The impact of horizontal and vertical FDI on host country's economic growth

The case of the ASEAN member states

Master Thesis

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Abstract

This paper performs an unbalanced panel data analysis to investigate the impact of horizontal and vertical FDI inflows on economic growth in the ten member countries of the Association of Southeast Asian Nations (ASEAN) for the period 1995 – 2011. As far as I know, this is the first paper that explores the differential effects of horizontal and vertical multinational activity in Southeast Asia. The results of this study show that both types of FDI inflows have no significant impact on growth. When country characteristics, such as human capital, trade openness, and financial development are taken into account, only vertical FDI interacting with trade affect growth positively.

Keywords: horizontal FDI, vertical FDI, economic growth, ASEAN.

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1 Introduction

Economic growth is one of the key indicators for economic policy makers. Many of them believe that foreign direct investment (FDI) inflows have positive effects on the host country's economic growth. These positive effects can occur in two ways: directly or through spillover effects. Direct effects are characterized by the increase in capital stock, employment and tax revenue. Spillover effects have an indirect impact on growth and take place through various channels, such as linkages between multinationals and local suppliers and customers, training of local employees, copying technologies of multinationals by local firms, and increasing competition. The belief in the growth-enhancing effects of FDI has influenced economic policy making. Particularly developing countries are competing for FDI by changing and implementing laws and regulations that make their economies more attractive to foreign investors.

Figure 1: Total FDI inflows in developing economies in US$ billion

Source: UNCTAD

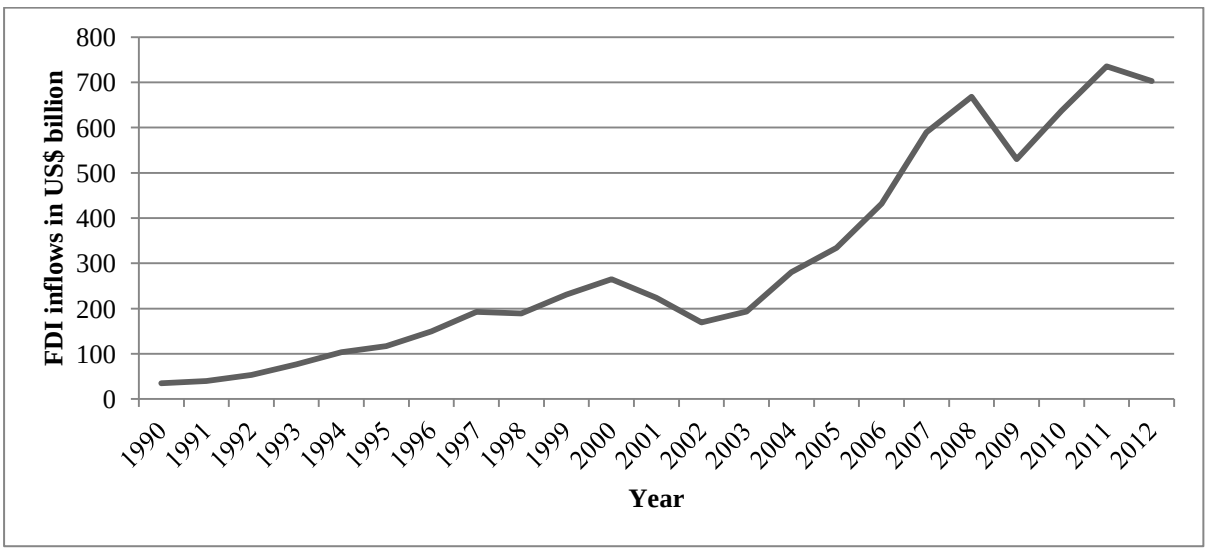


Figure 1 shows the total FDI inflows in developing economies from 1990 to 2012. The FDI inflows in 2012 are twenty times higher than in 1990; US$ 35 billion in 1990 and US$ 703 billion in 2012. Especially between 2002 and 2008, FDI inflows increased a lot with almost US$ 500 billion. This increasing trend in inflows is in line with the FDI attracting policies of developing countries. Furthermore, two dips are visible: one in 2002 and more importantly

one in 2009 at the start of the global financial crisis. Nonetheless, FDI inflows reached its top point of US$ 735 billion in 2011.

However, empirical evidence is not as clear about the growth-enhancing effects of FDI as theory would suggest. In the last two decades, research in this area has been intensified and came up with interesting but also contradicting results. Several studies did not find significant growth effects of FDI. Moreover, analyses emphasize that particular host country characteristics play an important role in the potential impact of FDI on economic growth, such as human capital development, trade policy regime, and financial system development.

These inconclusive findings are feeding the debate about the effectiveness of FDI on growth and in particular the FDI attracting economic policies. However, it could be logically reasoned that different types of FDI have different impacts on growth, since the nature of the investment influences the way it affects the local economy. This paper contributes to the debate by distinguishing between different types of FDI, particularly between horizontal FDI (HFDI) and vertical FDI (VFDI). More specifically, the case of the ten member states of the Association of Southeast Asian Nations (ASEAN) will be examined, which are Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. Southeast Asia is one of the fastest growing economic regions in the world and FDI is one of the fundamentals in ASEAN policy to increase economic development. Therefore, various laws and regulations are implemented to be more attractive for foreign investors. To my best knowledge, this is the first paper that investigates the impact of HFDI and VFDI on economic growth in the ASEAN member states.

The results of this paper do not significantly support the growth-enhancing effects of HFDI and VFDI. There is a weak indication that VFDI affects economic growth negatively. The overall results confirm the findings of the existing literature that no relationship exists between HFDI and VFDI and economic growth in developing countries (Beugelsdijk et al., 2008; Borensztein et al., 1998; Schneider, 2005; Akinlo, 2004). Furthermore, regarding the importance of the absorption capability through specific country characteristics only for trade openness and VFDI positive significant results are found. The interaction terms of human capital and financial development and both FDI types did not show robust outcomes.

The remainder of the paper is organized as follows: the next section gives an overview of existing academic literature and previous empirical studies. Section 3 describes the data used in this study. The estimated models and the empirical methodology are explained in section 4. Section 5 presents the results of the empirical analysis. Finally, section 6 concludes.

2 Literature review

The literature review starts with defining HFDI and VFDI in section 2.1. Followed by explaining the knowledge-capital model and how the distinction between HFDI and VFDI in the model is made in section 2.2. Section 2.3 discusses the direct and spillover effects of both FDI types on economic development while section 2.4 outlined the relationship between FDI and growth theoretically and empirically. Finally, section 2.5 highlights the nexus between FDI and trade policies.

2.1 Defining horizontal and vertical FDI

The United Nations Conference on Trade and Development (UNCTAD) (2013) defines FDI as an investment made to gain a stable interest in enterprises operating outside of the economy of the investor. FDI implies that the investor has a certain level of influence on the management of the enterprise. Only capital that is provided by the investor either directly or through other enterprises related to the investor must be labelled as FDI. FDI has three components: equity capital, reinvested earnings and intra-company loans. Equity capital refers to the investor's investment in shares of an enterprise in another country than its own. Reinvested earnings are the investor's earnings from its share in the foreign enterprise, which are not distributed as dividends or not transferred to the investor, but are reinvested by the affiliates. Intra-company loans comprise the short and long term borrowing and lending of capital between the parent enterprise (investor) and the affiliate enterprise.

According to the multinationals and FDI literature, there are two main types of investments: horizontal and vertical FDI (Beugelsdijk et al., 2008; Driffield and Love, 2007; Lipsey, 2001). Horizontal multinationals invest abroad in order to serve new markets. Therefore, horizontal FDI is also called market-seeking FDI. They produce the same or similar products in different countries. Roughly saying, the production processes in the countries are identical. Usually, the headquarter is established in the home country, where it provides both the home and the host countries with its services. All countries have their own plant, where each plant is serving its local market with products. In this way, horizontal FDI act as a substitute for exports and therefore avoiding transportation costs, import tariffs and other trade barriers (Markusen and Venables, 2000).

Vertical multinationals invest abroad in order to reduce the productions costs. They produce intermediate products in one country and ship them for further processing to their affiliates located in other countries. Helpman (1984) and Helpman and Krugman (1985) developed a basic framework for vertical fragmentation. Bowen et al. (2012) extended this framework. They assume that the headquarter is located in the home country and the plant is placed in the host country. They divided the production process in three stages. The first stage is the production of headquarter services by means of capital and labour. The second stage involves the manufacture of components and the last stage is the assembly of components. They assume that headquarter services are the most capital intensive, followed by the intermediate production (manufacture of components), and the assembly of components is the least capital intensive. Vertical multinationals replace their labour intensive production stages, like assembling and intermediate production, to cheap labour countries to reduce their costs. Therefore, vertical FDI is also known as efficiency seeking FDI.

2.2 The Knowledge-Capital Model: making a distinction in HFDI and VFDI

The knowledge-capital model is a theoretical model drawn from Markusen et al. (1996) and Markusen (1997). This approach has three principal assumptions. First, the services of knowledge-based and knowledge-generating activities, like headquarter services and R&D, can be easily supplied to geographically separated production facilities. Second, knowledge-intensive activities are skilled-labour-intensive relative to final production. Third, knowledge-based activities can be used at the same time by multiple production facilities. The first two assumptions motivate vertical fragmentation of production. Knowledge-intensive activities will be located in a country where skilled labour is cheap while production takes place where unskilled labour is cheap. The third assumption constructs firm-level scale economies and stimulates horizontal investments that have the same production process in different countries.

Furthermore, the model assumes that there are two homogeneous goods (X and Y), two countries (h and f), and two factors, skilled (S) and unskilled labour (L), which are not mobile between countries. Good Y is L-intensive and produced under constant returns to scale and perfect competition while good X is S-intensive and produced under increasing returns to scale and Cournot competition with free entry and exit. The production of good X needs headquarter services and production facilities, which can be geographically separated. The X-

firm can have plants in one or both countries. Within this framework, there are three X-firm types. First, national firms, those are firms with a single plant, which are located in the same country as its headquarter. Second, horizontal multinationals, those firms have their headquarter in one country and their plants in both countries. Third, vertical multinationals, those firms have their headquarter and plant in different countries. The last assumptions are that national markets for goods are segmented and that transport costs in trading goods between countries use unskilled labour.

From the knowledge-capital model can be inferred that country characteristics play an important role in the dominating multinational activity type in the country. Horizontal multinationals are dominant if countries are similar in size and in relative factor endowments and trade costs are high. The reasoning is that if countries are similar in relative endowments but differ in sizes, national firms in the larger country will be more dominant because they do not have the costly capacity in the smaller country. If countries differ in relative endowments but are similar in size, then firms will place knowledge-intensive activities in the skilled-labour-abundant country and production in the unskilled-labour-abundant country. Therefore, vertical multinationals are dominating if relative endowments are different and sizes similar and trade costs are not extremely high.

Carr et al. (2001) empirically verify the knowledge-capital model by using data from the U.S. Department of Commerce on annual foreign affiliates sales of U.S. parent firms and on American affiliates sales of foreign parent firms as a measure of affiliate production assuming that the headquarter is based in the parent country. The dataset consists of U.S bilateral data with 36 countries using a panel estimation from 1986 to 1994. They found that horizontal investments, investments between countries with a small income difference, are strengthened by higher trade costs and vertical investments, investments between countries with different income levels, are discouraged by trade costs. Another finding is that small skill and income differences between countries increase horizontal investments.

Markusen and Maskus (2002) derived a horizontal and a vertical model from the knowledge-capital model. They used exactly the same dataset as Carr et al. (2001), but used different estimation equations. They found also that large differences in income between countries have a significant negative impact on horizontal investments. Furthermore, skill differences favour vertical investments when the parent country is skilled-labour abundant. Last, host

country trade costs have a positive sign in the horizontal model, however the result is not significant.

2.3 The effects of FDI on the host country's economic development

Blomström and Kokko (1998) argue that the most important reason why countries acquire FDI is to bring in modern technology, namely the product itself, the associated process, the distribution of technology and also management and marketing skills. The purpose is to get entry to technologies and skills they do not possess yet. This can affect growth both directly and through spillover effects, which will be further explained in the following sections.

2.3.1 Direct effects of FDI

The most direct effect of FDI on the host economy is the raise of its capital stock. This goes often along with an increase in the technological development level, since FDI flows to developing economies take the form of a technology transfer (Borensztein et al., 1998). The increase in the overall capital formation by FDI inflows may be essential for the economic development of developing countries, since they traditionally fall short of capital. Moreover, FDI inflows mainly come from more advanced economies, which may lead to an improvement in the country's degree of technology and knowledge (Nunnenkamp and Spatz, 2004).

Furthermore, FDI also increases the level of employment in the host country. VFDI has a larger impact on employment in final goods production than HFDI, since vertical multinationals employ labour to produce for the home and host countries and horizontal multinationals employ labour to produce only for the local market (Beugelsdijk et al., 2008). Protsenko (2004) found empirical evidence for this interpretation in his study to the effects of German HFDI and VFDI on the Czech Republic labour market. VFDI is more employment enhancing in the host country than HFDI.

Another direct effect is that multinational activity can raise the corporate taxation revenues of the host country (Feldstein, 2000). The equity capital profits are subject of corporate taxation

in the host country. Although the investor could repatriate its investment income to the home country, the host country first taxes the funds that it repatriates.

