real GDP per capita) seems to be important in attracting foreign direct investment. Higher incomes lead to more investments; since development is thought of as a good sign of a nation's economic health. Second, balance of payments deficits have a negative correlation to the inflow of foreign direct investment. As a deficit would indicate that the country is spending too much. Frey et al. (1985) means that this would imply a danger for restrictions in capital transfers - especially transferring profits from the investments back to the home country. Less important influences are growth of GNP (+), workers skill level and education (+), inflation (-), and wage costs (-). Among the political determinants there also seems to be underlying factors of relevance. One among them are the effect of aid (most significantly is bilateral, but also multilateral aid). The aid may decrease the balance of payments deficit. The effect might also be due to restrictions connected to the

aid (given by organizations such as IMF and the World Bank). However, we have chosen not including aid in our estimations due the small amount of observations. Another important factor is political instability; if there is more political instability, there will be less foreign direct investment (Frey et al. 1985).

Svensson (1997) explains there is usually a negative relation between political instability and economic growth. Even that it is true, it doesn't really explain why it is so. Then Svensson (1997) tests whether the quality of property rights could be the linkage between the two variables. By adding property rights to the regression; the variable of political instability shows to have no direct effect on investment. It could still have some direct connection, but the study shows the importance of the quality of property rights. As investment effect economic growth, property rights may be an important factor to investigate further in (Svensson 1997).

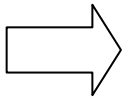
Another thing that can enhance foreign direct investment is the alliances and relationship between the host and the home country. Fewer conflicts between the countries mean a safer environment for the investors. A study by Biglaiser et al. (2005) shows that American investors tend to invest higher amount of capital in countries that has a defense pact with the United States (Biglaiser et al. 2005).

2.3. Property rights and foreign direct investment

As mentioned, property rights are an important factor for investments. Without secure laws on ownership there will be a lack of incentives to invest. This is also the case for foreign direct investment, where foreign investors want the investment environment in the host country to be as safe as possible. Therefore the effect of property rights on foreign direct investment in a country cannot be ignored. Table 1 shows some previous researches that have found positive or negative correlations between foreign direct investment and the independent variables.

Table 1. *Determinants of foreign direct investment presented in previous studies.*

Frey et al (1985)	Li et al (2008)	Zheng (2009)
Economical Variables		
(+) Economic Growth	(+) Growth Rate of GDP	(+) Macroeconomic stability
(+) Exports and Imports	(-) Wage Rate	
(+) Market Size	(+) Infrastructure	
(-) Borrowing Costs	(+) Market Size	
(-) Transaction Costs		
Political Variables		
(-) Political Risk	(+) Educational level	(-) Fiscal and business regulations
	(+) Degree of openness	(+) Legal stability



Our Variables
Economical Variables
Economic Growth
Income Level
Infrastructure
Market Size
Sound Money
Political Variables
Education
Free Trade
Property Rights

Notes: *The table shows the independent variables in two different categories; economical and political variables. Before each variable it is stated whether they are positively or negatively correlated with foreign direct investment. Our variables are chosen from previous researches.*

3. METHOD

We estimated the effect of political and economical variables by using panel data through up to 127 countries between 1970 and 2005. In this section we will present the advantages and disadvantages of using panel data, as well as the techniques on how to assess issues such as autocorrelation and heteroscedasticity.

3.1. Panel Data

In economics it is common these days to use econometrical methods, or models, to assess the effect of one factor on another one. The panel data method is one of the useful models that can be used for a large number of variables and their effect on each other. Panel data is today widely used in economic studies, for example, when showing the behavior of firms and wages over time. In the panel data method an identical sectional unit, for example one family, one firm or one state could be assessed. Panel data is used in a vast field of current researches, like as panel studies of income dynamics that is performed by the social researches institution of Michigan University, as well as several other governmental organizations (Gujarati 2002).

3.1.1. Advantages

Panel data has some benefits in comparison with time series data and sectional data. Since panel data relates to people, firms, states, countries and these kinds of sectors, there will be heteroscedasticity problems, but techniques within the panel data method can assess these issues in an appropriate way. In our report, we will investigate the effect of different variables, mainly property rights, on foreign direct investment, where our cross-sectional units are represented by countries over a time period from 1970 to 2005.

For our work it is necessary we explain why we choose to use a two-dimensional panel data instead of only one dimension; such as a cross-sectional or a time series data. There are several benefits of using two dimensions, although of course there are some limitations and disadvantages. An obvious benefit is that panel data includes more information and more degrees of freedom, since it combines both the cross-sectional and the time series dimensions. It also follows that the data has more variability and less linear correlation between the

variables. With more information it is possible to get more reliable estimates. Panel data analysis can also take the individual, or country specific, heterogeneity into consideration, which could lead to biased estimates. Another benefit is the advantage of studying dynamic behavior, which is not the case when using only one dimension (Gujarati 2002, Yaffee 2003).

3.1.2. Disadvantages

Although there are many advantages with using panel data, the researcher have to be cautious about some arising problems. The disadvantages of using panel data follows from using cross-sectional and time series dimensions, such as heteroscedasticity and autocorrelation, however they can be dealt with. There are also other issues like as intersecting sectional autocorrelation in unique units in equal time points. There are lots of techniques for assessing some of these kinds of problems. Two of the most famous are the fixed effects model (FEM) and the random effects model (REM) (or error components model (ECM)) (Gujarati 2002). On the other hand a main disadvantage is the problems arising from non-response, measurement errors or sample selection. For example; a common problem are the lack of data for some individuals or countries - that the cross-sectional units doesn't have data for one or several time periods. As for countries, the same kind of problem might be very likely show up for an interviewer who every year has the purpose of collecting data from many but the same individuals. Suddenly, one year, one or several of the interviewees doesn't show up or doesn't want to respond to the questions any more (Gujarati 2002, Yaffee 2003).

A well-known example of panel data is the Panel Study of Income Dynamics (PSID) that is collected by the Institute for Social Research at the University of Michigan. Since 1968 the mentioned institution have gathered data on economic, health and social behavior of up to 9000 households every year.[1] This is of course only one example of where panel data is used.

3.1.3. Unbalanced data

In our case we make use unbalanced data, which means that there are unequal numbers of observations in the cells of a design, for example that there are some missing years of data of an individual or country; that we have data for only 1970, 1975, 1985, 1990,…, etc.

