# The effect of foreign direct investment on economic growth in developing countries

The search for the best strategy: attracting FDI or improving local conditions?

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# Abstract

Most theoretical literature argues that more FDI inflows into developing countries will increase the economic growth rate in host countries. However, in the empirical literature the findings on the effect of FDI on economic growth are mixed. This research tries to clarify this effect by focusing on a set of developing countries between 1995 and 2019. The random effects model is used to estimate the regressions. The results show that FDI has a highly significant positive effect on economic growth per capita. Human capital is found to significantly enhance the effect of FDI on economic growth per capita. All the other possible absorptive capacities, financial development, trade and initial income do not significantly impact the relationship between FDI and economic growth per capita. The only significant threshold value shows that countries with low levels of financial development have a higher significant positive effect of FDI on economic growth, but this result is only valid for an exceedingly small number of observations. The Instrumental Variables regression reports insignificant effects of FDI, except when one year lagged values of FDI are used as instrument. However, the instruments are not adequate enough to be able to rely on the results of IV. The comparison between continents reveals that the positive effect of FDI is mainly driven by Asian countries. The effect of FDI is much lower in African countries and even insignificant in the other continents. The recommendation of this research for governments of developing countries is not to focus on attracting more FDI, but to improve human capital and to evaluate under scrutiny the FDI inflows.

# 1. Introduction

The rise in Foreign Direct Investment (FDI) flows was met with huge enthusiasm because of the expected positive effects. Globalisation in combination with opening up of financial markets to foreign investors led to this enormous increase of FDI inflows in the 1990's and early 2000's as can be seen in figure 1. Nowadays FDI is on average declining since the global financial crisis in 2008. It is especially concerning that the outflow of FDI from high-income countries as percentage of GDP is almost halved during the last decade (World Development Indicators database). The covid-crisis lead however to a further decline of FDI with 42%. This decline in combination with the expectation that FDI inflows will not recover fast can be a large problem for developing countries according to UNCTAD (2021).

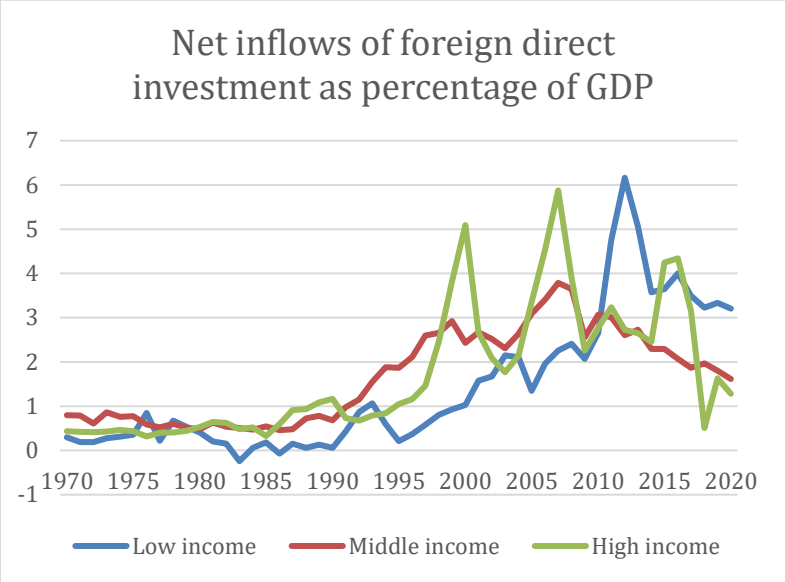


*Figure 1.1. The net inflow of FDI as percentage of GDP between 1970 and 2020*

Source: World Development Indicators

The reason for the focus on FDI is that FDI inflows are associated with all kinds of positive side effects for the host economy like the transfer of knowledge and technologies and the increase of export opportunities (OECD, 2008). Another benefit of FDI in comparison to other forms of capital is that it is a more stable or long-term form of capital because the investments cannot be sold easily (Galeza & Chan, 2017). Therefore, the hope was that FDI inflows could be helpful for developing countries to escape the poverty traps that they are facing as pointed out by Collier (2008) and catch up with the developing world. This is why the World Bank (2021) encourages developing countries to adopt policies to encourage the creation of a strong investment climate in order to attract more FDI. Attracting FDI is even believed to be necessary for developing countries to achieve the Sustainable Development Goals (SDG) (Evenett and Fritz, 2021).

Investments, like FDI, are essential for developing countries for their developing process, for example to get a high-quality infrastructure and a booming export sector. This is especially a problem for African developing countries because they experience a capital flight. The total capital flight of 30 African countries between 1970 and 2015 was 1,4 trillion US dollars (Ndikumana & Boyce, 2018). On average capital is flowing from developing to developed countries (Prasad et al., 2007). This also explain the enthusiasm about the increase in FDI flows to developing countries, because it could provide these countries with much needed investments.

The definition of FDI follows from the sixth edition of the IMF's Balance of Payments Manual (2009), which is based on the OECD's Benchmark Definition of Foreign Direct Investment (2008). This definition states that FDI consists of all investments in firms of which the foreign investor has at least 10 percent of the voting shares. According to the IMF (2009) there exists a direct investment relationship if there is 'control or a significant degree of influence on the management' of a foreign firm. The 10 percent voting shares is a strict requirement, there are no exceptions possible. Technically speaking FDI is not exactly the same as investments, because FDI is a pure financial measure. FDI is measured by changes on the balance of payments as the sum of changes in assets minus changes in liabilities. There are different forms of FDI. Greenfield investments is the establishment of new firms. In the case of joint ventures, the foreign investor makes a partnership agreement with a firm in the host economy. The last category is brownfield investment which consists of the purchase of firms by the foreign investor. A limitation of this definition is that FDI data does not contain information on non-equity flows to foreign firms, for example flows of goods and services are not recorded in the FDI data.

The increase of FDI during the turn of the century resulted also in attention for the effect of FDI on economic growth in the economic literature. Most economists believe that it is necessary for developing countries to be economically integrated through trade and investment to acquire a strong economy (Siddiqui, 1994). Therefore, the expectation was that FDI had a positive effect on economic growth, also given the spillovers associated with FDI inflows. This was especially expected for developing countries given the large technology gap. The results of the empirical literature confirm however not unanimously the positive effects for the host country. The results are mixed, some studies find a significant positive effect of FDI on economic growth, but others do not. Finally, there are papers that only find

positive results when specific country characteristics, like financial development or human capital, are present in the host country. These factors are called absorptive capacities in the literature, because they can help to host countries to deal more efficiently with inflows of FDI.

An explanation for these unconclusive result is that it is complicated to identify determinants of economic growth. It is difficult to statistically test the impact of variables on economic growth because of many interactions of variables that potentially affect economic growth. For policy makers in developing countries it is however useful to know the effect of FDI on economic growth and which country characteristics can enhance this effect of FDI to decide what are the best economic policies for the long term. The policymakers have the option to attract more FDI by implementing incentives for foreign investors like a reduction of taxes or favourable regulations. On the other hand, the policymakers could improve the education, trade volume and the financial sector to enhance the positive spillover effects of FDI.

The research question of this study is whether FDI increases the economic growth in developing countries. Next to this question I will investigate whether human capital, financial development, trade, and initial GDP are able to increase the effect of FDI on economic growth. The hypothesis is that FDI alone will not have a significant impact on economic growth given the mixed findings in the literature. The absorptive capacities are expected to establish a positive effect of FDI, because some capabilities are needed to make use of the spillovers.

Although this topic is studied a lot, I made some small changes and improvements to the literature. First, I selected countries based on their income level at the beginning of the sample period. Therefore, also countries that experienced a large development during the sample period are included. Secondly, I use an index variable for the level of financial development. This is an improvement of the literature that uses different single variable as proxy for the level of financial development, but according to Alfaro et al. (2004) no suitable proxy for financial development have been created. Finally, I will extent the literature by investigating whether there are different effects between continents.

The results of this paper show that FDI has a highly significant positive effect on economic growth per capita in developing countries. The only absorptive capacity that can significantly

increase the effect of FDI on economic growth is human capital. There seems to be no threshold value above which FDI has a significant effect on economic growth. The only significant threshold value has few observations below the threshold value. Although the instruments are of poor quality, I also used an Instrumental Variables (IV) regression. Only the one year lagged value of FDI resulted in a positive effect of FDI, the other instruments lead to insignificant results. The comparison between continents indicates that there is a large difference between Asia and the rest of the world. The effect of FDI on economic growth is highly significant in Asia and Africa, but the effect is twice as large in Asia. In the other continents the effect of FDI is insignificant.

In this paper I will first discuss the economic literature about the effects of FDI. Both the theoretical and empirical literature are covered. In this section are also the mechanism presented through which FDI is able to affect economic growth. Secondly, I discuss the methodology and the model that I will use to estimate the results. The third section shows all the data that is used for this research. The next section presents the empirical results. Finally, I conclude and discuss what the best options are for policymakers regarding FDI inflows.

# 2. Literature review

## 2.1 Theoretical literature

### 2.1.1 Neoclassical growth model

According to Acemoglu (2012) the Solow model (1956) was an ´intellectual breakthrough´ and formed the basis for modern neoclassical macroeconomics. The Solow model is based on the production function: $Y = F(K, AL)$, where Y is the output, K is capital, A is technological progress and L is the labour force. In this production function the technological progress is multiplied with the labour force. This means that the technological progress is labour augmenting. There are some assumptions that are underlying this production function. In the first place there are constant returns to scale. Increasing capital and labour with the same percentage will result in an increase in output with the same percentage. The marginal product of capital is assumed to diminish. Another assumption is that the initial levels of capital, labour and productivity are given and strictly positive. Solow also assumed that a fixed share of the output was invested, so investments are sY. Further features of the model

are that the labour force grows at rate n, the technological progress increases at rate g and the capital decrease with the depreciation rate δ.

The capital accumulation per unit of effective labour is the sum of total investment per unit of effective labour minus the break-even investment which is the investment needed to compensate for the deprecation, labour force growth and increase of the technological progress. This is displayed in the equation $k^* = sf(k) - (n + g + \delta)k$, where k* is the change in capital per unit of effective labour. If capital per unit of effective labour is below the intersection point, total investment is larger and therefore k* is positive, which means that k is rising. This will continue until k* becomes zero. The implies that the capital per unit of effective labour will always converge to the level where actual investment and break-even investment are equal (Romer, 2011). Since capital per unit of effective labour is constant in the steady state, K and effective labour (AL) are growing at rate n + g. The conclusion is that economies will always reach a balanced growth path no matter the starting point of the economy.

Changes in parameters of the model will only have level effects and no growth effects. For example, if the saving rate increases permanently, this will only temporarily lead to a higher growth rate of output per worker. The value of k* will turn positive, therefore capital per unit of effective labour starts increasing until a new higher intersection point is reached and k* is zero again. The only variable that can accomplish structural growth effects in the Solow model is the technological progress (A), because if there is no technological change (i.e. g = 0), there will be no economic growth per capita according to the model. The model does however not explain the technological progress. Therefore, the Solow growth model is called an exogenous growth model (Romer, 2011).

The Solow growth model predicts that income levels of countries will convergence in case they have similar technology levels and saving rates. This is called conditional convergence. However, in reality there is no convergence or higher growth rates for poor countries. This could be explained by lower saving rates in poor countries. However, given the same technological progress marginal product of capital should be higher in countries with lower capital per worker ratios due to diminishing returns of capital. Therefore, capital should flow to countries with lower capital per worker ratios until the capital per worker and output per worker ratios are the same in all countries. However, Lucas (1990) demonstrates that in

reality this is not happening. A possible explanation is that human capital, public capital, and institutions are important factors in the production function. The lower levels of these factors in most poor countries means that the marginal return on capital will also be lower (Montiel, 2006). Another explanation can be the lower productivity (A) in developing countries.

### 2.1.2 Endogenous growth theories

The Solow growth model has one major shortcoming, it does not explain where the technological progress comes from. The endogenous growth theories try to solve these problems, by internalizing the determinants for technological progress. There are two different categories of endogenous growth theories. The first theory is based on the assumption that individual firms will benefit from the aggregate output because of positive externalities. The second theory has a separate production function for technological progress (Sørensen & Whitta-Jacobsen, 2010).

#### Endogenous growth by positive externalities

In contrast to the Solow growth model this category of endogenous growth assumes that labour and capital inputs at the aggregate level have increasing returns to scale. In this situation there is no technological progress needed to achieve long term economic growth. The assumption that the returns on capital are diminishing does not have to be lifted. An individual firm is assumed to be small and facing constant returns to capital and labour inputs. However, in this case the technological progress is a function of the aggregate stock of capital: $A = K^{\varphi}$. If φ=0 we are in the same situation as the Solow growth model. (Sørensen & Whitta-Jacobsen, 2010).

A positive value of φ means that the aggregate productivity of capital and labour is increasing. The reasoning behind this is that knowledge created at the firm level cannot be kept secret and will eventually spillover to the rest of the economy (Romer, 1986). These externalities make it possible to have increasing returns at the aggregate level, while at the same time constant returns and perfect competition at the firm level. A more elaborate explanation for these productive externalities is the principle of learning by doing developed by Arrow (1962). The basic idea is according to Arrow (1962) that ’learning is the product of experience’, which means that economic activity increases the knowledge of workers. At the firm level capital input will have constant direct scale results for the production, but also indirectly increases the knowledge of workers.

If φ is 1 there will be no convergence at all, and countries will never reach a steady state. In that case a higher saving rate leads to a permanently higher economic growth rate and a constant population growth will lead to exploding economic growth. This is highly unrealistic. Therefore, Sørensen and Whitta-Jacobsen (2010) study values of φ just below 1. This case of moderate productive externalities means there is a long transitory state before ultimately the steady state is reached. However, if $0<\varphi<1$ there is only permanent economic growth if there is population growth ($n>0$).