2.3.2 Spillover effects of FDI

The spillover effects of FDI depend on the interaction between the industry and the characteristics of the host country (Nunnenkamp and Spatz, 2004). There are two opposing theories in the literature. On the one hand, Kojima (1973) argues that growth will be more enhanced if the technological gap between foreign affiliates and local firms is relatively small, because technology spillovers will be more likely. Therefore, he argues that FDI in developing countries should focus on more labour intensive and less technology intensive industries. On the other hand, Dutt (1997) and Findlay (1978) argue that FDI will stimulate growth more in developing host countries if foreign investments are made in technological advanced industries. The idea behind is that a raise in capital stock in less technological industries will lower the export prices of host countries and result in a decline in terms of trade.

Blomström and Kokko (1998) distinguish between two concepts of spillover effects: productivity and market access spillovers. Productivity spillovers occur when the entry or presence of a multinational affiliate in the host country leads to productivity and efficiency benefits for local firms when the affiliate can not internalize the full value of these benefits. Market access spillovers refer to the fact that local firms can benefit from the multinational's export markets. Multinationals often have substantial competitive advantages when they enter world markets. They have experience and knowledge in international marketing and have already built international distribution networks. Local firms can use the multinational's export operations by entering the same export markets through the created transport infrastructure and the distributed information about foreign markets. Although, the separation in productivity and market access spillovers is made, in practice it is very hard to distinguish them. Spillovers often have an impact on both concepts.

The technology transfer mostly occurs through the channel of spillovers and might raise long-term economic growth. The investment activities of foreign multinationals affect the host country and its local firms indirectly or through externalities either positive or negative. For

example, backward linkages reinforce the position of domestic firms, whereas competition could crowd them out.

2.3.2.1 Linkages

The first channel is the linkage between multinational affiliates and its local suppliers and customers. These spillovers take place when local firms and customers gain from the multinational's know-how of foreign markets and product and process technologies (Blomström and Kokko, 1998). Backward linkages refer to the multinational's relationship with suppliers, while forward linkages refer to the relationship with customers. Lall (1980) identified several practices how multinationals can increase the productivity and efficiency of local firms through backward linkages based on the Indian truck manufactory industry. The first one is to support the suppliers by setting up production facilities. Second, providing information and assistance to produce higher quality products. Third, providing assistance in purchasing resources. Fourth, supporting the set up of the management and organization structure and providing training. Behrman and Wallender (1976) found similar linkages in their study about the foreign operations of Pfizer, ITT and General Motors. Blomström and Kokko (1998) found that horizontal multinationals purchase more from local firms than vertical multinationals, because they are more local market orientated. Rodriguez-Clare (1996) developed a theoretical framework for the influence of multinationals on developing countries through linkages. He argues that local firms benefit the most when multinationals use local intermediate goods extensively, when the communication costs between the headquarter and the production plant are large and when the production of intermediate goods in the home and host countries are similar. If these requirements are not met then multinationals could damage the host economy. This is mainly the case with VFDI; vertical multinationals often form an enclave economy within the host country with a few linkages to the local market (Nunnenkamp and Spatz, 2004). Javorcik's (2004) analysis uses firm level data from Lithuania for her study to the productivity spillovers from FDI through backward linkages. She found that horizontal multinational presence in the host country increase the production of domestic suppliers with 15% while she did not find evidence for VFDI.

2.3.2.2 Training of local employees

The second channel of spillover effects is the training of local employees in the multinational affiliates. This contains all kinds of training, ranging from on the job training to overseas education at the parent company, which depends on the position in the firm and the needed skills. Positions could vary from manufacturing workers to technicians or managers. The skills obtained while working for a multinational might spill over if employees transfer to local firms or if they set up their own company (Blomström and Kokko, 1998). This suggests that spillover effects of VFDI are minimal given the fact that vertical multinationals are focused on cheap labour and therefore the training of local employees will be very basic. Contrary, horizontal multinationals are local market oriented, so they will offer their employees more training, which increase the spillover effects. Gershenberg (1987) studied the training and the distribution of managerial skills of multinationals and other firms in Kenya. He used data of 72 managers on top and middle level in 41 manufacturing companies and he concluded that managers of multinationals got more different kinds of training than managers of local firms. Managers of multinationals also move to local firms and spread their knowledge. The majority of the managers at local firms started their career at a multinational. Katz (1987) found a similar result for Latin America, most of the managers of local firms were trained by multinationals. However, the mobility of managers in multinationals is still low compared to managers in local firms due to the fact that multinationals generally pay more for skilled labour than local firms do. Chen (1983) concluded in his study of technology transfer to Hong Kong that the main contribution of multinationals is the training of employees at all levels and not necessarily the new techniques and products.

2.3.2.3 Demonstration and imitation effects

The demonstration effect takes place when local firms increase their productivity by copying the technologies used by the multinationals. VFDI often makes use of factor endowments and local assets in the host country in parts of their production process (UNCTAD, 1998). They move knowledge and technology that is suitable to the development level of the host country, which makes it more likely for local firms to profit from imitation (Nunnenkamp and Spatz, 2004). Riedel (1975) studied the manufacturing sector in the 1960s in Hong Kong and concluded that the progress in this sector was mainly due to demonstration effects of

multinational activities. Lake (1979) found that the spread of new technology by multinationals was larger than by local firms in the semiconductor industry in Great Britain. Tilton (1971) found a similar result in the same industry in other European countries. Swan (1973) argues that multinationals besides technology diffusion also form international communication channels, which create opportunities for demonstration across countries. These empirical studies suggest that the demonstration effect is essential for productivity and market access spillovers. However, there are too few studies to draw this conclusion. There are two main reasons for this. First of all, demonstration effects often take place very abrupt and therefore it is barely reported when, where and how a firm knows about new technologies or products that are implemented. Second of all, demonstration effects are closely related to competition, which is the fourth spillover channel (Blomström and Kokko, 1998).

2.3.2.4 Competition effects

The increase in competition due to the entry of the multinational could be beneficial for local firms because they are forced to use their technology and resources more efficiently. Jenkins (1990) notes that when local and foreign firms are competing with each other, local firms take a survival behaviour where they copy the production techniques of multinationals. Langdon's (1981) study of the Kenyan soap industry shows the combined effects of demonstration and competition from multinationals in local firms. The entry of multinationals and the introduction of industrialized production forced local firms to adopt new techniques, because they were not able anymore to sell handmade soap. Evans (1979) studied the Brazilian textile industry. He found that local firms got out of the market or were forced to cooperate with foreign firms to get access to new technology, because foreign firms introduced synthetic fibers in the market, which reduced the demand in cotton textiles of local firms.

As already observed by Evans (1979), intense competition could lead to the crowding out of local firms, especially when affiliates have exceptional market power over domestic firms. Aitken and Harrison (1999) found a similar result: foreign investments decrease the production of domestically owned plants in Venezuela. Exit of local competitors occurs particularly when horizontal multinationals enter the market, because they produce to serve the local market, which results in fiercer competition (Nunnenkamp and Spatz, 2004). However, Emami Namini and Pennings (2009) found theoretical and empirical evidence for a

complementary relation between domestic investments and HFDI. Besides, domestic investments and VFDI have substitutional relationship if there is a substantial difference in factor shares of the firm's domestic and foreign intermediate goods and if the shares of the domestic and foreign intermediate goods differ sufficiently in the firm's final good.

2.4 FDI and economic growth: a complicated relationship

Generally, economic theory suggests that FDI has the potential to be the engine of economic growth. However, empirical findings highlight the fact that FDI not always have a significant effect on growth if certain country characteristic requirements are not met. Empirical evidence shows ambiguous results and does not clarify the theoretical intuition. There is a similar pattern in the few studies that made the distinction between the HFDI and VFDI. The theory shows growth-enhancing effects, while empirics got inconclusive results.

2.4.1 Theoretical framework

Authors mostly adopt a theoretical framework based on the Solow (1957) New Growth Theory in order to analyse the relation between FDI and economic growth. The following production function is defined:

$$Y_{it} = A_{it} \cdot H_{it}^{b1} \cdot K_{it}^{b2} \quad (2.1)$$

Where Y_{it} stands for output, A_{it} is the total factor productivity level, H_{it} and K_{it} represent human and physical capital. Subscript i = 1,… N denotes country 1 to country N, and subscript t = 1,… T denotes the time period, starting from 1 to T.

As already discussed in the previous section, FDI can affect growth in two ways: directly or through spillover effects (indirectly). In the theoretical analysis of Borensztein et al. (1998), FDI has a direct impact on growth. The physical capital variable in the Solow production function consists of two components: domestic and foreign owned capital. In this specification, FDI influences growth in the same way as domestic capital does.

$$K_{it} = Kd_{it} + Kf_{it} \quad (2.2)$$

Zhang (2001) developed a specification where FDI promotes growth indirectly through spillover effects. The total factor productivity variable A is endogenized as a function of FDI. FDI affects output growth by enlarging total factor productivity.

$$A_{it} = B \cdot FDI_{it}^{b3} \tag{2.3}$$

Where B stands for the constant term, and FDI is the abbreviation for foreign direct investment. After substituting total factor productivity (A) into the production function and taking the logarithms and time derivatives, we obtain the following expression for the growth rate of the output in the economy:

$$g_y = b_0 + b_1 g_H + b_2 g_K + b_3 g_{FDI} \tag{2.4}$$

Where g refers the growth rates of their respective subscripts. b_1, b_2, and b_3 represent the elasticities of output with respect to human capital, physical capital, and FDI.

2.4.2 Theoretical analyses

Wang and Blomström (1992) developed a model for the international technology transfer via FDI. They concluded that FDI contributes to the development of developing countries through the inflow of advanced technologies and managerial experiences. They even argue that the technology gap between home and host countries will be closed if the rate at which host country firms imitate the multinational's technological advantage is higher than the growth rate of the multinational's research and development (R&D).

Borensztein et al. (1998) considered technological progress as the result of the increase of the range of capital goods available in their framework. The idea that FDI impacts economic growth through technological progress by implementing new technologies and producing new capital varieties suits well to this definition. This enlarged number of varieties will promote economic growth in the future. Grossman and Helpman (1991) used a similar approach and they define capital accumulation as an improvement of the quality of existing goods. In other words, FDI influences the technological progress by reducing the costs and improving the quality of existing capital goods, instead of increasing the number of varieties.

Balcao Reis (2001) extended the model of Grossman and Helpman (1991) and studied the welfare effects of FDI. In her approach, growth comes from the innovation in consumption goods. Foreign investors can introduce new goods in the host economy at lower costs than domestic firms, because they do not need to develop the new technology but just need to transfer it from the home economy. This means that foreign investors are crowding out domestic investments after they enter the market. R&D departments of domestic firms are not efficient enough anymore and stop to exist. The result is a loss of profits for domestic firms and a decrease of the national income. Foreign investments can only increase welfare in the host economy if overall the raise in productivity is larger than the loss of profits.

Beugelsdijk et al. (2008) created a theoretical framework based on the 'Constructed Capital' general equilibrium model of Baldwin et al. (2005). They extended the model by implementing the two types of FDI, HFDI and VFDI, and model these as in Ekholm and Forslid (2001). There are two main effects in their model regarding the impact of HFDI and VFDI on economic growth. First, there is the learning or spillover effect, which is larger for HFDI than VFDI, because HFDI takes place through domestic and foreign capital stocks, whereas VFDI only takes place through foreign capital stocks. Second, there is the employment effect, which is larger for vertical multinationals than horizontal multinationals, since the former employ labour in the host country to produce for the domestic and foreign market, whereas the latter employ labour to produce in the domestic market only. The relative importance of these two effects will determine which type of FDI affects economic growth the most.

2.4.3 Empirical evidence

Ram and Zhang (2002) did a cross-country study of 85 countries for the 1990s. They used three different proxies for the FDI variable: absolute FDI inflows, FDI inflows as percentage of GDP, and FDI stock. All proxies showed a positive relationship between FDI and growth. De Mello (1999) used time series and panel data for a sample of OECD and non-OECD countries during 1970 – 1990. He found that FDI is increasing long-run growth in the host country via new technologies and knowledge spillovers. De Gregorio (1992) found in his study to the growth determinants in Latin American countries during 1950 – 1985 that FDI was three to six times more efficient than domestic investment. Kokko (1994) found in his

analysis for the Mexican manufacturing industry in 1970 that domestic firms benefit from technology spillovers if foreign firms enter the market. Foreign firms introduce new technologies, provide technical support, help local suppliers and consumers and provide training for high skilled workers who might work for domestic firms later on. The fiercer competition brought by the foreign firms also stimulates domestic firms to operate more efficient.

However, other papers did not report direct evidence that FDI has a positive effect on economic growth. Borensztein et al. (1998) found in their cross-country study of 69 developing countries over the period 1970 – 1989 that FDI stimulates growth only if host countries have a certain level of human capital. Li and Liu (2005) did a more extensive cross-country study, as they used panel data for 84 countries from 1970 to 1999. They also found that the interaction between human capital and FDI has a strong positive effect on growth. Another finding was that the larger the technology gap, the larger the negative effects on growth. Balasubramanyam et al. (1999) concluded that the size of the domestic market and the competitive climate of the host country play also an important role in the enhancement of growth. Besides, they also found that human capital is essential for the growth performance of FDI. According to Alfaro's et al. (2004) cross-country study of 50 countries between 1980 and 1995, FDI alone has an ambiguous effect on growth. They argue that countries with well-developed financial markets benefit significantly from FDI.

