

Do business students go with the flow?  
Foreign direct investment flows and the allocation of talent  
in emerging economies

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**Abstract:** As a country develops, the relative importance of higher education increases. Emerging markets need capital for investing in the latest technology and a workforce able to make use of the same. Foreign investments can bring both physical capital and technological know-how, as well as provide work opportunities for skilled graduates with the right education. In this spirit, this paper asks whether inflows of foreign direct investment to emerging economies influence the relative attractiveness of university level studies in business and administration—a field possibly affected by the new employment opportunities in foreign affiliates. Employing a fixed-effects panel data estimation for 48 emerging economies over the years 1992–2012, a positive but insignificant effect from inflows of foreign capital on the share of business graduates is found. When considering regional effects, post-Soviet states stand out as they exhibit a negative effect from foreign capital inflows on the share of business graduates, also differing drastically from the other transition economies. Moreover, it seems possible to estimate the proposed effects from the inflows of foreign direct investment on two other fields of study, namely education and engineering, providing support for our main analysis. Hence, the results hint at an important effect from foreign direct investment flows on the allocation of talent in emerging economies.

**Keywords:** Development, Education, Human Capital, Foreign Direct Investment, Emerging markets, International Economics

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# 1 Introduction

At some places around the world, the economy is transforming fast. Growth is high and volatile, investments are large but risky, and jobs are created in new sectors. In the emerging markets, this is part of the every-day life.

For emerging markets, in their capacity as developing countries closing in on more advanced economies, capital for investing in the latest technology and a workforce able to make use of the same is crucial. Foreign investment often brings with it both physical capital and technological know-how that can spur domestic innovations and enable knowledge spillovers to the labor force. As such, foreign investment carries the potential of delivering exactly what the emerging markets need. The beneficial effects on the host economy are however dependent on the economy's level of human capital (Boretzstein et al., 1998; Li & Liu, 2005).

Human capital can also be affected by foreign capital flows. The firms that establish as a result of foreign investments demand labor both to their production sites and to their offices. In the latter case, positions for business administrators, accountants, and controllers open up as new employment opportunities for local workers—if they possess the right skills. Thus, when the foreign actors offer new opportunities they simultaneously increase the demand for certain types of skills, required for the new jobs.

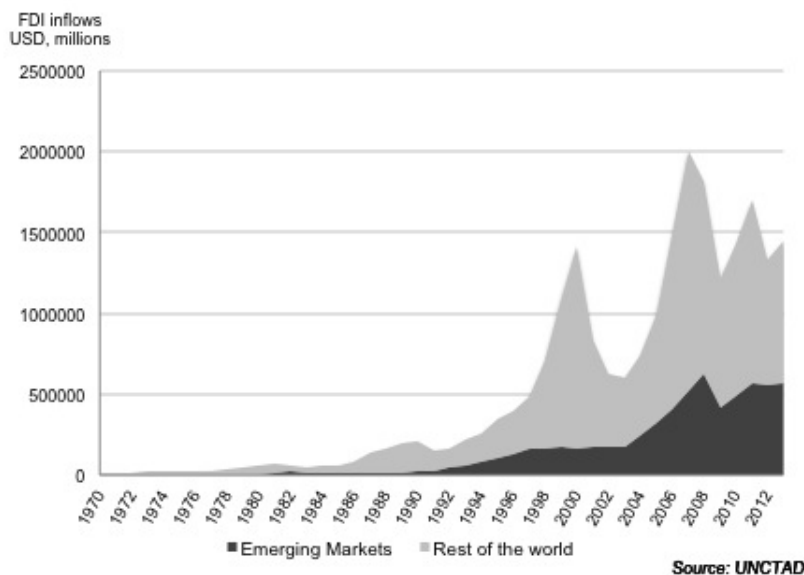
Pursuing higher education is one way of acquiring these skills. Many of us base our choice of higher education upon what degree we believe will provide the best career opportunities or where we expect to find the highest return. Based on this perception, we believe that the new work opportunities and the knowledge demanded from foreign firms can play a role in future students' decision of degree. This would imply that foreign capital inflows could influence the demand for certain types of knowledge acquisition, and change the allocation of talent in an economy.

Emerging markets have experienced a surge in foreign capital flows to their economies during the last couple of decades, both in absolute and relative terms. The 75 emerging economies included in this study have experienced an increase in foreign direct investment (FDI) to their economies also gaining an increasingly large share of the world total since the beginning of the 1990's (see Figure 1). From standing at just over 10 percent of total world FDI-inflows in 1990, the inflows reached a share over 40 percent in 2012.

Several studies have shown proof of a complex relationship between FDI and human capital, especially in emerging markets that have reached a certain level of human capital development. While this is the case, few articles have yet dug deeper and empirically analyzed how FDI affects the human capital composition of the host economies.

This paper asks the question of how FDI-inflows affect the share of graduates in the higher education field of business and administration (henceforth denoted as B&A). The field of B&A is chosen since it is a field that is expected to gain from the new employment opportunities that pop-up as foreign firms establish themselves in the emerging markets. Furthermore, as developing and

Figure 1 FDI-inflows, world and the 75 emerging markets in our sample, 1970-2013



emerging markets are recommended to focus on human capital in order to make the most out of FDI, the question is an important one to raise.

The time period of interest is the last two decades. Besides the rapid growth of global FDI-flows, the period is also characterized by dramatic economic and political evolvments in different regions around the world. Therefore we study whether the effect from FDI-inflows on B&A-attainment differs regionally, keeping a special focus on the post-Soviet and European transition economies. The regions in focus are chosen since both their economic and political backgrounds are deemed similar and if any regional differences can be distinguished, at least these two regions are expected to exhibit related effects.

The findings point at a positive but insignificant effect of FDI-inflows on the share of B&A-graduates five years later. However, we find this effect to vary across different regions, surprisingly also between the post-Soviet states and the European transition economies.

Further, an additional analysis of two other fields of study, namely education and engineering, provides support for our main analysis. Both fields are hypothesized to be unaffected by FDI-inflows in general, while engineering graduates could be positively affected by FDI going into resource dependent countries. The findings from the ancillary analysis indicate that FDI-inflows to emerging markets in general neither affects education graduates nor engineering graduates significantly. In resource dependent countries, the share of students graduating in engineering seems to increase as more FDI flows into these countries.

The rest of this paper is structured as follows: the next section outlines the literature regarding the effects from FDI in emerging markets and the determinants of educational choices; the third section pinpoints the propositions regarding FDI's impact on the allocation of talent; the fourth section describes the sample followed by the fifth section defining the empirical model and the data; in the sixth and seventh sections the results are presented and discussed; and the eighth and last section concludes.

## 2 Background literature

Human and physical capital forms the very basis for economic growth. In the endogenous growth theory popularized by scholars such as Romer (1986; 1990) and Lucas (1988) as well as in the augmented Solow growth model by Mankiw et al. (1992), physical capital is the workhorse needed for technological progress to drive growth, and human capital is crucial for technological progress in the first place. Without physical capital, growth ceases and with no human capital, there is no technological improvement and growth cannot be sustained.

A key recommendation to emerging markets wanting to accelerate their economic development is to invest in higher education (Haddad et al., 1990). Further, through attracting multinational corporations (MNCs) developing markets can access high-technology products and advanced technologies (Borensztein et al., 1998). Hence, FDI is an important source for top-level physical capital and technology for these markets.

The importance of both human capital and inward FDI for growth and development in developing and emerging markets has been frequently discussed in the literature. For instance, Borensztein et al. (1998) find that the relationship between FDI and human capital exhibits a complementary effect in the sense that the level of human capital in the host country augments the contribution of FDI to economic growth in the very same country. Likewise, in Li and Liu (2005) the technology-absorptive ability together with human capital is argued to be "very important for inward FDI to positively promote economic growth in developing countries" (p.404).

In addition to augmenting FDI's impact on economic growth and development, the human capital level of the host country is found to be one of the key determinants of FDI-inflows (Benhabib & Spiegel 1994; Noorbakhsh et al. 2001; Li & Liu, 2005).

As well as that the human capital of a country can attract FDI, evidence from the literature also point toward the causality going the opposite direction, meaning that FDI may influence the human capital stock in the host country. A few studies have investigated this relationship, focusing on human capital in the form of tertiary education. Egger et al. (2005) find that an increase in net capital flows resulting from capital market integration significantly increases the enrollment in higher education. Additionally, they find that capital flows have a positive and significant effect on economic growth, through the effect on higher education (Egger et al., 2005). Similarly, Checchi et al. (2007) investigate the consequences of the inward FDI-stock on educational attainment and find a significantly positive

impact of the presence of foreign firms on tertiary enrollment.

The positive effect from FDI on tertiary enrollment may stem from an increased demand for skilled labor originating from the large presence of foreign firms in the economy. For instance Feenstra and Hanson (1997) discuss that international flows of capital might have caused a surge in the relative demand for skilled labor in Mexico in the decade following the mid-seventies. According to their finding, in regions with the highest FDI-concentrations the growth in FDI could account for more than 50 percent of the increase in the share of total wages going to skilled labor.

As both physical capital and human capital, in the form of FDI and higher education, seem central for the development process in emerging economies, we will now elaborate further upon each of them separately.

## **2.1 FDI and its implications in emerging markets**

FDI has increasingly become a source for economic development, income growth and employment for developing and emerging markets. In a report by OECD (2002) it is discussed how these markets can minimize losses and maximize gains related to FDI-inflows. On the one hand, without the right policies FDI may have potential drawbacks for host economies. Some examples are deterioration of balance of payments, lack of positive linkages with local communities and even negative effects of competition in national markets. Further, if the host economy is not able to take advantage of the technologies or know-how transferred through FDI, the economy will also miss out on some of the potential positive effects from FDI. On the other hand, through adapting the right policies, host countries can make FDI trigger technology spillovers, assist human capital formation, contribute to stronger integration in international trade, help create a more competitive business environment as well as enhance enterprise development (OECD, 2002).

When investigating how FDI influences the choices of aspiring university students, the effect from FDI on employment opportunities and wages is of particular importance. To start off, the presence of MNCs can create new employment opportunities, which in return may raise the motivation to invest in training and education for those who seek to take advantage of the new prospects (Kapstein, 2002). The relationship between investments and employment is more or less implicit in the literature; rather than discussing *if* inflows of FDI lead to more employment opportunities it is discussed *how* inflows of FDI can lead to better employment opportunities.

For instance, there is a wide literature regarding FDI's effect on host country wage levels. Lipsey (2002) discuss the effects that FDI has on the host countries' wages and concludes "It is rare to find a study of FDI and wages in any host country that does not find that foreign-owned firms pay higher wages, on average, than at least privately-owned local firms" (p.20). Studies showing similar findings can be found around the world, for example Harrison (1995) studies this relationship in Morocco and Côte d'Ivoire, Aitken et al. (1996) does so in the United States, Mexico, and Venezuela; and Lipsey and Sjöholm (2004) in Indonesia. Lipsey (2002) states that the difference in wages between foreign

and domestic firms exists in most countries and most industries, and can partly be attributed to the weight of FDI toward high-pay industry sectors. Another reason to why multinational firms may pay higher wages could be that they are afraid of losing their staff to local firms after training (Blomström & Kokko, 1998).

As has been suggested by Blomström and Kokko (2003), the gains from FDI do not happen automatically, but are instead dependent on a complex relationship with human capital. The results in Benhabib and Spiegel (1994) support this claim. There it was found that the ability of a developing country to capture and utilize new technology from abroad is positively related to the country's level of human capital. Blomström & Kokko, (2003) further argues that "MNCs provide attractive employment opportunities to highly skilled graduates in natural sciences, engineering, and business sciences" (p. 12). This might according to Blomström & Kokko, (2003) work as incentives for students to complete tertiary training and for governments to invest in higher education to educate the labor force. This particular link is the one we will investigate further in this study. But before we do so, attention will be directed towards the determinants of future university students' choice of education field.