[1] For more information, see: http://psidonline.isr.umich.edu/

Unbalanced data can lead to heterogeneity of variance across cells and it may be causing some problems concerns to valid standard error estimates (Littell 2002).

3.2. Econometric model

For defining our econometric model, we will start with the dependent and independent variables which we used in our regression model;

$$FOREIGN\ DIRECT\ INVESTMENT_{ij}^{log} = \alpha + \gamma_i + \beta_1 * PROPERTY\ RIGHTS_{ij} + \beta_2 * INCOME\ LEVEL_{ij}^{log} + \beta_3 * INFRASTRUCTURE_{ij}^{log} + \beta_4 * MARKET\ SIZE_{ij}^{log} + \beta_5 * EDUCATION_{ij}^{log} + \beta_6 * ECONOMIC\ GROWTH_{ij} + \beta_7 * FREE\ TRADE_{ij} + \beta_8 * SOUND\ MONEY_{ij} + \varepsilon_{ij}$$

where *i* and *j* respectively are the country and the time period. α is the intercept, γ_i represents the specific fixed effect for each country, and each β stands for the estimated coefficients. On the variables where we have used the logarithms are denoted with *log*.

3.2.1. Dependent variable

FOREIGN DIRECT INVESTMENT

The dependent variable, *FOREIGN DIRECT INVESTMENT*, is the log of FDI net inflows per capita, in constant U.S. dollars. Firstly, we got the data as FDI net inflows as a percentage of GDP, but we transformed the variable and it is then calculated as follows:

$$FOREIGN\ DIRECT\ INVESTMENT = \log\left[(FDI\ net\ inflows\ as\ \%\ of\ GDP) * \left(\frac{GDP\ per\ capita\ \ in\ constant\ \ 2000\ \text{dollars}}{100}\right)\right].$$

The dependent variable as well as most of our independent variables is averaged over a five year period. This means that we have observations for 1970, 1975, 1980…, 2005, and the observation for 2005 will contain an averaged value of the time period 2003-2007. This will reduce the effect from business cycles in our regression, but it is also necessary since we only have limited data for some of the variables. In addition, we only use observations of a positive

net inflow. For *FOREIGN DIRECT INVESTMENT* we have made the restriction of a minimum of three observations per five year period when calculating the averaged values, or else it is counted as no value for that five year period. Averaged values are used for all data that is given annually, and the same restrictions will be used if nothing else is mentioned. Data are from the World Bank's *World Development Indicators* (World Bank 2009).

3.2.2. Independent variables

We have derived the most common independent variables used in previous studies, and they are arranged into two groups; economical and political variables. The economical variables consist of income level, market size, sound money, economic growth and infrastructure. The political variables are property rights, education quality and free trade.

3.2.2.1. Economical variables

INCOME LEVEL

The income variable may be a good indicator of the labor cost, but also the labor quality – a high wage - usually means higher education and knowledge of the host country's working force. The variable, *INCOME LEVEL*, is measured by the log of gross domestic product per capita in constant U.S. dollars. We use the logarithm since we want to remove the effect that arises because of exponential growth. *INCOME LEVEL* is expected to have a positive effect on the dependent variable. Data are from the World Bank's *World Development Indicators* (World Bank 2009).

MARKET SIZE

Larger markets are expected to attract more foreign direct investment, as they usually give bigger opportunities for future returns on the investments, than smaller markets do. Market size is often presented in previous studies about foreign direct investment and we will therefore also follow this convention, and we have chosen to use the log of gross domestic product in constant U.S. dollars as a measure of it. GDP is expected to affect FDI inflows per capita positively. Data are from the *World Development Indicators* (World Bank 2009).

SOUND MONEY

As a measure of macroeconomic stability, or $SOUND\ MONEY_{INDEX}$ as we choose to call it, we have used a chain-linked index (0-10) named *Access to Sound Money* from *Economic World of Freedom*. There are only observations for every fifth year in our time period between 1970 and 2005. The index is built upon four different categories; (a) money growth, (b) standard deviation of inflation, (c) inflation in the most recent years, and (d) freedom to own foreign currency bank accounts. The first free points account for the monetary policy and the long-term price stability and the last one is supposed to measure how easy it is to use other currencies than the local from domestic as well as foreign bank accounts. Inflation plays an important role in deciding the index score for each country – low and stable rates of inflation imply macroeconomic stability and consequently a high index score. $SOUND\ MONEY_{INDEX}$ is expected to have a positive effect on the dependent variable. Data are from the *Economic Freedom Network* (Gwartney et al. 2008).

In two of our models we instead use $SOUND\ MONEY_{INFLATION}$ as a measure of macroeconomic stability, which is just ordinary inflation data from the *World Development Indicators* (World Bank 2009). When changing the measure; we are also switching the expectations of it, since high inflation is expected to have a negative correlation with foreign direct investment.

ECONOMIC GROWTH

A growing economy attracts investors who see the future market opportunities. *ECONOMIC GROWTH* is measured as the annual growth of gross domestic product, in percentage. We expect it to attract investors and thus it will have a positive effect on foreign direct investment. Data are from the World Bank's *World Development Indicators* (World Bank 2009).

INFRASTRUCTURE

A country's infrastructure, such as roads, railways, buildings, communication possibilities and so on, may be an important factor in encouraging investments. We used telephone lines per capita to get an indication of the infrastructure. We could of course also use variables like as railways or roads, but due to lack of data for some of these variables, and since the most, if not all, countries use telephones; we think it may very well serve as a satisfactory variable for

infrastructure. Better infrastructure is expected to encourage investments. Data are from the *World Development Indicators* (World Bank 2009).

3.2.2.2. Political variables

EDUCATION QUALITY

The variable *EDUCATION QUALITY* can be measured in many ways. The method that gives the best representation of the educational quality can be widely discussed. We apply public spending per capita as a measure, which consists of government spending on both public and private educational institutions. It also considers subsides for students, or other private entities that are somehow related to the educational system. It is plausible to assume that it takes some years for the government spending to actually have an effect on the education quality. We have therefore added one lag (5 year) to the variable. Actually it would make sense to have an even further lag, but due to lack of data, we could not add more lags without loosing a lot of observations. For education quality, we have data starting from 1960. The original source of the data is the United Nations Educational, Scientific, and Cultural Organization (UNESCO). It is however available in the World Bank's *World Development Indicators* (World Bank 2009).