When looking at (South) East Asian economies, Kotrajaras' et al. (2011) analysis shows that the impact of FDI on growth depends on country specific characteristics. Countries benefit from FDI if there is an educated workforce, developed financial market, investments in infrastructure, and liberalized trade regime. They also found that countries with high-income levels gain more from FDI than countries with low-income levels. Zhang (2001) studied seven East Asian and four Latin American economies. He also found that FDI is more likely to promote growth if certain requirements are met, such as high trade openness, high education level, export-oriented FDI, and macroeconomic stability. Tu and Tan (2012) did a study to the relationship between FDI and growth in the ASEAN member countries. In their specification, the FDI inflows are divided in three categories: total FDI, intra-ASEAN FDI, and FDI from China. They found that only FDI in combination with human capital could maximize the FDI technology spillover effects. The host country must have human capital stocks above the threshold, otherwise FDI inflows would replace local investments and

compete local firms out of the market. This would stagnate the process of economic development.

These findings suggest that a specific level of development is required for the host country to gain from the spillovers of FDI. However, there is empirical evidence showing that if these development conditions are met, it not necessary results in growth. Carkovic and Levine (2002) did not find the nexus between FDI and human capital and financial market development in their cross-country study of 72 sample countries. There were four ASEAN countries in their sample: Indonesia, Malaysia, Philippines, and Thailand. Blomström and Kokko (2003) found also no evidence of human capital interacting with FDI to have a significant effect on growth.

There are only a few empirical studies that are focused on the influence of HFDI and VFDI on growth. Driffield and Love (2007) analysed 11 UK manufacturing sectors and focused inter alia on efficiency seeking FDI (VFDI) and ownership advantages (HFDI) from 30 countries between 1987 and 1997. They found that both types of FDI have a positive effect, although VFDI's result was insignificant. Beugelsdijk et al. (2008) investigated the nexus between economic growth and HFDI and VFDI in a panel data study of 44 sample countries over the period 1983 – 2003 using US outward FDI data from the US Bureau of Economic Analysis (BEA). For the recipient countries, they made a distinction between developed (OECD members) and developing (non-OECD members) countries. Their study showed that both HFDI and VFDI have a significant effect on growth in developed countries. However, the impact of HFDI is 50 per cent larger than VFDI. In developing countries, HFDI and VFDI do not affect growth significantly. Nunnenkamp and Spatz (2004) found mainly positive growth effects in the manufacturing sector for VFDI than HFDI in their analysis of 78 developing countries over the period 1990 – 2000.

2.5 FDI and trade policies

According to Bhagwati's (1978) hypothesis, the magnitude and the effectiveness of inward FDI depend on whether a country is having an export promoting (EP) or an import substituting (IS) policy. He defines the EP policy as one for which the average effective exchange rate for exports and the average effective exchange rate for imports are equal. In

contrast to the IS policy, where the average effective exchange rate for imports is larger than the average effective exchange rate for exports, the EP policy is trade neutral, where the IS policy triggers import substitution activities. He argues that an EP policy is more growth enhancing because it can operate in a barrier free area. The IS policy is focused on protecting its own market and stimulating domestic investments. He concludes that the impact of IS orientated FDI will not be as large as EP orientated FDI because it is limited to the host country characteristics.

Balasubramanyam et al. (1996) empirically verified this hypothesis by dividing their 34 sample countries in EP and IS countries based on the classification of the World Bank. 24 countries have an IS policy and 10 countries an EP policy. In all cases, FDI had a significant larger effect on growth in EP countries than in IS countries. The FDI impact on growth for IS countries were all insignificant and in some cases negative.

3 Data

This paper uses an unbalanced panel data for nine ASEAN member countries for a time frame of 17 years from 1995 to 2011. Myanmar is eliminated from the dataset because of the lack in data. Working with an unbalanced panel means that several countries lack some or more observations. The missing values are randomly spread across the dataset. However, this issue insists to treat the results carefully. The choice of the study period and the sample of countries are entirely dependent on the availability of the data. The data are extracted from two sources: the ASEAN Statistical Yearbooks and the World Development Indicators (WDI) of the World Bank.

3.1 The main variables: GDP growth, HFDI, and VFDI inflows

Despite the vast amount of FDI-growth studies, there are only a few studies that distinguish the growth enhancing effects of HFDI and VFDI. Generally, FDI data does not make this distinction possible and therefore most analyses are based on aggregate inward FDI. The HFDI and VFDI data in this paper arise from the knowledge-capital model. Annual data on bilateral FDI inflows in the ASEAN member countries are used to distinguish HFDI and VFDI. These data are collected in the ASEAN Statistical Yearbooks. As in Beugelsdijk et al. (2008), countries in the dataset are labelled as a developed country if they are a member of the Organisation for Economic Co-operation and Development (OECD) and if the World Bank classifies them as a high-income country, see table 6 in the appendix for the list of high-income OECD members. Otherwise, they are labelled as a developing country. None of the ASEAN member countries are member of the OECD and therefore they are all treated as developing countries. The idea is that the ASEAN member countries have similar income levels as developing countries and therefore FDI inflows from developing countries are marked as HFDI. VFDI comes from developed countries because they have different income levels than ASEAN countries. For reasons of comparability with other studies, total FDI inflows are also included in this study. The FDI, HFDI, and VFDI data are on a net basis: negative values could be caused by reverse investments or disinvestments. Total FDI, HFDI, and VFDI inflows are all taken as a percentage of GDP in the dataset. The calculation of the HFDI and VFDI variables is formulated as follow:

$$HFDI\ inflows\ (\%\ of\ GDP) = \frac{Total\ FDI\ inflows - FDI\ inflows\ from\ high\ income\ OECD\ countries}{GDP} \quad (3.1)$$

$$VFDI\ inflows\ (\%\ of\ GDP) = \frac{FDI\ inflows\ from\ high\ income\ OECD\ countries}{GDP} \quad (3.2)$$

Real GDP per capita growth is taken as a measure of economic development. This variable representing development is not unquestioned, since excessive growth rates in developing countries are often accompanied by increasing income inequality, environmental pollution, and political tension. Bleys (2012) argues that well-being, economic welfare or sustainability are better options for measuring development. For simplicity reasons, real GDP per capita growth seems to be the most accurate and objective measure for economic development. Data is taken from the World Bank's WDI. Figures 2 – 4 show the scatter plots of real GDP per capita growth and FDI, HFDI, and VFDI inflows. This first indication shows no direct relationship given the fact that the observations are mainly clustered in all three figures.

Figure 2: Real GDP per capita growth vs. FDI inflows (% of GDP)

Source: World Bank and ASEAN Statistical Yearbooks, own calculations

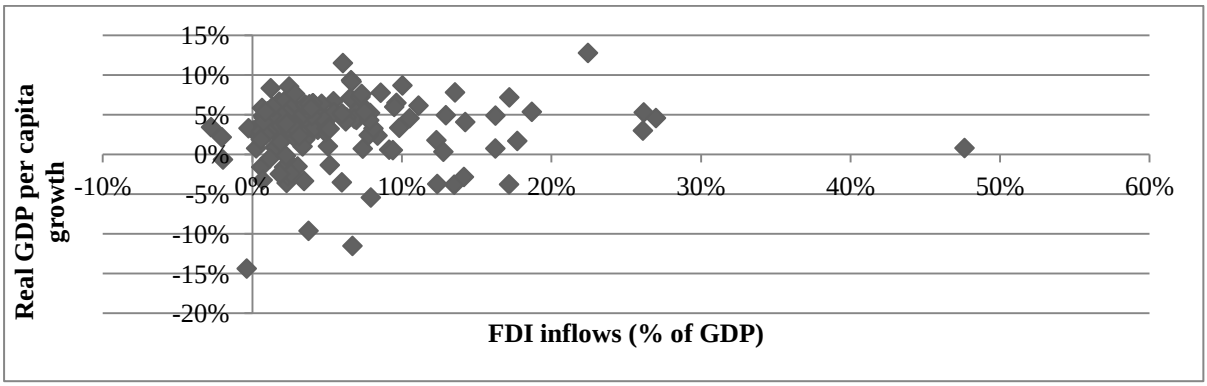


Figure 3: Real GDP per capita growth vs. HFDI inflows (% of GDP)

Source: World Bank and ASEAN Statistical Yearbooks, own calculations

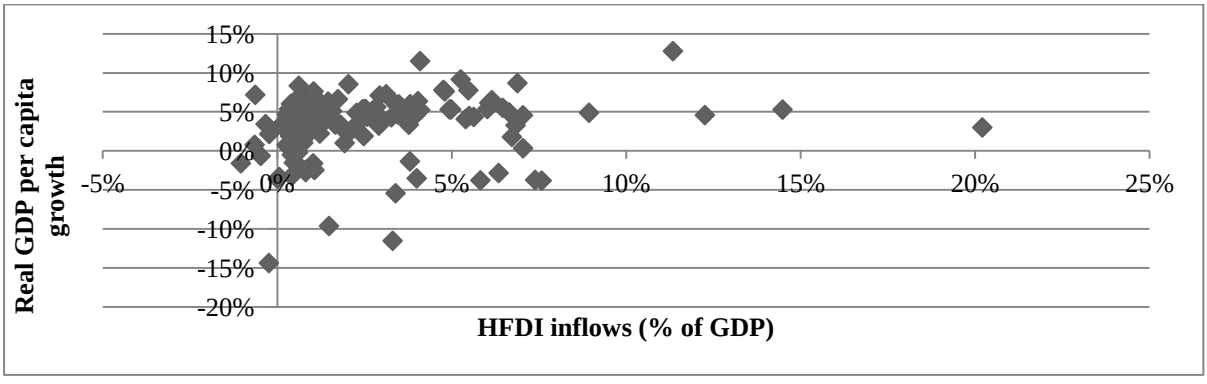
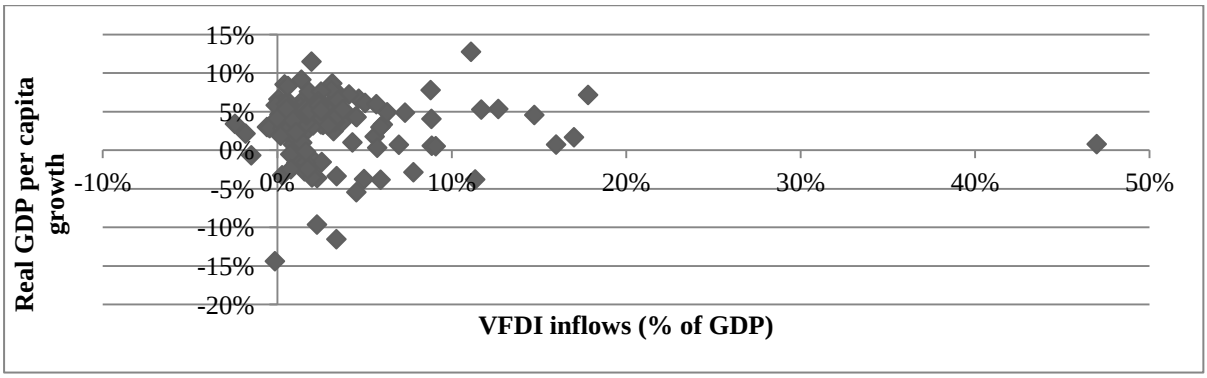


Figure 4: Real GDP per capita growth vs. VFDI inflows (% of GDP)

Source: World Bank and ASEAN Statistical Yearbooks, own calculations



3.1.1 Trends in growth, HFDI, and VFDI inflows

In order to determine the relationship between HFDI and VFDI and GDP growth, the focus in this part is on the trends of the two types of FDI and GDP growth. Table 1 reports the total FDI, HFDI, and VFDI inflows between 1995 and 2011 in the ASEAN member countries. Not all the data are available for Cambodia and Myanmar. For both types, there is an increasing trend in inflows in the ASEAN region. The HFDI inflows increased more than six times, from US$11 billion in 1995 to US$72 billion in 2011. The VFDI inflows more than doubled in the same time span, from US$17 billion in 1995 to US$43 billion in 2011. This rise in FDI inflows could be explained by the growing globalization and the FDI-attracting policies in Southeast Asia, which will be further explained in the next section. Singapore is traditionally the main receiver of FDI in the region: more than half of the inflows go to Singapore. This means also that their inflows are more sensitive to the global economic situation and therefore more volatile. Due to the global financial crises, Singapore suffered from a large drop in FDI inflows in 2008. HFDI inflows decreased with more than 60%, a loss of US$14 billion while VFDI inflows reduced by more than 80%, a decline of US$21 billion. However, both FDI types showed a high degree of resilience. HFDI inflows doubled and VFDI inflows almost tripled in 2009. Other countries that experienced a high raise in FDI inflows are Indonesia, Malaysia, Thailand and Vietnam.

