

Evalution of FDI in CE, SEE and Kosovo in Relation to Growth Rates and Other Indicators

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1 Introduction

Impact of the Foreign Direct Investment (FDI) in economic growth in the past three decades has been hotly debated. FDI is seen as a factor of economic growth, especially in the developing countries seeing a number of benefits from the direct flow and their indirect dissemination. The focus is not only on the direct effects, it is more on their indirect effects. Some Central European (CE) countries and South Eastern Europe (SEE) have had a history of industrialized countries which inherited an outdated technology after the fall of communism. Restructuring the economy can best be done through FDI. The necessity to attract technology from the developed countries was a disturbing problem, so these countries, as well as Kosovo, created numerous measures to attract foreign investors. FDI were considered solutions to the problems of transition. The World Bank statistics also give figures that only up to 0.02% of technology, machinery and equipment comes in through import, considering FDI as the main channel of technology transfer (Jude 2012: 5).

This is complete when we see that about 70% of investment in research and development are made by a small number of large companies in the world (WB). Since Kosovo and most of the countries in the sample have been facing the shortage of finance, the best opportunity to have access to technology and advanced knowledge comes through FDI, and not through import. Therefore through the secondary data can be mentioned the measurement of technological and human diffusion, capital formation and access to foreign markets. The appearance of these elements in the endogenous theory of growth favors the long term growth. The investment growth in 2000 and 2007 (1.9 billion US $), directed the attention of researchers more towards this phenomenon, though, their decline made the rationale of investment incentives in the host countries be further discussed.

Time commitments are necessary in terms of political and economic reforms, that encourage FDI inflows, since they are considered as a catalyst for economic growth, as a factor that can reduce the effects of the global crisis (Pere and Harshova 2011).

The objective of the government of Kosovo is attracting of the foreign investments to complement the technological and knowledge gap, employee training, building of new production capacities and increasing the export. By increasing the rate of GDP per capita in Kosovo, many problems aimed by the government of the country would be

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addressed, and one of the challenges from official sources is the highest unemployment rate in Europe, to 30.9%, while according to informal sources, it reaches even to 45%. The contribution of FDI in terms of economic and industrial development in Kosovo has been variable, ranging between 2.6% (2005) and 12.6% (2007) of GDP.[1] While, the problem is that there is a fall in FDI relative to the GDP of 3.5% in 2016.

Therefore, the objectives of the study are to find the direct and indirect FDI impact on economic growth. In the host countries the effect of FDI on economic growth depends on conditional factors:

- The level of human capital (absorptive capacity of human capital, the threshold level, the absorptive capacity of the host economy in catching the spread of technology and knowledge that foreign firms bring).
- The level of development of local firms (domestic investment).

Are the countries considered in transition or developing countries and some Central European countries able to absorb technology and knowledge? Do they have a sufficient threshold of knowledge that enables the use of technology that FDI bring? How attractive are these countries compared to the developed countries that are part of this study? Does FDI have complementary or substitute effect on domestic investments in CE and SEE? It has also been analyzed the "catch-up" effect in the process of convergence of the developing countries towards the levels of the advanced economies.

Like the majority of the European countries, Kosovo faces shortage of capital, knowledge, management, as well as with an employment challenge. This thesis contributes to the literature in two ways: It contributes to the literature of FDI growth, focusing on the effect of technology transfer and human capital in economic growth. The contribution here is in terms of fulfilling the skills level of human capital that contributes to attracting technology through FDI in the developing and developed countries. The study extends on the existing literature about the relationship of FDI with the growth and at the same time with the other determinants of growth, determinants of human capital and domestic investments in complementariness with FDI.

There are three research questions that cover this problematic:

(i) How Foreign Direct Investment affects the economic growth in the host country, through direct effects and indirect effects, what effect the term interaction on economic growth has between FDI and human capital, or FDI and domestic investments ?

(ii) Is the FDI effect conditioned by certain factors on economic growth, and what are they ?

(iii) What effect the economic growth has on FDI increase in the host country, and what effect the human capital, domestic investments, remittances and government spending have ?

[1] Pere, A, Hashorva—"Western Balkans' Countries In Focus Of Global Economic Crisis" pg. 11. Economy Transdisciplinarity Cognition; www.ugb.ro/etc.

While the following hypotheses raise the issues raised:

H1: "FDI has a direct effect on the economic growth of the host countries, FDI has an indirect effect on the growth through interaction between FDI and the level of human capital and FDI with domestic investments".

H2: "Besides the economic growth, other determinants as well as human capital, domestic investments, total government spending and remittances have positive effect on the flow of FDI".

2 The Role of FDI in Economic Growth Discussions and Empirical Debates

Seeing that governments around the world are working towards creating a climate friendly for FDI, as FDI contributes directly to the formation of capital in the country through the construction of factories, machinery, transport improvement and indirectly through the creation of employment, exports, consumption and savings, and attention is focused on them. The analysis of the relationship between FDI and economic growth in our study yielded unilateral results (economic growth has positive effects on FDI as FDI does not have an increasing effect) and serves to debate this issue, taking a look at other studies to conclude that FDI and economic growth convey each other, but not always and in all cases.

However, a positive relationship between FDI and growth depends on the host country's conditions, some of which are: the level of human capital, government policies, infrastructure, location, efficiency of institutions, Balasubramanyam et al. (1996).

In other studies, there are also arguments that high levels of FDI are related to high growth rates of De Mello (1997), Borensztein et al. (1998).

Study made by Jude (2012: Chap. 6) is seen in the order of very significant studies that find the positive effect of increasing FDI. In its findings, it confirms that by combining the negative effect on accumulation of positive capital, we are able to confirm a general positive impact of FDI on economic growth in the CEEC. This shows that the IHD-growth relationship is dominated by spreading.

Unlike our study of the absorption capacity of the host economies (i.e. economic growth depends on the interaction of FDI * HC variables), it finds that the effects of FDI in the CEEC are not dependent on this threshold. Using a simultaneous equation the author in question has found that FDI causes growth and growth in turn attracts FDI.

So the connection is positive in two directions, which often does not happen. However, there are studies that identified a negative correlation between FDI and economic growth, the most important being Durham (2004), Lyroudi et al. (2004), CarkovicLevine (2005) and Lipsey (2006). The negative relationship was also reported by Lyroudi et al. (2004: 98) and Levine (2005: 197) analysis, which received negative results at the level of education, economic development and trade.

What are the circumstances that support the positive spread of FDI is best argued by Borensztein et al. (1998), Xu (2000) and Alfaro (2003),[2] which suggest that the educational level, developed financial markets and other conditions in the host economy play an important role in the positive effects of FDI. The effect of the spread is often measured indirectly through the power of interaction of FDI with human capital; this has shown to have a significant positive effect on economic growth as suggested in Borensztein et al. (1998) and Xu (2000).[3]

Mencinger (2003) analyzed the relationship between FDI and economic growth in transition countries in the 1994–2001 period and reported having a negative link. Countries in transition were in the period of their economic and political transformation; investments had entered privatization, which means that greenfield investments were scarce. While countries were in transition, the privatization tools used the most for imports and consumption, not the increase in productivity. Such a practice is almost the same in most countries in the initial transition, so the effects of increasing FDI are very small or negative.