FREE TRADE

As for the *SOUND MONEY* variable, we use two different measures for *FREE TRADE.* The first, *FREE TRADE $_{INDEX}$*, is a chain-linked index from the *Economic Freedom Network*, and it consists of: (i) *taxes on international trade*, (ii) *regulatory trade barriers*, (iii) *size of the trade sector relative to expected*, (iv) *black-market exchange rates,* and (v) *international capital market controls* (Gwartney et al. 2008).

The second, *FREE TRADE $_{EX\&IM}$*, is measured by taking the imports of goods and services plus exports of goods and services, both as a percentage of GDP. The data is collected from the *World Development Indicators* database (World Bank 2009).

3.2.2.3. Property rights

Measuring property rights is not that simple, since it is not only a current status - "good" property rights should also involve the risk of losing a property in the future. The variable

consists of a chain-linked index (0-10) named *Legal structure and security of property rights* from the *Economic Freedom Network* (2008). The index is constructed by some sub-categories. The first sub-category, (i) *judicial independence*, is about if the judiciary in a country is independent from political influences, and it uses data from the *Global Competitiveness Report*. From the same source is also the second component, (ii) *impartial courts*, which ask about how the legal framework of a country for private business works with government actions and/or regulations, whether it is impartial or somehow a subject of manipulation. For countries with omitted data, they have used the *rule of law* ratings from the *World Bank's Governance Indicators* project to fill in on missed values. The third category, (iii) *protection of property rights*, includes the importance of non-physical property rights. Given from the *Global Competitiveness Report's* survey, the question asked is if: "*property rights, including over financial assets are poorly defined and not protected by law or are clearly defined and well protected by law*" (Gwartney et al. 2008). (iv) *Military interference in rule of law and the political process* is based on data from the *International Country Risk Guide*. It is mainly a measure of political instability with respect to military intervention, which usually means troubles for the stability and protection of the property rights. The military involvement can come from either an external or internal threat, in either case it may very well lead to an uneasy environment for the government and especially for foreign businesses. The fifth component is (v) *integrity of the legal system*, given from the same source as before it measures the strength, impartiality and observance of the legal system. The last two sub-categories are constructed by data from the World Bank's *Doing Business* project. (vi) *Legal enforcement of contracts* covers the time and money required to enforce a contract in the legal environment, for example a dept. The final component of the property rights index is (vii) *regulatory restrictions on the sale of real property*, and covers real property that measures the difficulty of transferring an ownership of properties such as land and warehouses. All together these sub-categories not only measure the legal framework for protecting physical property rights, but also non-physical and intellectual property rights. The property rights are expected to have a positive effect on the dependent variable. The index is assembled by the *Economic Freedom Network* with data from the following sources: the *International Country Risk Guide*, the *Global Competitiveness Report*, and the World Bank's *Doing Business* project (Gwartney et al. 2008).

As we have presented which independent variables are to be used in our models, and before we proceed to our estimation results, in next section we will present some further description of the data.

4. DESCRIPTION OF DATA

The regressions contain several variables, and to get an overview of these, we will present the number of observations, mean, standard deviation, minimum value and maximum value. This can be seen in Table 2. It should be acknowledged that some observations have been dropped out since we consider them as outliers, and these will therefore not be included in the description of our data. The numbers of dropped observations are quite few so they would not make any significant difference to our estimation results.

***Table 2**. Description of data.*

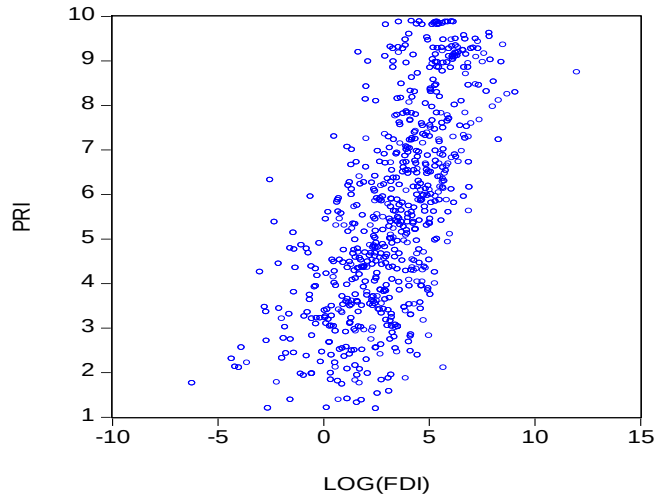
Variable	***Obs.***	***Mean***	***Std. Dev.***	***Min***	***Max***
FOREIGN DIRECT INVESTMENT	1046	318.76	5033.14	-496.32	8802.51
INCOME LEVEL	1474	5613.93	8587.83	73.76	66558.68
INFRASTRUCTURE	1674	0.12	0.16	0	1.05
MARKET SIZE	1480	1.31e+11	6.31e+11	2.78e+07	1.09e+13
SOUND MONEY inflation	1152	37.82	270.42	-3.46	5398.58
EDUCATION	1096	4.47	2.97	0.42	49.52
ECONOMIC GROWTH	1362	3.94	4.05	-25.81	48.05
FREE TRADE ex&im	1389	74.32	44.40	3.06	433.33
FREE TRADE index	806	6.079	1.67	1.14	9.78
SOUND MONEY index	910	6.75	2.10	0	10
PROPERTY RIGHTS	779	5.64	2.29	1.19	9.89

***Notes**: The present table shows the data characteristics, such as the number of observations, mean, standard deviation, minimum and maximum values.*

In Table 2 we can see that the minimum value of FDI per capita is a negative number, 44 out of 1046 observations on FDI per capita contain negative numbers. Since we use the logarithm of the variable in our models they will not be included in the panel data regressions. Infrastructure varies between 0 and 1.05. The *PROPERTY RIGHTS* variable varies between 1.19 which is held by Peru in the seventies, and up to the top position which is given to Finland during the nineties with an index value of 9.89. *SOUND MONEY* $_{INDEX}$ varies between 0 and 10, and Hong Kong has had the highest value of *FREE TRADE* $_{INDEX}$ since 1980.

As we will investigate more details in the next section, in Graph 1 a positive correlation can be seen between property rights and foreign direct investment. Since foreign direct investment is in the logarithm form the correlation is actually exponentially increasing.