### Endogenous growth by R&D sector

In the previous endogenous growth model economic growth arise as an externality of economic production, but no one is striving to achieve technological progress according to this model (Sørensen & Whitta-Jacobsen, 2010). In reality the government and firms are actively trying to discover new technologies. Therefore, this category of endogenous growth models has a separate production function for technological progress, which can be seen as the R&D sector. The R&D sector has labour and the existing technological progress as input factors. The output are new insights and ideas, which will result in a higher technological level (i.e. an increase of A). In order to stimulate private firms to develop ideas it is necessary that these firms can hold some form of monopoly over this idea. Therefore Romer (1990) assumes that the producer of an idea has some monopoly right over the use of these ideas. Romer (1990) also assumes that ideas are non-rivalry, which enables all firms to profit from ideas.

The production function for goods-producing firms is the same as before: $Y = (K_t, A_t L_{yt})$. The only difference is that $L_y$ is the share of labour that works in the goods producing sector, while $L_A$ is the share of labour that works in the R&D sector. The production function for R&D firms is: $\alpha = \rho A_t^{\varphi} L_{At}$ where α is the amount of new ideas produced. The assumption is that the production function has constant returns with respect to the input of labour. The existing technology can be useful by the production of new knowledge. This is the case when φ is positive. If φ is 1, the growth rate of technology is always increasing and goes to infinity. If $0<\varphi<1$, technology is also always increasing and will go to infinity, but the growth rate of technology is decreasing and will go to zero (Sørensen & Whitta-Jacobsen, 2010). The technology growth rate depends on the labour input in the R&D sector. This can be achieved by population growth or by an increase of the share of the labour force that works in the R&D sector (Sørensen & Whitta-Jacobsen, 2010).

In the model of Romer (1990) the labour force is called human capital. Therefore, the technological progress in his model is determined by the human capital that is used in the R&D sector to develop new ideas. The model of Lucas (1988) also focuses on the importance of human capital. The accumulation of human capital takes the same form as the previous described R&D production function, but the idea behind it is different. The growth in the model of Lucas is explained by the accumulation of human capital itself and not by the creation of new ideas.

### 2.1.3 The role of FDI in growth models

#### Technology

The current income difference between developed and developing countries is mainly caused by the difference in technology (Kemeny, 2010). Most technologies are produced by the developed countries, but technologies can spillover to developing countries. The income convergence that is visible nowadays is according to the endogenous growth models due to spillover of technologies (Barro & Sala-i-Martin, 1990). According to Yao and Wei (2007) FDI can be helpful in reducing the technology gap between developed and developing countries due to the introduction of new knowledge and technologies. Multinationals are responsible for most of the private R&D activities. Through foreign affiliates host economies can benefit from spillovers of the ideas that are acquired by their R&D activities (Sjöholm, 1999). This will raise the technological progress (A) in developing countries which will lead to economic growth.

According to Findlay (1978) there are more spillovers if the technology gap is larger, because the larger the technology gap the more technological improvements are possible. The empirical results from Sjöholm (1999) confirm this. However, other economists have mentioned that too large technology gaps could hamper the diffusion of knowledge. For example, Kohpaiboon (2003) showed that in the manufacturing industry where less technology is needed the spillovers are larger. A possible explanation is that it becomes impossible for domestic firms and workers to absorb new technologies if the technology gap is too large (Sjöholm, 1999).

#### Domestic investment

An increase of the saving rate will only increase the output per worker (level effect), but not establish permanent economic growth. However, in the short run the economic growth will

increase when the economy moves to the new steady state. The FDI inflow will increase investments in the host country because more capital resources are now available. Furthermore, some economists argue that FDI inflows can boost the domestic investments in the host country. The presence of foreign investors leads to higher returns and more investment opportunities which stimulates domestic investments. Alfaro et al. (2004) and Borensztein et al. (1998) have demonstrated that FDI will raise the total investments with more than one for one. This means that higher FDI inflows crowds in domestic investments.

However, according to Cotton and Ramachandran (2001) FDI can also decreases domestic investments if foreign investors act as a monopolist. This makes it impossible for domestic firms to compete with the foreign affiliates. The possibility that foreign competition will reduce domestic investments is also mentioned by Agosin and Machado (2005). They argue that the effect of FDI is more likely to be positive when the FDI flows to other sectors than most of the domestic capital. When FDI flows to sectors with already a substantive amount of domestic production, it can crowd out domestic investment. The empirical findings of Agosin and Machado (2005) for 36 developing countries are mixed. FDI inflows do not change the level of domestic investment in Africa and Asia, but they are crowding out domestic investment in Latin America. Koojaroenprasit (2012) finds a negative interaction term between FDI and domestic investments, which shows that FDI reduces domestic investments. A possible explanation for the contrasting results is that domestic investment, FDI and economic growth are usually interrelated, but that the direction of the relationships often differs per country and can run in both directions (Tan and Tang, 2016). Another conclusion can be that FDI inflows do not automatically result in positive effects for domestic investments (Agosin & Machado, 2005).

**Increase of export possibilities**

An increase of export possibilities can also be important to achieve economic growth. Higher export volumes increase the inflow of foreign exchange, which could be used to buy capital goods in developed countries (Kalaitzi & Chamberlain, 2020). These capital goods like machinery provide developing countries with new technologies. This is needed in poor countries to achieve economic development (Keesing, 1967). This means that exports can help to increase the technology level (A) in developing countries. However, it is extremely difficult for domestic firms in developing countries to export their products. Banerjee and Duflo (2019) illustrate this with the example of Egyptian carpenters. They are too small to

think about exporting their carpets, but even the intermediary Hamis carpets was not able to export. Only with the help of an NGO Hamis carpets managed to export a considerable number of carpets after five years. Banerjee and Duflo (2019) argue that this is because foreign companies are concerned about the quality and therefore will not buy from a firm without any reputation.

Besides NGO's, investments from multinationals are even more helpful in increasing export opportunities. In the first place this is because multinationals are usually much better in marketing, and they have already the distribution networks in place. The key factor is however that multinationals have built up a good reputation which is incorporated in a strong brand name. These strengths of multinationals can be used to export products to markets in developed countries (Cotton & Ramachandran, 2001). Domestic firms can also benefit from the superior marketing position of multinationals. Either because the multinational is investing in them or because they supply products to the multinational.

### 2.1.4 Absorptive capacities

The effect of FDI on the host economy depends on the abilities of the host economy to use FDI in an effective way. Below I will discuss whether the country characteristics initial GDP, financial sector, human capital and trade openness are able to affect the impact of FDI on economic growth.

#### Initial GDP

According to the exogenous and endogenous growth models, given all other parameters are equal, the countries with lower initial income level should have higher economic growth rates because they are more below the steady state. In case the steady state is reached, the initial level is of no importance any more for the growth rate. The empirical results from Helliwell and Chung (1992) show that there exists a negative relationship between initial income levels and economic growth. Sørensen and Whitta-Jacobsen (2010) also show that conditional on structural characteristics (i.e. the saving rate and population growth rate) countries with lower initial incomes have higher growth rates. This indicates that there is conditional income convergence. A possible explanation is that the steady state is not yet reached and therefore the growth rate is higher in poorer countries. Another argument for the convergence of income is that there can be a transmission of technology to poor countries.

As mentioned above the expectation is that FDI inflows could be a channel through which knowledge is transferred to developing countries. Blomström et al. (1992) use therefore FDI as a proxy for the inflow of new technologies. They argue that only the countries with the right characteristics are able to absorb new technologies. Otherwise, the technology gap is too large for domestic firms to benefit from the presence of multinationals. Their results show that FDI only have a significant effect on economic growth in the developing countries with higher income levels. The threshold value above which FDI has a significantly positive effect on economic growth is a GDP per capita of $8011 according to Jyun-Yi and Chih-Chiang (2008). These results indicates that a minimum level of development is needed in a country before FDI will lead to diffusion of technology.

### Financial sector

There are several reasons why the state of the financial sector can be an absorptive capacity. Alfaro et al. (2004) show in a theoretical model that a better financial market will stimulate more agents to start a business which will result in more technology spillovers from foreign investment to domestic firms. In another paper Alfaro et al. (2006) develop a theoretical model in which the firms producing intermediate goods have to produce a new variety which requires a capital investment when starting up the business. Better financial markets can provide entrepreneurs the capital needed to develop a new variety, which therefore result in a greater variation of intermediate goods. This leads to more connections in the supply chain (backward linkages) and therefore more spillovers from foreign to domestic firms. The reduction of risk is another important channel through which the financial sector can achieve more spillovers. The reason is that the willingness of domestic firms to invest in the adoption of technologies and knowledge of foreign firms will increase if risks are reduced (Hermes & Lensink, 2003). The above-mentioned channels are slightly different, but they have in common that a better developed financial sector will lead to more entrepreneurship which makes more spillovers of technology possible.

Most of the empirical results confirm the importance of the development of financial markets. Alfaro et al. (2006) find that the economic growth is almost two times higher in countries with a high developed financial market. Although Hermes and Lensink (2003) find no effect of FDI itself on economic growth, but the effect of FDI becomes significantly positive when the financial markets are well-developed. However, Hsu and Wu (2006) do not find that the level of development of the financial sector has a significant impact on the relation between

FDI and economic growth. The authors use an instrumental variable for the development of the financial sector. This instrumental variable for the development of the financial sector was constructed by La Porta et al. (1997;1998). They showed that the origin of the legal system has a significant impact on the legal and regulatory environment that controls the financial sector. The legal origin can be seen as exogenous because they were established long ago for different reasons than the current economic situation. Alfaro et al. (2004) also use the legal origin as an instrument for financial development, but they find still a positive impact of financial development on the relationship between FDI and growth.

### Human capital

The endogenous growth models have shown that more human capital in the R&D sector will increase the economic growth rate. Despite the low R&D expenditures in developing countries, the presence of multinationals could lead to the spillover of those technologies. The general idea is however that these spillovers only take place if the human capital in the host country is at a minimum level. The reason is that a higher educated population is better able to learn and use the new technologies and they can work for foreign firms at more advanced positions. Borensztein et al. (1998) empirically show that there exists a minimum threshold of human capital before FDI will have an effect on economic growth. Alfaro et al. (2006) also show that a higher skilled population contributes positively to the effectiveness of FDI. Jyun-Yi and Chih-Chiang (2008) estimate a threshold value of 2.108 average years of secondary education. The countries above this threshold experience positive effects of FDI. Most empirical studies do not find a significant interaction term between FDI and human capital (Alfaro et al., 2004; Carkovic & Levine, 2002; Iamsiraroj & Ulubaşoğlu, 2015; Shahbaz & Rahman, 2010). This implies that higher human capital does not always lead to more spillovers of FDI, but when human capital is below a certain level, the spillovers will be much lower.

### Trade openness

Bhagwati (1978) argues that the amount of FDI inflow and the efficiency of these inflows depends on whether the host economy follows an export promoting or import substituting trade regime. An export promoting regime is considered as neutral against imports and exports, while an import substituting regime levies tariffs and quotas on certain imports. In other words, there is more trade openness under the export promoting regime. The hypothesis from Bhagwati (1978) is that the export promoting policy will lead to larger FDI inflows and

that these inflows are used more efficiently. The reason is that there are no political created incentives and no limitation or distortion for FDI inflows. The IS regime instead is inefficient because of the reliance on quotas and tariffs, which leads to distortions. Lucas (1988) agrees that trade barriers are inefficient but removing trade barriers will only have a level effect and no permanent effect on economic growth. Balasubramanyam et al. (1996) however argues that trade liberalisation will increase efficiency in diverse ways. One reason is that less trade restriction will increase competition, because foreign firms are free to enter the domestic market. This forces domestic firms to invest more human capital and innovations.

Balasubramanyam et al. (1996) test therefore the hypothesis from Bhagwati by distinguishing EP and IS countries based on their imports as share of GDP. Countries with high imports ratios are expected to have no IS strategy. Their results show that FDI only has a significant impact on economic growth in EP countries and not in IS countries. However, studies that do not divide the sample based on trade regime but use an interaction term do not find a significant higher effectiveness of FDI both for tariffs (Borensztein et al., 1998) and for trade volumes (Jyun-Yi & Chih-Chiang, 2008). This can imply that increasing the trade openness of a country will not always increase the effectiveness of FDI. Indeed, Iamsiraroj and Ulubaşoğlu (2015) show that at extremely high levels of trade openness, the effect of FDI on economic growth will become insignificant.

## 2.2 Empirical literature on the effect of FDI on economic growth

### 2.2.1 Micro-level effect of FDI

The studies on the micro-level investigate whether the presence of foreign investors could increase the productivity of foreign affiliates and domestic firms. The firms that are bought by foreigners are expected to become more productive, because they receive FDI and are directly exposed to technology and other spillovers. However, Konings (2001) shows that these firms are not per definition more productive, probably because it takes time to restructure the purchased firms. Aitken and Harrison (1999) also find that not all firms receiving FDI will benefit. According to them only the firms with less than 50 employees experience positive effects.

The productivity of domestic firms that do not receive FDI can increase due to spillovers from foreign affiliates. The empirical results of most studies however indicate that domestic

firms do not always profit from the establishment of foreign firms in their neighbourhood. Probably because the reduction of domestic production due to more fierce competition is larger than the positive effect of technology spillovers (Konings, 2001). The increased competition forces domestic firms to reduce their production, which lead to higher average costs. This decreases the profitability of domestic firms, which implies a negative effect of FDI inflows on domestic firms (Aitken and Harrison, 1999).

These findings seem to be in contradiction with the theoretical expectation that foreign investors will increase their technology transfer to the host economy in case there is more competition. However, the theoretical model from Blomström and Wang (1989) demonstrate that the technology transfer will only be larger if the domestic firms have higher learning investments. In countries with larger investments into human capital and R&D, as is the case in Indonesia (Hill, 1995), competition will lead to more spillovers from FDI (Sjöholm, 1999). The most developing countries however do not invest enough in learning capacity of domestic firms. These firms are therefore not able to adopt to foreign affiliates. The domestic firms remain smaller and have lower R&D expenditures, which lead to fewer spillovers than expected (Jadhav & Reddy, 2013). Only the domestic firms adopting to the new technologies will survive. Therefore, in the long run the negative competition effect will become less important, because only the firms that can keep up with the foreign firms remain (Konings, 2001).