Table 1: Total FDI, HFDI, and VFDI inflows in US$ billion

Source: ASEAN Statistical Yearbooks

	1995			2000			2005			2010			2011		
	FDI	HFDI	VFDI	FDI	HFDI	VFDI	FDI	HFDI	VFDI	FDI	HFDI	VFDI	FDI	HFDI	VFDI
Brunei	0.58	0.32	0.26	0.55	0.02	0.53	0.29	0.05	0.24	0.63	0.09	0.53	1.21	0.07	1.14
Cambodia	0.15	n/a	n/a	0.15	n/a	n/a	0.38	0.26	0.12	0.78	0.63	0.15	0.89	0.64	0.25
Indonesia	4.35	1.18	3.17	-4.55	-0.55	-4.00	6.11	0.83	5.28	13.77	8.22	5.55	19.24	9.06	10.19
Lao PDR	0.09	0.01	0.08	0.03	0.02	0.01	0.03	0.02	0.01	0.33	0.29	0.04	0.30	0.29	0.01
Malaysia	5.82	2.61	3.21	3.79	0.77	3.02	3.96	1.46	2.51	9.16	2.32	6.83	12.00	4.79	7.21
Myanmar	0.32	0.11	0.21	0.21	0.08	0.13	0.07	0.04	0.03	0.45	0.41	0.04	n/a	n/a	n/a
Philippines	1.58	0.47	1.11	2.24	0.99	1.25	1.13	0.83	0.30	1.30	1.47	-0.18	1.26	0.83	0.43
Singapore	11.50	4.36	7.14	16.49	-0.60	17.09	20.08	11.04	9.05	48.75	24.63	24.12	64.00	49.51	14.49
Thailand	2.07	1.04	1.03	3.35	1.32	2.03	4.01	2.38	1.63	9.11	3.32	5.79	7.78	2.08	5.70
Vietnam	1.78	1.14	0.64	1.29	0.79	0.50	2.02	0.77	1.25	8.00	3.99	4.01	7.43	4.34	3.09
ASEAN	**28.23**	**11.22***	**16.86***	**23.54**	**2.83***	**20.56***	**38.08**	**17.66**	**20.42**	**92.28**	**45.39**	**46.89**	**114.11****	**71.59****	**42.52****

Notes: n/a denotes not available data. * and ** indicate that the inflows of Cambodia respectively Myanmar are not included.

Figure 5: Total FDI inflows as percentage of GDP

Source: ASEAN Statistical Yearbooks, own calculations

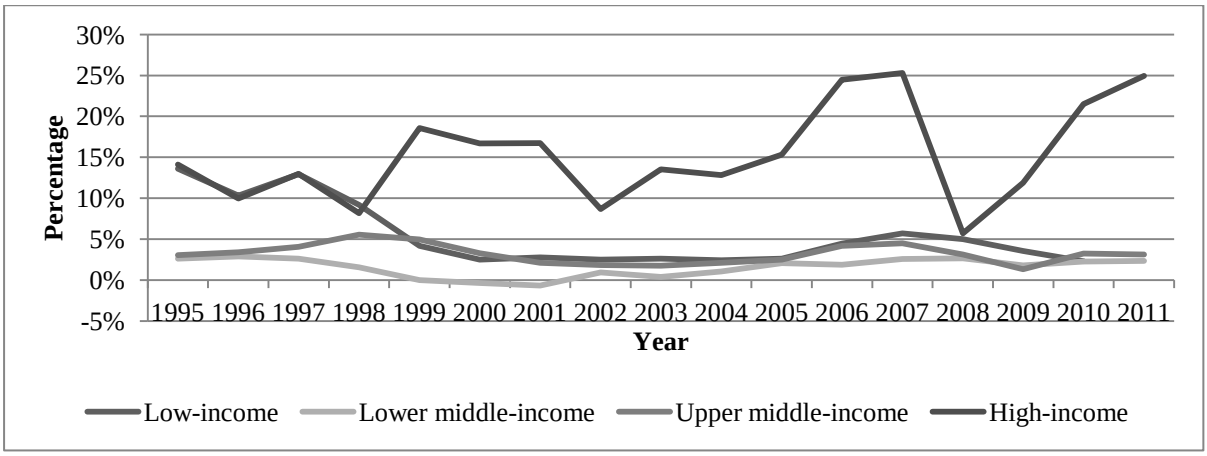


Figure 6: HFDI inflows as percentage of GDP

Source: ASEAN Statistical Yearbooks, own calculations

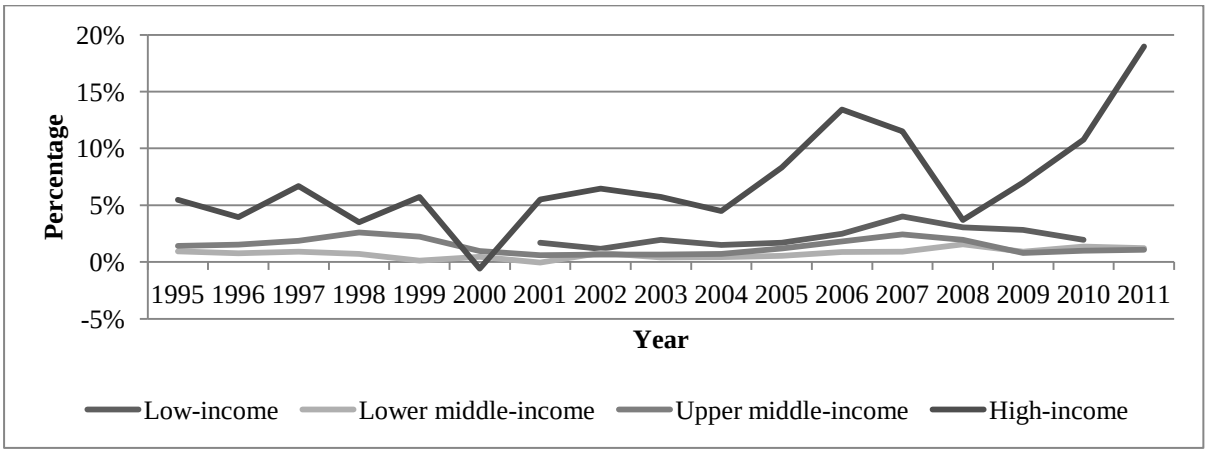
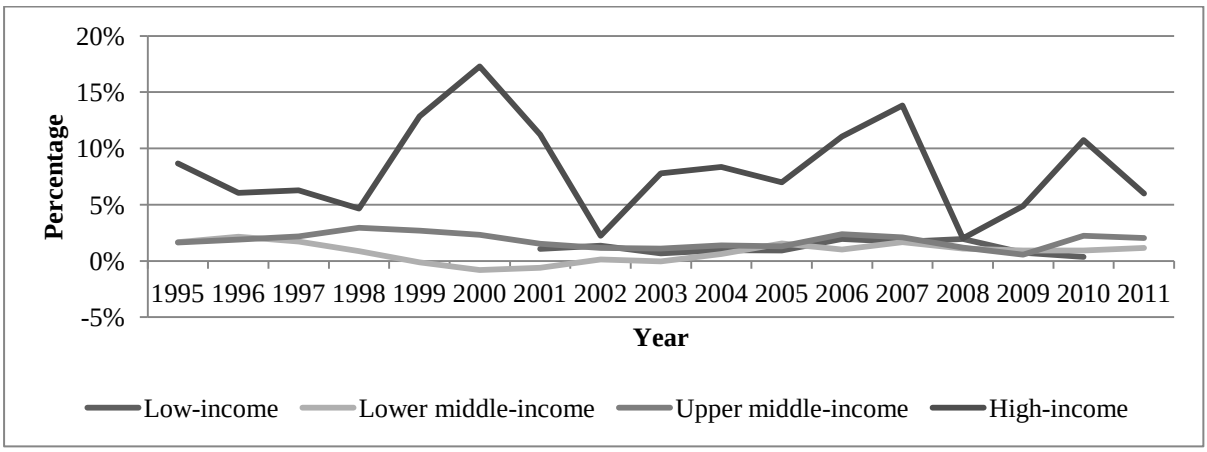


Figure 7: VFDI inflows as percentage of GDP

Source: ASEAN Statistical Yearbooks, own calculations



This irregular trend in FDI inflows of Singapore is also observed if the countries are categorized by their income and if FDI inflows are determined as percentage of GDP. There are four income groups based on the classification of the World Bank: low-income economies including Cambodia and Myanmar, lower middle-income economies including Indonesia, Lao PDR, Philippines and Vietnam, upper middle-income economies including Malaysia and Thailand and high-income economies including Brunei Darussalam and Singapore. Figures 5 – 7 show the ratios of FDI, HFDI and VFDI to GDP for the four income categories. The HFDI and VFDI ratios of low-income, lower-middle income and upper-middle income economies are very stable and moving between the 1% and 2% while the HFDI and VFDI inflows ratios of high-income economies are very fluctuating. HFDI as a share of GDP was the highest in 2011 at 19% and the lowest in 2000 at -1%. The VFDI ratio has its top point at 17% in 2000 and bottom point at 2% in 2008. Both FDI types shares challenged a huge decline in 2008, 8% for HFDI and 12% for VFDI, but both shares increased in the years after.

Table 2 reports the GDP growth rates of the ASEAN member countries. The growth rates of Myanmar are not available from 2005 to 2011. Overall, the growth rates of the member nations are around the 5 – 8 per cent. At the time of the Asian financial crises in 1997-1998, more than half of the countries had a negative growth rate. Indonesia and Thailand were affected the most with both a negative growth of more than 10 per cent. However, all countries recovered quickly and showed positive growth rates the years after. Figure 8 displays the growth rates per income category. There are two major declines for all income categories, one in 1997-1998 due to the Asian financial crisis and one in 2008-2009 because of the deteriorated global economic conditions. In both situations, there is also an upward trend in the period afterwards.

Table 2: Percentage GDP growth

Source: World Bank

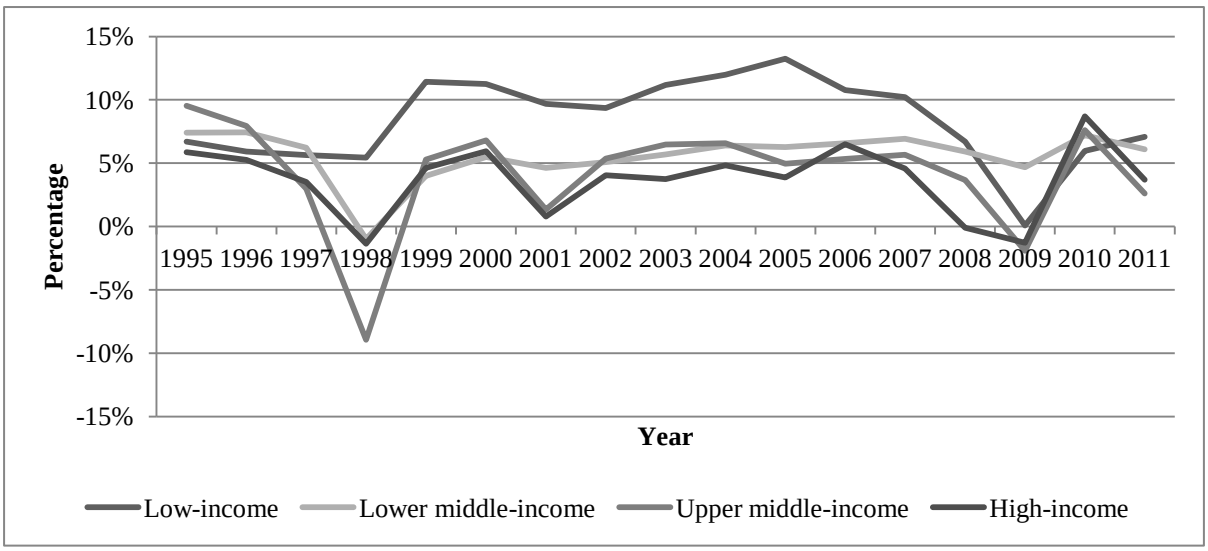
	1995	2000	2005	2010	2011
Brunei Darussalam	4.48	2.85	0.39	2.6	2.21
Cambodia	6.44	8.77	13.25	5.96	7.07
Indonesia	8.4	4.92	5.69	6.22	6.49
Lao PDR	7.03	5.8	7.11	8.53	8.04
Malaysia	9.83	8.86	5.33	7.43	5.13

Myanmar	6.95	13.75	n/a	n/a	n/a
Philippines	4.68	4.41	4.78	7.63	3.64
Singapore	7.28	9.04	7.37	14.78	5.16
Thailand	9.24	4.75	4.6	7.81	0.08
Vietnam	9.54	6.79	7.55	6.42	6.24

Note: n/a denotes not available data.

Figure 8: Percentage GDP growth

Source: World Bank, own calculations



3.2 Trade and investment policies in ASEAN

The primary goal of the ASEAN Economic Community (AEC) is to establish ASEAN as a single market and production base that will make ASEAN more competitive and dynamic. One of the five core elements of this goal is the free flow of investments. A free and open investment regime is fundamental for promoting ASEAN's competitiveness and attracting FDI. The continued investment inflows will enhance economic development. Therefore, several investment and trade agreements are implemented in the ASEAN region to attract FDI. In February 2009, the ASEAN Comprehensive Investment Agreement (ACIA) was signed. This is the main agreement regarding investment matters in the area covering liberalization, facilitation, promotion, protection and institutional cooperation. The objective of this agreement is to remove investment restrictions and impediments and to promote ASEAN as a single investment destination. The ACIA is built on two earlier ASEAN

investment frameworks: the ASEAN Investment Area Agreement (AIA) and the ASEAN Investment Guarantee Agreement (IGA). In order to achieve the second core element, the free flow of services, the ASEAN Framework Agreement on Services (AFAS) was signed in December 1998 to liberalize the services sector and to eliminate substantial barriers to trade in services. The ASEAN Trade in Goods Agreement (ATIGA) was signed in February 2009 to stimulate the free flow of goods in ASEAN. This agreement is focused on reducing and eliminating tariffs for trade in goods. Through ATIGA, 98.6% of the combined tariff lines with tariff rates of intra-ASEAN import are not exceeding 5%, where the majority of these lines are already at 0% tariff. ATIGA replaced the Agreement on the Common Effective Preferential Tariff (CEPT) Scheme for the ASEAN Free Trade Area (AFTA) (ASEAN Investment Report 2012).