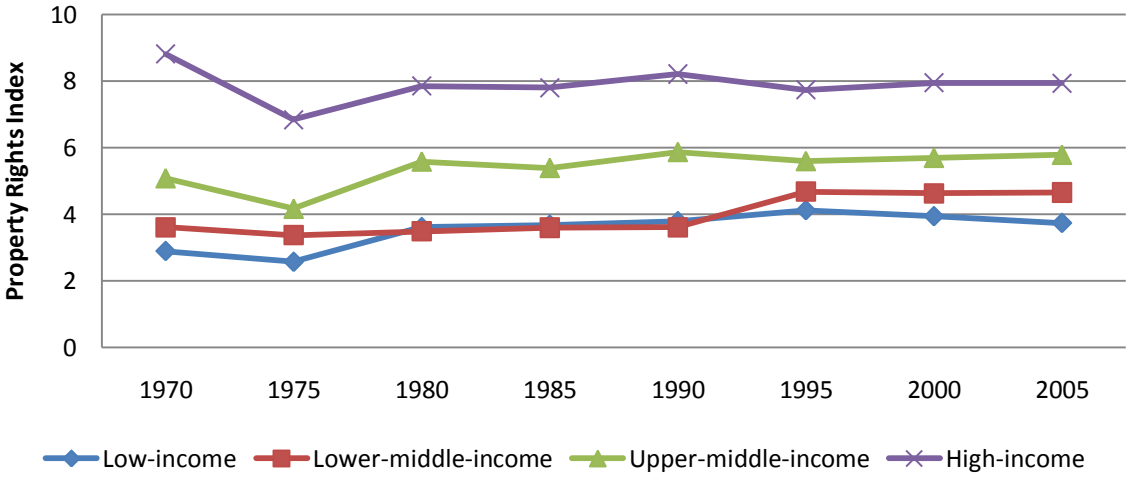
***Graph 1**. Property rights versus the logarithm of foreign direct investment.*



***Notes:** The graph clearly shows the correlation between property rights and the logarithm of foreign direct investment, between 1970 and 2005. The sources of data are the Economic Freedom of the World (2008) and the World Development Indicators (2009).*

Graph 2 shows how the property rights index has changed between 1970 and 2005. The graph is divided into four categories of countries. It is categorized by the World Bank as high-income, upper-middle-income, lower-middle-income and low-income countries. As the graph shows countries with higher level of income have better property rights compared to low-income countries. These results are not that surprisingly.

***Graph 2**. Property rights index between 1970 and 2005.*



***Notes:** The graph shows the changes of property rights between 1970 and 2005 for different income levels[2]. Source of data is the Economic Freedom of the World (2008).*

[2] *The income level classification used in the graph is the same as presented by the World Bank*, see *http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20421402~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html*.

We can also see that there is not that much variation of the property rights index within the regions, especially after 1980. In general there seems to be an increase of the index scores, however, in the 1970s during the oil crises there are some variability – downs and ups. The effect seems to be larger among the high- and upper-middle-income countries. In the earlier periods there are less observations regarding the data of the property rights index, therefore it is somehow difficult to make any clear conclusions out of the graph. The absence of data in the early periods are more observed for low-income countries, and thus it could be the case that the average index score of these countries, in the 1970s, is actually lower than presented by the graph.

The selection bias also means those countries with a higher property rights score more often contain observational data compared to countries which in reality would have a lower index value. Since we deal with panel data, we do not only incorporate the time series aspect but also the cross-sectional differences. Therefore in the estimation process we are able to adjust for this selection bias of the earlier periods. These regional differences could be investigated more by further research; we will however proceed with our estimation in the next section.

5. RESULTS

To achieve unbiased estimates it is appropriate to use the Hausman test to decide whether to employ the fixed effects model or the random effects model. In the estimation, we got absolutely different results when trying both of the models. In the Hausman test the null hypothesis is rejected which shows that using random effect is inappropriate (see Table A6 in the appendix). Therefore we will report the results obtained from the fixed effects model. To know the existence of autocorrelation the Wooldridge test is applied (see Table A7 in the appendix). The existence of autocorrelation is obtained and therefore we use robust standard errors.

The statistical results from our model specifications are presented in Table 3. All models are estimated with the fixed effects model with robust standard errors. Model 1 includes the following independent variables: *PROPERTY RIGHTS*, *INCOME LEVEL*, *INFRASTRUCTURE*, *MARKET SIZE*, *EDUCATION*, *ECONOMIC GROWTH*, *FREE TRADE* $_{INDEX}$ and *SOUND MONEY* $_{INDEX}$, while the second model additionally includes time dummies – one dummy for each five year period, because we expect there to be some unexplained variation due to period specific events; for example, the cold war or the oil crisis in the seventies. Model 3 is almost the same as Model 1 but other variables instead of *FREE TRADE* $_{INDEX}$ and *SOUND MONEY* $_{INDEX}$ are used; namely *FREE TRADE* $_{EX\&IM}$ and *SOUND MONEY* $_{INFLATION}$. Model 4 is the same as Model 3 except that it includes time dummies. In the last model, Model 5, we just present the simple correlation between *FOREIGN DIRECT INVESTMENT* and *PROPERTY RIGHTS*.

Table 3. *Panel data regression results.*

	Model 1	***Model 2***	***Model 3***	***Model 4***	***Model 5***
PROPERTY RIGHTS	*0.0958*	*0.1260**	*0.1412***	*0.1672***	*0.2124****
	(0.0599)	*(0.0649)*	*(0.0580)*	*(0.0644)*	*(0.0636)*
INCOME LEVEL	*-0.0195*	*1.4891***	*0.2235*	*1.4626***	-
	(0.7732)	*(0.7455)*	*(0.6966)*	*(0.7098)*	
INFRASTRUCTURE	*-0.1922*	*-0.2943*	*-0.1586*	*-0.3763*	-
	(0.2220)	*(0.2155)*	*(0.2335)*	*(0.2293)*	
MARKET SIZE	*2.1347****	*-0.2470*	*2.1615****	*0.1681*	-
	(0.7570)	*(0.8051)*	*(0.6793)*	*(0.9184)*	
EDUCATION	*-0.1335*	*-0.1957*	*-0.2162*	*-0.2064*	-
	(0.1809)	*(0.1882)*	*(0.1855)*	*(0.1886)*	
ECONOMIC GROWTH	*0.0445***	*0.0511***	*0.0489***	*0.0527***	-
	(0.0218)	*(0.0214)*	*(0.0241)*	*(0.0224)*	
FREE TRADE index	*0.2380****	*0.1724***	-	-	-
	(0.0757)	*(0.0767)*			
FREE TRADE ex&im	-	-	*0.0150***	*0.0124***	-
			(0.0071)	*(0.0058)*	
SOUND MONEY index	*0.0759***	*0.0130*	-	-	-
	(0.0374)	*(0.0409)*			
SOUND MONEY infl	-	-	*0.0000*	*0.0000*	-
			(0.0002)	*(0.0001)*	
Constant	*-51.1009****	*-5.9614*	*-52.8537****	*-15.7357*	*1.1935****
	(13.7120)	*(14.9680)*	*(12.8995)*	*(18.1841)*	*(0.4280)*
Time dummies	No	Yes (t1. t2. t10 dropped)	No	Yes (t1. t2. t3 dropped)	Yes (t1. t2. t3 dropped)
Observations	550	550	546	546	682
Countries	124	124	125	125	127
R-square (within)	0.5097	0.5671	0.4962	0.5611	0.4692