### 2.2.2 Macro-level studies

#### General results

At the macro-level, the impact of FDI is estimated by looking at the effect on economic growth. The results of these studies are far from unanimous on the question whether FDI causes economic growth. Some studies have found a positive effect of FDI (Soto, 2000; Blomström et al., 1992; Borensztein et al., 1998; Tiwari & Mutascu, 2011; Koojaroenprasit, 2012). Others showed that there is no significant effect of FDI (Carkovic & Levine, 2002; Jyun-Yi & Chih-Chiang, 2008; Lyroudi et al., 2004). Finally, Prasad et al. (2007) even find a correlation between less dependency on FDI and higher economic growth. An overview of the empirical macro-level literature of Iamsiraroj and Ulubaşoğlu (2015) also demonstrates the large disagreement in the literature. They observe 108 different studies from which 43 percent report a positive effect of FDI, 40 percent find an insignificant effect, and 17 percent

of the studies estimate a negative effect. Iamsiraroj and Ulubaşoğlu (2015) combine the results of all these studies to show that on average one percent increase in FDI leads to 0.15 percentage point more growth.

These results reflect only the direct effect of FDI on economic growth, but the relation is much more complex. Some studies have therefore investigated whether the effect of FDI depends on the sector to which it flows. Opoku et al. (2019) shows that FDI has a large effect in the agricultural and service sector, but no significant effect in the manufacturing sector. Tiwari and Mutascu (2011) find that FDI have especially a positive effect if it flows to sectors where the country has a comparative advantage.

The effect of FDI can also depends on the absorptive capacities of the host country. There are different options to check if an absorptive capacity exists. Balasubramanyam et al. (1996) split the sample in two groups based on their imports to prove that countries with a higher import share experience a larger effect of FDI on economic growth. Blomström et al. (1992) divide their sample between countries with high and low incomes to show that FDI only has a significant positive effect in high income countries. These division of the sample is however quite arbitrarily. Other studies therefore try to estimate threshold values. In this way it is possible to check if there exist a value for an absorptive capacity above which FDI has a different effect on economic growth. Jyun-Yi and Chih-Chiang (2008) show that minimum values of human capital, trade openness or initial GDP are needed before the effect of FDI on economic growth turns positive. Alfaro et al. (2004) and Hermes and Lensink (2003) find that a minimum level of financial development is required.

The most studies use interaction terms to study absorptive capacities. A positive interaction term means that higher values of the absorptive capacity increase the impact of FDI on economic growth. As discussed in the previous paragraphs, most studies report positive interaction terms, for example Borensztein et al. (1998) for human capital and Alfaro et al. (2004) for financial development. Carkovic and Levine (2002) do not find significant interaction terms for income per capita, human capital, financial development, and trade openness. However, this can be explained by the fact that they use a combination of developing and developed countries in their sample. The absorptive capacities are expected to be higher in developed countries, but the spillovers from FDI are probably lower in developed countries given the smaller technology gap.

The problem of interaction terms is that they are based on the assumption that for all values of the absorptive capacity the impact on the relationship between FDI and economic growth is the same. Iamsiraroj and Ulubaşoğlu (2015) study therefore if absorptive capacities can have a non-linear impact on the relationship between FDI and economic growth. They show that the effect of FDI on economic growth is positive for most values of financial development but becomes negative for extreme high values of financial development. For trade openness they find that effect of FDI on economic growth is the highest for low values of trade openness and insignificant for high values of trade openness.

It is also difficult to compare the empirical results because the included countries differ substantial per study. Some studies estimate the effect for Africa (Opoku et al., 2019), Asian (Tiwari & Mutascu, 2011) or Latin-American (Bengoa & Sanchez-Robles, 2003) countries. Others only observed developing countries Borensztein et al. (1998) or developing and developed countries Alfaro et al. (2004). However, there is only one study from Kherfi & Soliman (2005) that compared the effect of FDI between countries. They show that FDI only has an effect on economic growth in EU accession countries and not in non-Eu accession countries.

### 2.2.3 Development of estimation method

The previous results are not very useful without comparing the different economic models that are used, because endogeneity is a major concern for the relationship between FDI and economic growth. According to Alfaro et al. (2004) the endogeneity problem can explain the contrasting results reported by the literature.

#### OLS

The first studies on the relationship between FDI and economic growth use only cross-sectional data, for example Blomström et al. (1992) and Balasubramanyam et al. (1996). This means that only one observation per country is available, because of that these studies were only able to use OLS regressions to estimate the effect of FDI. In case of OLS, one need to control for all variables that have an effect on economic growth and FDI. These are called confounders. For example, innovations or institutional factors can influence the returns on capital which increases both economic growth and FDI. In practice it is however impossible to identify all confounders. Another problem when trying to find all the confounders is the risk of including mechanisms. Mechanisms are variables through which FDI can influence

economic growth. For example, FDI can increase the management skills, which results in higher economic growth. It is however sometimes difficult to distinguish mechanisms from confounders. Therefore, OVB is insurmountable when using OLS.

### IV

Other studies like Borensztein et al. (1998) and Alfaro et al. (2004) also use mainly OLS regressions. However, they try to improve their results by also performing the Instrumental Variables (IV) method. In simplest terms IV is based on the idea that the effect of the instrument on economic growth is the same as the effect of the instrument on FDI times the effect of FDI on economic growth. If the effect of the instrument on economic growth is divided by the effect of the instrument on FDI we find the causal effect of FDI on economic growth. In order for this to be true the instruments have to comply with three assumptions. In the first placed their need to be a strong first stage, which means that the instrument should have a strong causal effect on FDI. Secondly, the independence assumption means that the instrument should be more or less randomly assigned to the countries. This implies that the instrument should be uncorrelated with the error term, which are the omitted variables. Lastly the exclusion restriction needs to be fulfilled. This means that the instrument should not directly affect economic growth, but only through FDI (Angrist & Pischke, 2014). If all these requirements are fulfilled, IV will be the best solution to deal with endogeneity problems.

Finding an instrument that meet all the requirements is difficult, especially for the relationship between FDI and economic growth. Therefore, the ideal instrument for FDI is not available according to Borensztein et al. (1998). Instead, they use initial and lagged values of FDI and a dummy for East Asian countries as instruments. These instruments are highly correlated with FDI inflows, but it cannot be ruled out that these instrument affect economic growth directly. The IV regression from Borensztein et al. (1998) do not significantly differ from their OLS results. Alfaro et al. (2004) also try to solve the endogeneity problems of their OLS regression by using IV. Alfaro et al. (2004) use lagged FDI and exchange rates as instruments for FDI. Their results of IV are not vastly different from the OLS results, but they reflect more convincingly that FDI stimulates growth through financial markets. An explanation for the similar results of OLS and IV is according to Iamsiraroj and Ulubaşoğlu (2015) that the literature does not use proper instrument. The strength of IV depends on the quality of the instrument. The quality of the instrument is

however difficult to determine, because the independence assumption and exclusion restriction cannot be checked formally.

### Fixed and random effects models

The availability of panel data made it possible to use the fixed and random effects models. These model exploits the variation over time to control for unobserved time-invariant effects. The benefit of these models is that enables controlling for individual heterogeneity (Tiwari & Mutascu, 2011). This is needed because developing countries differ in many aspects from each other.

The fixed effects model is based on the assumption that the covariance between α (the time-invariant effects) and FDI is not zero. The fixed effects model removes all the time constant variables α. A limitation of the fixed effect model is that α has to be fixed and cannot be non-random. In the random effects model α can be non-random. The assumption underlying random effects is that the covariance between α and FDI is zero. This is the case under the assumption that all crucial factors for the determination of economic growth are included as control variables. Or if we assume that the effect of unobserved time constant variables is small.

The Hausman (1978) test helps to pick the best of the two methods, because it checks of the assumption of the random effects method holds. However, according to Wooldridge (2010) the fixed effects model is usually a more appropriate model for policy analysis in case data at higher levels of aggregation is used. In the case of FDI, data at country level is used. Fixed effects seems therefore to be more appropriate because a sample of countries cannot be treated as a random sample from a large population. Tiwari and Mutascu (2011) and Bengoa and Sanchez-Robles (2003) have used the Hausman (1978) test to determine whether fixed effects or random effects is the most appropriate model. For both studies, the Hausman test show that random effects is the best model. When comparing the results from the random and fixed effects methods, the results are very similar in both studies. Both studies use many periods in which case there will be not much difference between fixed and random effects models according to Wooldridge (2010).

Different models are used in the literature to estimate the effect of FDI on economic growth, but according to Iamsiraroj and Ulubaşoğlu (2015) this does not lead to different outcomes

compared to a simple OLS model. An explanation is that other methods also cannot solve all the endogeneity problems. From all methods fixed effects seems to be the best option, because it can at least partly reduce the OVB by controlling for time-invariant effects.

#### Reverse causality

Besides OVB another endogeneity concern is that the relationship between FDI and economic growth is vulnerable to reverse causality or simultaneity. It is plausible that countries with higher economic growth will attract more FDI, for example because foreign investors see more investment opportunities in those countries. Sun (2011) shows that the causality runs mainly from economic growth to FDI in China. Other studies report simultaneity, which means that the relationship runs in both ways. Anwar and Nguyen (2010) show that in Vietnam higher economic growth and better developed provinces attract more FDI, while FDI itself also has a positive effect on economic growth. Liu et al. (2009) show that the causality between FDI and economic growth runs in both directions in nine Asian economies. To avoid reverse causality the effect from FDI on economic growth needs to be distinguished from the effect of economic growth on FDI, which is impossible in practice.

A solution for this problem is the Granger (1969) causality test. This test can determine the direction of the causality, by using the lags of FDI and economic growth. The test estimate whether lags of FDI are able to affect current economic growth and lags of economic growth are able to affect current FDI. The only shortcoming of this test is that it is not able to identify situations in which an omitted variable affects both FDI and economic growth. Therefore, the conclusion that FDI Granger-causes economic growth will not mean that there is a certain causal effect.

### 2.2.4 Variables

The dependent variable that is used by almost all studies is the GDP growth per capita. FDI is the independent variable in the model. Net inflow of FDI is used by most studies as independent variable, for example by Soto (2000) and Alfaro et al. (2004). Most empirical study use the net inflows instead of gross inflows because they are interested in the amount of FDI that stays in the host country (Alfaro et al., 2004). Borensztein et al. (1998) study the effect of the inflow of FDI from OECD countries, because FDI flows from advanced countries are expected to generate more technology spillovers. Instead of only focussing on the effect of FDI, it is also possible to estimate the effect of FDI by using a production

function like in the growth models. Tiwari and Mutascu (2011) use a production function with capital, labour, FDI and export as input variables.

Human capital and financial development are included as control variables in many papers. Both variables usually have a positive effect on economic growth. Besides that, these variables can attract FDI, because multinationals prefer to invest in countries with an educated population and effective financial markets. The proxy which is most used in the literature for human capital is the average years of secondary schooling (Alfaro et al., 2004; Jyun-Yi & Chih-Chiang, 2008). It is much more difficult to measure the level of development of the financial sector. Different variables for the state of the financial sector are used in the literature. Alfaro et al. (2004) use the variables capitalization which is the value of stock trading as share of the size of the economy, the share of M2 in GDP, and the private credit extended in the economy. Carkovic and Levine (2002) use the variable domestic credit to private sector. Alfaro et al. (2006) use the interest spread which resembles the costs for intermediation, as a proxy for the development of financial sector.

Koojaroenprasit (2012) include export in the model as a control variable, because more trade is supposed to increase the specialization and competitiveness of domestic firms. This is expected to increase the capabilities of domestic firms to adapt to foreign subsidiaries, which means more spillovers. On the other hand, Balasubramanyam et al. (1996) argue that export likely lead to more technological improvements and learning from abroad, which could lead to more economic growth.

Initial GDP per capita is included as control variable because the economic growth of a country is negatively influenced by the initial level of income (Barro & Sala-i-Martin, 2003). Inflation is often used in the literature to control for the macroeconomic stability of a country. High inflation rates in developing countries are harmful for economic growth but is often also a reason for multinationals to refrain from investing. Alfaro et al. (2004) use the inflation deflator as control variable for inflation. This is the ratio of GDP in current local currency to GDP in constant local currency. According to Iamsiraroj and Ulubaşoğlu (2015) government expenditures might be needed to attract FDI which could lead to less expenditures in other sectors. Large government consumption has a significant negative impact on economic growth (Hajamini & Falahi, 2014). This implies that there is a positive relationship between FDI and government consumption which means that controlling for government consumption

leads to a higher coefficient of FDI (Iamsiraroj & Ulubaşoğlu, 2015). Economic freedom is an important control variable because according to Bengoa and Sanchez-Robles (2003) it increases both the GDP growth and the inflows of FDI.

Population growth can also be observed as a confounder because Headey and Hodge (2009) show that population growth negatively affects economic growth. Meanwhile population growth also has a positive correlation with FDI inflows (Aziz & Makkawi, 2012). An explanation for this is that a large population means a large selling market in the host economy for the multinational. Besides that, countries with a large population usually have many highly skilled employees available for the multinationals (Aziz & Makkawi, 2012). For this reason, Koojaroenprasit (2012) include the labour force participation as a control variable. Anwar & Nguyen (2010) use the annual manufacturing value added as a percentage of GDP as a proxy for learning by doing. If a country is better in learning by doing this implies that it will probably also be better in implementing foreign knowledge and technologies. Alvarado et al. (2017) also use the control variable manufacturing value added because of higher multipliers and more linkages in the manufacturing sector.