## **2.2 Human capital, allocation of talent and employment opportunities**

For a country to develop and grow, human capital accumulation is of key importance. This is true for least developed countries as well as for emerging and advanced economies. At low levels of development, the highest returns on education investments are found in the primary years of schooling. However, as the country develops, the relative importance of higher education increases (Psacharopoulos & Patrinos, 2004).

Blomström and Kokko (1998) argue that the main reason why countries want to attract FDI is to acquire modern technology, both in the form of products and processes and in the form of management and marketing skills. In order to take advantage of the positive spillovers from FDI it has been shown that a certain level of human capital is needed, as has also been discussed above. Hence, investing a bit more in university education can strengthen a country's possibilities to use FDI-inflows productively. This leads us to the question of what guides students' choice of academic disciplines and as such the specific composition of the human capital in a country.

A seminal paper in this regard is the work by Murphy et al. (1991). They discuss how the allocation of talent in the economy depends on market size, compensation contracts, and on the returns to ability. As far as their findings are concerned, a large engineering share is associated with low government consumption, high investment in physical and pure capital and few revolutions and coups, while the share of law graduates is not significantly affected by any of these factors. Moreover, growth is favored in countries with many people in the engineering profession, while a disproportionately large number of lawyers adversely affects growth (Murphy et al., 1991).

Building upon this, Natkhov and Polishchuk (2012) argue that talented individuals are sensitive to the quality of institutions when making their choice of study field. Where institutions (e.g. rule of



law and property rights protection) were weak they observed a larger proportion of graduates in law, whereas more people were inclined to study engineering where institutions were strong.

In addition, Natkhov and Polishchuk (2012) discuss how long lasting institutions might influence another important determinant for the choice of study field, namely cultural norms. They exemplify this in the case of the former Soviet Union. Moscow is known for having ensured high uniformity of post-secondary educational systems across the member states. Higher education was focused on engineering and sciences, whereas law schools for instance were few and geographically spread-out. As such, the prevailing attitudes and social customs viewed education in sciences as more prestigious.

A part from these macro-oriented studies on the determinants of academic discipline, more micro-oriented research has also been conducted in order to pinpoint these determinants. The literature on the factors influencing the choice of study field in emerging or in developing countries appears scarce while quite a few studies have been conducted in the United States. To start off, an influential paper by Cebula and Lopes (1981) finds economic incentives to play a central part when students choose their major, as the expected future earnings and the change in these earnings were given as important factors behind the choice. These results are supported by Montmarquette et al. (2002) who find similar effects.

Especially individuals considering to study business as their major seem to be more inclined to pursue a business degree when more career openings can be found and larger monetary rewards can be expected. That business students rank projected earnings and job opportunities as key factors behind their choice of major has been found in several studies (Daymont & Andrisani, 1984; Kim et al., 2002; Malgwi et al., 2005). For instance, Daymont and Andrisani (1984) look at the differences in work preferences across students in nine different study fields and find that work preferences such as making a lot of money and opportunities to lead increase the probability of majoring in business.

An example of a paper regarding the choice of academic discipline in emerging markets is a study at a large Romanian business faculty by Niculescu (2006). The factors deemed important by previous literature—such as salary and career opportunities—coincide with the findings for the Romanian students. However, an additional finding was that Romanian business students' choice of field also was guided by the opportunity to work abroad.

Aspiring B&A-students appear to choose their field of study based on monetary rewards, quick employment and career opportunities. Viewing outcomes of inward FDI flows through the lens of an aspiring B&A-student, desirable features in terms of new businesses and new career opportunities can be spotted. Hence, it would be plausible that more students choose to study B&A-programs as more FDI flows into the country.

This paper investigates the extent to which the inward flows of FDI affect the choice of pursuing a B&A-degree in emerging markets. Previous research on the factors guiding the choice of majoring in business or other fields have largely been focused on the micro-level by studying individuals directly and have mainly surveyed students in western countries. Our study takes a different approach from the

current thought in two ways. Firstly, it projects on a more macro-oriented path by determining how FDI affects the share of B&A-graduates on the country level, rather than studying individual specific factors. Secondly, it has its sole focus on emerging markets, contributing to the, as to the best of our knowledge, rather scarce literature on the determinants of business students' choices of major in these markets.

In terms of understanding how macro determinants affect the allocation of talent this study finds inspiration in the papers by Murphy et al. (1991) and Natkhov and Polishchuk (2012). Similar to Natkhov and Polishchuk (2012) we use graduates as the dependent variable. Since the number of graduates gives a direct measure of completion, as opposed to enrollment that can be terminated in advance, we believe a better picture of the effect from FDI on education can be obtained by looking at graduates.

Our study closest resembles the one by Checchi et al. (2007) in the sense that both studies look at the impact of FDI on education, and not on the opposite relationship. But the studies differ in two important aspects. While Checchi et al. (2007) employ enrollment in different levels of education as their dependent variable, this study analyze data on graduates within a specific field. Secondly, while they look at the general enrollment of tertiary education we go deeper and look at the potential impacts on a specific field of study, namely B&A.

It is important to understand how FDI affects the allocation of talent and human capital formation since the composition of the labor force and the aggregated level of human capital play a crucial role for growth. In that way, this study can hopefully make an important contribution to the knowledge of FDI and education in emerging markets.

### **3 FDI and the allocation of talent**

When FDI flows into a country more work opportunities are created and, as has been shown in the literature, these foreign firms tend to pay higher wages to their employees. It has also been indicated that positive FDI-inflows lead to more students enrolled in higher education. Merging these two claims, spiced with the finding that B&A-students rank monetary rewards as one of the key factors behind their choice of education, forms the basis for this study.

This study hinges on the assumption that each student can freely choose what to study and that the spots are set entirely according to demand. While aware of that this is a strong assumption, taking into consideration that spots are limited and that universities might be governed under austerity, we still hope to shed light upon potential demand effects that have developed during the investigated time period.

Using data on FDI-inflows to an economy, this paper will dig deeper into the effect that FDI has on the share of B&A-graduates in particular. The area of interest is further supported by the claim put forward by Blomström and Kokko (2003) that talented graduates in business, engineering and natural sciences enjoy employment opportunities as MNCs establish in their home countries.

The data on FDI-inflows is of general type, not divided on type of investment or sector. Therefore, it might be difficult to draw conclusions regarding the effects on certain fields of employment. However, as skilled B&A-personnel is needed across industries, for both new investments and when modernizing existing facilities, the general FDI-inflows serve a particular purpose when analyzing how B&A-graduates are incentivized. Just considering a specific sector or only greenfield investments would not take into account the fact that a B&A-degree is useful in a wide range of sectors.

Below we will state the propositions for our analysis. We have assumptions on what effects we expect to see, but we avoid denoting them as hypotheses, as we do not test them against established one-sided alternatives.

When studying B&A, the knowledge obtained can be used in both local and international firms. Foreign investors can choose to establish local presence in the host country, irrespective of the type of investment and sector, in order to facilitate the investment. Students with a B&A-degree can be expected to have a comparative advantage in seeking employment in the newly established firms, in need of carrying out day-to-day business activities. Hence, as FDI-inflows increase, there will hypothetically be more spots open to jobs that require this type of knowledge. As the demand for labor with B&A-skills increase, one can conjecture that the share of students studying this field will increase as a result of more FDI comes in. This effect is further strengthened by the fact that foreign firms are known to pay higher wages, argued above to be highly motivating for B&A-students especially. This reasoning leads us to our main proposition:

*P1: FDI-inflows have a positive effect on the share of B&A-graduates*

Analyzing a share of graduates may be problematic as the changes are dependent on relative changes in other fields. Also, as discussed above using FDI-inflows that are of general nature may serve as a blunt measure to capture new employment opportunities for a certain field. However, if it is possible to predict the expected effects on other fields of study this would serve as justification regarding our analysis of the effect on B&A-graduates. For instance, if fields that can be expected to be unaffected by FDI-inflows also turn out with the predicted zero effects, the use of a share and general FDI-inflows would be further motivated. Therefore, in addition to investigating the above stated proposition, we will conduct an analysis using three ancillary propositions regarding the impact of FDI-inflows on two other fields of study, namely education and engineering.

The first ancillary proposition concerns educational fields of study such as teaching and pedagogy. One might argue that FDI-inflows would not have any direct impact on the share of graduates in educational fields since it can be expected that the skills obtained are very specific to the domestic market. The larger number of work opportunities in international firms or the higher wages resulting from increased FDI may not considerably affect the labor prospects for education graduates. Taken together, this leads us to the following ancillary proposition:

*P2: FDI-inflows have no effect on the share of graduates in educational fields*

The second group of ancillary propositions are attributed to the engineering fields. As engineering skills can be applicable in an international setting, they might be demanded by MNCs. As claimed in Blomström and Kokko (2003), MNCs can, in addition to boosting possibilities for business graduates, also provide stronger employment opportunities for engineering graduates. This suggestion is likely to hold, if the MNCs are in need of engineers for the implementation of the investment. However, if the investment is not dependent on engineers, the claim can be questioned.

In emerging countries in general we do not expect the FDI-inflows to induce students to choose engineering as their field of study. This as we are analyzing aggregated FDI-inflows going into multiple sectors. Nevertheless, FDI going into highly resource dependent economies can on the contrary be expected to be more engineer intensive. As such, the FDI that goes into these economies can serve as a proxy for sectoral FDI-inflows and can in this way be expected to incentivize a certain field, in this case engineering. Thus, we formulate two additional propositions. Noteworthy is that these propositions are partially overlapping in the sense that the first deals with the whole sample while the second considers a subgroup of the whole sample.

*P3: FDI-inflows to countries in general have no effect on the share of graduates in engineering fields*

*P4: FDI-inflows to highly resource dependent economies have a positive effect on the share of graduates in engineering fields*

Finally, there could be a negative effect on the share of graduates in the other fields of study originating from the expected increase in the B&A-share. However, we see no reason why prospective education or engineer students would be more inclined to change to B&A than students in general, why this change is expected to be insignificant. This is another assumption in the model.

## 4 The sample of emerging economies

The data analyzed in this report is based on a panel of emerging markets during the period 1992–2012, where 2012 is the latest available year for data on tertiary graduates by field of study provided by the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics.

In this study, the countries of interest are emerging economies. These economies have experienced rapid inflows of foreign capital over the concerned time period as well as rapid development. In the process of emerging from lower levels of development the importance of higher education also increases. Together these factors motivate our focus on these markets.

The specific time period is motivated by the fact that globalization was intensified after the historic fall of the Berlin Wall in 1989. Markets became more liberalized and trade eventually opened up between East and West. Further, with many countries forming after the collapse of the Soviet Union, we start this study in 1992, a year at which many of the countries in Eastern Europe have

taken their form as sovereign states.<sup>1</sup>

The chosen time period is one factor motivating the particular attention toward the post-Soviet countries and European transition economies. Arguably, these economies have gone through particularly interesting trajectories over the concerned period. Moreover, many emerging economies are indeed also economies in transition and therefore the two exhibit many similarities both in terms of rapid economic growth and volatile markets (see e.g. Mody, 2004).

The emerging economies are broadly defined, including both lower and upper middle-income countries as well as a few high-income countries. The economies were chosen based on the International Monetary Fund's (the IMF) list of emerging and developing economies in the "World Economic Outlook 2014", excluding low-income developing countries (IMF, 2014) as well as countries defined as Least Developed according to the United Nations (2014).<sup>2</sup> In addition, small island states (islands belonging to the World Bank (2014) classification of Small States) were excluded from the dataset, as the options regarding field of study are limited in these states by default. Finally, as the paper has a particular focus on the post-Soviet states and the European transition economies we have chosen to include a few additional transition economies into our sample. We list the countries in the sample and the analysis in more detail in Tables A1 and A2 in Appendix A.