Notes: *The models used in this paper are presented in the table. The dependent variable is foreign direct investment, and its correlation with the above independent variables is estimated. The standard errors are presented within parentheses. The significance level is noted as: * = 10%, ** = 5% and *** = 1%.*

Before proceeding with our analyze on the effect of *PROPERTY RIGHTS*, some comments on the estimation results in general, as well as the other independent variables, will be presented.

In Model 1 *MARKET SIZE* and *FREE TRADE* $_{INDEX}$ show the highest significance of the model and both of the variables are significant at a one percent level. At a five percent significance level we can see that *ECONOMIC GROWTH* and *SOUND MONEY* $_{INDEX}$ are also significant. The coefficient of *MARKET SIZE* for example indicates that a one percent increase of GDP approximately results in an increase of 2.1 percent in the FDI per capita. This is the case for the variables that are measured with the logarithm, but the other variables, such as the

indexes, have an exponential effect on the FDI per capita. The effect of increasing *FREE TRADE* $_{INDEX}$ with one index score, for example going from 5.0 to 6.0, would lead to an almost 27 percent increase in FDI per capita.[3] In the second model, with time dummies, we can see that *ECONOMIC GROWTH*, *FREE TRADE*$_{INDEX}$ and *INCOME LEVEL* are significant at a five percent level. *INCOME LEVEL* has a coefficient of 1.4891 which means that one percent increase of GDP per capita leads to an increase of approximately 1.5 percent in FDI per capita.

MARKET SIZE, as well as the constant, shows the highest level of significance in the third model. *PROPERTY RIGHTS* and *ECONOMIC GROWTH* are also significant. For interpreting the effect of the *ECONOMIC GROWTH* variable; the increase in our dependent variable is about 4.9 percent when we have an increase of a one percentage point in the growth of GDP. When substituting the measures for *FREE TRADE* and *SOUND MONEY*, compared to the first model only *FREE TRADE* remains significant. When adding time dummies to the estimation, as in Model 4, it does not change the significance of either *PROPERTY RIGHTS* or *ECONOMIC GROWTH* that much compared to Model 3. However, *INCOME LEVEL* and *MARKET SIZE* change; whereas the first one becomes significant, the other, show an insignificant effect in the fourth model. Once again *ECONOMIC GROWTH* is significant at a five percent level. *INFRASTRUCTURE* shows no significance in any of the models. Since the variable itself does not vary that much, the effect on the FDI per capita is not that large.

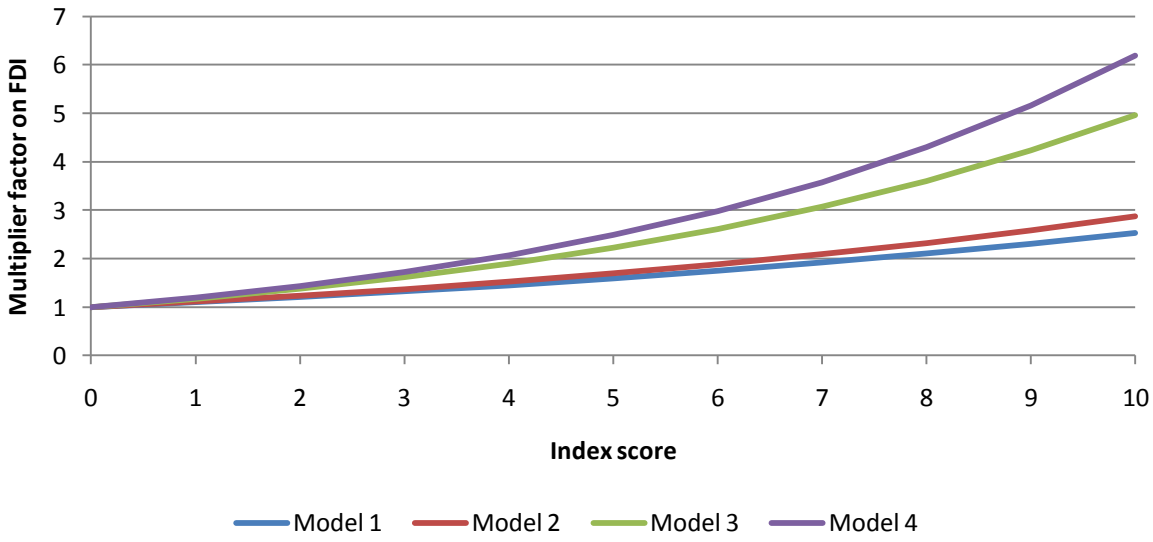
In Model 3 and 4, when using *FREE TRADE* $_{EX\&IM}$ and *SOUND MONEY* $_{INFLATION}$, we can see the highest effect of *PROPERTY RIGHTS*. It is as well significant in Model 2, but only at a 10 percent level. We can also see that for the R-square values[4] of the different models, Model 2 and 4 has the highest numbers with 0.5671 respectively 0.5611. This gives us the indication that using time dummies will increase the explanation of the variation in the data. Therefore we think it is appropriate to include time dummies in our estimation, which is the case in Model 2 and 4.