# 3. Methodology

In my opinion the fixed or random effects model is the most appropriate way to estimate the effect of FDI on economic growth. The reason is that this model makes it possible to control for time-invariant country specific characteristics. Besides the fixed and random effects model, I will also use the OLS model to compare the results. The main fixed or random effects regression will take the following form:

$$GDP\ growth_{it} = \alpha_i + \beta_1 FDI_{it} + \beta_2 X_{it} + \gamma_t + \varepsilon_{it}$$

where GDP growth is the GDP growth per capita, α is the individual fixed or random effect and $\beta_1$ is the coefficient of interest that captures the effect of FDI on growth. The X is a vector that includes different sets of control variables, $\gamma$ stands for the time dummies, ε is the error term, and i and t are indices that represent respectively each different country and time period of the variables. The OLS regression will take the same form as the fixed or random effects regression above, except that it does not contain the individual effects parameter α.

After I have used both fixed and random effects to estimate the results, I will use the Hausman test to determine which model is the most appropriate. However, I expect that there will not be much difference between fixed and random effects because the results of both models will become similar if there are many periods. This is with 25 periods quite large in this study.

The dependent variable economic growth will be captured by the annual percentage growth of GDP per capita. In this study the net inflow of FDI to developing countries will be used. This is the sum of new investments inflow minus disinvestments of foreign investors who hold at least ten percent of the voting shares. I use net inflows instead of gross inflows because I only want to consider the inflows that remain in the country. The net inflow of FDI also takes the withdrawal of FDI into account. Besides total net FDI inflows, I will also estimate the results if only the direct investment inflows of DAC (Development Assistance Committee) are used. The DAC consists of 24 of the most developed countries, which means that the technology gap between these countries and the developing countries should be large. This implies that more potential spillovers are possible. The only drawback of this variable is that it consists of all the investments made by residents of DAC countries. This means that this is not exactly equal to the definition of FDI which requires an ownership share of at least ten percent.

I will include time varying country characteristics as control variables. The control variable for human capital will be the average years of secondary schooling of the working age population. In addition, I will also check if the results differ for the share of the working age population that have completed secondary education. As control variables for the financial development, I will use the interest rate spread and domestic credit to private sector as percentage of GDP. Besides these variables I will use different indexes of the IMF on financial development. The expectation is that these indexes are more precisely predictions of the level of development of the financial sector than only using a single variable as proxy for financial development. I will use the index on the financial institutions, the index on financial markets and an index that combines the previous two.

Another control variable that I will use is the government consumption. This includes all government expenditures on goods and services. The expenditures on national defence and security are unfortunately also part of this variable, but not the expenditures on military

capital goods. I will use two different indexes on economic freedom, one from the Heritage Foundation and one from the Fraser Institute. To control for learning by doing, I will add the value addition in the manufacturing sector as percentage of GDP as control variable. The inflation deflator is added to the regression to control for the macroeconomic stability. Finally, population growth is also included as control variable, because of its expected negative effect on economic growth and positive effect on FDI inflows.

Besides a normal regression, I will also use a production function for GDP which include labour, capital, and export as independent variables:

$$GDP\ growth_{it} = \alpha_i + \beta_1 FDI_{it} + \beta_2 Labour_{it} + \beta_2 Capital_{it} + \beta_3 Export_{it} + \gamma_t + \varepsilon_{it}$$

In this regression I will control for population growth and inflation because these variables are important for determining the economic growth in a country. The variable capital represents the gross capital formation as share of GDP. This can be viewed as the gross net investments into fixed capital. The labour variable is captured by the labour force participation which is the fraction of the population between 15 and 64 who is economically active. The export variable is the export of goods and services as share of GDP.

Finally, the effects of the four absorptive capacities, initial GDP, human capital stock, trade openness, and financial development, will be estimated by including an interaction term in the regression model:

$$GDP\ growth_{it} = \alpha_i + \beta_1 FDI_{it} + \beta_2 FDI_{\ it} \times A_{it} + \beta_3 A_{it} + \beta_4 X_{it} + \varepsilon_{it}$$

where $\beta_2$ is the coefficient on the interaction term and A is the absorptive capacity. The coefficient $\beta_2$ shows if the absorptive capacity is able to change the influence of FDI on economic growth. The absorptive capacity should also be included separately in the regression. The absorptive capacity initial GDP is measured by the level of real GDP per capita in 1995. Human capital is measured by the average years of secondary schooling. The absorptive capacity trade openness is the sum of imports and exports as share of GDP. For the absorptive capacity financial development four different variables will be used. First two of the index variables from the IMF will be used. Then I will also use the interest spread and

the domestic credit provided to the private sector as proxies for the financial sector. Although the instruments are far from perfect, I will also use the IV method to check if this lead to different results. The instrument that I will use are different lagged values of FDI and the market exchange rate.

Finally, I will study if the effect of FDI could differ per continent. The culture is completely different, but also the attitude against FDI inflows differ between continents. Many liberalization reforms have taken place in Latin-America, while Asian countries has been more selective towards FDI inflows. Besides that, the economic environment is completely different between the regions. Most of Asia is growing rapidly, while most of African and Latin-American countries have had low growth rates in the past decades. I will first estimate the effect of FDI for each continent separately. Afterwards I will investigate whether the effect of FDI differs significantly between regions, by including an interaction term as in the regression model above. Only instead of an absorptive capacity I will use a continent dummy.

# 4. Data

The World Development Indicators (WDI) from the World Bank is the main database for this study. This database is used to acquire data about the net inflow of FDI, GDP per capita growth, GDP per capita, population growth, domestic credit to private sector, exports, trade, labour force participation, government consumption, gross capital formation, value added in manufacturing sector, inflation deflator, market exchange rate and interest rate spread. Data on the average years of education and the completion rate of secondary education of the working age population are obtained from the dataset of Barro and Lee (2013).

The OECD statistics database on the Geographical Distribution of Financial Flows to Developing Countries is used to obtain data about the inflow of direct investments of DAC countries into developing countries. This data is available for the period 1992-2019.
The index on economic freedom of the Heritage Foundation is used for data on economic freedom. This dataset contains data for the period between 1995 and 2021. The database of the Fraser institute on economic freedom is also used (Gwartney et al., 2021). The index for economic freedom is slightly different in this database. Data is annually available between 2000 and 2019 and between 1970 and 2000 for every five years.

The Financial Development Index Database from the IMF is used as a measure of the level of financial development. This database contains annually data between 1980 and 2019. Different indexes are included in the database. I will use the financial institutions index and the financial markets. Furthermore, I will use the index on financial development which is a combination of the previous two indexes. Extensive descriptions of each specific variable are reported in table 14 in the appendix.

For this research, the countries with a lower GDP per capita in constant US 2015 dollars than $4000 in 1995 are selected. The countries with not at least data on FDI and GDP per capita were dropped from this list. Therefore 77 countries remain of which 45 are used for the main regression because data on all control variables is available for these countries. The set of countries for the sample of 77 and 45 countries are displayed in table 14 and 15 in the appendix. For the threshold analysis, the countries Cote d'Ivoire, Haiti, Kyrgyz Republic, Lao PDR, and Moldova are deleted due to lack of data, because for the threshold regression it is not possible to have missing observations. So, 40 countries remain for the threshold regression. The time period for this study are the years 1995-2019, because before 1995 there is less data available.

# 5. Results

## 5.1 Summary statistics

Figure 1 presents the development of the averages of some variables during the sample period. First, the development of the dependent variable annual GDP growth per capita clearly demonstrate the impact of the Asian financial crisis in 1997 and the global financial crisis in 2008. Except for these two large recessions the average economic growth is slightly higher than the world average, which is around 2 percent, but there are major differences between countries. China had an average GDP growth per capita of 8,3 percent during the sample period while The Gambia and the Democratic Republic of the Congo experienced hardly any economic growth at all.

As already has been shown in the introduction, the inflow of FDI increased dramatically during the 1990's and early 2000's, but these inflows have decreased in the last decade. The same trend is also visible for the sample of 45 countries in figure 1. The average FDI inflow from my sample have reached its highest peak at more than 6 percent in 2011, but after this peak the net inflow of FDI halved to around 3 percent. The population growth is very stable around 2 percent. This is contrary to the world average which decreased from 1,5 to 1 percent during the sample period. The direct investment of DAC countries increased slightly but is low compared to the net inflow of FDI. This could indicate that most of the FDI flows are between developing countries themselves.

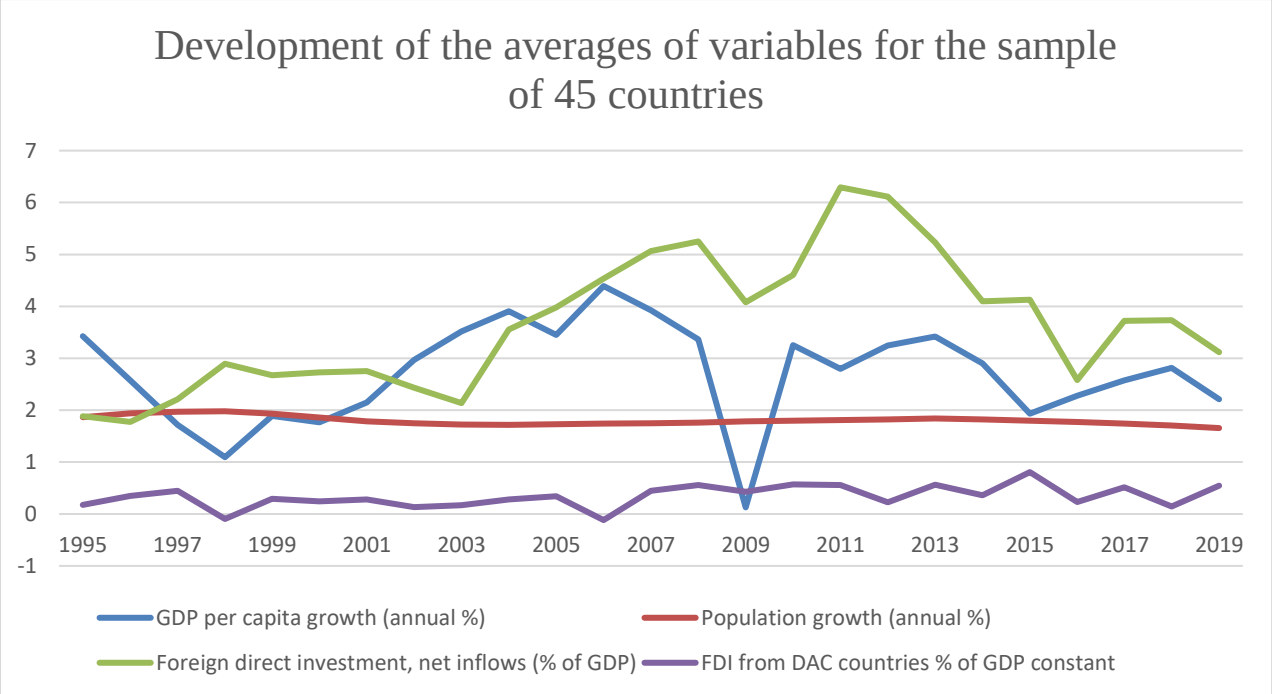


*Figure 5.2. The development of some variables for the sample of 45 countries.*

Figure 2 displays the development of some control variables. The gross capital formation slightly increased from 20 to 25 percent. This means that the saving rate should have increased in the sample countries, which increase economic growth at least in the short run according to the growth models. The average government consumption increased slightly to almost 15 percent. This is only just below the world average of 17 percent. The domestic credit to the private sector, which is a proxy for the level of development of the financial sector, steadily increased during the sample period to almost 40 percent of GDP. This indicates a substantial development of the financial sector. This is also reflected by the index

on financial development, which increased from 0,15 to 0,22. The decrease of the interest rate spread from 12,5 to 7,0 also shows the efficiency improvement in the financial sector.

Another remarkable development is the reduction of average inflation in the sample. The high values in 1995 and 1996 are caused by extreme inflation rates experienced by the Democratic Republic of Congo and Ukraine. However, even without these observations the average inflation deflator decreased from around 20 percent to less than 5 percent. This indicates that there is much more macroeconomic stability in these set of developing countries, which could promote higher inflows of FDI. The averages of all variables during the sample period are reported in table 12 in the appendix.