In addition, ASEAN signed major economic agreements with several partner countries including the creation of free trade areas, liberalization, and encouraging investments. Besides, each member country has also taken individual reforms to improve their business and investment environment. For example, ASEAN countries signed 370 double taxation treaties and 336 bilateral investment treaties in 2012 (ASEAN Investment Report 2012).

3.3 Hypotheses

In the literature review, theoretical arguments and empirical evidence about the growth-effects of FDI, and in particular the effects of HFDI and VFDI, are outlined. Previous case studies (Driffield and Love, 2007; Beugelsdijk et al., 2008; Nunnenkamp and Spatz, 2004) report that both types of inflows have positive effects on growth. However, the impact of HFDI inflows is larger than the impact of VFDI inflows. Additionally, theory claims that HFDI inflows cause larger spillovers than VFDI inflows. It seems that VFDI inflows have a smaller impact on growth and hence the following hypotheses are proposed:

Hypothesis 1: *Both HFDI and VFDI inflows have a positive significant effect on economic growth in the ASEAN member states.*

Hypothesis 2: *HFDI inflows have a significant larger growth effect than VFDI inflows, since HFDI inflows induce larger spillovers.*

The alternative hypotheses are: HFDI and VFDI inflows have no positive significant effect on growth; and HFDI inflows have no significant larger growth effect.

3.4 Control variables

To measure the effects of the different FDI inflows on GDP per capita growth, a selection of control variables is made. This set of control variables are widely used and acknowledged in the empirical growth literature and suggested by the neoclassical growth model. In particular, empirical work of Barro (1991) and Sala-I-Martin (1997) are relevant in this context. All variables are taken from the World Bank's WDI.

The first control variable is domestic investment, defined as the gross capital formation to GDP, which is expected to have a positive effect on GDP per capital growth. This variable consists of expenditures on additions to the fixed assets of the economy plus net changes in the level of inventories.

Human capital is measured by the gross secondary school enrolment ratio. This is the ratio of total enrolment in secondary school, regardless of age, to the population of the age group that officially corresponds to that level. Growth theory predicts that human capital development should promote growth. A certain level of schooling is crucial for absorbing the technological spillover effects from FDI. In Borenztein's et al. (1998) study this is shown by the positive interaction effect of schooling and FDI on economic growth.

The definition for government consumption is the general government final consumption expenditures as percentage of GDP. This variable accounts for all government current expenses for purchasing goods and services, excluding costs that are part of government capital formation, like government military expenditures. The literature is ambiguous on the effect of government consumption on economic growth. On the one hand it points out the importance of providing public goods, on the other hand there might be negative effects of bad governance and corruption. Therefore, the expected sign is unclear in this case.

The household final consumption expenditure as share of GDP is the measure for private consumption. This is the market value of all goods and services, including long continued

products, like cars, washing machines, and televisions, purchased by households. Private consumption is expected to have growth-enhancing effects.

Trade openness is calculated as the sum of exports and imports of goods and services to GDP. Trade liberalization and export-promoting policies enhance economic growth (Bhagwati, 1978; Balasubramanyam et al., 1996). A positive effect of trade openness interacting with HFDI and VFDI inflows would indicate that trade openness is an important channel for growth-enhancing effects of the FDI types. According to the Asian Development Outlook 2013 of the Asian Development Bank (ADB), robust domestic investment and private consumption promote economic growth in South East Asia together with the increasing trade with neighbouring countries. The integration of the ASEAN economies with its regional trading partners helped to boost growth. Therefore, domestic investment, private consumption, and trade are expected to be the main drivers of economic growth.

Financial development is defined by the domestic credit to the private sector as percentage of GDP. These financial resources are provided to the private sector by financial corporations through loans, purchases of nonequity securities, and trade credits. Credit is an essential link in the money transfer. It leads to economic activity by financing consumption, investment, and production. Empirical evidence reports that it is an important element in economic development (Hermes and Lensink, 2003). A positive effect of the interaction between financial development and HFDI and VFDI inflows would suggest that these inflows promote growth through the financial resources provided to the private sector.

An increase in the annual population growth rate is expected to have a negative effect on economic growth. Population increases can put pressure on a country's sustainability through impacts on natural resources and social infrastructure. A significant population increase will decline the availability of land for agriculture, whereas demand for food, water, energy, social services, and infrastructure will increase.

The annual inflation rate, as measured by the consumer price index, is computed by the annual percentage change in the cost of living of the average consumer. Higher inflation is often seen as a sign of macroeconomic instability. Such instability hinders private investments and saving decisions, leading to an inefficient allocation of resources and is therefore associated with a negative economic growth.

Last, interest rates have an indirect effect on growth through investments. It is a good indicator for the borrowing and saving behaviour of households and firms. Low interest rates raise economic activity, whereas high interest rates reduce economic activity indicating a negative relationship between interest rates and GDP per capita growth.

Table 7 in the appendix gives an overview of the descriptive statistics. They show that real GDP per capita growth is on average 3.27% over the sample period with a slightly larger standard deviation of 3.80. The maximum growth rate is 12.77% in 2010 in Singapore while the minimum has a negative value of 14.39 in 1998 in Indonesia. The mean of FDI to GDP is 5.64% with a standard deviation of 6.35, HFDI to GDP has an average of 2.49% with 3.01 standard deviation, and VFDI to GDP reports a mean of 3.13% with a standard deviation of 5.02.

Table 8 in the appendix represents the correlation matrix. HFDI has a significant positive correlation coefficient of 0.16 with real GDP per capita growth while FDI and VFDI show insignificant correlations. Furthermore, growth is positive and significantly correlated to domestic investment, private consumption, and trade. Human capital, government consumption, financial development, and population growth are negative significantly correlated to growth. Inflation and interest present insignificant correlations. Particularly, the negative correlation coefficients of human capital financial development are counterintuitive since growth theory implies that these variables should stimulate growth. Another remarkable result is the negative correlation between HFDI and human capital, although not significant. Human capital is significant positive correlated with FDI and VFDI. The other variables that will form an interaction term with the different types of FDI, trade and financial development, show also strong positive correlations.

4 Methodology

A panel data regression will be conducted to test the proposed hypotheses in section 3.3. In other words, to assess the role of the HFDI and VFDI inflows on economic development in Southeast Asia. Panel ordinary least squares is the estimation technique for the regression. First, the methodological steps are described to perform consistent and efficient results. Thereafter, four growth models are proposed to analyse the effects of HFDI and VFDI inflows on economic growth.

4.1 Panel data

The panel data set is formed by pooling the individual time series of nine ASEAN member countries. The availability of repeated observations on the same countries makes it possible to define and estimate more sophisticated and realistic models than a single cross-section or time series would do. A panel data allows identification of certain variables without the requirement to make restrictive assumptions. For instance, it makes it possible to specify differences on country level. If the average GDP growth rate for the ASEAN region rises by 4% in one year, a panel data can determine whether this increase is caused by 4% raise for all countries or a 8% increase for half of the countries and no change for the other half or any other combination. Besides the identification of the behaviour of individual countries, panel data also model the question why a country behaves different in certain time periods. A possible explanation is because of a different past (Verbeek, 2012).

4.2 Granger causality test

In order to determine the causality between GDP per capita growth and HFDI, VFDI and FDI inflows, the pairwise Granger causality test is performed. This test investigates if the lagged values of one variable help to predict another variable (Verbeek, 2012). Taking 4 lags and using a significance level of 5%, the test results show that FDI, HFDI, and, VFDI Granger cause GDP per capita growth. In other words, the lagged values of FDI, HFDI, and VFDI are statistically significant in the equation explaining GDP per capita growth. For the control variables, domestic investment, human capital, government consumption, private

consumption, population growth, and interest Granger cause GDP per capita growth. The variables trade and financial development are Granger caused by GDP per capita growth while inflation shows no Granger causal relationship with GDP per capita growth either way.

4.3 Augmented Dickey-Fuller test

The next step is to examine the variables on unit roots in order to avoid spurious regressions. This is the case when non-stationary variables are used in the regression model and the outcomes indicate significant results when there is none. Many time series of macroeconomic variables are non-stationary and therefore it is important to test on unit roots when using these variables (Hill et al., 2008). In this study, I make use of the Augmented Dickey-Fuller (ADF) test to examine the presence of unit roots. The null hypothesis is that the variable is non-stationary while for the alternative hypothesis it is stationary. The ADF test contains three variations regarding the intercept and the time trend in the test equation. The first option is to include just the intercept, the second option is to include the intercept and the time trend, and the third option is to include neither the intercept nor the time trend. Whether to include a time trend or not is basically based on intuition and the plots of the times series. The amount of lags in the test is based on the Schwarz Information Criterion (SIC). A critical value of 5% is used for the test. According to the plots of the variables' time series, only an intercept is included for performing the ADF test. The test shows that human capital, government consumption, trade, and population growth are non-stationary. After taking the first difference for these control variables, they had no unit root anymore.

4.4 Fixed and random effects

The standard linear regression model to estimate the equation can be written as:

$$y_{it} = \beta_0 + \beta x'_{it} + \varepsilon_{it} \tag{4.1}$$

Where y_{it} is the dependent variable and x'_{it} stands for the explanatory variables. β indicates the slope coefficients, β_0 is the intercept and ε_{it} is the error term. The index i indicates the countries (i = 1,…, N) where the index t stands for the time period (t = 1,…, T). This model assumes that the intercept β_0 and the coefficients β are constant for all countries and time

periods (Verbeek, 2012). It is very unlikely that this assumption will hold for our panel data set of nine different ASEAN member countries (Sayrs, 1989). Ignoring the country and time specific effects in the model could lead to heterogeneity in the model as a consequence that parameter estimates will be inconsistent and meaningless (Hsiao, 2003). Therefore, a regularly used panel data model has the following assumption:

$$\varepsilon_{it} = \alpha_i + u_{it} \tag{4.2}$$

Where α_i is the cross-country error component, which is assumed to be time invariant and homoscedastic across countries. u_{it} is the time series error component assumed that it is homoscedastic and not correlated over time. This model is known as the random effects model. The model restricts that the parameters in x_{it} are uncorrelated with both error components meaning that the explanatory variables are exogenous. However, in many applications it is expected that α_i is correlated with one or more explanatory variables. For example, in a GDP growth equation a country's unobserved characteristic is likely to affect both growth (y_{it}) and FDI inflows (an explanatory variable in x_{it}) (Verbeek, 2012).

The fixed effects model does not require that α_i and x_{it} are uncorrelated and includes the country-specific intercept terms in the model. This can be written as:

$$y_{it} = \alpha_i + \beta x'_{it} + u_{it} \tag{4.3}$$

Where α_i are fixed unknown constants that are estimated together with β. The intercept term β_0 is replaced by α_i. The fixed effects α_i capture all the observable and unobservable time-invariant changes across countries (Verbeek, 2012).

4.4.1 Hausman test

In order to determine whether the fixed or random effects have to be used, the Hausman test will be performed. This test compares the two estimators and assumes that x_{it} and α_i are uncorrelated under the null hypothesis. The underlying idea is that the fixed effects model is consistent under both the null and alternative hypothesis while the random effects is consistent under the null hypothesis only (Verbeek, 2012). A critical value of 5% is used for

the Hausman test. When the null hypothesis is rejected, the fixed effects model will be appropriate. Otherwise, the random effects model will be used. The Hausman test concludes for this panel data set that the fixed effects model is the most appropriate to use.

4.5 White standard errors

The fixed effects model assumes that α_i captures all the correlation between the unobservable characteristics in the different time periods. Therefore, u_{it} is assumed to be uncorrelated over countries and time. Given that the explanatory variables in x_{it} are exogenous, the presence of autocorrelation or heteroskedasticity in u_{it} does not result in inconsistent standard estimators. However, it does lead to the invalidation of the standard errors and the test results meaning that the estimators are inefficient (Verbeek, 2012). Therefore, White standard errors are applied in the models to control for heteroskedasticity and autocorrelation problems. Generally, the White cross-section estimator is common to use when the number of years is larger than the number of countries in the sample. However, in this study, the number of years is not much larger than the number of countries, the number of years is not more than two times larger than the number of countries (N = 9, T = 17). Hence, the White diagonal estimator is used in this panel data.

4.6 Growth models

The growth models are estimated in four ways: (1) in absolute values only, (2) in first differences for non-stationary variables, (3) in one period lagged FDI, HFDI, and VFDI inflows, and (4) in first differences only. The use of these four models is done for robustness reasons.

The estimation equations for the first model are as follow:

$$GDPpcg_{it} = \beta_0 + \beta_1 FDI_{it} + \beta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.4)$$

$$GDPpcg_{it} = \beta_0 + \beta_1 HFDI_{it} + \beta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.5)$$

$$GDPpcg_{it} = \beta_0 + \beta_1 VFDI_{it} + \beta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.6)$$

Where i indexes countries, t denotes time, $GDPpcg_{it}$ stands for GDP per capita growth. FDI, HFDI, and VFDI indicate their respective inflows to GDP and x'_{it} is the matrix of control variables including the interaction terms of human capital, trade, and financial development with FDI, HFDI, and VFDI inflows. η_i is the country-specific fixed effect, μ_t is the time-specific fixed effect and ε_{it} is the error term.

In the estimation equations for the second model, the first difference is taken for the control variables human capital, government consumption, trade, and population growth to make them stationary:

$$GDPpcg_{it} = \beta_0 + \beta_1 FDI_{it} + \beta x'_{it} + \beta \Delta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.7)$$

$$GDPpcg_{it} = \beta_0 + \beta_1 HFDI_{it} + \beta x'_{it} + \beta \Delta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.8)$$

$$GDPpcg_{it} = \beta_0 + \beta_1 VFDI_{it} + \beta x'_{it} + \beta \Delta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.9)$$

Where x'_{it} indicates the control variables domestic investment, private consumption, financial development, inflation, and interest. $\Delta x'_{it}$ denotes the other control variables that are first differenced.