## 5 The empirical model of FDI-inflows on B&A-graduates

Given the sample of emerging and transition economies as described above, in this section we embark upon the empirical model used to investigate whether FDI-inflows have an impact on the share of B&A-graduates. The basic theoretical background for the choice of a field of study is as follows. In country  $i$  there are agents which at time  $t$  become graduates. As a tertiary education is believed to take five years to complete<sup>3</sup>, the graduates are expected to have made their decision upon what to study five years earlier, at time  $t - 5$ .

At the time of decision, the agents are assumed to have been rational, having based their decision on perfect information consisting of information in the past and at the time for the decision. When information is volatile from year to year, the agents will try to make the information useful by calculating an average value of five time periods (the year of decision and the four previous years), in each time period. The reason for choosing a five-year average is somewhat arbitrarily based on the expected length of education. The agent then uses this smoothed average for the decision on whether or not to pursue a degree in B&A. The empirical investigation that is meant to capture the effect is based on the following model:

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<sup>1</sup>In the concerned data this is true for all states except for former Czechoslovakia which was separated into Czech Republic and Slovakia the 31 of December 1992.

<sup>2</sup>Using a definition from 2014 as our selection criteria excludes some economies that have been emerging markets for the larger part of the investigation period and is as such a limitation of the study.

<sup>3</sup>Based on the descriptions given by UNESCO, included in Table B1 in Appendix B.

$$B\&A_{it} = \alpha + \beta \ln(FDI)_{it-5} + \gamma \mathbf{X}_{it-5} + \eta_t + a_i + u_{it} \quad (1)$$

where  $B\&A_{it}$  is the share of B&A-graduates among the total number of graduates in country  $i$  at time  $t$ ,  $\alpha$  is the intercept,  $\ln(FDI)_{it-5}$  is the logarithm of the rolling average value of FDI-inflows calculated on the five consecutive years proceeding the date for future graduates' decision of study field,  $\mathbf{X}_{it-5}$  is a vector of additional controls,  $\eta_t$  is vector of time dummies and  $a_i$  is a time-invariant country specific fixed effect.

The fact that the variable  $B\&A$  is defined as a share involves potential risk. Firstly, the share of B&A may be affected by changes in other shares and secondly, a change in the share of B&A-graduates requires other fields to change as well. Bearing these risks in mind, we however argue that finding an effect on the B&A-share can be considered as a strong effect, as its change is relative to other shares.

To use the number of B&A-graduates instead of number of students enrolled has its advantages as it gives a clear number of how many have finished the education and officially fulfilled the requirements for the diploma, thus avoiding the issue of potential dropouts. Naturally, the choice of graduates does not come without any drawbacks. One drawback could be that some people pursue and take out several degrees and could do so at different points in time, yielding multiple observations.<sup>4</sup> Although the drawbacks from using the number of graduates cannot be ruled out, we still dare to consider them as minor issues in the estimation of model (1).

Moving on to the key explanatory variable of FDI-inflows, the specification deserves some attention. The measure of FDI is defined as:

$$\ln(FDI)_{it-5} = \ln \left( \frac{1}{n} \sum_t^{t-4} FDI \text{ inflows}_{it} \right)_{t-5}$$

where  $n$  is the number of observations available in each consecutive five-year period. The rolling average of five years illustrates the assumption described above that when students base their choice of study field on volatile variables, they are backward looking in their decision-making. As FDI is a year-to-year volatile source of capital, a rolling average of five years can provide more information for how high the inflows will be five years ahead than simply considering the current year inflows. As discussed previously, a tertiary graduation is assumed to take around five years to complete, hence the choice of considering a moving average with a five years perspective. As it might vary what year has the most representative FDI-inflows all five years are given the same weight for the decision-making.

The five-year averages may also reduce the occurrence of negative inflows in the panel. First, data on FDI-inflows may be counted as negative due to reverse investments or disinvestments and occurs occasionally in the data. As FDI-inflows vary greatly both within a given country and between countries the data becomes more comparable using logarithm values of FDI. If negative, the data point

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<sup>4</sup>For instance the same student could pursue degrees in several fields or degrees at different levels such as both a bachelor's and a master's degree.

will be dropped when taking the logarithm, hence dropping information from the model. Hopefully the five year smoothed averages will aid the problem, reducing the occurrence of negative values so only a negligible amount of observations are dropped. This needs to be carefully checked when estimating the model and will be discussed in the Data-section 5.2 below.

## 5.1 Other factors influencing the share of B&A-graduates

The vector of controls includes time varying variables expected to matter for the choice of a B&A-degree that are also needed to control for in order to capture the pure effect from FDI. Similarly to FDI, all controls are lagged five years in order to capture the information at the point when students' made their decision on study field.

The vector of controls includes, first of all, a variable taking into account the size of the market using population size as the proxy. A large market implies large economic activity and many possibilities of making business. In turn, this leads to work opportunities especially for business graduates. As argued in Murphy et al. (1991), the market size plays a crucial role in attracting talent<sup>5</sup> and as previous studies have stated, business students are strongly motivated by monetary rewards and fast career opportunities (see e.g. Cebula & Lopes, 1981; Montmarquette et al., 2002). Therefore, it seems arguably important to control for the hypothesized positive effect from market size on B&A-share in the specification above. Population is employed in its logarithmic form in order to amend the problem of heteroskedasticity.

A potential problem with using total population as a proxy for market size, is that national income inequalities can imply that consumption is carried out by only small fraction of the population, by an economic elite, if one wishes (see the discussion by Kundu & Contractor (1999)). An alternative proxy for market size used in the literature is Gross Domestic Product (GDP) (see e.g. Borensztein et al., 1998). The reasoning for why we do not use GDP as a variable for market size is that it might be a so-called *bad control* in our specification of the model. This issue arises since FDI averaged over five years can affect the level of the present GDP, meaning that GDP can be a possible outcome variable of our main explanatory variable too.<sup>6</sup> Besides being an outcome variable of FDI, GDP may be one of the channels through which the effect of FDI passes on to the share of B&A-graduates. Controlling for GDP would shut down this potential channel. As population on the other hand is not expected to be an outcome of FDI, the same problem as with GDP does not arise when controlling for market size approximated by total population in the regression. Therefore we use population instead of GDP as a proxy for market size.

Another interesting effect in connection to the market size is market growth. It is reasonable to assume that positive growth rates means new labor opportunities in this economy, especially for

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<sup>5</sup>Murphy et al. (1991) illustrate this mechanism with a sports-parallel: "[...] being a superstar in a large market pays more than being a superstar in a small market and so will draw general talent. A person of great general athletic ability, for example, would rather be the tenth best tennis player than the first best volleyball player, since far fewer people would pay to watch him play volleyball." (p.504)

<sup>6</sup>See Angrist and Pischke (2009) p.64-68 for further discussion regarding bad controls.

B&A-degree holders, inducing the share of B&A-graduates to increase. In addition to this, a growing market can be expected to attract FDI. Hence, in order to separate the effect of FDI-inflows from the effect of growth on B&A-graduates it is important to control for growth. As emerging market growth rates often are very volatile on a year-to-year basis, the growth rate of GDP is included as a moving five-year average, similar to our FDI variable.

Due to the potentially strong links between FDI and growth (a growing market can attract FDI and FDI in return can stimulate growth) there may be concerns for GDP-growth being a bad control. This issue is somewhat mediated by the fact that FDI-inflows and growth are measured in the same time periods. Therefore, considering that growth can have an important influence on the share of B&A-graduates, we choose to include growth as one of the controls in the model.

A third factor to control for is the structure of the economy and in this case especially the value addition from the service sector. The service sector includes areas such as wholesale and retail trade, government and financial services, as well as real estate services—all of which are potential work fields for B&A-graduates. Therefore the size of the service sector can have a positive impact on the professional opportunities for this type of graduates. In order to account for this effect, and to filter out the employment opportunities from the service sector that might confound the same effect from the increased FDI-inflows, we control for a measure of the services value added (as a percentage of GDP). Similar to GDP-growth and FDI-inflows, we include services value added in the form of a rolling average since the agent is likely to have some comprehension of this variable over the past five years, and that the past is likely to influence the decision of study field.

Trade can serve as a proxy for the openness of a country. Therefore, it can increase the work opportunities for B&A-graduates seeking employment in trading firms and industries. Moreover, an open economy can be expected to have closer links to other markets, attracting B&A-students interested in working abroad (an important determinant for the choice of business studies, as discussed by Niculescu (2006)). Reasonably, the implications of trade could influence the relative attractiveness of studying B&A, making it sensible to control for trade and in that way filter out the effects of economic openness coming from trade on the B&A-share. If it is not FDI-inflows but rather openness that is influencing the share of B&A-graduates, we would see the effect from FDI-inflows fall when including trade in the regression. As for FDI-inflows, GDP-growth and services value added, trade is included as a rolling average of five years, as it comprises a backward looking component just as the other rolling averaged variables.

Last but not least, time dummies are included for each year in order to control for the possibility of a time-trend over the period studied. For instance based on studies in Western countries it has been found that the number of business students has increased rapidly during the 1970's (Cebula & Lopes, 1981). The time trend could also capture other important trends during the period investigated.

More potential controls have been discussed, although not included. Two such variables are the size of population in the relevant age group for tertiary education and the number of total students



enrolled in university. These variables could affect the number of students enrolled in business education through peer-effects and through supply effects. The direction of these effects, if any effect at all, is however difficult to foresee and therefore we do not control for these variables.

Another potential control is the wage level in the specific field of study. This since wages are found to play an important role in the decision of studying business, as seen in previous studies. However, as FDI has also been found to affect wages, we set out with the belief that the effect of wages from FDI is incorporated in the FDI-measure. In that sense, FDI-inflows might have an impact on B&A-graduates through the effect that FDI has on wages. As we have not found any suitable method to distinguish between wage-increases caused by FDI-inflows and wage-increases caused by other factors we choose not to control for wages specifically.

A third variable that one could control for is institutions. As was discussed in the literature section, institutions can affect graduates in law and engineering (Murphy et al., 1991; Natkhov and Polishchuk, 2012). However, we consider the possibility that institutions affect the share of B&A-graduates in a similar way as in these studies to be small. Therefore, we do not control for the effect from institutions in this regression.

On the other hand, an institutional change such as a membership of the European Union (EU), is a factor that could have an effect on the share of B&A-graduates. With opening up of borders, the work opportunities abroad increase, for instance. However, this effect is not controlled for since the current EU-countries in our sample became members of the union in 2004 the earliest. The time span in this study is simply too short for controlling for the impact of EU-membership on the observed differences across countries.

The parameters  $a_i$  in specification (1) above are time invariant country fixed effects incorporating all the variables that could influence the share of B&A-graduates in different countries. The fixed effects specification deserves some explanation. In order to estimate the effect of FDI-inflows on prospective student's choice of pursuing a B&A-degree this study will use panel data. Many factors influence the decision of field of study for a student, and several of these factors such as culture and profession status can be difficult to measure and hence will be omitted from the estimation. The positive aspect of this is that these factors can be expected to remain relatively constant over time and hence be controlled for in the fixed-effects estimation.

If possible, it would have been more efficient to use a random effects specification to estimate the effect of FDI-inflows on B&A-share. However, the random effects estimator relies on a strict unrelatedness assumption implying that the individual-specific effect  $a_i$  is a random variable that is uncorrelated with the other explanatory variables in model (1). This assumption is relaxed in the fixed effects model and the individual-specific effect  $a_i$  is allowed to be correlated with the other explanatory variables. As many time constant factors such as location and resource composition may affect the FDI-inflows to a country, our intuition guides the use of the fixed effects model (also called the within model). In order to obtain the right standard errors we use a fixed effects model including an intercept,

taking into account that the fixed effects demeaning is conducted using estimated means.

Before moving on, a note on the issue of reversed causality is in place. The lagged structure of model (1) serves as a way of mitigating any potential reverse causality issues. This problem can for instance arise if human capital attracts FDI, leading to more FDI in countries with higher level of human capital, remembering the literature on the importance of human capital for FDI.