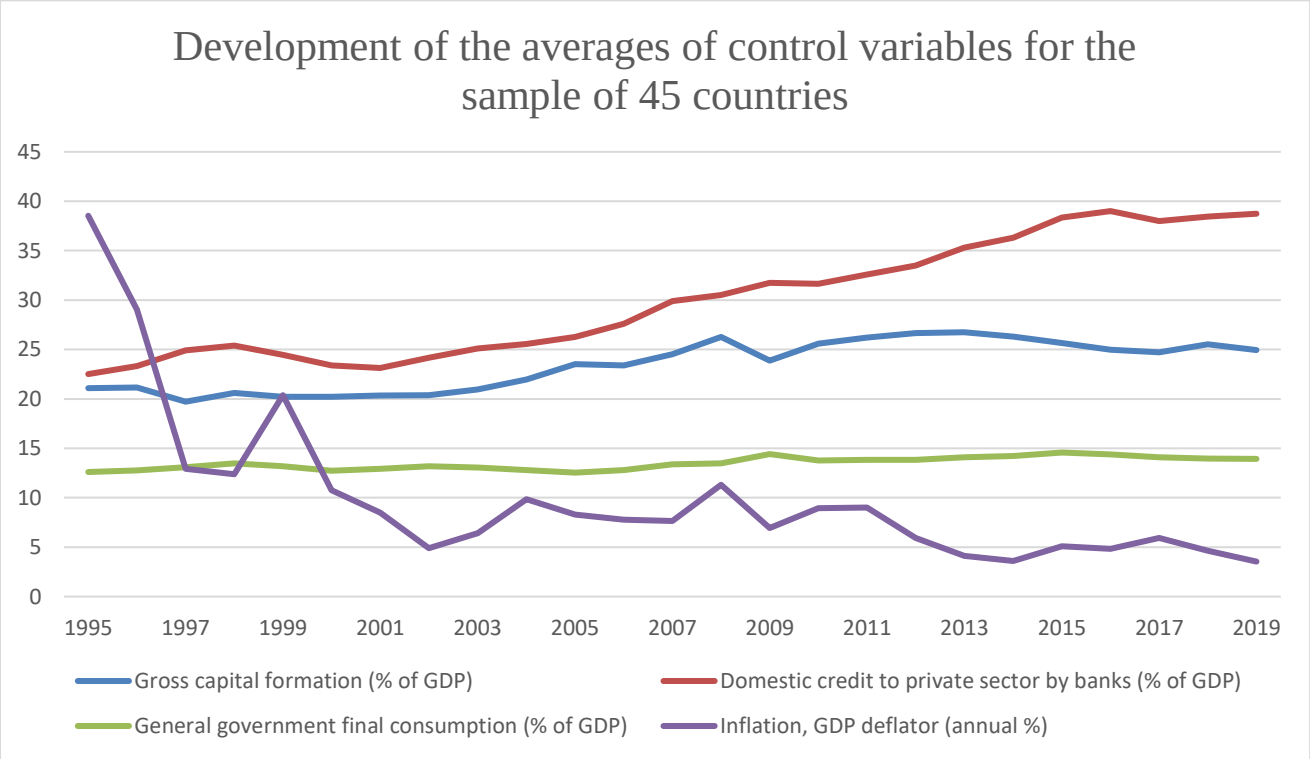


*Figure 5.3. The development of control variables for the sample of 45 countries.*

## 5.2 Comparing the two samples

First, I perform a simple regression with only population growth and the inflation deflator as control variables. These variables are included given their large potential effect on economic growth and FDI. In the OLS regression the log of initial GDP per capita is included as extra control variable, because OLS does not control for time-invariant factors. The initial GDP per

capita is expected to capture the initial developing state of a country, which is important for the development process.

The first three columns of table 1 report the regression results for the large sample of 77 countries. The OLS regression in column 1 shows a strong and significant effect of FDI on economic growth from almost 0,1. This implies that if the net inflow of FDI as percentage of GDP increases with 1 percent, the economic growth in the host country will increase with almost 0,1 percent. The fixed and random effects models have a slightly smaller and less significant coefficient for FDI.

In the last three column of table 1 the results for the smaller sample of 45 countries are displayed. The results are similar for the smaller sample. The only major difference is that the FDI coefficients in the fixed and random effects models are almost equal to the coefficient found by using the OLS regression. The similarity of the fixed and random effects results is expected, because the results will become similar if the number of time periods become larger (Wooldridge, 2015). For the smaller sample, the coefficient of FDI is for all estimation methods statistically significant at the five percent level. This result is in accordance with the average finding of the literature of a significant coefficient of 0.11 for FDI (Iamsiraroj & Ulubaşoğlu, 2015).

The coefficient of population growth is for almost all regression statistically significant negative. This means that a larger population growth will reduce the GDP per capita growth, which is in accordance with the result of Headey and Hodge (2009). The coefficient of the inflation deflator is exceedingly small and only significant in the smaller sample. The negative sign means that higher inflation will reduce economic growth which is in correspondence with the literature. The negative sign of the log of initial GDP per capita means that the countries with lower initial income level will experiences higher economic growth rates. This implies that there is income convergence within the sample.

To obtain appropriate standard errors, the standard errors are clustered for each country in the fixed and random effects models. In this way serial correlation is allowed within the observations of each specific country over time, but not between countries. This makes the standard errors also robust to heteroskedasticity (Wooldridge, 2015). The standard errors for

all the estimation methods will be robust. This means that despite heteroscedasticity the standard errors are unbiased.

*Table 1. The regression result for net inflows of FDI as percentage of FDI with GDP growth per capita as dependent variable.*

| *Variable* | *1* *OLS* | *2* *FE* | *3* *RE* | *4* *OLS* | *5* *FE* | *6* *RE* |
|---|---|---|---|---|---|---|
| *FDI (% of GDP)* | 0.095*** | 0.066* | 0.071* | 0.100*** | 0.101** | 0.101** |
| | (0.03) | (0.04) | (0.04) | (0.27) | (0.04) | (0.04) |
| *Population growth* | -1.053*** | -0.351 | -0.580** | -1.148*** | -1.039* | -0.925*** |
| | (0.13) | (0.55) | (0.27) | (0.16) | (0.56) | (0.29) |
| *Inflation deflator* | -0.0002 | -0.0003 | -0.0003 | -0.007*** | -0.006*** | -0.006*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *Log Initial GDP 1995* | -2.618*** | | | -2.637*** | | |
| | (0.41) | | | (0.51) | | |
| *Constant* | 13.278** | 3.095* | 3.546*** | 13.722*** | 5.426*** | -5.217*** |
| | (1.62) | (1.58) | (1.15) | (2.06) | (1.78) | (1.46) |
| *Observations* | *1918* | *1918* | *1918* | *1124* | *1124* | *1124* |
| *Number of countries* | *77* | *77* | *77* | *45* | *45* | *45* |

Note. Robust standard errors for OLS and cluster-robust standard errors for FE and RE are in parentheses; * p< 0.10, ** p<0.05, *** p<0.01.

In the second table I will use the direct investment from DAC countries as independent variable instead of net inflows of FDI. In contrast with table 1, the coefficient of direct investment from DAC countries has a negative sign for all different regression specifications. This is in stark contrast with the expectation that FDI inflows from developed countries will have a larger positive impact on economic growth. A possible reason is that this variable consists of other direct investments which cannot be qualified as FDI. Another explanation can be that the direct investments from DAC countries is much smaller in comparison with total net FDI inflows as shown in figure 5.1. Therefore, in the remainder of this study I will mainly use the net inflow of FDI as independent variable. The results of the Hausman test for both the smaller sample and larger sample indicate that the random effects model is the more appropriate. Therefore, in the remainder of this study unless mentioned otherwise random effects will be used. However, the results from both models are expected to be similar, which can also be seen in table 1 and 2.

*Table 2. The regression results for direct investment from DAC countries with GDP growth per capita as dependent variable.*

| *Variable* | *1* *OLS* | *2* *FE* | *3* *RE* | *4* *OLS* | *5* *FE* | *6* *RE* |
|---|---|---|---|---|---|---|
| *Direct investment* | -0.097 | -0.094 | -0.100 | -0.034 | -0.010 | -0.016 |
| *from DAC* | (0.07) | (0.08) | (0.08) | (0.08) | (0.06) | (0.06) |
| *Population growth* | -1.126*** | -0.044 | -0.634** | -1.232*** | -0.978 | -0.911*** |
| | (0.13) | (0.52) | (0.28) | (0.17) | (0.60) | (0.33) |
| *Inflation deflator* | 0.0004 | -0.0002 | 0.0002 | -0.006*** | -0.005*** | -0.005*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *Initial GDP 1995* | -2.713*** | | | -2.796*** | | |
| | (0.40) | | | (0.51) | | |
| *Constant* | 14.155*** | 3.956** | 4.336*** | 14.848*** | 6.072*** | 5.918*** |
| | (1.58) | (1.52) | (1.10) | (2.09) | (1.933) | (1.51) |
| *Observations* | *1888* | *1888* | *1888* | *1104* | *1104* | *1104* |
| *Number of countries* | *77* | *77* | *77* | *45* | *45* | *45* |

Note. Robust standard errors for OLS and cluster-robust standard errors for FE and RE are in parentheses; * p< 0.10, ** p<0.05, *** p<0.01.

## 5.3 Production function

Table 3 presents the results of the production function. I keep the control variables population growth and inflation in the regression model because they have a strong impact on economic growth according to the growth models. Besides FDI inflows, gross capital formation, export labour force participation are also included as independent variables. The idea is that this resembles a production function from the growth models, where capital formation is split up into foreign investments (FDI) and domestic investments (gross capital formation). The labour input is proxied by the labour force participation.

I have used OLS and random effects to compare the regression results for both samples. The results are approximately the same in columns 1 to 4. In contrary to the simple regressions from table 1, FDI does not have a significant positive effect on economic growth in table 3. Gross capital formation has in all different models a significant positive effect from around 0.1 on economic growth. This means that domestic investment is more important for economic growth per capita then FDI. The export has a negative effect on economic growth. This is surprising because more export is in the literature associated with more economic growth (Koojaroenprasit, 2012). However, the effect is small and has therefore little economic impact.

Domestic investment could be a mechanism through which FDI increases economic growth. Including domestic investment in the model could therefore pick up some of the positive

effects from FDI. Besides that, I cannot completely rule out that the variable gross capital formation consists only of domestic investments which could also trouble the results of the FDI coefficient in the production function. To check the impact of the variable gross capital formation I perform in column 5 the same regression as in column 4 but without the gross capital formation variable. The results are striking. The FDI coefficient is highly significant in this regression, while the other variables remain of the same size. This could mean that FDI stimulate domestic investments which in turn increases economic growth. Also, because it cannot be checked whether the variable gross capital formation contain only domestic investments, I will not use gross capital formation as a control variable in this study.

*Table 3. The regression results for the production function with GDP growth per capita as dependent variable.*

| *Variable* | *1* | *2* | *3* | *4* | *5* |
|---|---|---|---|---|---|
| | *OLS* | *RE* | *OLS* | *RE* | *RE* |
| *FDI (% of GDP)* | 0.043 | 0.032 | 0.041 | 0.038 | 0.108*** |
| | (0.03) | (0.03) | (0.03) | (0.04) | (0.04) |
| *Population growth* | -0.730*** | -0.665*** | -0.857*** | -0.924*** | -0.992*** |
| | (0.12) | (0.22) | (0.16) | (0.24) | (0.28) |
| *Inflation deflator* | -0.007*** | -0.007*** | -0.006*** | -0.006*** | -0.006*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *Gross capital formation (%GDP)* | 0.106*** | 0.098*** | 0.115*** | 0.119*** | |
| | (0.01) | (0.02) | (0.02) | (0.02) | |
| *Export (%GDP)* | -0.016** | -0.011 | -0.026*** | -0.025** | -0.020 |
| | (0.00) | (0.01) | (0.00) | (0.01) | (0.01) |
| *Labour force participation* | 0.029*** | 0.022 | 0.056*** | 0.048** | 0.041* |
| | (0.01) | (0.02) | (0.01) | (0.02) | (0.02) |
| *Constant* | -0.113 | 0.555 | -1.315* | 0.470 | 3.224** |
| | (0.65) | (1.23) | (0.72) | (1.28) | (1.35) |
| *Observations* | *1816* | *1816* | *1104* | *1104* | *1109* |
| *Number of countries* | *77* | *77* | *45* | *45* | *45* |

Note. Robust standard errors for OLS and cluster-robust standard errors for FE and RE are in parentheses; * p< 0.10, ** p<0.05, *** p<0.01.

## 5.4 Regressions with control variables

Given the similarity of the results for both samples I will from now on only focus on the smaller sample, because more data is available for these countries. This makes it possible to add some more control variables to the regression in table 4. In the first column of table 4 I have performed a simple regression with only labour participation as extra control variable. The labour participation has a positive effect on economic growth which is in accordance with the economic theory. The export variable is not included in the regression anymore, because of its insignificant effect on economic growth in column five of table 2.

In column two the control variables government consumption and manufacturing value added are included in the regression. This leads to a more significant effect of FDI on economic growth. The government consumption has a significant negative effect on the economic growth. This is in accordance with the result from Hajamini and Falahi (2014) that large governments have a negative impact on economic growth. The fact that the variable government consumption contains also military and police expense can also explain the negative effect of government consumption, because it can be a signal for conflicts or civil unrest. The expectation is that controlling for government consumption leads to larger effects of FDI (Iamsiraroj & Ulubaşoğlu, 2015). The coefficient of FDI is indeed slightly higher when government consumption is added as control variable. The variable manufacturing value added, is expected to represent the ability of a country to learn by doing. However, one would expect that in case more value is added in the manufacturing sector this will result in higher economic growth. This expectation is in contrast with the negative sign, but the variable is far from significant.

In column three and four two different indexes on economic freedom are added to the regression. The coefficient of the Fraser institute is larger because this is an index between 0 and 10 while the Heritage foundation is based on an index between 0 and 100. Although insignificant, both indexes have a negative sign which is in contrast with the positive impact found by Bengoa and Sanchez-Robles (2003). Possible explanation is that the reforms to increase economic freedom will at least in the short run hurt the economy. The index of the Heritage Foundation will be used in the remainder of this study because this index contains the most data observations.

Two different measures of human capital are added to the regression in column 5 and 6. Both coefficients are positive as expected, but insignificant. The coefficient for the completion rate in column 5 is smaller because this is a percentage. The coefficient for the average years of schooling in column 6 is a little bit more significant. In the rest of this study, I will therefore use the average years of secondary schooling as the control variable for human capital. Another reason is that these variable captures more accurate the level of human capital, because it measures all the secondary education that have been followed secondary education and not only the inhabitants who completed secondary education.