In the third model the FDI, HFDI, and VFDI inflows are one period lagged. This means that the effect of the inflows of the former period on the current period GDP per capita growth will be estimated.

$$GDPpcg_{it} = \beta_0 + \beta_1 FDI_{i,t-1} + \beta x'_{it} + \beta \Delta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.10)$$

$$GDPpcg_{it} = \beta_0 + \beta_1 HFDI_{i,t-1} + \beta x'_{it} + \beta \Delta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.11)$$

$$GDPpcg_{it} = \beta_0 + \beta_1 VFDI_{i,t-1} + \beta x'_{it} + \beta \Delta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.12)$$

Where $FDI_{i,t-1}$, $HFDI_{i,t-1}$, and $VFDI_{i,t-1}$ are the one period lagged inflows.

In the last model, the first difference is taken for all variables.

$$\Delta GDPpcg_{it} = \beta_0 + \beta_1 \Delta FDI_{it} + \beta \Delta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.13)$$

$$\Delta GDPpcg_{it} = \beta_0 + \beta_1 \Delta HFDI_{it} + \beta \Delta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.14)$$

$$\Delta GDPpcg_{it} = \beta_0 + \beta_1 \Delta VFDI_{it} + \beta \Delta x'_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (4.15)$$

Where $\Delta GDPpcg_{it}$ is first difference for GDP per capita growth. ΔFDI_{it}, $\Delta HFDI_{it}$, and $\Delta VFDI_{it}$ are the first differences for their respective inflows and $\Delta x'_{it}$ denotes the first difference for all control variables.

5 Empirical results

Tables 3 – 5 report the results for estimating equations 4.7 – 4.9. The results for the other estimating equations can be found in tables 9 – 17 in the appendix. The second model, where the non-stationary variables are first differenced, has the largest explanatory power together with the third model, where FDI, HFDI, and VFDI inflows are one period lagged. The adjusted R-squared values are between 78% and 80% while the first differences model has the lowest adjusted R-squared score of 56 – 65 per cent.

The FDI variable shows ambiguous results; on the one hand it affects growth positively at a significance level of 10% while on the other hand it has insignificant negative signs. Most of the regressions show no significant results, which is in line with empirical work of Borensztein et al. (1998) and Alfaro et al. (2004). HFDI inflows to GDP have no significant effect in any of the regressions and have both positive and negative signs. Beugelsdijk et al. (2008) found a similar result for developing countries where the HFDI variable had also no significant impact on growth. VFDI inflows as share of GDP report also inconclusive results, both positive and negative signs again. However, there are four significant negative outcomes. Furthermore, the one period lagged VFDI variable presents only negative results. This indicates that the previous period VFDI inflows affect real GDP per capita growth negatively. These results support the theoretical intuition from Rodriguez-Clare (1996) who argues that vertical multinationals often operate in enclaves within the host country with barely linkages to the local market, which can deteriorate the host economy.

The results for domestic investment are very robust. Except from the first differences model, the variable has positive and highly significant signs in all regressions. The largest effect is found in regression 4.4.4 in table 9 in the appendix with a value of 0.25 meaning that a 1% increase in domestic investment to GDP leads to a raise of 0.25% in real GDP per capita growth. This result is according to the growth theory, since a raise in capital availability enhances the potential growth in the Southeast Asian economy and is also in line with the empirical study in the same region of Kotrajaras et al. (2011). Furthermore, it confirms the reports of the ADB that domestic investment is a main driver of growth.

Human capital has in all regressions only negative results, where a few are significant at a 10% level. These results are counterintuitive, since growth theory suggests that an increase in the gross secondary school enrolment ratio should promote growth. Moreover, the interaction between human capital and the different types of FDI inflows show ambiguous results, both positive and negative and none of them are significant. These findings do not support the studies of Borensztein et al. (1998), Balasubramanyam et al. (1999), and Tu and Tan (2012). However, Beugelsdijk et al. (2008), Carkovic and Levine (2002), and Blomström and Kokko (2003) did also not find evidence for growth-enhancing effects of human capital interacting with both types of FDI.

Both government and private consumption show no significant results and the signs are all positive except from the first differences model. The expected results for government consumption were unclear while private consumption is expected to be one of the main drivers of growth. Alfaro et al. (2004) found also ambiguous results for government consumption.

Trade openness has in all regressions positive but non-significant signs. Beugelsdijk et al. (2008) found also no significant result for this variable and Li and Liu (2005) had even significant positive and negative signs for trade. Noteworthy observation is that trade interacting with VFDI have a highly significant result for the absolute values and first differences models. Although, the impacts are quite small, 0.0071 for the first model and 0.0056 for the last model. This is in line with Nunnenkamp and Spatz's (2004) study where they find that sectors that are dominated by VFDI, such as the machinery and the electrical equipment sectors, are mainly benefiting from trade openness.

The results for financial development are very robust, except from regressions 4.14.4, 4.14.5, and 4.15.5 they are all at least significant at a 5% level. However all the signs are negative, hence no supporting evidence is found for the study of Hermes and Lensink (2003) regarding the importance of financial development for economic growth. For the interaction between financial development and the FDI types only in the fourth model of VFDI (regression 4.15.6) a positive result at a 5% significance is found. However, given that the other regressions got insignificant results and that the first differences model has the lowest explanatory power, no conclusion can be drawn. Beugelsdijk et al. (2008) found also no significant results for this interaction term.

Population growth is in all regressions negative and mostly highly significant as well. The 1% significant values have a large impact on growth and they vary from -2.4407 to -7.0475. A 1% increase in population indicates a decline of 2.44 to 7.05 per cent in real GDP per capita growth. These results correspond to theoretical intuition and the expected sign discussed in section 3.4. Several papers found significant negative results for population growth, such as Alfaro et al. (2004) and Beugelsdijk et al. (2008).

The results for inflation are uniform: all regressions have a negative effect indicating that a high inflation level leads on average to lower per capita growth. This result suggests that countries with a stable macro economy have higher levels of growth because the country risk is smaller, which makes it attractive for domestic and foreign investors (Bengoa and Sanchez-Robles, 2003). However, this finding should be treated with caution, since only five values are significant at a 10% level.

Last, the real interest rate variable shows insignificant results. The signs are all negative in the first three models while the fourth model reports positive signs. Intuition suggests that high interest rates diminish economic activity, which corresponds to the first three models. However, no conclusions can be drawn from these outcomes, since none of them are significant.

Table 3: Non-stationary variables first differenced (estimation equation 4.7)

	(4.7.1)	**(4.7.2)**	**(4.7.3)**	**(4.7.4)**	**(4.7.5)**	**(4.7.6)**
Constant	2.6615***	-0.5430	2.4057	2.1204	3.3114	1.2389
	(0.3779)	(1.3413)	(3.4784)	(3.5216)	(3.5747)	(4.2325)
HFDI	0.1073*	0.0590	0.0614	0.0392	-0.0327	0.0274
	(0.0620)	(0.0525)	(0.0397)	(0.0508)	(0.0613)	(0.0512)
Domestic investment		0.1704***	0.1902***	0.1917***	0.1863***	0.1995***
		(0.0612)	(0.0576)	(0.0571)	(0.0563)	(0.0601)
Human capital		-0.1823	-0.1318	-0.1324	-0.1124	-0.1217
		(0.1362)	(0.1246)	(0.1242)	(0.1224)	(0.1223)
Government consumption			0.2329	0.2454	0.2588	0.2477
			(0.2433)	(0.2574)	(0.2484)	(0.2636)
Private consumption			0.0145	0.0171	0.0117	0.0338
			(0.0513)	(0.0520)	(0.0516)	(0.0653)
Trade			0.0211	0.0172	0.0155	0.0151
			(0.0323)	(0.0333)	(0.0316)	(0.0312)
Financial development			-0.0659***	-0.0620**	-0.0753***	-0.0629**
			(0.0243)	(0.0253)	(0.0250)	(0.0249)
Population growth			-5.4010***	-5.3700***	-4.5768***	-5.2603***
			(1.0363)	(1.0507)	(1.1529)	(1.0468)
Inflation			-0.1190	-0.1198	-0.1628*	-0.1371
			(0.0827)	(0.0835)	(0.0876)	(0.0880)
Interest			-0.0721	-0.0802	-0.0766	-0.0854
			(0.0549)	(0.0588)	(0.0568)	(0.0608)
HFDI*Human capital				0.0003		
				(0.0003)		
HFDI*Trade					0.0008*	
					(0.0004)	
HFDI*Financial development						0.0008
						(0.0006)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	1.7713	1.8024	2.5156	2.5296	2.5132	2.4905
Adjusted R-squared	0.5603	0.6835	0.7932	0.7907	0.7956	0.7909
Observations	153	98	83	83	83	82

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.

Table 4: Non-stationary variables first differenced (estimation equation 4.8)

	(4.8.1)	**(4.8.2)**	**(4.8.3)**	**(4.8.4)**	**(4.8.5)**	**(4.8.6)**
Constant	2.8424***	-0.1582	0.6191	1.0661	1.4516	1.9925
	(0.3509)	(1.1850)	(3.4495)	(3.4985)	(3.5368)	(3.7494)
HFDI	0.1517	0.1890	0.0848	-0.1757	-0.2152	-0.2318
	(0.1162)	(0.1992)	(0.1056)	(0.4840)	(0.3345)	(0.2500)
Domestic investment		0.1371**	0.2037***	0.2122***	0.2158***	0.2095***
		(0.0547)	(0.0553)	(0.0574)	(0.0544)	(0.0538)
Human capital		-0.0591	-0.1744	-0.1788	-0.1841	-0.1768
		(0.1433)	(0.1163)	(0.1171)	(0.1154)	(0.1170)
Government consumption			0.1634	0.1556	0.1677	0.1834
			(0.2664)	(0.2745)	(0.2781)	(0.2785)
Private consumption			0.0362	0.0315	0.0278	0.0247
			(0.0503)	(0.0507)	(0.0511)	(0.0519)
Trade			0.0231	0.0224	0.0208	0.0232
			(0.0329)	(0.0339)	(0.0342)	(0.0333)
Financial development			-0.0584**	-0.0623**	-0.0635**	-0.0673**
			(0.0244)	(0.0249)	(0.0240)	(0.0251)
Population growth			-5.5263***	-5.4258***	-5.5097***	-5.6428***
			(1.0134)	(1.0026)	(1.0016)	(1.0183)
Inflation			-0.1268	-0.1415*	-0.1586*	-0.1726*
			(0.0808)	(0.0834)	(0.0832)	(0.0896)
Interest			-0.0673	-0.0670	-0.0700	-0.0722
			(0.0572)	(0.0581)	(0.0582)	(0.0588)
HFDI*Human capital				0.0029		
				(0.0046)		
HFDI*Trade					0.0010	
					(0.0009)	
HFDI*Financial development						0.0035
						(0.0025)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	1.8853	2.0448	2.5377	2.5362	2.5380	2.4567
Adjusted R-squared	0.5831	0.7215	0.7871	0.7842	0.7867	0.7888
Observations	147	93	83	83	83	83

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.

Table 5: Non-stationary variables first differenced (estimation equation 4.9)

	(4.9.1)	**(4.9.2)**	**(4.9.3)**	**(4.9.4)**	**(4.9.5)**	**(4.9.6)**
Constant	2.9349***	-0.0139	1.9203	2.0060	1.0972	4.0479
	(0.2649)	(1.1910)	(3.3749)	(3.4158)	(3.3809)	(4.4616)
VFDI	0.0913	0.0693	0.0545	0.1400	-0.4217	-0.1714
	(0.0637)	(0.0529)	(0.0378)	(0.5575)	(0.3495)	(0.2495)
Domestic investment		0.1361**	0.1970***	0.1962***	0.1778***	0.1849***
		(0.0540)	(0.0567)	(0.0569)	(0.0589)	(0.0632)
Human capital		-0.0480	-0.1503	-0.1483	-0.1378	-0.1356
		(0.1461)	(0.1197)	(0.1224)	(0.1174)	(0.1238)
Government consumption			0.2103	0.2057	0.2042	0.2251
			(0.2479)	(0.2545)	(0.2451)	(0.2521)
Private consumption			0.0183	0.0171	0.0418	0.0033
			(0.0504)	(0.0517)	(0.0492)	(0.0545)
Trade			0.0225	0.0220	0.0150	0.0210
			(0.0329)	(0.0337)	(0.0308)	(0.0318)
Financial development			-0.0625**	-0.0633**	-0.0671***	-0.0805***
			(0.0237)	(0.0248)	(0.0239)	(0.0289)
Population growth			-5.5468***	-5.6238***	-2.5760	-5.0871***
			(1.0547)	(1.1268)	(2.6505)	(1.2583)
Inflation			-0.1142	-0.1106	-0.1435	-0.1317
			(0.0843)	(0.0946)	(0.0900)	(0.0894)
Interest			-0.0698	-0.0685	-0.0651	-0.0736
			(0.0547)	(0.0574)	(0.0532)	(0.0553)
VFDI*Human capital				-0.0009		
				(0.0060)		
VFDI*Trade					0.0045	
					(0.0033)	
VFDI*Financial development						0.0045
						(0.0050)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	1.8451	1.9190	2.5162	2.5076	2.5245	2.4406
Adjusted R-squared	0.5860	0.7231	0.7913	0.7871	0.7961	0.7916
Observations	147	93	83	83	83	83

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.