Finally, in addition to investigating the four propositions in section 3, we will run model (1) for different regional effects using interactions between the FDI-variable and regional dummies.

## 5.2 Data

Having presented the previous research, the propositions and the empirical model, one step remains before heading to the results and that is to describe our data set more in depth.

The analysis is based on 48 countries. Due to insufficient data, a number of the 75 countries in the sample were excluded from the analysis. These are countries that lack observations when combined with the full-set of controls. As we seek to observe within-country observation we have excluded countries that have only one observation. A list of the dropped countries can be found in Table A2 in Appendix A.

The data for the dependent variable on tertiary graduates is obtained from two sources. Data for the years up until 1997 was found in UNESCO Division of Statistics statistical yearbooks 1996–1998 (Table 3.12 Education at the third level: graduates by ISCED level and field of study) categorized according to the International Standard Classification of Education (ISCED) 1976. The data is available for 18 groups of educational programs. Data for the period 1998–2012 was provided from UNESCO Institute of Statistics categorized in 24 groups of programs according to the ISCED classification 1997. In order to match these two datasets and obtain a time series ranging the entire period we screened the two ISCED classifications and combined the categories according to Tables B1 and B2 found in Appendix B.

The frequency of B&A-observations varies between the years. The years with the most observations are 2009 and 2010, with 38 observations on B&A-graduates, while the year of 1998 has merely one observation and is thus the year with the least number of observations (as seen in Figure C1 in Appendix C). Equally important to mention is that in 1998 the ISCED 1976 classification was replaced by the new ISCED 1997 classification. In Figure 2 one can see how the share of business graduates have varied over time during the specific time period investigated in this study. Important to keep in mind is that the share for 1998 is based on one observation.

In the analysis the dependent variable covers the period 1997–2012 while the controls cover the period 1992–2007, as the choice of majoring in B&A is assumed to be dependent on a choice made five years back in time. The sample to be analyzed includes 48 emerging economies from Africa, Asia, Latin America and Europe. Unfortunately not all countries have reported on both B&A-share and FDI-inflows for all periods, why our panel is unbalanced.

Figure 2 Share B&A-graduates yearly mean, 48 analyzed countries, 1997-2012

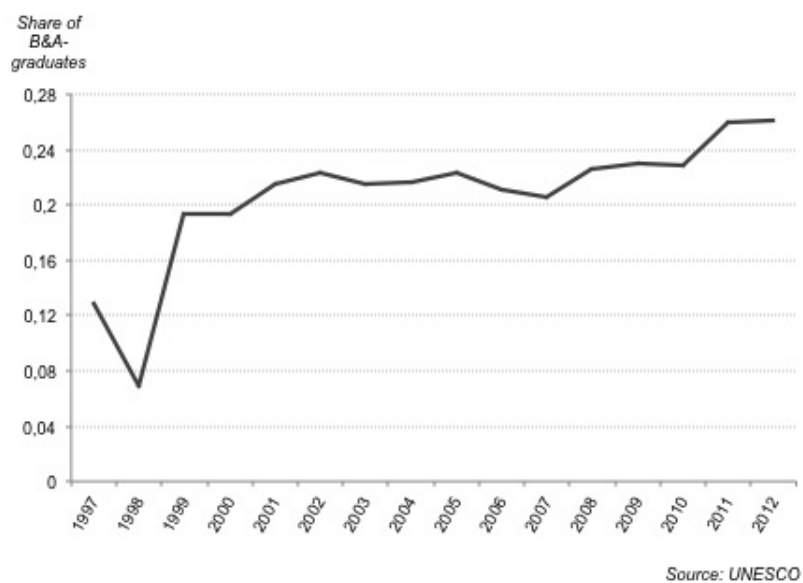
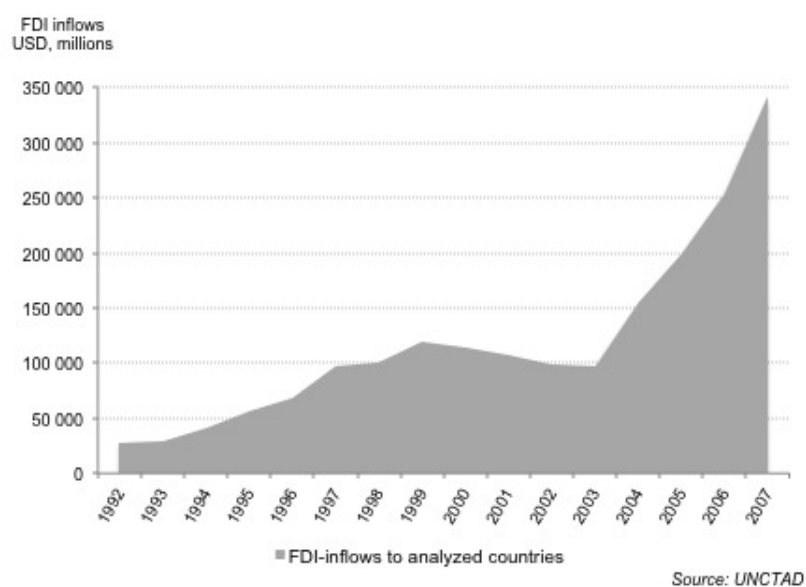


Figure 3 FDI-inflows, 48 analyzed countries 1992-2007



As the ISCED classification was changed in 1997 together with the reporting system, a robustness check using only B&A-shares from 1999 and onwards will be conducted in order to assure the results are robust to the change of classification.

The smoothing of the FDI-inflows and concerned controls result in that the value on the first year of our analysis, the year 1997, will be based on a rolling average of solely one observation, namely the one for the year of 1992. As a result, the value in the following three years will also be based on less than five observations (the first year using full five years rolling averages is therefore 2001). We believe that the issue with the first five time periods in our sample will not affect the results in a major fashion. This claim may find support in the above mentioned robustness check, as using B&A-shares from 1999 and onwards suffers less from this potential issue.

An additional robustness check, using an extended time period ranging back to 1990 with graduates from 1995 will also be conducted. Worth mentioning is that this analysis is only for the sake of supporting the main results and it will not be presented fully in the text as several of the concerned countries were formed in 1992.

The data on the controls springs from different high quality sources. First, data on inward FDI flows is obtained from the United Nations Conference on Trade and Development (UNCTAD). Second, data on other economic activity variables such as market size (size of total population), GDP growth, trade (percentage of GDP), and on the service value added (percentage of GDP) are all obtained from the World Bank World Development Indicators. In order to investigate the ancillary proposition of a larger engineering share when FDI flows to resource dependent countries, data on natural resource exports was collected from UNCTAD. A detailed description and links to the data-sources can be found in Table D1 in Appendix D.

As was stated in the last ancillary proposition, the share of engineer graduates are expected to increase as a result of higher FDI-inflows to highly resource dependent countries. Regarding that, the countries are denoted as highly resource dependent if they have on average 50 percent or more of their exports in natural resources over the period 1992–2012. The measure on natural resource exports is based on exports on fuels; ores and metals; and pearls, precious stones and non-monetary gold (as defined by the current Standard International Trade Classification (SITC) codes 3, 2, 6 and 9 and grouped by UNCTAD). Table D2 in the Appendix D describes more in detail the above mentioned categories.

Before moving on to the results, a comment on the nature of the data is required. Figure 3 shows the sum of the FDI-inflows to the 48 countries included in the analysis during the years 1992 to 2007. As can be seen, the analyzed countries have experienced rapid increases in FDI-inflows during the time period investigated, with a sharp increase in 2003.

Table 1 Summary statistic of key variables in the analysis

| Variable  | Mean  | Std. Dev. | Min.   | Max.   | Observations |
|---|-------|-----------|--------|--------|--------------|
| B&A-share   | 0.222 | 0.080     | 0      | 0.488  | 416          |
| FDI-inflows <sub><math>t-5</math></sub>           | 3 394 | 6 538     | -4 749 | 55 874 | 416          |
| Mov. avg FDI-inflows <sub><math>t-5</math></sub>  | 2 495 | 4611      | 1.60   | 26476  | 416          |
| GDP growth <sub><math>t-5</math></sub>            | 3.98  | 5.64      | -32.1  | 34.5   | 414          |
| Population (millions) <sub><math>t-5</math></sub> | 21.2  | 34.9      | 0.287  | 190    | 416          |
| Services <sub><math>t-5</math></sub>              | 55.8  | 11.5      | 17.6   | 79.9   | 416          |
| Trade <sub><math>t-5</math></sub>                 | 95.0  | 41.9      | 15.8   | 220    | 413          |

B&A-share is over the years 1997–2012, all other variables are over the years 1992–2007 (denoted by  $t - 5$ )

Table 1 shows some summary statistics of the key variables in the analysis. The variable of FDI-inflows includes some negative values, while the moving average of FDI-inflows does not. Therefore, we will not loose any observations when taking the logarithm of this variable. For further information regarding the data and variables please see Table C1 in Appendix C.

## 6 Results

### 6.1 The effect of FDI on B&A-graduates

In Table 2, results from six different regressions can be found. All the models show signs of heteroscedasticity as the null of groupwise homoskedastic errors was rejected at the 1 percent level in a Wald test. To mediate this problem and any potential serial correlation in the errors, cluster-robust standard errors are used in all of the regressions.

Starting with column (1), it appears to be a significant correlation between FDI-inflows five years back in time and the amount of B&A-graduates today. When allowing for a time trend in column (2), a drastic shift in the estimate size can be noted corresponding to a reduction in size by almost 50 percent while it remains significant at the 5 percent level. Next, in column (3) when including services value added the coefficient of the key explanatory variable decreases but remains positive and statistically different from zero at the 10 percent level. Moving on to column (4) when controlling for both services value added and trade the effect from the key explanatory FDI declines both in estimate size and significance. When adding the population as a proxy for market size in column (5) the results remain rather stable, while the estimate on FDI-inflows increases slightly when including GDP-growth in column (6). According to specification (6) a one percent increase in FDI-inflows leads to a 0.00815 percentage point increase in the share of B&A-graduates five years later. Although the coefficients on FDI in columns (4) to (6) are not significant at any conventional levels, they are basically unchanged in size.<sup>7</sup>

As expected, the variables services value added and population size enter with positive signs. While positive, the estimated effect from service value added enters significantly at the 10 percent level

<sup>7</sup>As we are using a fixed effects regression including time dummies the R-squared will not be informative and is therefore not reported in the tables.

Table 2 **Main results – Dependent: Yearly share B&A-graduates 1997–2012**

|                                | (1)                    | (2)                   | (3)                   | (4)                     | (5)                     | (6)                     |
|--------------------------------|------------------------|-----------------------|-----------------------|-------------------------|-------------------------|-------------------------|
| $\ln(\text{FDI})_{t-5}$        | 0.0201***<br>(0.00443) | 0.0106**<br>(0.00483) | 0.00880*<br>(0.00503) | 0.00748<br>(0.00505)    | 0.00730<br>(0.00515)    | 0.00815<br>(0.00531)    |
| $\text{Services}_{t-5}$        |                        |                       | 0.00143<br>(0.00100)  | 0.00158<br>(0.00110)    | 0.00214<br>(0.00185)    | 0.00289*<br>(0.00170)   |
| $\text{Trade}_{t-5}$           |                        |                       |                       | -0.000267<br>(0.000438) | -0.000223<br>(0.000501) | -0.000178<br>(0.000452) |
| $\ln(\text{Population})_{t-5}$ |                        |                       |                       |                         | 0.0764<br>(0.147)       | 0.0726<br>(0.146)       |
| $\text{GDP growth}_{t-5}$      |                        |                       |                       |                         |                         | -0.00177<br>(0.00221)   |
| Constant                       | 0.0931***<br>(0.0284)  | 0.0410<br>(0.0364)    | -0.0129<br>(0.0552)   | 0.0258<br>(0.0862)      | -1.215<br>(2.443)       | -1.219<br>(2.377)       |
| Year dummies                   | No                     | Yes                   | Yes                   | Yes                     | Yes                     | Yes                     |
| Fixed effect                   | Yes                    | Yes                   | Yes                   | Yes                     | Yes                     | Yes                     |
| Observations                   | 416                    | 416                   | 415                   | 414                     | 414                     | 412                     |
| Countries                      | 48                     | 48                    | 48                    | 48                      | 48                      | 48                      |

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ 

only in column (6), after adding GDP growth. The measure for market size, population, is insignificant in all specifications. On the other hand, trade and growth enter with negative signs. Even if these effects are small and statistically insignificant, the unexpected negative effects will be discussed further below.