*Table 4. The random effects regression results for the sample of 45 countries between 1995 and 2019 with GDP growth per capita as dependent variable.*

| *Variable* | *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|---|
| *FDI (% of GDP)* | 0.101** | 0.105*** | 0.104*** | 0.116*** | 0.103*** | 0.102*** |
| | (0.04) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| *Population growth* | -0.930*** | -0.927*** | -0.713*** | -1.157*** | -0.679** | -0.621** |
| | (0.28) | (0.25) | (0.23) | (0.32) | (0.27) | (0.28) |
| *Inflation deflator* | -0.006*** | -0.006*** | -0.023*** | -0.006*** | -0.023*** | -0.024*** |
| | (0.00) | (0.00) | (0.01) | (0.00) | (0.01) | (0.01) |
| *Labour participation* | 0.041* | 0.046* | 0.045** | 0.051** | 0.047** | 0.051** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| *Government consumption* | | -0.131*** | -0.123*** | -0.123*** | -0.123*** | -0.121*** |
| | | (0.04) | (0.03) | (0.03) | (0.03) | (0.03) |
| *Manufacturing, value added (% of GDP)* | | -0.001 | 0.006 | -0.007 | 0.008 | 0.010 |
| | | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| *Economic freedom (Heritage)* | | | -0.013 | | -0.014 | -0.016 |
| | | | (0.03) | | (0.03) | (0.03) |
| *Economic Freedom (Fraser Institute)* | | | | -0.476 | | |
| | | | | (0.40) | | |
| *Completion rate secondary schooling* | | | | | 0.007 | |
| | | | | | (0.02) | |
| *Average years of secondary schooling* | | | | | | 0.179 |
| | | | | | | (0.18) |
| *Constant* | 2.548** | 3.653** | 3.626* | 6.731* | 3.377 | 2.820 |
| | (1.23) | (1.81) | (2.18) | (3.45) | (2.26) | (2.40) |
| *Observations* | *1124* | *1029* | *1011* | *837* | *1011* | *1011* |
| | *45* | *45* | *45* | *45* | *45* | *45* |

Note. Cluster-robust standard errors are in parentheses; * p< 0.10, ** p<0.05, *** p<0.01.

In table 5 some proxies for the level of development of the financial sector are included as control variables. In the first column domestic credit to the private sector is added. Many studies have found a positive effect from this variable on economic growth. However, in my regression this variable is highly insignificant. In the fifth column I have used the interest rate spread as measure for financial development. In contrast to the literature the interest spread also does not have a significant positive effect on economic growth.

Therefore, in the columns 2-4 I have used indexes from the IMF on the financial development, because these indexes capture more aspects from the financial sector. The complete index on financial development is included in column two. The significant positive coefficient indicates that financial development positively contributes to economic growth. In column three the index about financial institutions is added. This coefficient is also positive, but only significant at the 10 percent level. Finally, I have used the part of the index about the financial markets in column four. This coefficient is also significant and positive. The conclusion is therefore that the financial sector as a whole contributes positively to economic growth in developing countries. Therefore, I will consider column two of table 5 with the index on financial development as my preferred regression for the remainder of this study.

The preferred regression from column two is performed by using the fixed effects model in column six and OLS in column seven. The FDI coefficients are approximately the same as for random effects and still highly significant. Again, the Hausman test shows that the random effects model is more appropriate.

*Table 5. The regression results with different controls for financial market development with GDP growth per capita as dependent variable.*

| *Variable* | *1* | *2* | *3* | *4* | *5* | *6* | *7* |
|---|---|---|---|---|---|---|---|
| | *RE* | *RE* | *RE* | *RE* | *RE* | *FE* | *OLS* |
| *FDI (% of GDP)* | 0.106*** | 0.102*** | 0.103*** | 0.101*** | 0.110*** | 0.100*** | 0.108*** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.02) |
| *Population growth* | -0.618*** | -0.610** | -0.604** | -0.623** | -0.548*** | -0.645 | -0.543*** |
| | (0.24) | (0.29) | (0.24) | (0.29) | (0.21) | (0.51) | (0.13) |
| *Inflation deflator* | -0.044*** | -0.023*** | -0.023*** | -0.023*** | -0.044*** | -0.023*** | -0.023*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| *Labour force participation* | 0.056*** | 0.050** | 0.051*** | 0.048** | 0.064*** | -0.023 | 0.060*** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.05) | (0.01) |
| *Government consumption* | -0.113*** | -0.129*** | -0.132*** | -0.120*** | -0.105*** | -0.214*** | -0.106*** |
| | (0.03) | (0.03) | (0.04) | (0.03) | (0.03) | (0.07) | (0.02) |
| *Manufacturing, value added (% of GDP)* | 0.023 | -0.008 | 0.005 | -0.010 | 0.025 | -0.071 | 0.013 |
| | (0.02) | (0.03) | (0.03) | (0.03) | (0.03) | (0.05) | (0.02) |
| *Economic freedom (Heritage)* | -0.026 | -0.024 | -0.022 | -0.020 | -0.038 | -0.029 | -0.028 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.04) | (0.02) |
| *Average years of secondary schooling* | 0.212 | 0.113 | 0.125 | 0.142 | 0.288* | 0.491 | 0.161 |
| | (0.16) | (0.18) | (0.17) | (0.18) | (0.16) | (0.56) | (0.10) |
| *Domestic credit to private sector by banks* | -0.006 | | | | | | |
| | (0.01) | | | | | | |
| *Financial Development index* | | 3.526** | | | | 3.679 | 2.943*** |
| | | (1.51) | | | | (2.69) | (0.77) |
| *Financial Institutions Index* | | | 2.382* | | | | |
| | | | (1.32) | | | | |
| *Financial Markets Index* | | | | 2.536** | | | |
| | | | | (1.19) | | | |
| *Interest rate spread* | | | | | -0.034 | | |
| | | | | | (0.02) | | |
| *Constant* | 3.143 | 3.324 | 2.923 | 3.412 | 3.438* | 9.692** | 1.956 |
| | (2.24) | (2.37) | (2.35) | (2.41) | (1.95) | (3.82) | (1.76) |
| *Observations* | *989* | *1011* | *1011* | *1011* | *914* | *1011* | *1011* |
| *Number of countries* | *45* | *45* | *45* | *45* | *45* | *45* | *45* |

Note. Robust standard errors for OLS and cluster-robust standard errors for FE and RE are in parentheses; * p< 0.10, ** p<0.05, *** p<0.01.

## 5.5 Absorptive capacities

Table 6 shows the effects of different absorptive capacities. In column 1 the interaction term between FDI and average years of secondary education is included in the model. This interaction term in positive and significant at the five percent level, which means that an

increase of the average years of secondary education with one year increase the FDI coefficient with 0.18. The problem is that the FDI coefficient has lost its significance, but the FDI coefficient is still positive. This implies that at the average value for the average years of secondary education of 2,18, the effect of FDI will be approximately the same as in the regression without interaction term. This means that human capital can be regarded as an absorptive capacity, because higher values of human capital increase the effect of FDI on economic growth. Human capital seems to have a relevant effect because for countries at the average level of education the effect of FDI is more than twice as large.

Next, different indicators for the state of the financial sector are used to investigate whether the development of the financial sector is an absorptive capacity. The coefficient on the interaction terms with the financial development index is positive but insignificant. The interaction term with the index on financial markets is significant at the 10 percent level and in this case the effect of FDI remain significant at the five percent level. Although the interaction term is not significant at the five percent level, it has a substantial economic impact. The countries with the average value on the financial markets index have only a 0.03 point higher FDI coefficient. However, for the quart highest observations the effect of FDI is at least 0,11 point higher. Finally, the interaction term with the interest spread and the domestic credit to the private sector are insignificant and small. This seems to indicate that these variables do not accurately resembles the state of development of the financial sector.

The third possible factor that could enhance the positive effect of FDI on economic growth is trade volume as percentage of GDP. The coefficient of the interaction term between trade and FDI in column six is however exceedingly small and insignificant. Finally, the effect of the log of initial GDP as interaction term is observed. From Blomström et al. (1992) follows that countries with higher initial GDP will have a larger positive effect of FDI on economic growth. The interaction term with log of initial GDP in column seven is positive, but insignificant. The coefficient of FDI itself has even turned negative. This does however not imply that countries with very low income levels can experience negative effects. Even for Mozambique the country with the lowest initial GDP per capita level, the effect of FDI is in total positive due to the positive interaction term. However, since the interaction term is insignificant, I cannot conclude that higher initial income levels increase the effect of FDI on economic growth per capita.

*Table 6. The random effects results when different interaction terms are included with GDP growth per capita as dependent variable.*

| *Variable* | *1 Schooling* | *2 Financial development* | *3 Financial Markets Index* | *4 Interest spread* | *5 Domestic credit to private sector* | *6 Trade* | *7 Log initial GDP* |
|---|---|---|---|---|---|---|---|
| *FDI (% of GDP)* | 0.051 | 0.048 | 0.076** | 0.085 | 0.145*** | 0.147 | -0.090 |
| | (0.04) | (0.05) | (0.04) | (0.05) | (0.05) | (0.11) | (0.26) |
| *Population growth* | -0.629** | -0.630** | -0.654** | -0.557*** | -0.600** | -0.603** | -0.760** |
| | (0.30) | (0.31) | (0.31) | (0.22) | (0.25) | (0.28) | (0.30) |
| *Inflation deflator* | -0.023*** | -0.024*** | -0.023*** | -0.043*** | -0.043*** | -0.023*** | -0.024*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| *Labour force participation* | 0.047** | 0.048** | 0.047** | 0.064*** | 0.056*** | 0.051*** | 0.019 |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| *Government consumption* | -0.127*** | -0.129*** | -0.122*** | -0.105*** | -0.113*** | -0.120*** | -0.121*** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.04) | (0.03) |
| *Manufacturing, value added (% of GDP)* | -0.011 | -0.010 | -0.012 | 0.024 | 0.025 | -0.004 | 0.017 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.02) | (0.03) | (0.02) |
| *Economic freedom (Heritage)* | -0.023 | -0.022 | -0.018 | -0.039 | -0.026 | -0.026 | -0.005 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| *Average years of secondary schooling* | 0.017 | 0.094 | 0.122 | 0.288* | 0.223 | 0.146 | 0.229 |
| | (0.20) | (0.19) | (0.19) | (0.16) | (0.16) | (0.19) | (0.15) |
| *Financial development index* | 3.487** | 2.561 | | | | 3.639** | 5.082*** |
| | (1.50) | (1.74) | | | | (1.52) | (1.37) |
| *Financial market index* | | | 1.319 | | | | |
| | | | (1.45) | | | | |
| *Interest rate spread* | | | | -0.046 | | | |
| | | | | (0.04) | | | |
| *Domestic credit to private sector by banks* | | | | | 0.004 | | |
| | | | | | (0.01) | | |
| *Trade (% of GDP)* | | | | | | -0.002 | |
| | | | | | | (0.01) | |
| *Log initial GDP* | | | | | | | -3.279*** |
| | | | | | | | (1.10) |
| *Average years of secondary schooling x FDI* | 0.018** | | | | | | |
| | (0.01) | | | | | | |
| *Financial development index x FDI* | | 0.253 | | | | | |
| | | (0.17) | | | | | |
| *Financial market index x FDI* | | | 0.319* | | | | |
| | | | (0.17) | | | | |
| *Interest rate spread x FDI* | | | | 0.003 | | | |
| | | | | (0.00) | | | |
| *Domestic credit to private sector x FDI* | | | | | -0.001 | | |
| | | | | | (0.00) | | |
| *Trade (% of GDP) x FDI* | | | | | | -0.0004 | |
| | | | | | | (0.00) | |
| *Log initial GDP x FDI* | | | | | | | 0.055 |
| | | | | | | | (0.08) |
| *Constant* | 3.656 | 3.598 | 3.583 | 3.617* | 2.873 | 3.186 | 15.203*** |
| | (2.38) | (2.40) | (2.40) | (1.92) | (2.32) | (2.38) | (5.34) |
| *Observations* | *1011* | *1011* | *1011* | *914* | *989* | *1011* | *1011* |
| *Number of countries* | *45* | *45* | *45* | *45* | *45* | *45* | *45* |

Note. Cluster-robust standard errors are in parentheses; * p< 0.10, ** p<0.05, *** p<0.01.

## 5.6 Threshold regressions

To examine whether there exists threshold value for the effect of FDI on economic growth I use the method of Hansen (1999). Wang (2015) has made a command in Stata to implement a threshold regression for fixed effects. The results of the threshold regressions for the absorptive capacities are presented in table 7. The effect of FDI is significant for countries above and below this threshold value, but the effect is six times larger for countries below the threshold. However, the p-value shows that this threshold value is far from significant. Besides that, the threshold value is incredibly low. Only Mozambique has observations that are below this threshold value.

Then I estimated if there is a threshold value for the level of financial development. I have used only the financial development index and the financial market index because that are the only proxies for the financial sector that have a significant effect on economic growth.
The threshold for the financial development index is significant at the five percent level. All countries experience a significant positive effect of FDI on economic growth per capita, but the effect is higher in the countries above the threshold value. The importance of this conclusion is small, because only 33 observations are below the threshold value. This is just a fraction of the total observations of 1000. In the third column I estimated the threshold value for the financial market index. The results suggest that the effect of FDI on economic growth per capita is more than three times larger in the 252 countries above the threshold. However, the threshold value is insignificant.

In column four the results for trade openness are presented. Unfortunately, the threshold value is far from significant, but the results show that the effect of FDI is twice as large in the 77 countries above the threshold. The positive effect of FDI above a trade volume of 124% is in contradiction with the results of Iamsiraroj and Ulubaşoğlu (2015), who find a significant positive effect of FDI for all countries below a trade volume of 114%.

It is not possible to compute a threshold value for the log of initial GDP by using fixed effects. Fixed effects only exploits the variation within each country and since the initial GDP is the same during the sample period, the threshold value for log of initial GDP cannot be estimated. Therefore, the five years lagged values of the log of GDP per capita are used instead of initial values. In my opinion this will still capture the average development state of

each specific country. The results are presented in column five and indicate that FDI has a positive significant effect on economic growth per capita for all 433 observations below the threshold. The FDI coefficient is insignificant and even negative for all countries below the threshold value. This is in contrast with the existing literature (Jyun-Yi & Chih-Chiang, 2008), but the threshold value is insignificant.