There are studies that have found a mixed effect of increasing FDI (Alfaro 2003: 1–31). An empirical analysis that she made using cross-country data for the period 1981–1999 reports that FDI exerts a mixed effect on growth, depending on which sector analyzes. Growth in the primary sector has a significant negative effect on growth, in the manufacturing sector a positive and significant effect and in the services sector an ambiguous effect.

2.1 Relations with Economic Growth, FDI and Domestic Investment

We start from our study to measure the extent to which FDI flows have become productive investments.[4] However, we are starting from the positive view that FDI is not just an addendum to existing capital, but they can also change the existing equity structure. So we have asked the question how local investors react when entering FDI, i.e. they are substitutes or complementary[5] to domestic investments. In our study the results are consistent with several other studies,[6] FDI has followed the existing structure of the economy by going to industries where there were already many local firms and increasing competition has led to a crawling out. This analysis is done through small generalized squares using the Fixed Effects model (FE). Our analysis for the Central and Southeast European countries suggests that there is a substitution between FDI and local investment (it is characteristic that most sample countries in the

[2] Hirschman (1958: 109) stressed that not all sectors have the same potential to absorb foreign technology or to create links with the rest of the economy. He noted, for example, "the links are weak in agriculture and mining."

[3] The case of our study, we reported positive FDI * HC outcomes in economic growth in countries (SEE, SEE).

[4] FDI is in fact a financial flow which does not in fact guarantee its transformation into fixed capital.

[5] Jude (2012: Chap. 5), IHD may be complementary to domestic investment when intermediate goods demand stimulates the production of local suppliers and encourages them to make new investments.

[6] While similar results have found, in her study, Jude (2012: Chap. 5) which she has done instead of CCECs.

measurement period have gone through the most important stage of privatization, a stronger reason we have such results).

FDI opponents argue that the negative impact on economic growth is generated by domestic investment accumulation (Braunstein and Epstein 2002: 23); Huang (1998, 2003: 3). It is known that FDI contributes directly through the flow of capital (construction of new factories) and the introduction of new equipment (technological transfer).

However, their effect on the host economy is even greater in the form of spreading investments through indirect effects (creating links with local firms), however, it often happens that they receive their inputs from import and do not need such links. This is more so in transition countries when FDI comes in the form of acquisitions and mergers (through privatization) and often take the place of local firms through competition without contributing to economic growth in the country.

Borensztein et al. (1998) has tested the effect of FDI on economic growth by utilizing direct investment data in the 69 developing countries for the period 1970–1990 and found that FDIs "accumulate" Domestic Investment. Similar to Borensztein are the results of our study in 24 European countries have a negative and important coefficient when interacting with Domestic Investment FDI.

Finally, many authors emphasize, as a result of "learning, demonstrating, creating the effects, linking foreign and domestic firms", the effect of overseas collection weakens or even overturns in the long term, FDI will have positive effects on domestic entrepreneurship.

3 Study Methodology

Objectives enable us to apply a special methodology. Structuring the literature was difficult, coming to a conclusion that literature should be divided into two segments: firstly, the literature of FDI based on industrial organization and international production, and secondly the literature of economic growth based on the growth models. Even the paper has been structured according to this division, giving the deserved place to these two segments of literature. The macroeconomic and microeconomic analyses harmonize the differences for a more complete estimation of the FDI phenomenon. Firstly the transfer of technology basically is a microeconomic phenomenon, including identification of channels, which might not be all at this level. Therefore, having noticed that the net estimation of FDI cannot be achieved by microeconomic level, then we also have to use the macro approach, finding the determinants of the economic growth and FDI in two separate equations, too. Also the comparative method is used amongst Kosovo and the 23 countries of CE and SEE. Estimation of FDI and determinants of the economic growth has provided a real picture of the FDI performance and other indicators for 11 years (2004–2014). Also construction of a database by the World Bank (2017) (World Development Indicators—WDI) for an econometric estimation of FDI phenomenon and economic growth, has been completed with the determinants of economic growth and FDI. Econometric analysis focuses on macroeconomic dimension, to find out the effect of FDI on economic growth, the relationship

between them, what effect FDI have in domestic investments, technological progress and then globally in 24 European countries and Kosovo. Meanwhile the internal instruments (7 variables with the data from the host economies) were used for the secondary data, using the method of little squares and generalized little squares too convenient and popular in the use of panel data. There were also used two methods, such as the method of Fixed Effects and Random Effects, since it is a heterogeneous sample, they can correct the dynamic panel from bias (differences) and provide efficient assessments even if endogenous the explanatory variables are present.

Methodology of secondary data—Having as objective FDI and their role in economic growth, then the literature includes two segments, growth patterns and increase productivity by using the technology and knowledge which come through FDI. Access treatment of these macro level. For an empirical explanation of problems are used these instruments in research. The study uses a panel of data on which countries are the unit of observation. Devices of multiple, linear and correlation regression used in the evaluation process are those designed specifically for panel data, such as the method of general little squares (GLS) combined with the tests of Fixed Effects (FE) and Random Effects (RE), the test of Hausman (Rho), Wald test, etc.

– *The focus group (secondary data)*, there were selected seven variables: logarithm of GDP_initial, FDI, the growth of GDP per capita, private investments, human capital (number of students enrolled in secondary level of education in relation to the population), total costs of the government and remittances. N = 24,[7] short time period (the panel has an equal amount of observations in time (years) T = 11 for each site so we have N = 24 < T = 11, while data is balanced.[8] The program STATA version 12 has served for statistical processing of secondary data.

4 Theoretical and Empirical Model

Description of the theoretical model—The assessment approach is the same as at Borensztein et al. (1998)[9] modified on several variables.

- It is used the model adopted by Borensztein et al. (1998).
- Use of LS and GLS methods through the method of fixed effects and random effects to estimate whether the transfer of technology is directed towards the growth.
- Mechanisms: The growth of the diversified capital goods (N) drives the technological progress (TP) toward growth.

[7] Albania, Kosovo, Macedonia, Montenegro, Croatia, Bosnia and Herzegovina, Serbia, Slovenia, Bulgaria, Romania, Hungary, Poland, Portugal, Czech Republic, Slovak Republic, Lithuania and Estonia; Germany, Switzerland, Auatria, Holland, Italy, Norway and Sweden.

[8] The unbalanced panel according to Wooldridge (2002, p. 275) causes major problems in the assessment so this is a priority in our case.

[9] The expanded model of Boreisztein et al. (1998) and its adaptation with some changes has been used in the Doctoral Thesis, Kida (2016: 169–182).

- $Y = AHt^{a}\ kt^{1-a}$.
- There exist the varieties N and k_t.
- $N = n - n^*$.

It is an endogenous development model that considers the technological transfer as a stimulant of growth. It follows the chain of events as: when there is an increase in the variety of capital goods or improvement in the quality of existing capital goods, then occurs the technological transfer (TP), which increases the economic growth.