In order to perform valid hypothesis testing, normality of the residuals is required. Therefore three types of graphical normality analyses are conducted for the regression in column (6) of Table 2. Although there are signs of deviation both regarding the middle and the tails, the residuals follow an approximate normal distribution. The concerned graphs can be viewed in Figure C2–4 in Appendix C. As such, we still feel confident enough to interpret the t-statistics, however stressing that the results should be interpreted with care.<sup>8</sup>

As pointed out in the data section, there was a change in the educational classification system by UNESCO in 1998. Figure 2 also indicates a steady increase in the share of B&A-graduates after 1998. This increase could be due to more students actually choosing to study business or due to the fact that tertiary education defined in ISCED 1997 constitutes a different number of study levels than does the former system ISCED 1976, or both. As described above, screening the two classifications and picking out level 4 from the 1998–2012 data, was an attempt to make the two classifications compatible.

<sup>8</sup>It should also be noted that the normality assumption is not needed in order to obtain unbiased estimates of the regression coefficients.

To make sure that the positive effects seen in Table 2 are not driven by the use of two different classifications, the same regression as for the main results is conducted, but now based on a dataset only containing the B&A-share in 1999 and onwards. The results, displayed in Table C2 Appendix C are comparable to the main results, but with higher significance levels. Thus, they speak in favor for the main results.

Another analysis carried out, using data for two more years (i.e. from the year 1990 for FDI and the year 1995 for B&A-graduates) further supports the findings in the main table. There the effect from FDI-inflows on the share of B&A-graduates is positive, significant and slightly bigger than in Table 2.<sup>9</sup> The results are displayed in Table C3 in Appendix C.

## 6.2 FDI on B&A-graduates in post-Soviet, transition and other regions

The countries in our sample are classified into one and the same category of emerging economies, while spanning over many different geographical regions. By running model (1) with the complete set of controls, as presented in column (6) in Table 2, but adding interaction terms between regional dummies and the inward FDI-flows, we study the potential difference in the regional effects from FDI on B&A-share of graduates. Thus we run the following extension of model (1):

$$B\&A_{it} = \alpha + \beta_1 \ln(FDI)_{it-5} + \beta_2 \ln(FDI)_{it-5} \times Region + \gamma \mathbf{X}_{it-5} + \eta_t + a_i + u_{it}$$

where *Region* is a dummy indicating one or more of the regions included in our sample (Africa, Asia, Latin America, Middle East, post-Soviet and transition economies excluding post-Soviet).

As was discussed in Section 4, we have a particular focus on transition economies and the former Soviet states: two groups of countries that have similar political backgrounds and that have both gone through important changes since 1989 and the fall of their political and economic systems. The two groups are therefore expected to be comparable while different in the sense that the post-Soviet states were previously governed as one and the same country in contrast to the other economies in transition. By looking at these two groups of countries separately, we will investigate this natural experiment setting further.

The results from these regressions can be found in Table 3 below. The first column displays the effect of FDI-inflows in former Soviet states (post-Soviet) compared to the rest of the countries in our sample, while the second column also displays the effects in European transition economies excluding former Soviet-states (transition). In the third column the results from including the complete set of regions are displayed.

Important to mention is that when reading the results in Table 3 attention must be paid to the fact that the comparison groups contain different countries. The reason for displaying the results as in Table 3 is to show the effect when the post-Soviet states are separated out and put that effect in

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<sup>9</sup>The reasons why this data is not used for our main analysis is the fact that several of the included economies (read post-Soviet countries) were not formed until 1992.

contrast to the effect seen from separating out the European transition economies. Moreover, in the third column, all regions are compared to the three African countries.

As can be observed in the first column of Table 3 the difference between post-Soviet and the rest of the countries in our sample is statistically significant at the 5 percent level and on average negative. For post-Soviet countries, a one percent increase in FDI-inflows corresponds to a 0.010 ( $= 0.0122 - 0.0222$ ) percentage points decrease in B&A-graduates. In the second column when also bringing out the transition economies from the comparison group, the coefficient for this group compared to the rest of the countries in our sample (countries in Africa, Asia, Latin America and the Middle East) is small and insignificant. The coefficient on post-Soviet keeps its magnitude but becomes insignificant at any conventional level of significance.

The third and last column of Table 3 contains all the regional dummies in our sample and has the African region as the comparison group. To begin with, the post-Soviet states exhibit roughly the same negative net-effect as in the previous columns. Transition economies appear with positive net-effects, similar in size to the regional effects of Latin America and the Middle East. At the other end, a negative regional effect is found in the Asian countries. This coefficient should however be interpreted with care as the Asian group consists of only 3 countries and 13 observations. The comparison group consisting of African countries turn out to have a very positive effect, but also here the estimate is based on few data points (3 countries, 14 observations).

### 6.3 Effects of FDI on other fields of study

As a check of robustness for our theory on how FDI-inflows can affect the relative attractiveness of a certain major, a basic form of the empirical model is applied to two other shares of graduates, for which FDI-inflows can have different implications than for B&A-graduates. To connect back to our ancillary propositions, the first one regards the relationship between FDI-inflows and the relative attractiveness of graduating in education, with the expectation of no effect. The second and third ancillary propositions instead regard the impact of FDI-inflows on the share graduating in engineering and whether this impact changes when FDI goes into resource dependent countries.

In order to investigate these hypothetical relationships, regressions were run on FDI-inflows and the shares of graduates in education and engineering, in Table 4 using emerging markets in general and in Table 5 considering highly resource dependent countries in particular. The regressions in this section use the same basic specification as all previous regressions including fixed effects and general time trends but excluding the vector of controls. This because the controls are specific for B&A-graduates, and cannot directly be transferred to explain education or engineering graduate shares. The implication for the results is that we cannot easily say something about causality. Although this is the case, the results are illustrative in explaining the correlations and their signs. The results are corrected for heteroskedasticity and serial correlation by using clustered standard errors.



Table 3 **Regional effects – Dependent: Yearly share B&A graduates 1997–2012**

|  | (1)                     | (2)                     | (3)                     |
|--|-------------------------|-------------------------|-------------------------|
| $\ln(\text{FDI})_{t-5}$  | 0.0122**<br>(0.00568)   | 0.0119<br>(0.00760)     | 0.0795<br>(0.0657)      |
| $\text{Services}_{t-5}$  | 0.00299*<br>(0.00171)   | 0.00298*<br>(0.00173)   | 0.00304*<br>(0.00176)   |
| $\text{Trade}_{t-5}$   | -0.000354<br>(0.000473) | -0.000355<br>(0.000471) | -0.000364<br>(0.000475) |
| $\ln(\text{Population})_{t-5}$   | 0.0476<br>(0.143)       | 0.0533<br>(0.166)       | 0.0490<br>(0.167)       |
| $\text{GDP growth}_{t-5}$  | 0.000917<br>(0.000941)  | 0.000915<br>(0.000933)  | 0.000945<br>(0.000923)  |
| $\ln(\text{FDI})_{t-5} \times \text{post-Soviet}$                                | -0.0222**<br>(0.0108)   | -0.0215<br>(0.0156)     | -0.0896<br>(0.0692)     |
| $\ln(\text{FDI})_{t-5} \times \text{transition}$<br><i>excluding post-Soviet</i> |                         | 0.00101<br>(0.0126)     | -0.0667<br>(0.0679)     |
| $\ln(\text{FDI})_{t-5} \times \text{Middle East}$                                |                         |                         | -0.0673<br>(0.0663)     |
| $\ln(\text{FDI})_{t-5} \times \text{Latin}$                                      |                         |                         | -0.0681<br>(0.0673)     |
| $\ln(\text{FDI})_{t-5} \times \text{Asia}$                                       |                         |                         | -0.112<br>(0.100)       |
| $\ln(\text{FDI})_{t-5} \times \text{Africa}$<br><i>(omitted)</i>                 |                         |                         | 0<br>(.)                |
| Constant   | -0.783<br>(2.343)       | -0.873<br>(2.702)       | -0.806<br>(2.707)       |
| Year dummies   | Yes                     | Yes                     | Yes                     |
| Fixed effect   | Yes                     | Yes                     | Yes                     |
| Observations   | 412                     | 412                     | 412                     |
| Countries  | 48                      | 48                      | 48                      |

*Note:* Soviet: 101 observations in 11 countries, transition: 121 observations 10 countries, Middle east: 69 observations 8 countries, Latin america: 95 observations 13 countries Asia: 13 observations 3 countries, Africa: 14 observations 3 countries. Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 4 **Dependent: Yearly share education and engineer graduates 1997–2012**

|                  | (1)                  | (2)                  |
|------------------|----------------------|----------------------|
|                  | Educ                 | Engin                |
| $\ln(FDI)_{t-5}$ | 0.00317<br>(0.00989) | 0.00377<br>(0.00469) |
| Constant         | 0.255***<br>(0.0530) | 0.109***<br>(0.0283) |
| Year dummies     | Yes                  | Yes                  |
| Fixed Effect     | Yes                  | Yes                  |
| Observations     | 435                  | 400                  |
| Countries        | 48                   | 48                   |

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ 

The two regressions in Table 4 illustrate the findings regarding the first and second ancillary propositions. The first column shows the regression of education share and FDI-inflows. The coefficient of FDI is positive although statistically insignificant according to expectation. Similarly, when investigating the effect from FDI-inflows on engineering graduates the sign is positive while statistically insignificant, as was expected.

The absence of an effect of FDI-inflows on engineering graduates is not surprising as the data on FDI-inflows employed in this study is general and spread across sectors. As engineering is a narrower field than B&A we do however expect a positive relationship when the investment can be regarded as more engineer intensive. To test this brings us to the last ancillary proposition where inward FDI-flows in highly resource dependent countries are expected to have a positive effect on the share of engineering graduates. Two regressions similar to the ones in column (1) and (2) in Table 4 were run, but now with the addition of an interaction term between FDI-inflows and a resource-dependent dummy variable denoted as  $\ln(FDI)_{it-5} \times Resource$ , to capture the effect in highly resource dependent countries.

The results from this test can be found in Table 5. The first column shows that both the FDI term and the interaction term turn out insignificant for the share of education graduates. When looking at the engineering shares, the coefficient of FDI-inflows is negative and insignificant, while the interaction term is positive and highly statistically significant at the 1 percent level. This result implies that a one percentage increase in inward FDI-flows coming to highly resource dependent countries is associated with a 0.0197 percentage point increase in the share of students graduating in engineering. Thus, when FDI-inflows go into resource dependent countries, there is a positive association with a positive change in the relative attractiveness of achieving an engineer diploma, as opposed to obtaining a diploma in education. Hence, the findings in Table 5 speak in favor of the proposed effect.

Table 5 **Interaction highly resource dependent countries and FDI –**  
**Dependent: Yearly share education and engineer graduates 1997–2012**

|  | (1)                  | (2)                    |
|--|----------------------|------------------------|
|  | Educ                 | Engin                  |
| $\ln(\text{FDI})_{t-5}$                        | 0.0161<br>(0.0171)   | -0.00515<br>(0.00422)  |
| $\ln(\text{FDI})_{t-5} \times \text{Resource}$ | -0.0315<br>(0.0233)  | 0.0248***<br>(0.00358) |
| Constant                                       | 0.210***<br>(0.0726) | 0.146***<br>(0.0201)   |
| Year dummies                                   | Yes                  | Yes                    |
| Fixed Effect                                   | Yes                  | Yes                    |
| Observations                                   | 435                  | 400                    |
| Countries                                      | 48                   | 48                     |

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 7 Discussion

The main aim of the conducted investigation in the previous section was to see whether our claim of a positive impact from FDI-inflows on the share of B&A-graduates holds. The results, as displayed in Table 2 do speak in favor of a positive effect from increased foreign capital inflows to the host economy’s share of business graduates.