Continuously, we will analyze the effect of *PROPERTY RIGHTS* on *FOREIGN DIRECT INVESTMENT*. *PROPERTY RIGHTS* is significant in all models, in exception of the first one. In Model 5, where we only use *PROPERTY RIGHTS* as an independent variable, it shows a high

[3] When calculating this we use make use of the following formula: $\frac{e^{\beta * FREE\ TRADE\ _t}}{e^{\beta * FREE\ TRADE\ _{t-1}}}$. This shows the effect that property rights tend to have on foreign direct investment, given the properties of the model.
[4] We use the within R-square value in STATA, because we use the fixed effects model.

correlation with *FOREIGN DIRECT INVESTMENT*. In the first model, when using the control variables, *PROPERTY RIGHTS* is insignificant. However, when adding time dummies, the variable turns significant, at a ten percent level. In Model 3 and Model 4, we modify the measurement of *FREE TRADE* and *SOUND MONEY*, and thus in both models the significance of *PROPERTY RIGHTS* estimated is regarded as relatively high – the significance representing a five percent level. However, it is not only of importance to estimate whether a variable is significant or not, but it is also of interest to measure the extent of the effect; for example, in Model 3, if *PROPERTY RIGHTS* would increase with one index score, it would enlarge the FDI per capita with about 15 percent. Whereas in Model 4; where *PROPERTY RIGHTS* has a coefficient of 0.1672 the same change would lead to an estimated effect of 18 percent on the *FOREIGN DIRECT INVESTMENT*.

***Graph 3**. The effect of property rights on FDI per capita.*



***Notes:** The graph presents the amount of the effect of property rights on FDI per capita in our models. The control variables are assumed to be constant. Since the fourth model has the highest estimated coefficient of the property rights variable, it also represents the highest effect on the foreign direct investment.*

Observing the effect of *PROPERTY RIGHTS* on *FOREIGN DIRECT INVESTMENT*, in Graph 3 we can see the changes when keeping all other variables constant. As can be seen it shows that the effect from *PROPERTY RIGHTS* are higher in model 3 and 4. It is difficult to say exactly which amount of effect it has on the *FOREIGN DIRECT INVESTMENT*, since the outcome is actually changing due to which other variables we choose to include in the model. But, generally we can somehow conclude that it has a significant effect, even thought the exact coefficient is difficult to estimate. It depends not only on which variables the model includes, but also on how the model is constructed. Even when some variables are removed, for example *FREE TRADE* and *SOUND MONEY*, there are not any

considerable changes for *PROPERTY RIGHTS*. Also, when introducing more lags to *EDUCATION* and/or *ECONOMIC GROWTH*, we can see about the same results (see Table A8 and A9 in the appendix).

This paper thus contributes to show that *PROPERTY RIGHTS* seems to have an important effect on *FOREIGN DIRECT INVESTMENT*. In our models we have used several variables that are proposed by previous research, but comparing with the simplest regression, namely Model 5 in the table, between the *PROPERTY RIGHTS* and the dependent variable, the coefficient is not decreasing very much when introducing additional control variables.

6. CONCLUSION

This paper is supposed to investigate the correlation between property rights and foreign direct investment. While as previous studies often consider somehow Western-style circumstances where the institutions are usually of high quality and thus formal institutions such as property rights are ignored in the formulation of models. When the same kind of analyzing tools are adopted onto the developing countries, the models used may ignore the importance of a "good" institutional framework. When we study the determinants of foreign direct investment, by using panel data for 127 countries from different regions around the world between 1970 and 2005, the estimation results show the importance of including property rights, even thought a "good" institutional framework consists of many determinants.

It is difficult to measure the exact amount of effect from property rights on foreign direct investment since it depends a lot on how the model is constructed. In most of our models we found a significant positive correlation between property rights and the dependent variable. Although we only study the effect on foreign direct investment, these findings suggests further research to investigate on including institutional variables, such as property rights, in explaining other macroeconomic variables.

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APPENDIX

Table A1. *Model 1*

```
. xtreg log_fdi pri log_gdppc log_infr log_gdp l1.log_edu gdpgr fti smi if fdi>0, fe cluster(id)

Fixed-effects (within) regression               Number of obs      =       550
Group variable: id                              Number of groups   =       124

R-sq:  within  = 0.5097                         Obs per group: min =         1
       between = 0.1280                                        avg =       4.4
       overall = 0.1557                                        max =         7

                                                F(8,123)           =     33.43
corr(u_i, Xb)  = -0.8670                        Prob > F           =    0.0000

                                    (Std. Err. adjusted for 124 clusters in id)
------------------------------------------------------------------------------
             |               Robust
     log_fdi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         pri |   .0958186   .0599242     1.60   0.112    -.0227977     .214435
  log_gdppc  |  -.0194828   .7732186    -0.03   0.980    -1.550022    1.511056
   log_infr  |   -.19216    .2220153    -0.87   0.388    -.6316256    .2473057
     log_gdp |   2.134694   .7570265     2.82   0.006     .6362061    3.633181
     log_edu |
         L1. |  -.1334943   .1808977    -0.74   0.462    -.4915701    .2245816
       gdpgr |   .0445186   .0218454     2.04   0.044      .001277    .0877602
         fti |   .2379623   .0757024     3.14   0.002     .0881141    .3878105
         smi |   .0758605   .0373823     2.03   0.045     .0018645    .1498565
       _cons |  -51.10092   13.71195    -3.73   0.000    -78.24287   -23.95896
-------------+----------------------------------------------------------------
     sigma_u |  4.1461053
     sigma_e |   .9183132
         rho |   .95323705   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table A2. *Model 2*

```
. xtreg log_fdi pri log_gdppc log_infr log_gdp l1.log_edu gdpgr fti smi t1-t10 if fdi>0, fe cluster(id)

Fixed-effects (within) regression               Number of obs      =       550
Group variable: id                              Number of groups   =       124

R-sq:  within  = 0.5671                         Obs per group: min =         1
       between = 0.7938                                        avg =       4.4
       overall = 0.7495                                        max =         7

                                                F(14,123)          =     30.09
corr(u_i, Xb)  = -0.0264                        Prob > F           =    0.0000