N = the number of varieties of capital for an economy, n = number of varieties of capital goods produced by domestic firms, n* = number of varieties of goods produced by foreign firms. The rate of growth in developing economies that include foreign firms and domestic ones is expressed in this way:

$$g = 1/\sigma\left[A^{1/a}\psi F(n^{*}N, N/N^{*})^{-1}H - \rho\right] \tag{1}$$

Equation (1), Borensztein et al. (1998: 7–9), shows that FDI, which are measured with the products manufactured by foreign firms in the total number of products (*n*/N*), deduct the price of the introduction of new varieties of capital goods, increasing in this way the rate where the new capital goods are introduced. Significant terms are l: (n*/N), (N/N) and H.

In this model, growth positively depends on the percentage of goods produced from foreign firms. This is because the presence of foreign firms facilitates the production of capital goods. (H) is also positively associated with the growth. Finally, growth negatively depends on the proportion of goods produced in an economy compared to goods produced in countries with more advanced technology (N*). Thus, countries with technology behind grow faster. This is in accordance with "convergence" in the literature of growth. Empirical model of Borensztein et al. (1998):

$$g = C_0 + C_1FDI\ + C_2FDI \times H + C_3H + C_4Y_0 + C_5X_1 \tag{2}$$

Ku : g = represents an annual growth rate of GDP per capita ($\hat{y}_{it}$).
FDI = FDI in relation to GDP.
H = Human capital is represented by the student enrollment rate, secondary school level in relation to the population, applied some time ago by Romer (1994, IV) who found the positive effect of human capital in FDI.
Y = initial GDP per capita is measured as the logarithm value of GDP in 2003 to capture the "Catch up" effect—it is the process of convergence towards the levels of the advanced economies (N/N*).
A or X_{it} = the group of variables introduced as determinants of economic growth.

In regression we notice that there is a coefficient for each, FDI and human capital, which cooperate together, except once when they are included separately. The same occurs with FDI variables, either, in cooperation with domestic investments, while in (X) are involved other factors, too (remittances and government spending).

Our empirical equation

$$\text{LogGDPgpc} = a_{0it} + \beta_1 \text{FDI}_{it} + \beta_2 \text{HC}_{it} + \beta_3 \text{FDI}_{it}\, x\, \text{HC}_{it} + \beta_4 Y_{0it} + \beta_5 \text{Dom.Inv}_{it} + \beta_6 \text{Dom.Inves.x FDI}_{it} + \beta_7 \text{G.C.F.G.C}_{it} + \beta_8 \text{REM}_{it} + u_{it} + \varepsilon_{it} \quad (2a)$$

where (i) is the place, (t) is the time-period, (ai) is the specific coefficient parameter of the country (GDPgpc), a measure for the growth rate of GDP per capita, X_{it} is the matrix that represents other determinants of growth apart FDI, Human Capital ((HC) and initial GDP (Y_0), as there are the variables: Domestic Investment (Dom.Inv.), General Expenses of Government Final Consumption (GCFGC), REM.-Remittances.

μ_i—difference of specific variables in different observed countries or unverified variables; ε_i—Terms of random errors;

The second equation for FDI takes the form:

$$\text{log_FDI}_{it} = a_{0it} + \beta_1 \text{log_}\hat{y}_{yit} + \beta_2 \text{HC}_{it} + \text{log_1}\beta_3 \text{HC}_{it} + \text{log_2}\beta 4 \text{HC}_{it} + \beta_5 \text{Dom.Inves}_{it} + \beta_6 \text{REM}_{it} + \beta_7 \text{G.C.F.G.C}_{it} + u_{it} + e_{it} \quad (3)$$

We use the natural logarithm log_log for two variables, FDI dependent and growth of GDP per capita independent ((log_FDI_{it} = log_GDPgpc), by country (i) in the period (t). Meanwhile we have used time delays for certain variables (lag_1 and lag_2) in equation about human capital (measurement of absorptive capacities in host countries).

The advantages of the methods and techniques used

- The estimation does not suffer from differences between countries—unnoticed prejudices because the method of the Fixed Effects eliminates these differences.
- The techniques used are reliable to control endogeneity between explanatory variables (correlation between them).
- They are useful when the database is short as in the case of our study.
- Hausman test that replaces several tests.

5 Results of the Study

Submission of Descriptive Statistics (Table 1, on appendix) from panel data—For each variable is included the number of observations, average, average distribution, and the minimum and maximum points that make the range around which the variable values fluctuate. The same conclusion is reached for all variables except for FDI, remittances and the variables that interact with any other variables (FDI * HC and FDI * Dom.Inv.) on which will be carried out the tests for normality of average distribution. Solution of

the First Hypothesis and Table Results-For the output of the dependent economic growth, some tests will need to be carried out.

- Tables 2—Determination of the effects of fixed effects versus random effects,
- Table 3—Hausman's,
- Table 5—Testing for Fixed Time Effects,
- Tables 6—Testing for heteroskedasticity and the choice of the Fixed Effects Method for GDP per capita GDP,

Tables 2 and 3 from Stage A—complete, Table 4 (Appendix)-FE choice versus RE (Fixed Effects Test for Case Effects). Similarities and differences in the two models (FE/RE) of the study.

The coefficient results can be ascertained that there are similarities and differences in two regression models. Accepting that a constant (intercept) is much larger in the Fixed Effects model (40.60), it is statistically important, compared to the RE constant (10.27%), is a good start.

As mentioned in the theoretical part, individual heterogeneity is possible in the model of fixed effects and is therefore captured by a constant (that is the proof). In terms of variables the differences in coefficients in the two models are small, only in the human capital variable the change is large, and that in the FE model has a positive and insignificant coefficient while in the RE model it is negative and important.

Both models show a negative GDP_fillestare and (p = 0.000) statistically important and a general finding that economic growth is largely dependent on increased domestic investment. Another difference is that the R-square is much higher in the FE model compared to RE. The change occurs because in the FE model the constant captures the heterogeneity of the sites, while the random effects due to technical evaluation deficiencies cannot capture the differences. Therefore, the explanatory power in the RE model is lost.

(a) **Hausman Test in Appendix complement, Table 5**

To set the model's effects on fixed effects and random effects model we have used a Hausman test. The point is: If the unique (u!) Random effects are related to independent variables (regresor) in our regression. *The zero hypothesis H0* = says the random effects are not related to the regressor, and that the RE model is preferred.

Alternative Hypothesis H1 = says u! Is associated with regressors in the model of fixed effects and is the most advanced evaluation technique.

This is <0.05 (i.e. coefficients are significant) Fixed effects used.

The result of the Hausman test is shown in Table 5 (in the Appendix) and it is convincing that the zero hypothesis is dropped to the 1% level. The result of the Hausman test says that unique effects are linked to independent variables within our model so the random effects model is biased and its coefficient (Beta) estimation will not melt to true coefficient parameters (Beta) in large samples. Therefore, the estimated coefficient gains with fixed effects are stable.