The reader is advised to interpret the results with care as factors both weakening and strengthening the results are found. First of all, the estimated effect from FDI-inflows on the share of B&A-graduates five years later do not remain significant at any conventional level when stepwise including the other controls. However, the FDI estimate remains relatively unchanged in size throughout all specifications including a time trend—speaking favor of the estimated effect. Second, ambiguous indications are observed when considering regional effects. On the one hand, a deviation from the pattern of positive effects from FDI-inflows on the share of B&A-graduates is seen in the post-Soviet countries. On the other hand, the effects in three of the five analyzed regions (Latin America, the Middle East and transition economies excluding post-Soviet countries) are positive and of similar size.

The method used to analyze the effect appears valid when performing a basic analysis of two other fields of study. Three propositions, one regarding graduates from the educational field of study and two regarding engineering graduates, were investigated and the results indicated the same effects as were proposed.

The results in this study are related to the findings in Egger et al. (2005) and Checchi et al. (2007), as both of these studies find a positive effect from FDI on the enrollment in higher education. Moreover, the result corresponds to the discussion in Blomström and Kokko (2003) with regards to how

increased FDI-inflows create an incentive to complete tertiary training in business. Bearing in mind that the significance is below conventional levels, the results, nevertheless, still hint at an interesting effect on B&A-graduates stemming from FDI-inflows in emerging economies. Next, we will dig deeper into the possible implications of the results, and discuss their economic significance.

## 7.1 Analysis of main results

The estimated effect of FDI-inflows on the B&A-share is 0.00815 (column (6) of Table 2), an effect that at first glance might look rather small. Three things are then important to keep in mind. Firstly, the estimates mirror a percentage point change in the share of B&A-graduates related to a one percent increase in FDI-inflows. Secondly, the dependent variable is a share and thus requires other fields of study to decrease in order for it to increase. Thirdly, even a small marginal impact from FDI-inflows on the B&A-share matters since the inward FDI-flows have increased substantially for the analyzed economies between the years 1992 and 2007 (from USD 27 000 million in 1992 to USD 341 000 million in 2007, see Figure 3 in the Data-section). Combined, these factors indicate that the estimated effect is not negligible.

Now to the stepwise included controls in Table 2. As was expected, there are indications of a positive effect on the share of B&A-graduates from a larger service sector. Also, as the estimate of FDI falls when including services, it seems like the effect from the service sector partly confounded the effect from FDI-inflows when not included.

Similarly it seems important to control for the economic openness of the country as the effect and the significance from FDI drops further when including trade. Another effect to note is that the effect from services grows at the same time as the effect from FDI falls. A possible explanation may be that more FDI leads to more financial services being traded, which could be neglected when not controlling for trade. Nevertheless, the exact reason for this effect is out of the scope of this study.

Although the estimate for trade is insignificant, capturing a zero effect within one standard deviation, the potentially negative estimate for trade deserves a comment. One possible explanation could be that other fields of study become even more attractive than B&A when the economy is open for trade.

Size of population, included as a measure of market size, turned out to decrease the effect from FDI. Hence, the assumptions that FDI is attracted to larger markets and that larger markets may have more business opportunities as well as more students graduating in business seem to hold. It should also be mentioned that population was included with the expected (positive) sign while very insignificant.

Noteworthy effects also appear when including the variable growth. It was expected that growth would decrease the estimate on FDI as a result of growth capturing some of the effect from FDI on B&A-graduates. However, opposite to expectation, growth turned out to have a negative effect on the B&A-share. As a consequence the estimate on FDI increased in size as it was no longer confounded

by the negative effect from growth. A similar effect in terms of an increase in the estimate is seen for services value added, which becomes significant at the 10 percent level when growth is included.

In the light of our results, it is the hypothesized relationship between growth and B&A-share that appears faulty, rather than the one between growth and FDI-inflows. The unexpected sign may have a similar explanation as the one mentioned when discussing the variable trade. Meaning that other fields of study gain more from growth than the field of B&A do, as these fields become more productive when growth is high. As the effect is strongly insignificant it will not be discussed further.

## 7.2 Regions and ancillary analysis

Moreover, we find the relationship between inward FDI-flows and the share of business graduates to differ between the post-Soviet states and the other economies in the sample. Post-Soviet states seem to exhibit a negative effect from FDI-inflows on the share of B&A-graduates. When only breaking out the post-Soviet region from the rest of the countries in our sample, the negative effect is significant at the 5 percent level. The result observed for former Soviet countries, might imply that this group could be different from the rest of the emerging markets regarding the effects that FDI-inflows have on the share of B&A-graduates, even if the few Asian economies were included with a negative effect.

The negative effect from FDI-inflows on the share of B&A-graduates for post-Soviet countries is puzzling but we see a couple of potential explanations. First, regarding the negative estimate, future students in former Soviet countries may be culturally induced to believe that alternative degrees can prove more useful when applying for a position in the MNCs. Also, if the investments provide better wages for employees with other degrees than B&A, aspiring B&A-students—expected to be especially triggered by monetary rewards—might pursue other degrees, reducing the relative share of B&A-graduates in the future.

The countries denoted as transition countries and the former Soviet states, are all characterized by a shift from planned economy to market economy during the investigation period. As their institutional backgrounds can be deemed similar, it was expected that the groups would generate comparable effects. The result did not turn out as expected. The transition countries excluding post-Soviet are more similar to Latin America and the Middle East, than they are to the post-Soviet countries, as seen in Table 3. Since we see differing regional effects that do not seem to be explained by a similar institutional background (or regional geographic position), this suggests that something currently not accounted for might drive the results.

The ancillary analysis conducted regarding graduates in the education and engineering study fields provides support for our main analysis. As was found in the Results-section 6.3 neither the share of education graduates nor the share of engineering graduates exhibit a significant correlation with FDI-inflows. Both of the effects can also be considered as small when compared to the corresponding effect for B&A-share, as shown in column (2) of the Main results-table 2.

Education and B&A are rather general fields, but with the difference that graduates in educa-

tional fields are less likely to find direct employment in foreign affiliates. For this reason, we expected no effect from FDI-inflows on education. Moreover, an insignificant correlation between FDI-inflows and the share of engineering graduates was expected when looking at countries in general. Hence, both these cases turned out as proposed.

When considering the effect of foreign capital inflows to resource dependent countries in particular, a positive and significant relationship between the share of engineering graduates and FDI-inflows was revealed (Table 5). The insignificant relationship in general and the significant impact for a certain group of countries corresponds to the proposed effects. The argument by Blomström & Kokko (2003) that FDI may serve as an incentive for tertiary education in engineering does not seem to hold in the general case whereas it stands strong when the flows can be regarded as more engineer-intensive. This suggests that economies with different characteristics are influenced by FDI-inflows in different ways regarding human capital composition.

Or perhaps it is the other way around: that countries are affected differently depending on the characteristics of the FDI-inflows. Taking the differing and unexplained regional results into consideration, together with the finding regarding FDI-/economy-characteristics point at an interesting area for future studies.

### 7.3 Endogeneity and validity

The possibility of omitted variable bias in the specification above would occur when failing to control for one or more independent variables that could have an effect on the B&A-share. The fixed effects estimator partly takes care of this problem, as long as the omitted variables are constant over time.

In this section we will give some examples of variables that are not controlled for and hence could cause a risk of endogeneity bias in our model. Culture is one such variable that in some contexts could affect the willingness to study business but that is omitted from the model (1). For instance, the view of the market economy can be a result of cultural values and beliefs. This view can potentially spill over to the perception of the jobs in the financial or economic sector, and in that sense affect the desire to study business. Hypothetically, a positive attitude toward the market economy as a system will result in a relatively favorable view of the market institutions supporting this system, causing a positive view of employment and education in business. At the other end of the spectrum, a negative view of the market may generate a more negative perception of business professions and degrees.

In our model we have perceived this type of cultural variables or perceptions as fixed. A possibility for endogeneity in model (1) arises as the omitted variable could be changing cultural attitudes toward the market economy during the investigation period. Considering the large changes that still occur in terms of market and political integration intensified since the early 1990's for the countries in our sample, a change in cultural perceptions regarding market economy could have occurred.

If the status of holding a B&A-degree changes due to an altering cultural perception of the market economy the estimates in our regressions will be biased. Depending on the effect and change of cultural

perception, the direction of the bias of the key explanatory FDI will differ. Hence, the predicted effect from a cultural variable is not easy to determine, especially as data on this phenomenon is scarce. Nevertheless, we deem the model to be valid since cultural attitudes tend to change slowly and any change during the concerned time period should reasonably be small.

Another factor causing possible threats to the validity of our model is the assumptions made regarding the choices of education. The underlying assumption for the model specified is that each student herself/himself chooses what field to study. The problem arises if the spots, rather than being set according to the sole demand from the students, are set by the state as a fixed amount. This may occur irrespective of the demand from the labor market or as a strategic response to it. Either way, this would result in an increase or decrease in the B&A-share, depending on what field the state deems as important or most necessary to develop. Our controls would then be misspecified as they are all based on the assumption of demand from the students.

We do not exclude the probability of states setting the number of spots on other grounds than the demand from students or the labor market. However, as we have not come across literature discussing the topic in other regards than in the case of former Soviet (premiering engineering and science), we dare to assume that the risk of spots being set irrespective of the demand from the labor market as limited. Judging from the scarce literature on how the composition of higher education can be used in order for emerging economies to make the most use of FDI, it might be difficult for countries to act strategically in how they respond to increased FDI-inflows. This is the research gap that this study has tried to reduce.

Many elements of the method implemented in this study would also be useful when analyzing a related question in another setting. The specific results found in this study may however not be extrapolated to other contexts as the results are very specific to the time period and the countries in question.

The internal validity of the results can be questioned given the risk of omitted variable bias discussed above and the fact that the normality assumption appears weak. Despite these shortcomings, the model still provides results that hint at important effects on educational attainment that need to be accounted for when trying to maximize the benefits of foreign capital inflows. Our main proposition finds support as the other propositions regarding education and engineering also respond according to expectation. Lastly, the positive effect on B&A-graduates stand robust to the results in the robustness checks made on the longer time period (using the B&A-share from 1995 and onwards) and on the shorter time period starting in 1999 after the ISCED classification change (see Table C2 and Table C3 in Appendix C).

## 8 Conclusion

The aim of this study was to shed light upon one aspect of how foreign capital flows affect the choices of university education in emerging markets. We have done so by investigating the effect from inward FDI-flows on the distribution of B&A-graduates during the past two decades. In order to support our main proposition, a simple form of the model was tested regarding FDI's effect on graduates in education and engineering respectively. Moreover, the study focused on potential regional differences regarding FDI-inflows' effect on the share of B&A-graduates. Attention was directed toward the former Soviet states and the other transition countries in Europe—two regions exposed to a similar market liberalization process after the fall of their political and economic systems in the early 1990's.

Many previous papers have studied the impacts of FDI in the host economies from a wide variety of angles. While it is important to understand these broad effects, it is as crucial to grasp the deeper implications that FDI can have on the host markets, on their people and, in the long run, on their development.