*Table 7. The results of threshold regressions by using fixed effects with GDP growth per capita as dependent variable.*

| *Variable* | *1 Schooling* | *2 Financial Development* | *3 Financial Markets* | *4 Trade* | *5 Log of lagged Initial GDP* |
|---|---|---|---|---|---|
| *Threshold* | 0.134 | 0.057** | 0.166 | 124.538 | 3.628 |
| *p-value* | 0.423 | 0.033 | 0.55 | 0.883 | 0.377 |
| *0 FDI (% of GDP)* | 0.772*** | 0.780*** | 0.099** | 0.093*** | 0.121*** |
| | (0.14) | (0.23) | (0.04) | (0.03) | (0.02) |
| *1 FDI (% of GDP)* | 0.127*** | 0.107*** | 0.318*** | 0.181*** | -0.072 |
| | (0.03) | (0.03) | (0.09) | (0.06) | (0.06) |
| *Population growth* | -1.284* | -1.294* | -1.330** | -1.298* | -1.273* |
| | (0.65) | (0.65) | (0.65) | (0.65) | (0.64) |
| *Inflation deflator* | -0.006*** | -0.005*** | -0.006*** | -0.006*** | -0.005*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| *Labour force participation* | -0.047 | -0.021 | -0.052 | -0.031 | -0.051 |
| | (0.07) | (0.06) | (0.07) | (0.06) | (0.06) |
| *Government consumption* | -0.246** | -0.260*** | -0.253*** | -0.255*** | -0.245*** |
| | (0.09) | (0.09) | (0.09) | (0.09) | (0.08) |
| *Average years of secondary schooling* | -0.142 | -0.144 | -0.070 | -0.222 | 1.514*** |
| | (0.38) | (0.37) | (0.32) | (0.41) | (0.48) |
| *Financial development index* | 1.889 | 2.395 | | 1.363 | 10.354*** |
| | (3.12) | (3.09) | | (2.90) | (3.05) |
| *Financial market index* | | | -0.410 | | |
| | | | (2.579) | | |
| *Trade (% of GDP)* | | | | 0.008 | |
| | | | | (0.01) | |
| *Log of 5 years lagged GDP per capita* | | | | | -11.251*** |
| | | | | | (2.26) |
| *Constant* | 10.984*** | 9.379** | 11.712** | 9.896** | 41.740*** |
| | (4.44) | (4.52) | (4.54) | (4.41) | (7.113) |
| *Observations* | *1000* | *1000* | *1000* | *1000* | *1000* |
| *Number of countries* | *40* | *40* | *40* | *40* | *40* |

Note. Cluster-robust standard errors are in parentheses. Below the threshold values are the p-values for these threshold values reported; * p< 0.10, ** p<0.05, *** p<0.01.

## 5.7 Instrumental variables

In order to check the validity of the random effects model I use IV. This makes it possible to find out whether the IV results are from the same size as the previous found results. In the first three columns I use different lagged values of FDI as instruments. In column four I us the market exchange rate as an instrument. In column 1 where the 1 year lagged value of FDI

is used as instrument, the FDI coefficient is highly significant. The coefficient is approximately a half time larger as most of the previous coefficient. This could indicate that the fixed and random effect regression underestimate the effect of FDI. However, all the other instrument for FDI inflows do not report a significant FDI coefficient.

Unfortunately, it is not possible to rely too much on the IV results due to the inappropriate instruments for FDI. Firstly, the exclusion restriction can be violated. It is likely that the lagged values of FDI impact current economic growth have a direct effect on economic growth because it takes time for FDI inflows to have effects on the host countries economy. The exclusion restriction can also cause problems for the instrument market exchange rate, because large exchange rate fluctuations can be harmful for exports and therefore affect economic growth directly. Secondly, the independence assumption can be violated because it is likely that the instruments are correlated with the omitted variables. The lagged values of FDI will probably be influenced by some of the same variables as current FDI. The last assumption that must be fulfilled by an instrument is a strong first stage. This is the only assumption that can be tested by regressing the instrument on FDI. There is a strong first stage if the F-statistic is larger than ten. All the lagged values of FDI have a strong effect on current FDI with F-statistics much larger than 10. The effect of the market exchange rate on current FDI is significant at the 1 percent level, but the F-statistic of 8.85 is just below ten. This means that the strong first stage assumption is not fulfilled for the market exchange rate instrument.

*Table 8. The results of different instrumental variables for net FDI inflow with GDP growth per capita as dependent variable.*

| *Variable* | *1*<br>*FDI 1-year lagged* | *2*<br>*FDI 3-year lagged* | *3*<br>*FDI 5-year lagged* | *4*<br>*Market exchange rate* |
|---|---|---|---|---|
| *FDI (% of GDP)* | 0.162*** | 0.013 | -0.175 | 0.209 |
| | (0.06) | (0.08) | (0.14) | (0.39) |
| *Population growth* | -0.914*** | -0.832*** | -0.738*** | -0.940*** |
| | (0.19) | (0.22) | (0.26) | (0.31) |
| *Inflation deflator* | -0.007*** | -0.007*** | -0.006*** | -0.007*** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| *Labour force participation* | 0.059*** | 0.066*** | 0.076*** | 0.057** |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| *Government consumption* | -0.126*** | -0.102*** | -0.064* | -0.132** |
| | (0.03) | (0.03) | (0.04) | (0.06) |
| *Average years of secondary schooling* | -0.026 | 0.106 | 0.273 | -0.059 |
| | (0.14) | (0.16) | (0.24) | (0.31) |
| *Financial development index* | 2.622 | 2.382 | 2.072 | 2.641 |
| | (2.11) | (2.12) | (2.12) | (2.15) |
| *Constant* | 1.306 | 0.673 | -0.228 | 1.454 |
| | (1.46) | (1.51) | (1.754) | (1.88) |
| *Observations* | *1080* | *1077* | *1065* | *1080* |
| *Number of countries* | *45* | *45* | *45* | *45* |

Note. Cluster-robust standard errors are in parentheses; * p< 0.10, ** p<0.05, *** p<0.01.

## 5.8 Reverse causality

Dumitrescu & Hurlin (2012) have developed a Granger non-causality test for panel data. This makes it possible to report the cross-section average of individual Wald statistics. The null hypothesis is that FDI does not Granger-cause economic growth in all countries. If this hypothesis can be rejected, FDI must cause economic growth in at least one country. The results indicates that the null hypothesis that FDI does not Granger-cause economic growth can be rejected at the five percent significance level. However, also the hypothesis that economic growth does not Granger-cause FDI can be rejected. Therefore, the Granger-causality for individual countries is estimated by using three lags of economic growth and FDI. The results show that FDI Granger-cause economic growth in Albania, Jordan, Laos, Mauritania, Niger, Sierra Leone, and Vietnam. On the other hand, economic growth Ganger-cause FDI in Benin, Dominican Republic, Egypt, Nicaragua, Peru. The conclusion is that the relationship between economic growth and FDI does not only run from FDI to economic growth.

## 5.9 Comparing continents

In table 10 a random effect regression is performed separately for four different regions. Column 1 shows that FDI has a positive effect in 20 African countries, but this coefficient is

only significant at the 10 percent level. The remarkable result is that the coefficient of FDI is highly significant for 13 Asian countries in column 2. On the other hand, the FDI coefficient is not significant at all in the American and European countries. The only country not included in one of these continents is Fiji, but in Fiji is also no significant relationship between FDI and economic growth. Therefore, I include Fiji to the European countries for the following comparisons between continents.

*Table 9. The random effects regression for different world regions with GDP growth per capita as dependent variable.*

| *Variable* | *1* | *2* | *3* | *4* |
|---|---|---|---|---|
| | *Africa* | *Asia* | *America* | *Europe* |
| *FDI (% of GDP)* | 0.073* | 0.204*** | 0.087 | 0.112 |
| | (0.04) | (0.02) | (0.12) | (0.44) |
| *Population growth* | -0.068 | -1.545*** | -1.413*** | -2.551 |
| | (0.74) | (0.24) | (0.27) | (4.06) |
| *Inflation deflator* | -0.015*** | -0.086* | -0.084** | -0.144** |
| | (0.00) | (0.05) | (0.04) | (0.06) |
| *Labour force participation* | 0.039 | -0.013 | -0.036 | -0.168 |
| | (0.04) | (0.23) | (0.06) | (0.28) |
| *Government consumption* | -0.082 | 0.005 | -0.099 | -0.067 |
| | (0.08) | (0.06) | (0.12) | (0.31) |
| *Manufacturing, value added (% of GDP)* | 0.020 | 0.019 | 0.046 | 0.007 |
| | (0.04) | (0.05) | (0.06) | (0.44) |
| *Economic freedom (Heritage)* | -0.002 | -0.160*** | -0.048 | -0.095 |
| | (0.04) | (0.05) | (0.05) | (0.15) |
| *Average years of secondary schooling* | 0.244 | 0.092 | 0.257 | -1.643 |
| | (0.75) | (0.26) | (0.51) | (3.17) |
| *Financial development index* | 0.720 | 0.301 | 8.353** | 44.611 |
| | (2.96) | (2.44) | (4.17) | (43.99) |
| *Constant* | -0.286 | 17.848*** | 10.465*** | 66.340*** |
| | (5.00) | (3.72) | (2.75) | (6.01) |
| *Observations* | *434* | *284* | *195* | *73* |
| *Number of countries* | *20* | *13* | *8* | *3* |

Note. Cluster-robust standard errors for FE are in parentheses; * p< 0.10, ** p<0.05, *** p<0.01.

The problem of the previous regression is that only data from the countries of the respective continents are used. This makes it impossible to estimate whether the effect of FDI differ significantly between continents. Therefore, in table 10 I will include a continent dummy times FDI as interaction term in the regression. In the same way as is done by Kherfi & Soliman (2005).

Column one includes the interaction term between FDI and the African dummy. This interaction term is negative and insignificant, while the FDI coefficient is highly significant. This means that FDI has a significant positive effect in non-African countries. The interaction term implies that the effect of FDI differs not significantly between African and non-African

countries. Column two includes the interaction term between FDI and the Asian dummy. This show that FDI has no significant effect in non-Asian countries, but the interaction term indicates that the effect is significantly higher in Asian countries. The third and fourth column show that the effect of FDI is positive and significant in non-American and non-European countries. At the same time the interaction terms demonstrate that the effect of FDI is significantly lower in American and European countries (for European countries only at the 10 percent significance level).

*Table 9. The random effects regression with interaction terms for each continent with GDP growth per capita as dependent variable.*

| *Variable* | *1* | *2* | *3* | *4* |
|---|---|---|---|---|
| | *Africa* | *Asia* | *America* | *Europe* |
| *FDI (% of GDP)* | 0.110** | 0.048 | 0.112*** | 0.114*** |
| | (0.05) | (0.03) | (0.03) | (0.03) |
| *Population growth* | -0.606** | -0.668** | -0.608** | -0.668** |
| | (0.28) | (0.31) | (0.27) | (0.31) |
| *Inflation deflator* | -0.023*** | -0.023*** | -0.023*** | -0.023*** |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| *Labour force participation* | 0.049*** | 0.045** | -0.055*** | 0.047** |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| *Government consumption* | -0.125*** | -0.119*** | -0.126*** | -0.130*** |
| | (0.03) | (0.03) | (0.03) | (0.03) |
| *Manufacturing, value added (% of GDP)* | -0.007 | -0.014 | -0.001 | -0.014 |
| | (0.03) | (0.03) | (0.03) | (0.03) |
| *Economic freedom (Heritage)* | -0.025 | -0.020 | -0.015 | -0.022 |
| | (0.03) | (0.03) | (0.03) | (0.03) |
| *Average years of secondary schooling* | 0.097 | 0.007 | 0.124 | 0.138 |
| | (0.19) | (0.19) | (0.17) | (0.18) |
| *Financial development index* | 3.445** | 2.787* | 3.167** | 3.415** |
| | (1.53) | (1.48) | (1.50) | (1.50) |
| *Interaction term continent dummy x FDI* | -0.019 | 0.137*** | -0.149** | -0.148* |
| | (0.06) | (0.04) | (0.07) | (0.09) |
| *Constant* | 3.309 | 3.779 | 2.424 | 3.585 |
| | (2.36) | (2.33) | (2.35) | (2.46) |
| *Observations* | *1011* | *1101* | *1101* | *1101* |
| *Number of countries* | *45* | *45* | *45* | *45* |

Note. Cluster-robust standard errors for FE are in parentheses; * p< 0.10, ** p<0.05, *** p<0.01.

Instead of including only one interaction term, in table 11 I will include all but one interaction term. This causes that the FDI coefficient resembles the effect for the continent that is not included as interaction term. The regression without the interaction term for Asian countries in column one reports a highly significant FDI coefficient. This means that FDI has a positive effect in Asian countries. At the same time all the interaction terms are significantly negative, which implies that the effect of FDI is significantly lower in all the other continents. Column two does not include the interaction term for African countries and shows a significant and positive FDI coefficient. This means that also in African countries

FDI has a significantly positive effect on economic growth per capita. The interaction terms shows that the effect is significantly higher in Asian countries, but significantly lower in American countries. The columns three and four show that the FDI coefficient is not significant in American and European countries.