(b) Testing for Fixed Time Effects[10]

To see if fixed time effects are needed during a FE model, the testparm command is used. It is a common test for the forearm all years are equal to 0, if they are, then it is not necessary to use fixed time effects, press "help-testparm". After running the Fiber Effect model, write: test certificate and we have the following results (we have the table in Annex A): Prob > F is 0.8708 > 0.05,[11] so we can not reject the zero hypothesis because coefficients for all years are equal to zero, so there is no need for Fixed Time Effects in this case.

From the coefficients of table d, in Appendix, we complete the following equation: Equation Fixed Time Effects:

$$\begin{aligned}\text{Log}\Delta\text{GDPgpc}_{it} = {} & 47.12254 - 1.449186\text{logGDPinitial.}_{it} + 0.0060911\text{FDI}_{it} + 0.0022707\text{HC}_{it} \\ & + 0.0635436\text{Dom.Inv.}_{it} + 0.0284214\text{REM}_{it} - 0.0315179\text{G.C.C.Ex.G}_{it}\end{aligned}$$

(c) Testing for heteroskedasticity

This paragraph briefly examines the powerful robust covariance estimator of the sandwich type to provide a basis for their broader handling in a data panel.[12] The robust estimators approach has gained popularity among statisticians and econometrists since the early beginnings of econometric evaluations, Long and Ervin (2000). Assessing the most powerful standard errors creates fewer assumptions about the indivisible differences between countries as in our case (when heterogeneous data are included), but create more variance. When using this effect it is likely to be important for the accuracy of the results. In favor of their use are Stock and Watson (2003). The dose table coefficients[13] of Appendix, the "intra-regression" fixed effects, are given in the following equation:

$$\begin{aligned}\text{logGDPgpc}_{it} = {} & 37.70864 - 1.51023\text{logGDP} - \text{initial.}_{it} + 0.006199\text{FDI}_{it} + 0.0025701\text{HC}_{it} \\ & + 0.0649064\text{GCFC}_{it} + 0.0286658\text{REM}_{it} - 0.0313851\,\text{G.C.C.Ex.G}_{it}\end{aligned}$$

Hence the modification of the Wald test according to Fox and Weisberg (2011), for the heteroskedasticity group, is a good way for the Fixed Effects regression model. H0: sigma (i)^2 = sigma^2 for all (i); Chi2 (24) = 956.05.

Prob > Chi2 = 0.0000 (Presence of heteroskedasticity).

Zero is homoskedasticity (or constant variance).

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[10] Note: For more details about the practical process in Condition 12, see references. https://www.princeton.edu/~otorres/Panel101.pdf.

[11] Note: testparmvitet; (1) years = 0; F(1, 179) = 0.03; Prob > F = 0.8708.

[12] The reader for a recent treatment should refer to the text Econometrics, e.g., Greene (2003), in which this paragraph is based.

[13] A heteroskedasticity test for the Fixed Effects Model is available via the command: xttest3. This is a user-written program to install and print: ssc install xttest3 (the results are given in Appendix).

We reject the null hypothesis as invalid and derive the heteroskedasticity result, Prob > CHI2 = 0.0000 < 0.05.

The use of robust regression methods complements all assumptions in a regression with panel inputs. We will use one of the robust regression approach approaches: regression with robust standard errors. As an alternative, we use the "robust" option for standard egabimus estimation using Huber-White sandwich-estimators sandwich-estimators according to Rohlfing et al. (2011: 1–10), are against heteroskedasticity, thus confirming the heteroskedasticity also known as Huber/White, (White 1980). Robust standard errors: Command-reg. xtreg. and the Robust, heteroskedastic option makes the robust standard error rating even in the linear model with the panel. There are not the same regressions as above, using the "robust" option.

So if we compare the robust FE results in regression 1, 2 and 3 in Table 7, there are differences in standard errors and t-tests (there are also variations in the coefficients) in this particular example, using robust standard errors changed the conclusions from the initial regression of Least Squares (LS). This suggests that the problems in essence were not small, meaning that there were individual differences assumed from data from the 24 countries in the study. Therefore, after this assessment the results are more convincing. The final results are calculated by Stata Software vc.12 (Table 7).

(d) ***Testing for Correlation in the Series***

According to Baltagi et al. (2012: 1401–1406), the cross-correlation correlation applies to large long time series (over 20–30 years). Since corelacon is not a problem in small panels (with a few years), in our case we have only 11 years so we have no serial correlation that makes the standard error of the coefficients smaller, while R^2 is the most higher than they would actually be. Therefore, such a technique was not practiced in the panel data in our case.

5.1 The Final Results at the Rate of GDP per capita—Dependent

So after testing, the explanatory power is $R^2 = 41.6\%$, regression 4, Table 4 (Appendix) regression 1 to 4, Table 4, the explanatory power ranges from 39.8% to 41.6%, statistically are powerful. The results showed that 41.6% of the growth rate in GDP per capita can be explained by the values of the independent variables, while 58.4% of the growth rate of GDP per capita is explained by other factors that were not measured in the study. And the constant of 37.33% foresees the model as significant.

Completion of the growth equation with coefficients from Table 4:

$$\begin{aligned}\text{Log_}\Delta\text{GDPgpc}_{it} = {} & 37.33 - 1.496\text{log_GDPfill}_{\cdot it} + 0.0246\text{FDI}_{it} - 0.0213\text{HC}_{it} + 0.00407\text{FDI} * \text{HC}_{it} \\ & + 0.0896\text{Dom.Inv}_{it} - 0.00290\text{FDI} * \text{GCFC}_{it} + 0.0145\text{REM}_{it} - 0.0399\text{GCFGC}_{it} + e_{it}\end{aligned}$$

(i) **InitialGDP is negative**—The variable GDP_initial is negative from p-values of the explanatory variables is clear that it is statistically important at the level 1% (i.e. p-value < 0.01) Table 4 (Appendix). Our result shows that developing

countries tend to grow faster than developed countries, supported by a catching-up effect from 17 developing countries.

(ii) **Foreign Direct Investment (FDI)**, Following we measure the effect of FDI on economic growth shown in regressions 1 and 2 (Table 4), the coefficients are positive and statistically insignificant. So our findings showed that increasing effect of FDI is not found, noted that FDI does not meet domestic investment.

(iii) **Human Capital (HC)**, as a measure of human capital development, coefficients in regression 1 and 2, are statistically insignificant. Elasticity panel of the GDP growth rate per capita in regression 4, given the differences amongst countries on the panel, reveals a significantly negative sign with the coefficient –0.0213 (–0.2%) to human capital.

(iv) **Domestic Investments (Don.Inv.)**, next (Table 4, the result of the growth equation indicates that domestic investments[14] strong positive impact (significance level 1%) so growth of 1% of domestic investments stimulates economic growth to 9% (coefficient 0.0896 or 8.9%). We therefore have found that domestic investments are an important and considerable resource of the economic growth in European countries.

(v) **The term**-interaction between FDI and domestic investments (FDI * Dom.Inv),

How much have both types of investments contributed to economic growth?

The answer is that they have given negative and significant effects at 10% level i.e. increase of 10% of variables in cooperation lowers the economic growth for −0.002%. This is explained by the nature of FDI either; the period 2004–2014 is still characterized by privatization at the expense of Greenfield, similar to studies of Mencinger (2003).