In this study we have made an attempt to quantify such a deeper implication and have found a positive effect from FDI-inflows on the share of B&A-graduates. The positive effect is assumed to stem from prospective students being incentivized by the new possibilities for employment in the foreign affiliates. However, this positive effect is not seen everywhere. When regional effects are considered, the effects from FDI-inflows on B&A-graduates differ. Especially puzzling is that post-Soviet states and other transition economies exhibit drastically different effects despite their similar institutional backgrounds. Nevertheless, it is worth to note that the bulk of regions in our sample show very close effects. Our main analysis finds further support when testing the effect from FDI-inflows on the two other fields of study, as these effects turn out as expected. Hence, the contribution from this study to the current knowledge is that foreign investments seem to affect the composition of the human capital stock of a country.

Using the new findings in this paper together with the established knowledge can hopefully provide a step on the way toward fully understanding the effects from capital market integration on emerging economies. As such, the results carry potential to be of use when forming recommendations for educational decisions in countries experiencing rapid inflows of foreign capital.

As has been stressed throughout this work we are only at the beginning of a great journey toward fully understanding the impacts of increased market integration on human capital accumulation. It is therefore important to provide suggestions for what questions to be taken on for future research.

Studies digging deeper into the effects from FDI on other fields of study as well as evaluating how the transformed human capital composition affects growth and development, can assist to bridge the current research gap in this regard. One suggestion is to consider FDI-flows to specific sectors and estimate the effect of these flows on related fields of study. This since general FDI and B&A cannot provide all the answers regarding the link between FDI and human capital formation. A related topic is how this link depends on an economy's characteristics. The finding that engineering



graduates were positively affected by FDI in highly resource dependent countries, motivates such a focus. Using country specific case studies could be one way of investigating this type of more in-depth effects. Perhaps this could also capture the differing regional effects left unexplained in this paper. Additionally, in order to draw more general conclusions, a recommended approach would be to study this phenomenon in a wider set of countries and during a longer period of time.

A longer time period could enable a deeper analysis of the differing regional effects. For instance, it would then have been possible to evaluate whether the membership of the European Union (EU) could play a part in the differing effect seen across the transition countries and the post-Soviet states. As the EU-countries in our sample became members of the EU in 2004 the earliest, the time span in this study is simply too short for drawing any conclusions from the impact of EU-membership on the observed differences across countries.

Lastly, in further research on this topic it becomes increasingly important to control for the effect regarding changing cultural attitudes. In particular, the cultural effect that we have deemed constant over the time-period investigated in this study might not remain constant in longer time periods. Therefore, it may be wise for future studies to consider the possibility of cultural change to affect the relative attractiveness of studying business.

While a few question marks have been left for future research to explore, this paper points at important effects necessary to be accounted for in the future explorations.

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# Appendices

## Appendix A – Sample countries

Table A1 The 48 countries included in analysis

| <u>Africa</u>   | <u>Latin America</u>       | <u>Middle East</u>             | <u>Post-Soviet</u>           | <u>Transition</u> |
|-----------------|----------------------------|--------------------------------|------------------------------|-------------------|
| Morocco (2)     | Argentina (11)             | Brunei Dar. <sup>R</sup> (13)  | Azerbaijan <sup>R</sup> (5)  | Albania (5)       |
| Namibia (5)     | Brazil (9)                 | Un. Arab Em. <sup>R</sup> (2)  | Belarus (6)                  | Bulgaria (14)     |
| Swaziland (7)   | Chile <sup>R</sup> (7)     | Iran <sup>R</sup> (9)          | Estonia* (13)                | Croatia (10)      |
|                 | Colombia (4)               | Jordan (6)                     | Georgia (10)                 | Czech Rep.* (14)  |
|                 | Costa Rica (5)             | Lebanon (11)                   | Latvia* (15)                 | Hungary (13)      |
| <u>Asia</u>     | El Salvador (10)           | Oman <sup>R</sup> (3)          | Lithuania (15)               | Macedonia (14)    |
| Malaysia (8)    | Guyana (9)                 | Saudi Arabia <sup>R</sup> (13) | Kyrgyz Rep.* (13)            | Poland (10)       |
| Philippines (2) | Mexico (13)                | Turkey (11)                    | Moldova* (4)                 | Romania (13)      |
| Sri Lanka (3)   | Panama (10)                |                                | Russia <sup>R</sup> (3)      | Slovakia* (14)    |
|                 | Peru <sup>R</sup> (7)      |                                | Tajikistan <sup>R*</sup> (6) | Slovenia* (14)    |
|                 | Paraguay (2)               |                                | Ukraine (11)                 |                   |
|                 | Uruguay (5)                |                                |                              |                   |
|                 | Venezuela <sup>R</sup> (3) |                                |                              |                   |

Number in parenthesis is number of observations in column (6) Table 2

<sup>R</sup> Defined as resource dependent country

\* Non-emerging post-Soviet or transition economy

Serbia, Montenegro and Kosovo are excluded since none of them have existed as sovereign states during the majority of the investigation period.

Equatorial Guinea and Angola are excluded since they are counted as Least Developed Countries by the United Nations (2014).

Table A2 The 27 countries dropped due to missing data

| <u>All regions</u> |                    |                |                  |                  |
|--------------------|--------------------|----------------|------------------|------------------|
| Algeria (0)        | China (0)          | India (0)      | Pakistan (0)     | Turkmenistan (0) |
| Armenia (1)        | Dominican Rep. (1) | Indonesia (1)  | Qatar (0)        | Tunisia (1)      |
| Bahrain (1)        | Ecuador (0)        | Iraq (0)       | South Africa (0) | Uzbekistan (0)   |
| Bosnien Herz. (0)  | Egypt (0)          | Kazakhstan (0) | Suriname (0)     |                  |
| Belize (0)         | Gabon (0)          | Kuwait (0)     | Syrian A. R. (0) |                  |
| Botswana (0)       | Guatemala (1)      | Libya (0)      | Thailand (0)     |                  |

Number in parenthesis is number of observations if included in column (6) Table 2

## Appendix B – ISCED classifications

Table B1 Educational level classifications

| ISCED 1976 Level 5   | ISCED 1997 Level 5b   |
|--|---|
| "Education at the third level, first stage, of the type that leads to an award not equivalent to a first university degree. The core at this level consists of education for those who have completed requisite programmes at the second level, second stage, and who have completed requisite programmes at the second level, second stage, and who continue their education in a type of programme that generally does not lead to the awarding of a university degree. Typically in these programmes, less time and attention are paid to the theoretical, general, and scientific principle of the subjects studies, attention being concentrated more on application to particular vocations. Thus the programmes here are typically shorter in duration than the corresponding university degree types, i.e. characteristically shorter than four years [...] The core programmes in this level [...] are ususally shorter and more "practical" in orientation. (p.147)" | "Qualifications [...] that focus on occupational specific skills geared for entry into the labor market, although some theoretical foundations may be covered in the respective programme. The content of ISCED level 5B programmes is practically oriented/occupationally specific and is mainly designed for participants to acquire the practical skills, and know-how needed for employment in a particular occupation or trade or class of occupations or trades – the successful completion of which usually provides the participant with a labor-market relevant qualification. A programme belongs to 5B if it meets the following criteria: it is more practically oriented and occupationally specific than programmes at ISCED 5A, and does not provide direct success to advance research programmes; it has a minimum of two years' full-time equivalent duration but generally is of two or three years; it provides access to an occupation." (p.35-36) |
| ISCED 1976 Level 6   | ISCED 1997 Level 5a   |
| "Education at the third level, fist stage, of the type that leads to a first university degree or equivalent. The core at this level consists of programmes of education for those who have completed requisite programs at the second level, second stage, and who choose to continue their education in a type of programme that is generally provided by a university. [...] The importance of research is stressed by preparing students for participations in original work. Examples of these degrees are bachelor of arts, bachelor of science, diplôme, etc. (p.213)"  | [...] tertiary programmes that are largely theoretically based and are intended to provide sufficient qualifications for gaining entry into advanced research programs and profession with high skill requirements. They must satisfy a sufficient number of the following criteria: they have a minimum cumulative theoretical duration of three years' full-time equivalent, although typically they are of 4 or more years [...]; they typically require that the faculty have advanced research credentials; they may involve completion of a research project or thesis; they provide the level of education required for entry into a profession with high skills requirements or an advanced research programme. (p.35)"   |
| ISCED 1976 Level 7   | ISCED 1997 Level 6  |
| "Education at the third level, second stage, of the type that leads to a postgraduate ...  | "Second stage of tertiary education (leading to an advanced research qualification). This ...   |

| <b>ISCED 1976 Level 7</b> <i>continues</i>   | <b>ISCED 1997 Level 6</b> <i>continues</i>   |
|--|--|
| ... university degree or equivalent. The core at this level consists of programmes of education for those who have completed requisite programmes at the third level, first stage, of a type that leads to first university degree, and who choose to continue their education toward a higher degree or equivalent award. These are programmes of high-level professional education and those involving independent research of high order. [...] Programmes included in this category are of two types: [...] leading usually to a higher degree such as a master's degree [...], the other consists mainly of original research, [...], resulting in a dissertation worthy of publication. Examples of degrees are master of arts, master of science, diplôme d'études supérieures, doctorates of various kinds." (p.273) | ... level is reserved for tertiary programmes which lead to the award of an advanced research qualification. The programmes are therefore devoted to advanced study and original research and are not based on course-work only. It typically requires the submission of a thesis or dissertation of publishing quality [...]." (p.39) |

Source UNESCO ISCED 1976 and ISCED 1997

Table B2 **Educational field classifications**

| <b>ISCED 1976</b>  | <b>ISCED 1997</b>                         |
|--|---|
| 514 Teacher-training programmes<br>614, 714 Education science and teacher training         | 14 Teacher training and education science |
| 534 Commercial and business administration<br>634, 734 Business administration and related | 34 Business and administration            |
| 554, 654, 754 Engineering programs   | 52 Engineering and engineering trades     |

Source ISCED 1976 and ISCED 1997

## Appendix C – Data and robustness

Table C1 Detailed summary statistic of key variables - natural and adapted values

| Variable                                       |         | Mean  | Std. Dev. | Min.    | Max.   | Observations |
|--|---------|-------|-----------|---------|--------|--------------|
| B&A-share                                      | overall | 0.222 | 0.080     | 0       | 0.488  | N=416        |
|  | between |       | 0.686     | 0.346   | 0.605  | n=48         |
|  | within  |       | 0.502     | -0.371  | 0.400  | T-bar=8.67   |
| FDI-inflows <sub>t-5</sub><br>(USD millions)   | overall | 3 394 | 6 538     | -4 749  | 55 874 | N=416        |
|  | between |       | 6 561     | 31.6    | 36 304 | n=48         |
|  | within  |       | 3 633     | -17 466 | 23 128 | T-bar=8.67   |
| Mov. avg. FDI <sub>t-5</sub><br>(USD millions) | overall | 2 495 | 4 610     | 1.60    | 26 476 | N=416        |
|  | between |       | 4 231     | 35.3    | 18 825 | n=48         |
|  | within  |       | 2 087     | -8 803  | 12 660 | T-bar=8.67   |
| ln(Mov. avg. FDI) <sub>t-5</sub>               | overall | 6.42  | 1.88      | 0.471   | 10.2   | N=416        |
|  | between |       | 1.67      | 3.19    | 9.79   | n=48         |
|  | within  |       | 0.983     | 2.25    | 9.43   | T-bar=8.67   |
| GDP growth <sub>t-5</sub>                      | overall | 3.98  | 5.64      | -32.1   | 34.5   | N=414        |
|  | between |       | 3.42      | -3.01   | 21.5   | n=48         |
|  | within  |       | 4.97      | -32.2   | 17.0   | T-bar=8.63   |
| Mov. avg. GDP growth <sub>t-5</sub>            | overall | 2.67  | 5.37      | -32.1   | 21.5   | N=414        |
|  | between |       | 3.00      | -3.87   | 14.9   | n=48         |
|  | within  |       | 4.73      | -30.1   | 16.7   | T-bar=8.63   |
| Population (millions) <sub>t-5</sub>           | overall | 21.2  | 34.9      | 0.287   | 190    | N=416        |
|  | between |       | 37.0      | 0.337   | 180    | n=48         |
|  | within  |       |           | 1.9     | 7.85   | T-bar=8.67   |
| ln(Population) <sub>t-5</sub>                  | overall | 15.9  | 1.44      | 12.6    | 19.1   | N=416        |
|  | between |       | 1.43      | 12.7    | 19.0   | n=48         |
|  | within  |       | 0.0618    | 15.2    | 16.3   | T-bar=8.67   |
| Services VA <sub>t-5</sub>                     | overall | 55.8  | 11.5      | 17.6    | 79.9   | N=414        |
|  | between |       | 10.4      | 28.4    | 74.9   | n=48         |
|  | within  |       | 5.09      | 22.3    | 75.5   | T-bar=8.62   |
| Mov. avg. Services <sub>t-5</sub>              | overall | 54.9  | 11.4      | 17.6    | 76.2   | N=415        |
|  | between |       | 10.5      | 32.8    | 74.4   | n=48         |
|  | within  |       | 4.76      | 25.8    | 72.5   | T-bar=8.64   |
| Trade <sub>t-5</sub>                           | overall | 95.1  | 41.9      | 15.8    | 220    | N=413        |
|  | between |       | 40.8      | 24.2    | 206    | n=48         |
|  | within  |       | 14.1      | 33.0    | 186    | T-bar=8.60   |
| Mov. avg. Trade <sub>t-5</sub>                 | overall | 93.0  | 41.7      | 16.0    | 210    | N=415        |
|  | between |       | 40.5      | 22.5    | 204    | n=48         |
|  | within  |       | 11.4      | 31.9    | 140    | T-bar=8.65   |