                                    (Std. Err. adjusted for 124 clusters in id)
------------------------------------------------------------------------------
             |               Robust
     log_fdi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         pri |   .1260003   .0648868     1.94   0.054    -.0024393    .2544398
  log_gdppc  |   1.489094   .7455496     2.00   0.048     .0133242    2.964864
   log_infr  |  -.2943429   .2155218    -1.37   0.175    -.7209552    .1322694
     log_gdp |  -.2470452   .8050874    -0.31   0.759    -1.840666    1.346576
     log_edu |
         L1. |  -.1957337   .1882252    -1.04   0.300     -.568314    .1768465
       gdpgr |   .0510624   .0214457     2.38   0.019      .008612    .0935128
         fti |   .1724453   .0766538     2.25   0.026     .0207138    .3241768
         smi |   .0129764   .0408815     0.32   0.751    -.0679461     .093899
          t1 |  (dropped)
          t2 |  (dropped)
          t3 |  (dropped)
          t4 |  (dropped)
          t5 |   .0337149   .2568717     0.13   0.896    -.4747468    .5421767
          t6 |   .1832037   .2379658     0.77   0.443    -.2878351    .6542424
          t7 |   .5415293   .3111944     1.74   0.084     -.074461     1.15752
          t8 |   1.137598   .3510557     3.24   0.002     .4427053    1.832492
          t9 |   1.759526   .4192654     4.20   0.000     .9296153    2.589436
         t10 |   1.867947   .4564567     4.09   0.000     .9644191    2.771475
       _cons |  -5.961425   14.96796    -0.40   0.691    -35.58958    23.66673
-------------+----------------------------------------------------------------
     sigma_u |  .97409902
     sigma_e |  .86913302
         rho |  .55676263   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table A3. *Model 3*

```
. xtreg log_fdi pri log_gdppc log_infr log_gdp l1.log_edu gdpgr exim infl if fdi>0, fe cluster(id)

Fixed-effects (within) regression               Number of obs      =       546
Group variable: id                              Number of groups   =       125

R-sq:  within  = 0.4962                         Obs per group: min =         1
       between = 0.2573                                        avg =       4.4
       overall = 0.2474                                        max =         7

                                                F(8,124)           =     28.02
corr(u_i, Xb)  = -0.8806                        Prob > F           =    0.0000

                                    (Std. Err. adjusted for 125 clusters in id)
------------------------------------------------------------------------------
             |               Robust
     log_fdi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         pri |   .1412154   .0580086     2.43   0.016     .0264001    .2560307
   log_gdppc |   .2235157   .6965909     0.32   0.749    -1.155233    1.602264
    log_infr |  -.1585853   .2334914    -0.68   0.498    -.6207301    .3035595
     log_gdp |   2.161503   .6792682     3.18   0.002     .8170405    3.505965
     log_edu |
          L1.|  -.2022188   .1855017    -1.09   0.278    -.5693787     .164941
       gdpgr |   .0489444   .0240538     2.03   0.044     .0013352    .0965536
        exim |   .0149777   .0071027     2.11   0.037     .0009195    .0290359
        infl |  -.0000368   .0001723    -0.21   0.831    -.0003778    .0003042
       _cons |   -52.8537   12.89947    -4.10   0.000    -78.38537   -27.32203
-------------+----------------------------------------------------------------
     sigma_u |  3.9793203
     sigma_e |   .92708414
         rho |   .9485168   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table A4. *Model 4*

```
. xtreg log_fdi pri log_gdppc log_infr log_gdp l1.log_edu gdpgr exim infl t1-t10 if fdi>0, fe cluster(id)

Fixed-effects (within) regression               Number of obs      =       546
Group variable: id                              Number of groups   =       125

R-sq:  within  = 0.5611                         Obs per group: min =         1
       between = 0.7766                                        avg =       4.4
       overall = 0.7292                                        max =         7

                                                F(14,124)          =     26.01
corr(u_i, Xb)  = -0.3971                        Prob > F           =    0.0000

                                    (Std. Err. adjusted for 125 clusters in id)
------------------------------------------------------------------------------
             |               Robust
     log_fdi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         pri |   .1672307   .0644235     2.60   0.011     .0397186    .2947429
   log_gdppc |   1.462565   .7098381     2.06   0.041      .057596    2.867533
    log_infr |  -.3762644   .2292942    -1.64   0.103    -.8301018     .077573
     log_gdp |   .1681493   .9184256     0.18   0.855    -1.649672    1.985971
     log_edu |
          L1.|  -.2063775    .188569    -1.09   0.276    -.5796084    .1668533
       gdpgr |   .0526771   .0224494     2.35   0.021     .0082435    .0971108
        exim |   .0124449   .0058021     2.14   0.034      .000961    .0239289
        infl |   .0000271   .0001344     0.20   0.840    -.0002389    .0002932
          t1 |  (dropped)
          t2 |  (dropped)
          t3 |  (dropped)
          t4 |  (dropped)
          t5 |  -.0518101    .258673    -0.20   0.842    -.5637965    .4601762
          t6 |   .0038495   .2489097     0.02   0.988    -.4888126    .4965115
          t7 |   .2698639   .3228082     0.84   0.405     -.369064    .9087917
          t8 |   .9006152   .3617671     2.49   0.014     .1845768    1.616654
          t9 |   1.532769   .4308403     3.56   0.001     .6800155    2.385523
         t10 |   1.404169   .5008571     2.80   0.006     .4128327    2.395506
       _cons |  -15.73569   18.18411    -0.87   0.389    -51.72714    20.25576
-------------+----------------------------------------------------------------
     sigma_u |  1.1560587
     sigma_e |   .87165269
         rho |   .63755356   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table A5. *Model 5*

```
. xtreg log_fdi pri t1-t10 if fdi>0, fe cluster(id)

Fixed-effects (within) regression               Number of obs      =       682
Group variable: id                              Number of groups   =       127

R-sq:  within  = 0.4692                         Obs per group: min =         1
       between = 0.4586                                        avg =       5.4
       overall = 0.3669                                        max =         8

                                                F(8,126)           =     41.68
corr(u_i, Xb)  = 0.2753                         Prob > F           =    0.0000

                                    (Std. Err. adjusted for 127 clusters in id)
------------------------------------------------------------------------------
             |               Robust
      log_fdi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         pri |   .2123848   .0635705     3.34   0.001     .0865805    .338189
          t1 |  (dropped)
          t2 |  (dropped)
          t3 |  (dropped)
          t4 |   .1293512   .2159226     0.60   0.550    -.2979532    .5566557
          t5 |   .1027815   .2724388     0.38   0.707     -.436367    .6419299
          t6 |  -.0182468   .2808349    -0.06   0.948    -.5740107    .5375172
          t7 |   .3858937    .282777     1.36   0.175    -.1737137     .945501
          t8 |   1.098357   .2559177     4.29   0.000     .5919037    1.604811
          t9 |   1.753376   .2523729     6.95   0.000     1.253938    2.252815
         t10 |   1.995928   .2602173     7.67   0.000     1.480965     2.51089
       _cons |   1.193511   .4280466     2.79   0.006     .3464194    2.040603
-------------+----------------------------------------------------------------
     sigma_u |  1.8467374
     sigma_e |  .97146705
         rho |  .78325502   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table A6. *The Hausman test*

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	*0.881253*	*Mean dependent var*	*3.561453*
Adjusted R-squared	*0.846343*	*S.D. dependent var*	*2.326369*
S.E. of regression	*0.911915*	*Akaike info criterion*	*2.851092*
Sum squared resid	*359.2465*	*Schwarz criterion*	*3.840335*
Log likelihood	*-670.3058*	*Hannan-Quinn criter.*	*3.237366*
F-statistic	*25.24393*	*Durbin-Watson stat*	*1.560627*
Prob(F-statistic)	*0.000000*		

➔ *We should use fixed effects.*

Table A7. *The Wooldridge's test for autocorrelation*