(vi) **The term FDI in cooperation with human capital** (FDI * HC), the interaction term FDI * HC is positive and statistically significant at the level 10%. The growth of interactive variables for 10% has caused economic growth for 0.003%. FDI is attractive for the human capital in the country, specialization and training of human capital from FDI.

(vii) **Remittances as a percentage of GDP (REM)**, statistically they do not provide significant results at any level and in four regressions.

(viii) **The size of government** (General Expenses of Government Final Consumption %GDP) the coefficient of the size of government is presented with a negative sign −0.039 and statistically insignificant even after the powerful evaluation of standard errors (Table 4).

[14] Domestic investments (capital flow and technology flows) is proved that along with FDI is an endogenous variable and influenced by the economic environment. This was also explained by Durlauf et al. (2005), who states that the marginal effect of growth in domestic investment is associated with environmental effect of each country.

5.2 Solution of the Second Hypothesis Dependent FDI

In order to obtain final results for dependent FDI, we carry out the necessary tests:

(a) Hausman test, Table 5 color blue in Annex A.

To place between the model fixed effects and random effects model we have used a Hausman test. The question is whether the unique (u!) Random effects are related to independent variables (regressors) in our regression.

Hipothesis zero = says, u! the random effects are not related to the regressor, and the RE model is preferable.

Alternative hypothesis = says, u! is associated with regressors in the model of fixed effects and is the most advanced evaluation technique.

The following hypothesis should be tested: H0: a = 0 and H1: a $\neq$ 0.

The result of the Hausman test is shown in Table 20 (in the table appendix c) and it is obvious that the alternative hypothesis is dropped to the 1% level. The Hausman Test[15] has identified who is the most accurate evaluator.

Table 5 shows that the Hausman test (1978) confirms the choice of use RE instead of FE because its p-value is greater than 0.05. Try 0.156 > 0.05 suggests that the Case Effect method should be used, so we use the method of Effective Cases, as foreseen by Clark and Linzer (2015: 2).

Statistics, Hausman and Taylor (1981: 1377), have asymptotic distribution as Hi-square with k-degrees of freedom under zero hypothesis, random effects method (RE) is more accurate. After performing the necessary tests we have followed this logic of interpretation. According to the statistics in our model, all tests—F, are less than 0.5% (<0.05). This is a test (F) to see if all the coefficients in the model are different from zero.

In all of our estimates, we have results consistent with the F-tests suggested that the coefficients are different from zero and are important to explain the growth rate of FDI as a dependent variable. Statistics also suggest that R-squares vary between 0.149 and 0.396, suggesting the high explanatory power of our two models.

This explains that more than 39% of dependent variance varies depending on independent variable variance in the RE model, while in FE it is 14.9%. We now go back to the discussion of the results separately for each of the methods used (FE/RE) in providing final conclusions for each hypothesis raised, answering research questions.

Test setting for RE versus FE (Table 6) Appendix. Random Effect Selection versus Fix Efect and result.

Similarities and differences in both models (RE/FE)

Results in coefficients can be ascertained that there are similarities and differences in two patterns of regression. Accepting that a constant (intercept coefficient) is much greater in the fixed effects model (1.233), but is not statistically significant, compared to

[15] For more details on how to use the Hausman test, reference. http://www.stata.com/manuals13/rhausman.pdf.

the RE constant (−1.222), which is statistically significant even though it is negative, a confirmation that the RE model should be accepted.

As stated in the theoretical part, in the model of the fixed effects is possible the individual heterogeneity that was captured by the constant in Table 5, through the powerful versatility of standard errors. In the random effects method, the standard error estimation was not applied, and the alleged differences between 24 countries were treated as random because both the data were taken as random and therefore the results are considered more convincing in the RE.

In terms of variables, the differences in coefficients in the two models are large, only in domestic investment variables and government spending the change is smaller and that, in the RE model there is a positive and important coefficient, whereas in the FE model are negative and irrelevant except remittances, so the authentication of the second hypothesis is done through the results of the RE model. The RE model shows an increase in GDP per capita and (p = 0.027) is statistically significant at 1%, and it is concluded that FDI growth depends on GDP growth per capita, an increase of 1% of GDP growth per capita causes an increase of FDI of 2.7%.

Another difference is that the R-square is much higher in the RE model (39.6%) compared to FE (14.9%), meaning that the 39.65 of FDI growth depends on the explanatory variables used in the model, while the rest from other unknown variables. Regression of the second equation—the net inflow of FDI expressed as a percentage of GDP, determined as a dependent variable. Correlation is zero that does not indicate a strong or weak correlation between variables (r or corr (u_i, X) = 0). Prob 0.156 > 0.05 suggests that the Case Effect Method should be used.

The regression equation (in our case the logarithmic model), showed statistically significant Wald chi2 (5, 203) = 36.49, and p = 0.000, with the measure of explanatory power R-sq: within R^2 = 12.1%; R-sq between: 39.6%; R-sq Overall: 20.1% (regression 1 to 3, the explanatory power ranges from 12.1 to 39.6% (Table 7, Appendix).

The results showed that 39.6% of the growth rate in net FDI inflows can be explained by the values of independent variables, while 60.4% of their level is explained by other factors that have not been studied.

At present, the rate of GDP growth per capita in these countries plays an important role in boosting FDI growth. Overall performance, the model is pleasing, can be seen in the statistics of the model given below. The purpose of this hypothesis is to assume the determinants of FDI in some European countries. FDI determinants in our study have been found to be GDP per capita growth, domestic investment, remittances and government spending.

FDI equation, Random Effects model, Table 7 Appendix[16]:

$$\begin{aligned}\text{Log_IHD/GDP} = &-1.122 + 0.28\text{GDPgpc_log} - 0.010\text{HC} - 0.024\text{HC_1lag} + 0.021\text{HC_1 lag} \\ &+ \text{Dom.Inv}0.055 + \text{REM}.0.034 + \text{GCFGC}.0.052 + u_{it}\end{aligned}$$

[16] $u_i = \alpha_i + \varepsilon_{it}$, with α_i start the random variables (being random variables—i.i.d. random-effects) and $\text{Cov}(\mathbf{x}_{it}, \alpha_i) = 0$ (vector $\mathbf{x}_{it}$ corresponds with independent variables which have taken place in our evaluation).

(i) GDP growth per capita (GDPgpc), is a determinant of FDI in a significance level of 1* which means that with an increase of 1% of economic growth we have increase FDI of 2.8%.
(ii) Domestic Investment (Dom.Inv./GDP) are considered important factors in the growth of FDI in significance level of 1*, and therefore with an increase of 1% of domestic investments we have increase of FDI from 5.5%. So, domestic investments have positive effects on FDI.
(iii) Remittances (REM), appeared to be a determinant of FDI at a level of 5%, and therefore the growth 5% of remittances we have an economic growth of 3.4% FDI.
(iv) Government spending (GCFGC), are found to be important determinants of FDI in a significance level of 10%, with growth of only 1% of them, we have increase of FDI from 5.2%.
(v) Human capital (HC) is not considered significant in either equation. Such results complete the required minimal threshold as total (14.3%) but this threshold in analytics is completed only by 7 developed countries in the sample, while the quality of education in 17 developing countries (10–12%) does not damage our ultimate outcomes very much.