6 Concluding remarks

The relationship between FDI and economic growth has been a main topic among applied economists for several decades. Regardless the abundance of FDI-growth studies, only a few were able to study the effects of different FDI types on growth. Conducting an unbalanced panel data analysis on HFDI and VFDI inflows in the ASEAN member states for the period 1995 – 2011, this study investigated the impact of HFDI and VFDI inflows on economic growth, while taking the role of country characteristics into account.

The findings in this paper do not report strong results that HFDI and VFDI inflows have a positive impact on growth in Southeast Asia. The HFDI outcomes have only insignificant signs while the VFDI variable has significant negative results in four regressions. These insignificant growth effects are not according to the expectations and therefore the first null hypothesis that HFDI and VFDI have both significant growth-enhancing effects in the ASEAN region as proposed in section 3.3 is rejected. Furthermore, this sample gives a weak indication that the effects on growth of HFDI might be larger than the effects on growth of VFDI given the fact that significant negative results are found for VFDI. However, this result is not convincingly supported in the four models and hence the second hypothesis that HFDI has significant larger growth-enhancing effects than VFDI does not hold either.

Concerning the interactions of the HFDI and VFDI inflows with human capital, trade openness, and financial development only positive significant results are found for VFDI and trade. The other interaction terms show insignificant outcomes. These findings contradict the theory and previous empirical studies, which stress the importance of a minimum level of development in the host country to be able to absorb the technology transfer and to optimally benefit from FDI.

Regarding the control variables, domestic investment has shown to be the engine of growth in the empirics of Southeast Asia. In three out of four models, it reports positive and highly significant results. This is in line with growth theory and previous empirical work and confirms the analysis of the ADB.

In this paper bilateral aggregate FDI flows are used in the analysis due to data availability. Future research on the sector level is recommended to more specifically analyse the effects of different FDI types in Southeast Asia. However, the data problem is hard to overcome since these data do not exist yet or are not publicly available. Furthermore, this study is limited to the ASEAN member countries meaning that results could differ for other regions, selection of countries, or worldwide sample. Finally, any future study about the FDI impact on growth should rather distinguish between different types of FDI. As Lipsey (2001) mentioned, the concept of FDI is just a statistical aggregate, disguising fundamental underlying differences.

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Appendix

Table 6: List of high-income OECD members

Source: World Bank

Asia	**Australia**	**Europe**		**North America**	**South America**
Israel	Australia	Austria	Luxembourg	Canada	Chile
Japan	New Zealand	Belgium	Netherlands	United States	
Korea, Rep.		Czech Republic	Norway		
		Denmark	Poland		
		Estonia	Portugal		
		Finland	Slovak Republic		
		France	Slovenia		
		Germany	Spain		
		Greece	Sweden		
		Iceland	Switzerland		
		Ireland	United Kingdom		
		Italy			

Table 7: Descriptive statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Obs.
Growth	3.2673	4.1145	12.7663	-14.3851	3.8002	153
FDI	5.6445	3.7532	47.6255	-2.7572	6.3468	153
HFDI	2.4949	1.2169	20.2059	-1.0411	3.0142	147
VFDI	3.1345	1.7496	46.9682	-2.4232	5.0187	147
Domestic investment	24.7698	23.4971	43.6401	10.4374	7.6758	148
Human capital	63.7146	66.3952	111.8416	15.5815	23.0172	121
Government consumption	10.7551	9.8757	29.8673	3.4604	5.4190	148
Private consumption	59.0651	61.1408	97.9637	13.1411	18.5799	148
Trade	140.6425	108.5719	444.1004	45.5121	93.8473	153
Financial development	60.3421	43.2299	165.7191	3.4789	45.5395	148
Population growth	1.7595	1.7073	5.3216	-1.4764	0.7708	153
Inflation	6.7879	4.0022	128.4191	-2.3150	13.8830	152
Interest	4.2532	4.7593	35.4131	-42.0987	8.9739	130

Table 8: Correlation matrix

	Growth	FDI	HFDI	VFDI	Domestic investment	Human capital	Government consumption	Private consumption	Trade	Financial development	Population growth	Inflation	Interest
Growth	1.0000												
FDI	0.0518	1.0000											
HFDI	0.1647**	0.6596***	1.0000										
VFDI	-0.0303	0.8923***	0.2493***	1.0000									
Domestic investment	0.2121***	0.0682	0.1749**	-0.0079	1.0000								
Human capital	-0.4016***	0.2321**	-0.0061	0.3329***	-0.0612	1.0000							
Government consumption	-0.3941***	0.3113***	-0.0403	0.4385***	-0.0951	0.6738***	1.0000						
Private consumption	0.3254***	-0.3826***	-0.1309	-0.4648***	-0.1074	-0.7773***	-0.7170***	1.0000					
Trade	0.0150***	0.5591***	0.5924***	0.3743***	0.1411*	0.3549***	0.0208	-0.4543***	1.0000				
Financial development	-0.1915**	0.1884**	0.1427*	0.1702**	0.4408***	0.3722***	0.2253***	-0.5609***	0.5590***	1.0000			
Population growth	-0.1941**	0.2927***	0.2539***	0.2336***	-0.0371	-0.1174	0.1364*	-0.1323	0.2827***	-0.0993	1.0000		
Inflation	-0.0547	-0.1362*	-0.0480	-0.1509*	-0.0246	-0.3104***	-0.3519***	0.3638***	-0.1911**	-0.2233***	-0.0223	1.0000	
Interest	0.1387	-0.0344	0.0608	-0.0789	0.1593*	-0.1730*	-0.1076	0.2891***	-0.0434	-0.0360	-0.0083	-0.5867***	1.0000

Notes: Pairwise correlation coefficients. ***, **, and * denote the significance level at 1%, 5%, and 10%.

Table 9: Absolute values (estimation equation 4.4)

	(4.4.1)	**(4.4.2)**	**(4.4.3)**	**(4.4.4)**	**(4.4.5)**	**(4.4.6)**
Constant	2.6615***	6.7321*	4.1052	4.8859	4.8147	5.7076
	(0.3779)	(3.6922)	(7.7741)	(7.7831)	(7.5917)	(8.2923)
FDI	0.1073*	0.0726	0.0724	-0.3864	-0.1156	-0.0175
	(0.0620)	(0.0597)	(0.0550)	(0.4126)	(0.1016)	(0.1145)
Domestic investment		0.1440***	0.2345***	0.2466***	0.2317***	0.2315***
		(0.0471)	(0.0648)	(0.0642)	(0.0641)	(0.0671)
Human capital		-0.1088*	-0.0364	-0.0642	-0.0593	-0.0445
		(0.0565)	(0.0848)	(0.0860)	(0.0782)	(0.0843)
Government consumption			0.0895	0.1132	0.1037	0.1086
			(0.1530)	(0.1567)	(0.1521)	(0.1565)
Private consumption			0.0259	0.0237	0.0234	0.0136
			(0.0712)	(0.0717)	(0.0694)	(0.0764)
Trade			0.0194	0.0238	0.0193	0.0189
			(0.0218)	(0.0212)	(0.0211)	(0.0225)
Financial development			-0.0698***	-0.0715***	-0.0719***	-0.0780***
			(0.0212)	(0.0206)	(0.0209)	(0.0229)
Population growth			-2.8555***	-2.4407***	-2.2080**	-2.8115***
			(0.9323)	(0.8941)	(0.9420)	(0.9394)
Inflation			-0.0470	-0.0619	-0.0711	-0.0556
			(0.0669)	(0.0707)	(0.0670)	(0.0680)
Interest			-0.0084	-0.0154	-0.0310	-0.0150
			(0.0353)	(0.0356)	(0.0342)	(0.0359)
FDI*Human capital				0.0049		
				(0.0045)		
FDI*Trade					0.0014*	
					(0.0008)	
FDI*Financial development						0.0015
						(0.0019)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	1.7713	1.7866	2.1930	2.2838	2.2742	2.1441
Adjusted R-squared	0.5603	0.6022	0.6830	0.6859	0.7033	0.6813
Observations	153	116	98	98	98	98

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.

Table 10: Absolute values (estimation equation 4.5)

	(4.5.1)	**(4.5.2)**	**(4.5.3)**	**(4.5.4)**	**(4.5.5)**	**(4.5.6)**
Constant	2.8424***	3.1376	4.4660	5.2708	4.6253	3.8176
	(0.3509)	(3.8209)	(7.8065)	(7.9484)	(7.8683)	(7.9815)
HFDI	0.1517	0.2144	0.2138	-0.1232	0.0919	0.3661
	(0.1162)	(0.1720)	(0.1378)	(0.5797)	(0.3909)	(0.4431)
Domestic investment		0.1279**	0.2367***	0.2444***	0.2396***	0.2365***
		(0.0524)	(0.0654)	(0.0661)	(0.0656)	(0.0662)
Human capital		-0.0490	-0.0499	-0.0651	-0.0540	-0.0451
		(0.0567)	(0.0807)	(0.0845)	(0.0825)	(0.0821)
Government consumption			0.1259	0.1244	0.1282	0.1136
			(0.1422)	(0.1463)	(0.1445)	(0.1510)
Private consumption			0.0320	0.0271	0.0297	0.0378
			(0.0708)	(0.0710)	(0.0705)	(0.0715)
Trade			0.0191	0.0227	0.0205	0.0181
			(0.0217)	(0.0219)	(0.0222)	(0.0217)
Financial development			-0.0664***	-0.0697***	-0.0676***	-0.0622***
			(0.0214)	(0.0226)	(0.0221)	(0.0229)
Population growth			-3.0257***	-2.8570***	-2.9306***	-3.0857***
			(0.9410)	(0.9339)	(0.9580)	(0.9583)
Inflation			-0.0663	-0.0698	-0.0678	-0.0603
			(0.0659)	(0.0674)	(0.0670)	(0.0649)
Interest			-0.0201	-0.0231	-0.0223	-0.0191
			(0.0353)	(0.0359)	(0.0363)	(0.0360)
HFDI*Human capital				0.0035		
				(0.0060)		
HFDI*Trade					0.0004	
					(0.0012)	
HFDI*Financial development						-0.0016
						(0.0040)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	1.8853	1.9075	2.2978	2.3277	2.3107	2.3347
Adjusted R-squared	0.5831	0.6206	0.6845	0.6815	0.6801	0.6807
Observations	147	110	98	98	98	98

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.

Table 11: Absolute values (estimation equation 4.6)

	(4.6.1)	**(4.6.2)**	**(4.6.3)**	**(4.6.4)**	**(4.6.5)**	**(4.6.6)**
Constant	2.9349***	2.9215	3.7168	3.0695	0.7071	6.3951
	(0.2649)	(3.9198)	(7.8163)	(7.7647)	(7.3651)	(8.6306)
VFDI	0.0913	0.0612	0.0517	-0.7450	-0.5591***	-0.2301
	(0.0637)	(0.0545)	(0.0458)	(0.7532)	(0.1950)	(0.2881)
Domestic investment		0.1352**	0.2373***	0.2396***	0.1953***	0.2274***
		(0.0536)	(0.0643)	(0.0640)	(0.0687)	(0.0712)
Human capital		-0.0446	-0.0401	-0.0502	-0.0468	-0.0450
		(0.0593)	(0.0860)	(0.0848)	(0.0726)	(0.0832)
Government consumption			0.1126	0.1540	0.1417	0.1340
			(0.1494)	(0.1535)	(0.1386)	(0.1522)
Private consumption			0.0298	0.0371	0.0530	0.0057
			(0.0714)	(0.0714)	(0.0638)	(0.0823)
Trade			0.0206	0.0196	0.0089	0.0169
			(0.0217)	(0.0214)	(0.0210)	(0.0238)
Financial development			-0.0684***	-0.0637***	-0.0637***	-0.0840***
			(0.0210)	(0.0211)	(0.0215)	(0.0254)
Population growth			-2.8362***	-2.5006***	-0.8381	-2.7185***
			(0.9466)	(0.8908)	(1.1528)	(0.9524)
Inflation			-0.0464	-0.0618	-0.0475	-0.0386
			(0.0687)	(0.0721)	(0.0633)	(0.0706)
Interest			-0.0074	-0.0109	-0.0187	-0.0163
			(0.0362)	(0.0356)	(0.0300)	(0.0334)
VFDI*Human capital				0.0087		
				(0.0082)		
VFDI*Trade					0.0056***	
					(0.0018)	
VFDI*Financial development						0.0055
						(0.0058)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	1.8451	1.8374	2.1567	2.2401	2.0302	1.9991
Adjusted R-squared	0.5860	0.6158	0.6771	0.6809	0.7240	0.6795
Observations	147	110	98	98	98	98

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.