```
Linear regression                               Number of obs =       426
                                                F(  8,   108) =     31.26
                                                Prob > F      =    0.0000
                                                R-squared     =    0.2334
                                                Root MSE      =    .99099

                                   (Std. Err. adjusted for 109 clusters in id)
------------------------------------------------------------------------------
             |               Robust
   D.log_fdi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         pri |
          D1.|    .101073   .0419854     2.41   0.018     .0178508    .1842953
  log_gdppc  |
          D1.|   -.6012116   1.115207    -0.54   0.591    -2.811746    1.609323
   log_infr  |
          D1.|    .1936882   .1862113     1.04   0.301    -.1754148    .5627913
    log_gdp  |
          D1.|    1.89328   .9077033     2.09   0.039     .0940541    3.692505
    log_edu  |
          D1.|   -.0015803   .2164217    -0.01   0.994    -.4305655     .427405
      gdpgr  |
          D1.|    .0521844   .0160045     3.26   0.001     .0204608     .083908
         fti |
          D1.|    .1608219   .0632562     2.54   0.012     .0354371    .2862067
         smi |
          D1.|    .0406664   .0327942     1.24   0.218    -.0243374    .1056703
------------------------------------------------------------------------------

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      93) =     52.139
          Prob > F =     0.0000
```

➔ *We have autocorrelation.*

Table A8. *Model 4 with extra lags*

```
. xtreg log_fdi pri log_gdppc log_infr log_gdp l3.log_edu l1.gdpgr exim infl t1-t10 if fdi>0, fe cluster(id)

Fixed-effects (within) regression               Number of obs      =       426
Group variable: id                              Number of groups   =       121

R-sq:  within  = 0.5673                         Obs per group: min =         1
       between = 0.6085                                        avg =       3.5
       overall = 0.5656                                        max =         5

                                                F(12,120)          =     26.31
corr(u_i, Xb)  = 0.1396                         Prob > F           =    0.0000

                                   (Std. Err. adjusted for 121 clusters in id)
------------------------------------------------------------------------------
             |               Robust
     log_fdi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         pri |   .2299954   .0730096     3.15   0.002     .0854414    .3745493
  log_gdppc  |   .7990201    .820589     0.97   0.332    -.8256891    2.423729
   log_infr  |  -.2496377   .2439148    -1.02   0.308    -.7325721    .2332966
    log_gdp  |  -.3114513   1.076774    -0.29   0.773    -2.443388    1.820486
    log_edu  |
          L3.|  -.0333347   .2143893    -0.16   0.877    -.4578105    .3911411
      gdpgr  |
          L1.|   .0192543   .0202249     0.95   0.343    -.0207896    .0592982
        exim |   .0121592   .0053323     2.28   0.024     .0016017    .0227167
        infl |  -.0001784    .000118    -1.51   0.133     -.000412    .0000553
          t1 |  (dropped)
          t2 |  (dropped)
          t3 |  (dropped)
          t4 |  (dropped)
          t5 |  (dropped)
          t6 |  -1.961066   .4023309    -4.87   0.000    -2.757653   -1.164479
          t7 |  -1.490061   .2789088    -5.34   0.000    -2.042281   -.9378413
          t8 |  -.8023809   .2125508    -3.78   0.000    -1.223217   -.3815451
          t9 |  -.1899639   .1523346    -1.25   0.215    -.4915758    .111648
         t10 |  (dropped)
       _cons |   2.708474   21.33651     0.13   0.899    -39.53633    44.95328
-------------+----------------------------------------------------------------
     sigma_u |  1.3960111
     sigma_e |  .78812186
         rho |  .75831122   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Table A9. *Model 4 without FREE TRADE and SOUND MONEY*

```
. xtreg log_fdi pri log_gdppc log_infr log_gdp l1.log_edu gdpgr t1-t10 if fdi>0, fe cluster(id)

Fixed-effects (within) regression               Number of obs      =       582
Group variable: id                              Number of groups   =       125

R-sq:  within  = 0.5455                         Obs per group: min =         1
       between = 0.7720                                        avg =       4.7
       overall = 0.7158                                        max =         7

                                                F(12,124)          =     35.77
corr(u_i, Xb)  = -0.5242                        Prob > F           =    0.0000

                                              (Std. Err. adjusted for 125 clusters in id)
------------------------------------------------------------------------------
             |               Robust
      log_fdi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         pri |   .1513707   .0601327     2.52   0.013     .0323514    .2703901
  log_gdppc |   2.011011   .6149621     3.27   0.001     .7938292    3.228194
   log_infr |  -.1771018   .1953015    -0.91   0.366    -.5636582    .2094546
    log_gdp |  -.5469493   .7426421    -0.74   0.463    -2.016846    .9229474
    log_edu |
         L1.|  -.2959134   .1869362    -1.58   0.116    -.6659126    .0740857
      gdpgr |   .0702803   .0186018     3.78   0.000     .0334622    .1070984
         t1 |  (dropped)
         t2 |  (dropped)
         t3 |  (dropped)
         t4 |  (dropped)
         t5 |   .0457642   .2432241     0.19   0.851    -.4356444    .5271728
         t6 |   .0824664    .248244     0.33   0.740    -.4088779    .5738108
         t7 |   .4950436   .3236575     1.53   0.129    -.1455653    1.135652
         t8 |   1.139951   .3527835     3.23   0.002     .4416933    1.838208
         t9 |   1.830421   .4044854     4.53   0.000     1.029831    2.631011
        t10 |   1.823156   .4572448     3.99   0.000     .9181404    2.728171
      _cons |  -1.414127   14.36209    -0.10   0.922    -29.84073    27.01248
-------------+----------------------------------------------------------------
    sigma_u |  1.1903064
    sigma_e |  .88853261
        rho |  .64216868   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```