5.3 Unilateral Effect of FDI and Economic Growth

In Table 8, (Appendix) the coefficients evaluated by the Wald zero test to see the effect of two variables according to the above equation and the Hausman test for the two variables as follows. In the FDI equation, Wald test refuses the zero hypothesis, but it does not have any importance.

To find the relationship between FDI and the GDP growth rate per capita we use Wald test (Abraham 1943: 11–58), Hausman test (1978)[17] and parmwise test of Granger (1988) of the causal relation. The test shows that FDI has positive irrelevant correlation to GDP growth per capita. While on the other hand the evidences prove that the growth rate of GDP per capita has strong positive links with FDI (significance level 1%). An increase to 1% in growth of GDP per capita will increase the level of FDI to around 9% (0.0867). In the Table 9, there is a positive relationship between GDP per capita and FDI. Therefore we conclude that the relationship between two variables is unilateral, economic growth has a positive effect on inflows of FDI in European countries, while FDI statistically has insignificant effects on economic growth, although it is positive.

6 Conclusion and Recommendations

First we present the results on confirmation of the first hypothesis:

[17] J. A. Hausman (1978). Specification Tests in Econometrics. pp. 1251–1271. http://econweb.tamu.edu/keli/Hausman%201978.pdf.

The rate of GDP growth per capita dependent—In regression 1 of Table 4, the correlation between initial GDP and economic growth is negative and statistically significant at level of 1%. In accordance with expectations, the coefficient of the initial real GDP represents a negative signal, indicating that the convergence hypothesis is confirmed.

The coefficient of FDI is not statistically significant. FDI contains estimates "random effect" which means that FDI has not been rated for a longer period of time. This result should not be surprising because all the countries in the sample had received insignificant amount of FDI between 2004 and 2014.

The variable that represents the human capital (HC) is negatively correlated with the growth, opposing the theoretical findings (i.e., it has negative effects and statistically insignificant). The threshold level meter of knowledge on human capital (secondary education) is still negative and statistically insignificant.

In regressions 3 and 4, there have been added the interactive variables which have a positive effect, i.e. the change from interaction (FDI * HC) is positive and statistically significant at the 10% level. So a 10% increase in FDI and human capital affects the economic growth to 0.04% (Table 4).

Domestic investments are positively associated with economic growth and are statistically significant at 1% level. This means that a 1% increase of the domestic investments causes economic growth of 8.9%. So the economic base of these countries relies on domestic investments.

Meanwhile, when the domestic investments interact with FDI, the result is unexpected, significant at level of 10% and with a negative coefficient. So, the cumulative, "crowding-out" effect appears, and benefit levels are repatriated. This way, FDI has cumulative effects of domestic investments and not complementary ones.

We have a positive effect but statistically insignificant from increasing remittances, which means that expectations for an economic growth in the longer term will not be realized. While government spending has a negative coefficient and increasing statistically insignificant, which means despite the government activity, growth is not positive.

The final results for the second hypothesis—Foreign Direct Investment—Dependent.

The results (Table 7), showed that 39.6% of the growth rate in the net inflows of FDI can be explained through the values of the independent variables, while 60.4% of their level is explained through other factors.

We can find the positive effect and statistically significant growth of GDP per capita in the growth of FDI. It means that GDP per capita is an important determinant of FDI. To coefficients of growth per capita and statistically significant at 1% level. This means that 1% of the GDP growth per capita brings FDI growth of 2.8%, so FDI is dependent on economic growth.

Domestic investment is important for FDI at the level of 1% and with a positive coefficient, this way an increase of only 1% of domestic investment causes increase in FDI for 5.5%.

Remittances create positive effects in attracting FDI either because all of the coefficients in regressions 1 to 3 are positive in the level of significance for 5%, which means that a 5% increase in remittances will boost FDI to 3.4%.

The size of government has positive coefficients of 0.052% a level of importance from 1%, which means that a 1% increase in government spending leads to increase of FDI for 5.2%. In fact, a part of government spending in these countries has been used to build the infrastructure and institutions in order to attract foreign investment.

As a summary we can say that the empirical analysis of this study finds that the rate of growth of GDP per capita (the economic growth) consistently proves to be an important explanatory of FDI inflows in European countries at the level of significance of 1%.

As it is seen, there is a decreasing trend of enrollment at the secondary level of education, a great inclusion of them in education in the social sciences, an average threshold of 14% for 24 countries, while separately this level does not exceed 10% for the majority of the developing countries (especially countries of the Western Europe).

Although we find a trivial effect of FDI growing, we can say that FDI is seen as a package consisting of shares of capital and technology, as an addition to knowledge through employee training, acquisition of skills and their distribution, the introduction of new managerial and organizational practices, which together improve the quality of general investment and create the conditions for long run growth in the host countries.

Recommendations and implications of the study

- The results suggest that the absorption capacity factors of the host country are crucial for determining the economic growth. The study suggests a supportive policy in improving FDI, important investments and a higher quality of human capital. While, remittances should not be considered as an important determinant of growth in the long term even though their value is significant now.
- Policymakers should pursue the policies to attract FDI which generate overall benefits to the economy; the best way is through diversification of FDI in the sectors where the expectations are greater.
- Increasing the quality of secondary education and vocational orientation also comes as a priority.
- The paper focuses only on the positive effects of FDI on economic growth; it would be of great interest that the future studies analyze negative effects of FDI, too. The important thing is that there is no misunderstanding, though the panel defect is that the number of observations is reduced due to the major distinguishing features amongst the countries (numerous assumptions amongst individual countries).

This is one of the suggestions to be taken into account in the future studies. Regardless the obstacles that may have occurred, the study remains too important for the field of FDI.

Appendix

See Tables 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10.

Table 1. Descriptive statistics of panel data (24 countries) for 2004–2014

Variable	Observations	Mean	Stand. dev.	Minimum	Maximum
log_ΔGDPgro. pc ~ a (ŷ)	210	1.006541	0.902363	−3.18799	2.51886
LogGDPinitial	264	25.24811	1.841369	21.25839	28.95328
FDI	264	6.380687	9.898636	−16.15452	88.09634
HC	264	14.45674	4.971523	7.54	26.75
FDI * HC	264	88.67297	118.342	−178.5074	999.0125
Dom.Inv. ~ f	264	23.02217	3.914311	14.55275	38.2489
FDI * Dom. Inv.	264	151.0936	228.0288	−369.1633	1904.64
REM ~ m	264	4.948647	7.092913	0.1208355	33.7
G.E.F.C.G ~ o	264	18.68272	4.217964	6.205039	29.9406