Mov. avg. stands for moving average over 5 years (4 previous years and the current)



Figure C1 **Frequency B&A observations**

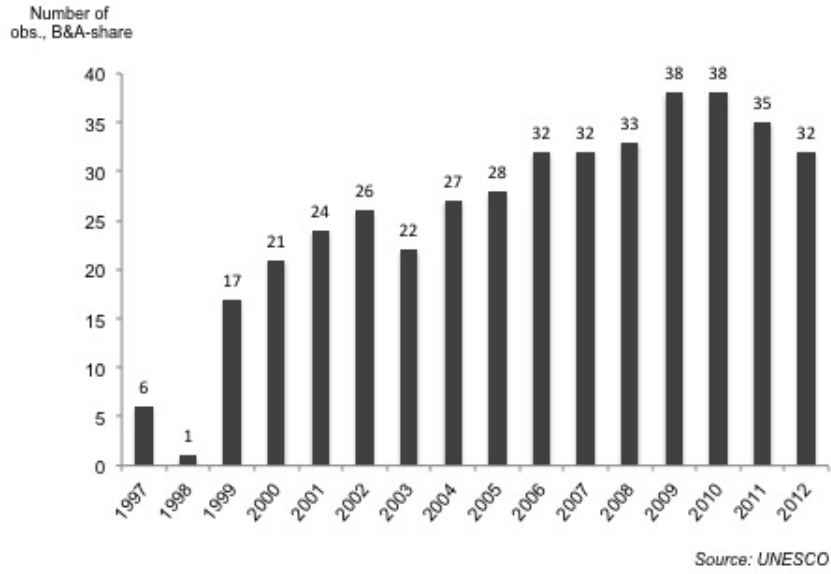


Table C2 **Robustness check: ISCED classification 1997 only**  
**Dependent: Yearly share B&A graduates 1999–2012**

|                                | (1)                    | (2)                   | (3)                    | (4)                     | (5)                     | (6)                     |
|--------------------------------|------------------------|-----------------------|------------------------|-------------------------|-------------------------|-------------------------|
| $\ln(\text{FDI})_{t-5}$        | 0.0156***<br>(0.00429) | 0.0110**<br>(0.00460) | 0.00945*<br>(0.00486)  | 0.00818<br>(0.00508)    | 0.00815<br>(0.00510)    | 0.0100*<br>(0.00557)    |
| $\text{Services}_{t-5}$        |                        |                       | 0.000875<br>(0.000826) | 0.000515<br>(0.000927)  | 0.000611<br>(0.00181)   | 0.00146<br>(0.00148)    |
| $\text{Trade}_{t-5}$           |                        |                       |                        | -0.000560<br>(0.000495) | -0.000549<br>(0.000581) | -0.000489<br>(0.000463) |
| $\ln(\text{Population})_{t-5}$ |                        |                       |                        |                         | 0.0122<br>(0.155)       | 0.00275<br>(0.144)      |
| $\text{GDP growth}_{t-5}$      |                        |                       |                        |                         |                         | -0.00251<br>(0.00215)   |
| Constant                       | 0.123***<br>(0.0278)   | 0.131***<br>(0.0282)  | 0.0892**<br>(0.0390)   | 0.161**<br>(0.0717)     | -0.0375<br>(2.565)      | 0.0468<br>(2.355)       |
| Year dummies                   | No                     | Yes                   | Yes                    | Yes                     | Yes                     | Yes                     |
| Fixed effect                   | Yes                    | Yes                   | Yes                    | Yes                     | Yes                     | Yes                     |
| Observations                   | 408                    | 408                   | 407                    | 407                     | 407                     | 405                     |
| Countries                      | 48                     | 48                    | 48                     | 48                      | 48                      | 48                      |

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table C3 **Robustness check: Extended period**  
**Dependent: Yearly share B&A graduates 1995–2012**

|                                | (1)                    | (2)                    | (3)                   | (4)                     | (5)                     | (6)                     |
|--------------------------------|------------------------|------------------------|-----------------------|-------------------------|-------------------------|-------------------------|
| $\ln(\text{FDI})_{t-5}$        | 0.0217***<br>(0.00383) | 0.0130***<br>(0.00438) | 0.0117**<br>(0.00483) | 0.00954**<br>(0.00458)  | 0.00955**<br>(0.00459)  | 0.0111**<br>(0.00488)   |
| $\text{Services}_{t-5}$        |                        |                        | 0.00123<br>(0.000854) | 0.00159*<br>(0.000851)  | 0.00169<br>(0.00162)    | 0.00250*<br>(0.00149)   |
| $\text{Trade}_{t-5}$           |                        |                        |                       | -0.000130<br>(0.000422) | -0.000117<br>(0.000521) | 0.0000364<br>(0.000426) |
| $\ln(\text{Population})_{t-5}$ |                        |                        |                       |                         | 0.0124<br>(0.143)       | 0.00624<br>(0.145)      |
| $\text{GDP growth}_{t-5}$      |                        |                        |                       |                         |                         | -0.00221<br>(0.00232)   |
| Constant                       | 0.0822***<br>(0.0242)  | 0.136***<br>(0.0233)   | 0.0733*<br>(0.0419)   | 0.0769<br>(0.0657)      | -0.125<br>(2.361)       | -0.0857<br>(2.351)      |
| Year dummies                   | No                     | Yes                    | Yes                   | Yes                     | Yes                     | Yes                     |
| Fixed effect                   | Yes                    | Yes                    | Yes                   | Yes                     | Yes                     | Yes                     |
| Observations                   | 435                    | 435                    | 433                   | 432                     | 432                     | 430                     |
| Countries                      | 48                     | 48                     | 48                    | 48                      | 48                      | 48                      |

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Figure C2    Normality checks: Kernel density estimate

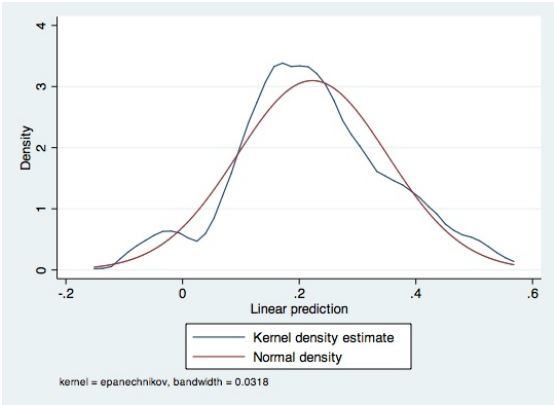


Figure C3    Normality checks: Standardized normal probability plot

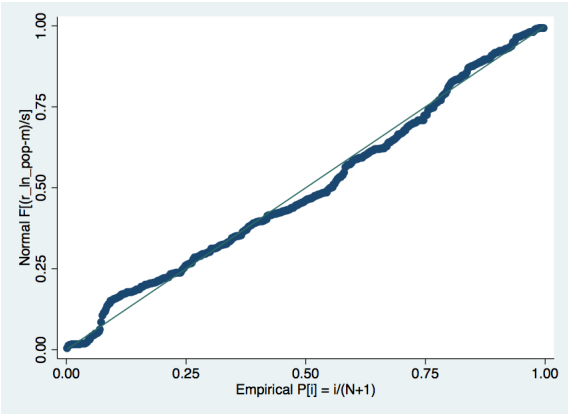
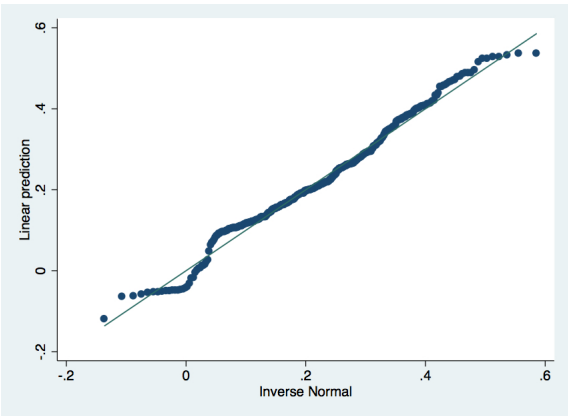


Figure C4    Normality checks: Quantile plot



## Appendix D – Data sources and definitions

Table D1 Detailed description of regression variables

| Variable          | Description  | Source   |
|-------------------|--|--|
| <i>B&amp;A</i>    | Number of graduates in business and administration as a share of the total number of graduates.  | UNESCO Institute for Statistics & UNESCO Statistical Yearbooks.  |
| <i>FDI</i>        | Logarithm of the moving average of inward FDI flows. Annual inward FDI flows are in US Dollars at current prices and current exchange rates in millions. | United Nations Conference for Trade and Development (UNCTAD).<br>< <a href="http://unctadstat.unctad.org">http://unctadstat.unctad.org</a> > |
| <i>Services</i>   | Service, etc., value added (% of GDP).   | World Bank World Development Indicators<br>< <a href="http://data.worldbank.org">http://data.worldbank.org</a> >                             |
| <i>Trade</i>      | The sum of exports and imports of goods and services, as % of GDP.   | World Bank World Development Indicators  |
| <i>Population</i> | Population, total.   | World Bank World Development Indicators  |
| <i>GDPgrowth</i>  | Growth of Gross domestic product, annual, in percent (%).  | World Bank World Development Indicators  |

Table D2 Detailed description of natural resource variables

| SITC code: Top level  | Detailed level   |
|---|--|
| <b>SITC 2</b> Crude materials, inedible, except fuels                           | <b>27</b> Crude fertilizers, crude minerals (excl. coal, petroleum and precious stones)<br><b>28</b> Metalliferous ores and metal scrap                                      |
| <b>SITC 3:</b> Mineral fuels, lubricants and related materials                  | <b>32</b> Coal, coke and briquettes<br><b>33</b> Petroleum, petroleum product and related materials<br><b>34</b> Gas, natural and manufactured<br><b>35</b> Electric current |
| <b>SITC 6</b> Manufactured goods classified chiefly by material                 | <b>667</b> Pearls and precious or semiprecious stones, unworked or worked<br><b>68</b> Non-ferrous metals  |
| <b>SITC 9</b> Commodities and transactions not classified elsewhere in the SITC | <b>971</b> Gold, non-monetary (excluding gold ores and concentrates)   |

Source: United Nations Statistics Division: Detailed structure and explanatory notes

For data on these variables see UNCTAD <<http://unctadstat.unctad.org>>