Table 12: FDI one period lagged (estimation equation 4.10)

	(4.10.1)	**(4.10.2)**	**(4.10.3)**	**(4.10.4)**	**(4.10.5)**	**(4.10.6)**
Constant	3.3627***	-0.4634	-0.0496	1.6584	0.6678	1.3547
	(0.3092)	(1.3487)	(3.3248)	(3.5387)	(3.4909)	(3.9574)
FDI	-0.0371	-0.0282	-0.0169	-0.0109	-0.1081	-0.0922
	(0.0437)	(0.0323)	(0.0340)	(0.0564)	(0.0699)	(0.0881)
Domestic investment		0.1854***	0.2126***	0.1996***	0.2093***	0.2026***
		(0.0583)	(0.0543)	(0.0638)	(0.0531)	(0.0561)
Human capital		-0.2018	-0.1945*	-0.2143*	-0.1794	-0.1869
		(0.1295)	(0.1090)	(0.1218)	(0.1103)	(0.1137)
Government consumption			0.1476	0.2022	0.1949	0.1952
			(0.2758)	(0.3010)	(0.2946)	(0.3042)
Private consumption			0.0412	0.0239	0.0359	0.0291
			(0.0498)	(0.0530)	(0.0513)	(0.0538)
Trade			0.0223	0.0327	0.0171	0.0195
			(0.0342)	(0.0401)	(0.0353)	(0.0351)
Financial development			-0.0523**	-0.0596**	-0.0574**	-0.0602**
			(0.0240)	(0.0287)	(0.0242)	(0.0250)
Population growth			-5.7102***	-4.9636***	-5.9781***	-5.8337***
			(1.0409)	(1.3176)	(1.0565)	(1.0455)
Inflation			-0.1202	-0.1470	-0.1501*	-0.1400
			(0.0810)	(0.0934)	(0.0862)	(0.0880)
Interest			-0.0696	-0.0862	-0.0817	-0.0793
			(0.0595)	(0.0682)	(0.0642)	(0.0654)
FDI*Human capital				-0.0001		
				(0.0004)		
FDI*Trade					0.0008	
					(0.0005)	
FDI*Financial development						0.0015
						(0.0016)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	1.8688	1.7358	2.5216	2.4871	2.5442	2.5489
Adjusted R-squared	0.5593	0.6780	0.7862	0.7753	0.7859	0.7844
Observations	144	98	83	77	83	83

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.

Table 13: HFDI one period lagged (estimation equation 4.11)

	(4.11.1)	**(4.11.2)**	**(4.11.3)**	**(4.11.4)**	**(4.11.5)**	**(4.11.6)**
Constant	2.4776***	-0.2329	1.0007	1.5518	1.3595	1.2566
	(0.4269)	(1.1626)	(3.5456)	(3.8134)	(3.5816)	(3.9105)
HFDI	0.2520	0.1620	0.1312	-0.0136	-0.0132	0.0933
	(0.1598)	(0.1856)	(0.1284)	(0.3797)	(0.2576)	(0.2173)
Domestic investment		0.1433***	0.2051***	0.2042***	0.2051***	0.2033***
		(0.0525)	(0.0563)	(0.0567)	(0.0565)	(0.0579)
Human capital		-0.0843	-0.1959*	-0.1899	-0.1857	-0.1948*
		(0.1412)	(0.1130)	(0.1134)	(0.1141)	(0.1152)
Government consumption			0.1502	0.1647	0.1773	0.1624
			(0.2651)	(0.2728)	(0.2823)	(0.2943)
Private consumption			0.0249	0.0185	0.0246	0.0229
			(0.0534)	(0.0559)	(0.0531)	(0.0550)
Trade			0.0271	0.0257	0.0236	0.0263
			(0.0345)	(0.0352)	(0.0351)	(0.0343)
Financial development			-0.0572**	-0.0595**	-0.0607**	-0.0584**
			(0.0231)	(0.0246)	(0.0240)	(0.0239)
Population growth			-5.5790***	-5.4818***	-5.5513***	-5.5905***
			(1.0117)	(1.0334)	(1.0059)	(1.0186)
Inflation			-0.1064	-0.1131	-0.1300	-0.1119
			(0.0796)	(0.0818)	(0.0904)	(0.0890)
Interest			-0.0647	-0.0665	-0.0707	-0.0668
			(0.0565)	(0.0579)	(0.0609)	(0.0620)
HFDI*Human capital				0.0020		
				(0.0047)		
HFDI*Trade					0.0009	
					(0.0011)	
HFDI*Financial development						0.0006
						(0.0027)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	1.9168	1.9929	2.5584	2.5443	2.5689	2.5664
Adjusted R-squared	0.5938	0.7149	0.7877	0.7838	0.7846	0.7835
Observations	138	92	83	83	83	83

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.

Table 14: VFDI one period lagged (estimation equation 4.12)

	(4.12.1)	**(4.12.2)**	**(4.12.3)**	**(4.12.4)**	**(4.12.5)**	**(4.12.6)**
Constant	3.3770***	-0.0817	-0.0558	1.6058	0.3590	1.4406
	(0.2391)	(1.2143)	(3.3274)	(3.5725)	(3.4651)	(3.8887)
VFDI	-0.0933**	-0.0384	-0.0259	-0.0184	-0.1852	-0.1861
	(0.0415)	(0.0291)	(0.0323)	(0.0558)	(0.1320)	(0.1498)
Domestic investment		0.1521***	0.2126***	0.1997***	0.2086***	0.2016***
		(0.0528)	(0.0540)	(0.0637)	(0.0527)	(0.0548)
Human capital		-0.0773	-0.1961*	-0.2156*	-0.1815	-0.1824
		(0.1387)	(0.1087)	(0.1214)	(0.1107)	(0.1135)
Government consumption			0.1508	0.2033	0.1846	0.1818
			(0.2797)	(0.3043)	(0.2883)	(0.2875)
Private consumption			0.0402	0.0238	0.0378	0.0289
			(0.0503)	(0.0540)	(0.0515)	(0.0537)
Trade			0.0214	0.0323	0.0183	0.0205
			(0.0340)	(0.0392)	(0.0354)	(0.0353)
Financial development			-0.0512**	-0.0586**	-0.0555**	-0.0627**
			(0.0238)	(0.0284)	(0.0246)	(0.0265)
Population growth			-5.6911***	-4.9613***	-6.3358***	-5.9551***
			(1.0356)	(1.3004)	(1.2490)	(1.0839)
Inflation			-0.1181	-0.1452	-0.1418	-0.1365
			(0.0809)	(0.0929)	(0.0860)	(0.0855)
Interest			-0.0721	-0.0883	-0.0804	-0.0784
			(0.0599)	(0.0685)	(0.0620)	(0.0615)
VFDI*Human capital				-0.0001		
				(0.0004)		
VFDI*Trade					0.0016	
					(0.0012)	
VFDI*Financial development						0.0034
						(0.0031)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	1.9197	1.8565	2.5192	2.4813	2.5394	2.5407
Adjusted R-squared	0.5900	0.7146	0.7870	0.7758	0.7860	0.7861
Observations	138	92	83	77	83	83

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.

Table 15: First differences (estimation equation 4.13)

	(4.13.1)	**(4.13.2)**	**(4.13.3)**	**(4.13.4)**	**(4.13.5)**	**(4.13.6)**
Constant	-0.1078	0.2920	0.0315	0.0191	0.0473	-0.0080
	(0.2805)	(0.3935)	(0.4591)	(0.4857)	(0.4658)	(0.4639)
FDI	0.1022*	0.0752	0.0430	0.1454	-0.0524	-0.2029
	(0.0555)	(0.0455)	(0.0271)	(0.8500)	(0.3526)	(0.2246)
Domestic investment		0.1914**	0.1501	0.1481	0.1469	0.1478
		(0.0792)	(0.0933)	(0.0929)	(0.0915)	(0.0939)
Human capital		-0.2142	-0.1995	-0.1893	-0.1944	-0.1808
		(0.1551)	(0.1603)	(0.1681)	(0.1625)	(0.1539)
Government consumption			-0.0168	-0.0111	-0.0212	-0.0773
			(0.3923)	(0.3986)	(0.3913)	(0.3816)
Private consumption			-0.1275	-0.1230	-0.1205	-0.1187
			(0.1073)	(0.1103)	(0.1115)	(0.1040)
Trade			0.0256	0.0239	0.0220	0.0287
			(0.0561)	(0.0523)	(0.0543)	(0.0531)
Financial development			-0.1888**	-0.1859**	-0.1920**	-0.1966**
			(0.0872)	(0.0920)	(0.0876)	(0.0870)
Population growth			-5.5156**	-5.5907**	-4.2143	-4.5925*
			(2.1989)	(2.3920)	(5.3375)	(2.6313)
Inflation			-0.0833	-0.0848	-0.0882	-0.0794
			(0.0988)	(0.1007)	(0.0981)	(0.0937)
Interest			0.0808	0.0794	0.0816	0.0808
			(0.0751)	(0.0789)	(0.0741)	(0.0732)
FDI*Human capital				-0.0011		
				(0.0092)		
FDI*Trade					0.0009	
					(0.0033)	
FDI*Financial development						0.0047
						(0.0043)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	2.6849	2.5882	2.4272	2.4181	2.3881	2.2049
Adjusted R-squared	0.4617	0.4626	0.5731	0.5642	0.5655	0.5805
Observations	144	97	81	81	81	81

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.

Table 16: First differences (estimation equation 4.14)

	(4.14.1)	**(4.14.2)**	**(4.14.3)**	**(4.14.4)**	**(4.14.5)**	**(4.14.6)**
Constant	-0.1345	0.0005	0.2413	0.2073	0.1916	0.2376
	(0.2879)	(0.4217)	(0.4619)	(0.4564)	(0.1916)	(0.4687)
HFDI	0.0548	-0.0172	-0.3241	0.9951	0.2762	-0.4516
	(0.2143)	(0.3422)	(0.2761)	(0.9872)	(0.5014)	(0.3276)
Domestic investment		0.1957**	0.1625*	0.1413	0.1582*	0.1662*
		(0.0902)	(0.0918)	(0.0924)	(0.0934)	(0.0943)
Human capital		-0.0421	-0.2870*	-0.2399	-0.2707*	-0.2841*
		(0.1744)	(0.1462)	(0.1474)	(0.1482)	(0.1466)
Government consumption			-0.0730	0.0780	-0.0435	-0.0903
			(0.3928)	(0.3984)	(0.3995)	(0.4022)
Private consumption			-0.1121	-0.1083	-0.1236	-0.1060
			(0.1120)	(0.1088)	(0.1105)	(0.1138)
Trade			0.0509	0.0482	0.0492	0.0534
			(0.0545)	(0.0546)	(0.0544)	(0.0538)
Financial development			-0.2004**	-0.1520*	-0.1622*	-0.2047**
			(0.0870)	(0.0877)	(0.0848)	(0.0849)
Population growth			-6.0547***	-7.0475***	-6.9730***	-5.9997***
			(1.9870)	(1.8948)	(1.9431)	(2.1073)
Inflation			-0.0872	-0.0862	-0.0734	-0.0884
			(0.1036)	(0.0997)	(0.1011)	(0.1041)
Interest			0.0831	0.0526	0.0689	0.0850
			(0.0734)	(0.0777)	(0.0759)	(0.0742)
HFDI*Human capital				-0.0181		
				(0.0119)		
HFDI*Trade					-0.0028	
					(0.0018)	
HFDI*Financial development						0.0016
						(0.0045)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	2.7003	2.6435	2.5231	2.6175	2.6292	2.4864
Adjusted R-squared	0.4609	0.4604	0.5806	0.5929	0.5880	0.5728
Observations	138	91	81	81	81	81

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.

Table 17: First differences (estimation equation 4.15)

	(4.15.1)	**(4.15.2)**	**(4.15.3)**	**(4.15.4)**	**(4.15.5)**	**(4.15.6)**
Constant	-0.1257	-0.0596	0.0352	0.0376	0.3721	0.0865
	(0.2862)	(0.4472)	(0.4527)	(0.4562)	(0.4288)	(0.4256)
VFDI	0.1016*	0.0870*	0.0570*	-0.1701	-0.7063***	-0.7596**
	(0.0589)	(0.0457)	(0.0331)	(0.8019)	(0.2433)	(0.3448)
Domestic investment		0.2081**	0.1550	0.1538	0.1591*	0.1381
		(0.0895)	(0.0926)	(0.0945)	(0.0876)	(0.1004)
Human capital		-0.0096	-0.1966	-0.2059	-0.2341	-0.2053
		(0.1791)	(0.1598)	(0.1611)	(0.1523)	(0.1484)
Government consumption			-0.0099	0.0009	-0.0246	-0.0565
			(0.3935)	(0.3913)	(0.3713)	(0.3806)
Private consumption			-0.1310	-0.1407	-0.0968	-0.1655
			(0.1073)	(0.1144)	(0.0951)	(0.1049)
Trade			0.0235	0.0252	0.0193	0.0170
			(0.0567)	(0.0568)	(0.0510)	(0.0476)
Financial development			-0.1894**	-0.1879**	-0.1387	-0.1839**
			(0.0856)	(0.0857)	(0.0888)	(0.0795)
Population growth			-5.5319***	-5.4464***	1.6566	-3.3119
			(2.1393)	(2.1582)	(2.5781)	(1.9914)
Inflation			-0.0819	-0.0787	-0.0857	-0.0531
			(0.0993)	(0.1007)	(0.0817)	(0.0884)
Interest			0.0802	0.0792	0.0510	0.0609
			(0.0746)	(0.0749)	(0.0669)	(0.0676)
VFDI*Human capital				0.0025		
				(0.0087)		
VFDI*Trade					0.0071***	
					(0.0022)	
VFDI*Financial development						0.0160**
						(0.0068)
Fixed effects	country, year	country, year	country, year	country, year	country, year	country, year
White standard errors	yes	yes	yes	yes	yes	yes
Durbin-Watson test	2.7065	2.6166	2.4290	2.4573	2.5803	2.3648
Adjusted R-squared	0.4747	0.4794	0.5768	0.5684	0.6498	0.6333
Observations	138	91	81	81	81	81

Notes: Dependent variable is real GDP per capita growth. Robust standard errors are in parentheses. ***, **, and * denote the significance level at 1%, 5%, and 10%.