Source Data from World Development Indicators (WDI), calculated by the author

Table 2. FE Selection versus RE

(Depreciation rate depreciation GDPpc growth rate) Independent variables coefficients standard errors	Table (a) FE	Table (b) RE
$logGDP_initial._{it}$	−1.624*** (0.208)	−0.395*** (0.082)
$logGDP_initial_1_{it}$	5.85l (4.54)	3.20 (1.89)
FDI_{it}	0.006 (0.005)	0.001 (0.005)
FDI * HC	0.004* (0.002)	Missing
HC_{it}	0.002 (0.030)	−0.058*** (0.019)
$Dom.Inve_{it}$	0.063 (0.014)	0.057 (0.015)
FDI * Dom.Invest.	−0.002* (0.001)	Missing
REM_{it} Remittances	0.025 (0.021)	0.005 (0.013)
$G.E.F.C.G_{it}$ General Expenditures of Final Consumption Governments	−0.041 (0.034)	0.002*** (0.021)
Constant	40.603*** (5.34)	10.275*** (2.311)
R-squares	403	230
Correlation	−975	0

Note (In brackets are standard errors); RE: p > | z |] and [FE: p > | t |]; Significant levels: *** 1%, ** 5%, * 10%; Calculation by the author

Source World Development Indicators

Table 3. Evaluation of Hausman test on panel model for 24 seats, table c

	Coefficient (b) Fixed	Coefficient (B) Random	(b − B) Difference	Sqrt (diag (V_b − V_B)) S.E
LogGDPfill	−1.51023	−0.3906873	−1.119542	0.1727806
FDI/GDP	0.006199	0.00911549	−0.0029559	–
HC/Pop	0.0025701	−0.577948	0.0603649	0.0243275
Dom.inves/GDP ~ f	0.0649064	0.0577269	0.0071795	–

Note b = consistent under Ho and Ha; obtained from xtreg; B = inconsistent under Ha, coefficient under Ho; obtained from xtreg; Test: Ho: difference in coefficients not systematic, chi2(4) = (b − B)'[(V_b − V_B) ^ (−1)] (b − B) = 31.30, Prob > chi2 = 0.0000; (V_b − V_B is not positive definite)

Table 4. Evaluation results on the basis of fixed effects (FE): The rate of GDP growth per capita —dependent, FDI—independent along with other explanatory variables, panel over a decade (2004–2014), calculated by the author

Regression number	(1)	(2)	(3)	(4)
Independent variables	FE coefficient (Standard error)	FE robust	FE robust 2	FE robust 3
LogInitialGDP	−1.510***	−1.510***	−1.491***	−1.496***
	(0.189)	(0.179)	(0.174)	
				(0.174)
FDI	0.00620	0.00620	−0.0393	0.0246
	(0.00542)	(0.00798)	(0.0283)	(0.0405)
HC	0.00257	0.00257	−0.0198	−0.0213
	(0.0307)	(0.0235)	(0.0240)	(0.0239)
FDI_HC			0.00394*	0.00407*
			(0.00217)	(0.00223)
Dom.Inv % GDP (Dom.Inv.)	0.0649***	0.0649***	0.0608***	0.0896***
	(0.0149)	(0.0167)	(0.0156)	(0.0282)
FDI_Dom.Invest				−0.00290*
				(0.00163)
Remittances % GDP (REM)	0.0287	0.0287	0.0191	0.0145
	(0.0215)	(0.0174)	(0.0190)	(0.0197)
General Expenses of Government Final Consumption (GEGFC/GDP)	−0.0314	−0.0314	−0.0323	−0.0399
	(0.0341)	(0.0243)	(0.0239)	(0.0259)
Constant	37.71***	37.71***	37.64***	37.33***
	(4.861)	(4.670)	(4.619)	(4.462)
Observations	210	210	210	210
R-squared	0.398	0.398	0.406	0.416
Number of countries R^2 Within R^2 Between R^2 Overall	24 404 432 192	24	24	24
No. of countries below the threshold (start, end) = (24) 2004–2014	HC Threshold ≈ 14.3%			

Note (i) *, **, *** show level of significance* $p < 0.1$ (10%), $p < 0.05$ (5%), and $p < 0.01$(1%). (ii) Dependent variable real growth of GDP per capita. (iii) Robust standard errors were used and reported in parentheses below each coefficient of estimation. (iv) Absorptive capacity of the country, threshold of education level (HC threshold ≈ 14.5%) for 24 countries

Table 5. Evaluation of the Hausman test table h, Appendix, in the panel model

	Coefficient (b) Fixed	Coefficient (B) Random	(b-B) Diference	Sqrt (diag (V_b-V_B)) S.E
Log_ΔGDPGPC~e	0.2676096	0.2798688	− 0.0122592	0.032659
HC	− 0.1070223	− 0.0203723	− 0.08665	0.0364594
Dom.Inv.~f	0.0430892	0.0545818	− 0.0114926	0.0081922
REM~m	− 0.0078233	0.0363206	− 0.0441439	0.0269042
G.E.F.C.G~ë	0.0257276	0.0448618	− 0.0191343	0.0403195

Calculated by the author. b = consistent under Ho and Ha; obtained from xtreg; B = inconsistent under Ha, efficient under Ho; obtained from xtreg; Test: Ho: difference in coefficients not systematic; chi2(5) = (b − B)′[(V_b − V_B) ^ (−1)](b − B) = 8.00; Prob > chi2 = 0.1560

Table 6. RE Selection versus FE (Tables, Appendix), result

Variables coefficients stand. errors p-value	FE	RE
$\log_\Delta\hat{y}_{it}$	−0.267 (0.092)	0.027*** (0.086)
HC_{it}	−0.107 (0.042)	−0.02** (0.022)
$Dom.Inves._{it}$	0.043*** (0.022)	0.054*** (0.020)
REM_{it}	−0.01*** (0.031)	0.036*** (0.015)
$G.E.F.C.G_{it}$	0.025*** (0.048)	0.044*** (0.026)
Constant	1.233 (1.233)	−1.222 (0.836)
R-squares	149	396
Corr.	−975	0

In brackets are standard errors; [RE: p > | z |] and [FE: p > | t |]; Significant levels: *** 1%, ** 5%, * 10%; Calculated by the author

The sample of the countries included in the study

See Table 11.

Definition of data

Empirical literature provides different opinions on the influence of independent variables (growth determinants) on economic growth. In our study, the determinants of growth are simultaneously determinants of FDI.