*Table 11. The random effects regression with one continent as basis point with GDP growth per capita as dependent variable.*

| *Variable* | *1* | *2* | *3* | *4* |
|---|---|---|---|---|
| | *Asia* | *Africa* | *America* | *Europe* |
| *FDI (% of GDP)* | 0.180*** | 0.085*** | -0.046 | -0.038 |
| | (0.02) | (0.03) | (0.06) | (0.08) |
| *Population growth* | -0.706** | -0.706** | -0.706** | -0.706** |
| | (0.30) | (0.30) | (0.30) | (0.30) |
| *Inflation deflator* | -0.023*** | -0.023*** | -0.023*** | -0.023*** |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| *Labour force participation* | 0.050*** | 0.050*** | 0.050*** | 0.050*** |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| *Government consumption* | -0.118*** | -0.118*** | -0.118*** | -0.118*** |
| | (0.03) | (0.03) | (0.03) | (0.03) |
| *Manufacturing, value added (% of GDP)* | -0.010 | -0.010 | -0.010 | -0.010 |
| | (0.03) | (0.03) | (0.03) | (0.03) |
| *Economic freedom (Heritage)* | -0.012 | -0.012 | -0.012 | -0.012 |
| | (0.03) | (0.03) | (0.03) | (0.03) |
| *Average years of secondary schooling* | 0.070 | 0.070 | 0.070 | 0.070 |
| | (0.18) | (0.18) | (0.18) | (0.18) |
| *Financial development index* | 2.525* | 2.525* | 2.525* | 2.525* |
| | (1.52) | (1.52) | (1.52) | (1.52) |
| *Interaction term Africa dummy x FDI* | -0.095** | | 0.130** | 0.123 |
| | (0.04) | | (0.06) | (0.09) |
| *Interaction term Asia dummy x FDI* | | 0.095** | 0.225*** | 0.218*** |
| | | (0.04) | (0.07) | (0.04) |
| *Interaction term America dummy x FDI* | -0.225*** | -0.130** | | -0.007** |
| | (0.07) | (0.06) | | (0.10) |
| *Interaction term Europa dummy x FDI* | -0.218*** | -0.123 | 0.007 | |
| | (0.08) | (0.09) | (0.10) | |
| *Constant* | 2.986 | 2.986 | 2.986 | 2.986 |
| | (2.38) | (2.38) | (2.38) | (2.38) |
| *Observations* | *1011* | *1101* | *1101* | *1101* |
| *Number of countries* | *45* | *45* | *45* | *45* |

Note. Cluster-robust standard errors for FE are in parentheses; * p< 0.10, ** p<0.05, *** p<0.01.

# 6. Conclusion

The main conclusion is that FDI can make a relevant contribution to economic growth in developing countries. Contrary to the literature an index variable on economic development is used to control for the state of the financial sector. This index has a significant positive effect on economic growth, in contrast to the insignificant effects of the normally used proxies for the financial sector. The results show that there are some absorptive capacities that can increase the effectiveness of FDI inflows. In countries with more human capital is

the effect of FDI on economic growth much higher. The financial sector also increases the effect of FDI on economic growth, but the interaction terms for the indexes on financial development and financial markets are insignificant. In contrast to the literature, trade openness and initial GDP do not impact the effect of FDI on economic growth.

There does not exist a threshold value for specific country characteristics which is needed to have positive effects of FDI on economic growth. The only significant threshold value has no economic relevance, because only a few observations from Mozambique are below the threshold. The conclusion is that FDI always can have positive effects and that there is not a minimum level of some absorptive capacity required. It is more likely that the effect of the absorptive capacities gradually increases as indicate by some interaction terms.

The comparison between continents reveals enormous difference. The effect of FDI is significant and twice as large in the Asian countries. This indicates that the positive effect of FDI for all countries is mainly driven by the Asian countries. The FDI coefficient is much lower and only significant at the ten percent level in African countries, while the effect of FDI is insignificant in American and European countries. The interaction terms with dummy variables show that the effect is significantly higher in Asian countries compared to the other countries, while the effect is significantly lower in American and European countries.

The long time period and annual data makes it possible to use fixed and random effects which increases the internal validity compared to an OLS regression. The results are however still vulnerable to reverse causality and omitted variables. Instrumental variables is used to solve these endogeneity problems, but the different instruments show various results. However, the results are not very reliable given that the used instruments probably do not fulfil the exclusion restriction and independence assumption. A better instrument for FDI is needed to confidently rely on the results of IV regressions. The reverse causality is investigated by the Granger causality test. This test shows that the relationship between FDI and economic growth can run in both directions.

The large set of developing countries seems to imply that the results are externally valid for almost all developing countries. The different effects between world regions show however that this is not the case, because the variation of the effect of FDI is large. Further research could try to better explain these differences. For example, by focusing on the question if the

form of FDI inflows or the regulations on FDI inflows is different in Asia. Further research can also investigate the effect of FDI in different sectors and the impact of government regulations on the inflow and effects of FDI. FDI is diverse and the impact of FDI can therefore depends on the situation. The distinction between greenfield and brownfield FDI could also be relevant for the effect of FDI on economic growth.

The conclusion of this study that FDI increases economic growth in developing countries does not mean that governments of developing countries should focus on attracting larger amounts of FDI. The reason is that the relationship between FDI and economic growth is extremely complex. Country characteristics, especially human capital, play a key role in this relationship. Carkovic and Levine (2002) recommend therefore to implement no special policies to attract more FDI, like tax reduction or subsidies for FDI inflows. Instead, they plea for the implementation of policies that stimulate economic growth, because that is also a good environment for FDI. Chang (2007) advocates for more regulations of FDI inflows in order to generate more spillovers. For example, by the implementation of local content requirements, export requirements or only attracting FDI for certain sectors that are of strategical importance for the country's economic development. Further research could also investigate the impact of such regulation on the contribution of FDI on economic growth per capita. The general conclusion is however that developing countries should not prohibit the inflows of FDI, because they can certainly stimulate the economic development in developing countries.

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# 8. Appendix

*Table 12. The average of all the variables during the sample period.*

| Variable | Average |
|---|---|
| GDP per capita growth (annual %) | 2,707516579 |
| Manufacturing, value added (annual % growth) | 4,350714474 |
| Population growth (annual %) | 1,801746846 |
| Foreign direct investment, net inflows (% of GDP) | 3,663080894 |
| Direct Investment from DAC countries | 357,9744305 |
| FDI from DAC countries % of GDP constant | 0,338051962 |
| Exports of goods and services (% of GDP) | 31,43813122 |
| Gross capital formation (% of GDP) | 23,42087996 |
| Labour force participation rate, total (% of total population ages 15-64) (modelled ILO estimate) | 65,32311111 |
| Domestic credit to private sector (% of GDP) | 30,02900277 |
| Domestic credit to private sector by banks (% of GDP) | 29,99577033 |
| Gross domestic savings (% of GDP) | 13,36902275 |
| GDP (constant 2015 US$) | 56619651763 |
| General government final consumption (% of GDP) | 13,48712943 |
| Inflation, consumer prices (annual %) | 9,78675311 |
| Inflation, GDP deflator (annual %) | 12,37746463 |
| Trade (% of GDP) | 73,03392679 |
| Interest rate spread (lending rate minus deposit rate, %) | 8,454903201 |
| Manufacturing, value added (% of GDP) | 14,3094258 |
| Economic Freedom Heritage | 56,51527355 |
| Property rights (Heritage Foundation) | 36,47912521 |
| Fraser Institute economic freedom | 6,240527243 |
| Financial Development Index | 0,189761592 |
| Financial Institutions Index | 0,268203974 |
| Financial Markets Index | 0,105538209 |
| Completion ratio secondary schooling for working age population | 20,00137778 |
| Average years of secondary schooling | 2,176737778 |
| GDP (constant 2015 US$) | 2,07109E+11 |
| GDP constant in millions | 56619,65176 |
| GDP current in millions | 47454,49936 |
| GDP per capita (constant 2015 US$) | 2158,875641 |
| GDP per capita, PPP (constant 2017 international $) | 5541,848889 |
| Initial GDP 1995 | 3960,656262 |
| log initial GDP | 3,498738595 |
| log GDP per capita | 3,62907588 |
| FDI 1-year lagged | 3,606831407 |
| FDI 3-year lagged | 3,407684629 |
| FDI 5-year lagged | 3,233494488 |
| Price level ratio of PPP conversion factor (GDP) to market exchange rate | 0,368295664 |

*Table 13. The countries for the sample of 77 countries.*

| | |
|---|---|
| Albania | Kyrgyz Republic |
| Algeria | Lao PDR |
| Angola | Lesotho |
| Armenia | Madagascar |
| Bangladesh | Mali |
| Belize | Mauritania |
| Benin | Moldova |
| Bhutan | Mongolia |
| Bolivia | Morocco |
| Burkina Faso | Mozambique |
| Burundi | Myanmar |
| Cabo Verde | Namibia |
| Cambodia | Nepal |
| Cameroon | Nicaragua |
| Central African Republic | Niger |
| Chad | Nigeria |
| China | Pakistan |
| Comoros | Papua New Guinea |
| Congo, Dem. Rep. | Peru |
| Congo, Rep. | Philippines |
| Cote d'Ivoire | Rwanda |
| Dominican Republic | Senegal |
| Egypt, Arab Rep. | Sierra Leone |
| El Salvador | Sri Lanka |
| Eswatini | Sudan |
| Ethiopia | Tajikistan |
| Fiji | Tanzania |
| Gambia, The | Thailand |
| Georgia | Togo |
| Ghana | Tonga |
| Guatemala | Tunisia |
| Guinea | Uganda |
| Guinea-Bissau | Ukraine |
| Haiti | Uzbekistan |
| Honduras | Vanuatu |
| India | Vietnam |
| Indonesia | Zambia |
| Jordan | Zimbabwe |
| Kenya | |

*Table 14. The countries for the sample of 45 countries.*

| | |
|---|---|
| Albania | Lesotho |
| Algeria | Mali |
| Armenia | Mauritania |
| Bangladesh | Moldova |
| Belize | Mongolia |
| Benin | Mozambique |
| Bolivia | Namibia |
| China | Nicaragua |
| Congo, Dem. Rep. | Niger |
| Cote d'Ivoire | Pakistan |
| Dominican Republic | Peru |
| Egypt, Arab Rep. | Philippines |
| Eswatini | Rwanda |
| Fiji | Senegal |
| Gambia, The | Sierra Leone |
| Guatemala | Sri Lanka |
| Haiti | Tanzania |
| Honduras | Thailand |
| Indonesia | Togo |
| Jordan | Uganda |
| Kenya | Ukraine |
| Kyrgyz Republic | Vietnam |
| Lao PDR | |

*Table 14. Description of the variables.*

| | |
|---|---|
| Net inflow of FDI<br>Source: World Development indicators (WDI) | Net inflows of foreign direct investment as percentage of GDP. This are the new investments minus the disinvestment from foreign investors. All the investments which acquire at least 10 percent management interest in a firm in another country are included. |
| GDP per capita growth<br>Source: WDI | Annual percentage of GDP per capita growth. The GDP is measured in constant local currency |
| Real GDP per capita<br>Source: WDI | Purchasing power parity rates are used to convert GDP to real GDP in constant 2017 international dollars. |
| Population growth<br>Source: WDI | The annual percentage of population growth. The de facto measure of population is used. |
| Domestic credit to private sector<br>Source: WDI | Measures the financial resources that are provided by banks to the private sector as percentage of GDP. |
| Exports<br>Source: WDI | Exports of goods and services as percentage of GDP. |
| Trade<br>Source: WDI | Trade as percentage of GDP |
| Labour force participation<br>Source: WDI | The labour force participation of the working age population between 15 and 65. |
| Government consumption<br>Source: WDI | General government final consumption expenditure as percentage of GDP. |
| Gross capital formation<br>Source: WDI | Gross capital formation as percentage of GDP measures all the additions to fixed assets plus net changes of inventories. This variable was formerly called gross domestic investment. |

| | |
|---|---|
| Manufacturing value added<br>Source: WDI | Value addition in the manufacturing sector as percentage of GDP. Value addition is the sum of all outputs minus intermediate inputs. |
| Inflation deflator<br>Source: WDI | The annual inflation rate. The inflation is measured with the GDP implicit deflator which is the ratio of GDP in current local currency to GDP in constant local currency. |
| Exchange rate<br>Source: WDI | Price level ratio of PPP conversion factor to market exchange rate. This provides the differences of the general price levels of countries. |
| Interest rate spread<br>Source: WDI | The interest rate spread is the sum of the interest rate charged by banks on loans minus the interest rate paid for borrowing. |
| Average years of secondary schooling<br>Source: Barro and Lee (2013) | The average years of schooling for the working age population aged 15-64. |
| Completion rate of secondary schooling<br>Source: Barro and Lee (2013) | The fraction of the working age population aged 15—64 that have completed secondary education. |
| Direct investment from DAC countries<br>Source: OECD statistics database on the Geographical Distribution of Financial Flows to Developing Countries | The net direct investments from all DAC countries to the specific country. The DAC is the development assistance committee and consist of 24 of the most developed countries. |
| Economic freedom (Heritage)<br>Source: The Heritage Foundation (2021) | The index is published by the Heritage foundation, an American conservative think tank, in cooperation with the Wall Street Journal. The index consists of 12 factors divided over four categories. 1. Rule of law which consists of property rights, judicial effectiveness, and government integrity. 2. Government size which consists of tax burden, government spending and fiscal health. 3. Regulatory efficiency which consist of business freedom, labour freedom and monetary freedom. 4. Open markets which consists of trade freedom, investment freedom and financial freedom. The index gives each country a score between 0 and 100. |
| Economic freedom (Fraser Institute)<br>Source: The Fraser Institute (2021) | The index is published by the Fraser Institute, a conservative and libertarian Canadian think tank. The index consists of five categories: Size of government, Legal system and property rights, Sound money, Freedom to trade internationally and Regulation. The index assigns each country a score between 0 and 10. |
| Financial Development index<br>Source: IMF | Index which is a combination of the following two indexes. The indexes of the IMF result in a score between 0 and 1 for each country. |
| Financial Institutions Index<br>Source: IMF | Index uses data on bank credit to the private sector, pension fund assets, mutual fund assets, insurance premiums, bank branches, ATM's, banking sector net interest margin, lending-deposits spread, non-interest income to total overhead costs to total assets, return on assets and return on equity. |
| Financial Markets Index<br>Source: IMF | Index uses data on stock market capitalization, stocks traded, international debt securities of government, total debt securities of financial and nonfinancial corporations, percent of market capitalization outside of top 10 largest companies, total number of issuers of debt and stock market turnover ratio. |