Table 7. FDI and economic growth (The result through the Random Effects method)

Regression number		(1)	(2)	(3)
Independent variable	Coefficient (Standard errors)	Random 1	RE 2	RE 3
log_GDPgrowthcapita		0.280***	0.281***	0.286***
		(0.0860)	(0.0860)	(0.0867)
HC		−0.0204	−0.00936	−0.0104
		(0.0221)	(0.0310)	(0.0314)
lag1_HC			−0.0103	−0.0240
			(0.0283)	(0.0341)
lag2_HC				0.0212
				(0.0284)
GCFC/GDP		0.0546***	0.0542***	0.0553***
		(0.0207)	(0.0209)	(0.0210)
Remittances/GDP		0.0363**	0.0366**	0.0343**
		(0.0157)	(0.0160)	(0.0164)
(General Expenses of Government Final Consumption %GDP)		0.0449*	0.0514*	0.0520*
		(0.0267)	(0.0274)	(0.0282)
Constant		−0.881	−0.998	−1.122
		(0.836)	(0.865)	(0.887)
R-Squares (within, Between, Overall)		121	396	215
Observations		203	202	201
Number of countries		24	24	24
No. of countries below the threshold (start, end) = (24) 2004–2014		HC threshold ≈ 14.3%		

Note The dependent variable is GDP growth rate per capita. Evaluation is done by GLS. (Standard errors are in parenthesis). *** p < 0.01, ** p < 0.05, * p < 0.1; (1%, 5%, 10%). Calculated by the author

Table 8. Evaluation of the Hausman test (1978) for FE and RE

Test cross-section Fix effects			
Test summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section Fixes	31.30	4	0.0000
Test cross-section random effects			
Test summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	8.00	5	0.156

Note Hausman test-calculated with STATA, vs. 12 (from the author)

Table 9. Testi Parwise i Granger Causality (Granger 1988)

Koeficientet e vlersuar - Variabla të Varuara (x-y)	
ΔGDPGpc(lag)	FDI(lag)
ΔGDPGpcit (0.0867)	0.286***
FDI_{it} (0.0405)	0.0246
Granger Causality parwise Test Wald Causality Test	
Null Hypothesis: GDP causes FDI FDI does not cause GDPGCP	

Note In parentheses is the standard deviation *** Significant at level 1%. Calculated by the author

Table 10. Regression variables

Variables	Definition	Argument, importance
Annual GDP growth rate per capita (GDPGPC)	Annual GDP growth per capita in percentage. GDP per capita is the gross domestic product in relation to the population	
FDI_{it}-in relation to GDP	$lag^{a}FDI^{b}$: Foreign Direct Investment, net inflows (% of GDP).. FDI/GDP*100	**Positive** (Borensztein et al. 1998; Ram and Zhang 2002); Negative (Alfaro 2003)
Initial GDP (T_1) with a year time lag	GDP (current in US $)	**Negative** (Barro 2013; Mankiw et al. 1992)
Log_Initial GDP (Y_0)—logarithm of initial GDP	GDP (current in US $). For the indicator; 0 log of y is considered the natural logarithm of GDP per capita (2003) of the country (i), as the initial level of our analysis. The study includes 24 countries; $i \epsilon$ [1;24]. STATA_12 is represented by $\log Y_0$	
HC-human capital in relation to the population without time lag	(lagHC): The gross registration ratio in secondary schools is used as a representative of human capital development in the host country in relation to the population (used with lag)	**Positive** (Borenztein 1998)
HC_1 human capital with one year lag	(lagHC): Secondary education with one year lag, registration in the high secondary education[c]/population	
HC_2 human capital with two year lag	Registration in the high secondary level of education with two years lag/Population (secondary education, students)	
FDI_HC	(lagFDI * HC): FDI in interaction with human capital. The conditions of FDI interaction with the factors of absorption capacity of the host country multiply FDI	
FDI_DOM.INV.	Direct Foreign Investments as a percentage of GDP in interaction with Domestic Investment (as a percentage of GDP). FDI * FDI_DOM.INV	
DOM.INV	Domestic investment (% of GDP)	**Positive** (Barro 2013)
Remittances	Personal remittances, taken (% of GDP)	

(*continued*)

Table 10. (*continued*)

Variables	Definition	Argument, importance
EGFC	Total Expenditure of Government Final Consumption (% of GDP): This variable is used to capture the impact of the government's size on the economic growth of the host country as suggested in the literature	**Positive** (Ram 1986)

[a]The time factor (lag) is used to measure the effect in the initial period due to unfavorable conditions in the host country (inherited from the planned economy, political conflicts or wars, and delayed effects) where is suggested a return back (lag) of one or two years after the entry of a foreign firm (this study, for 2003 measures the effect in 2004 (lag_1 and Lag_2) and in 2005). Failure to apply the time factor often argues the negative effects of FDI. For example, Stancik (2007)

[b]Net FDI flows as a percentage of GDP are used as a measure for the investments of Multinational Companies (and foreign firms) in the host country (UNCTAD 1999). Asia Pacific J. Manage (2008) 25:573–593. https://doi.org/10.1007/s10490-007-9074-z. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1490986

[c]According to Aleksynska et al. (2003), the level of high (tertiary) education of human capital in a host country is expected to make FDI more effective in stimulating economic growth

1. *Economic growth*—represented by real annual GDP growth per capita (GDPgpc).
2. *Gross Domestic Product (GDP_{it}) at the beginning of 2003 (Y_0)*: Log_InitialGDP (Y_0) or the natural logarithm of real GDP ($\log Y_0$) at the beginning of each period, so that it is equal to the initial year of one and two year intervals. For the Initial_GDP per capita, the scale of 2003 is chosen, i.e. the year before the start of the sample. GDP is taken at purchase prices, or the amount of the added value of all resident producers in an economy, plus product taxes and minus subsidies. So, the initial GDP variable (Y_0) in the study is expected to reach the catching-up effect (N/N*).[18]
3. *Foreign Direct Investment* (*FDI as % of* GDP) are used as a standard in literature (Asiedu 2002; Choi 2009), in the model is conceptually analogous to parts of goods produced by foreign firms, (n * /N).[19] The FDI net inflow was used for measurement of FDI. It includes the amount of capital, reinvestment of profits, long-term capital and short-term capital as shown in the balance of payments.
4. *FDI in interaction with human capital (FDI/GDP_{it} * $HC/Population_{it}$)*: FDI in interaction with the variable of absorption capacity (HC) of the host country, i.e. gross registration in the secondary education as a percentage of the country's population, expresses the term of interaction or the indirect impact of FDI on economic growth. This will also determine the level of education threshold.
5. *Domestic Investment ($DOM.INV./GDP_{it}$)*: Is represented by formation of the fixed gross capital minus FDI. GCFCs are expenditures or additions to fixed assets of the economy minus net changes in the inventory level.

[18] There are empirical evidence from the studies of Barro (2013) and Mankiw et al. (1992). This was also applied by Carkovic and Levine (2002) but in a five year period.

[19] We assume that the ratio of Foreign Direct Investment to GDP, which, for over a decade, has been an independent variable, is a good representation for (n * / N). FDI is available in this study only from 2004–2013.

Table 11. The sample of the countries included in the study (developed countries, developing countries, transition countries)

European countries (24)		
Developed Countries	Developing countries	Countries in transition
SWE	CVN	KVS
NLD	BGR	ALB
AUT	ROM	FYROM
DEU	HUN	MNE
CHE	POL	HVR
NOR	PRT	BIH
ITA	CZK	SRB
	SVK	
	LTU	
	EST	
7	10	7

Source World Bank (World Development Indicators 2015). By the author

6. *Variables in interaction with each other: [(FDI/GDP$_{it}$) × (DOM.INV./GDP$_{it}$)],* in our case, is an interaction variable between FDI and domestic investment.

7. *Secondary level of education* (*lag_HC/pop$_{it}$*): The gross registration rate is the total census report, regardless of age, of the age group that officially corresponds to the level of education (secondary education—the high secondary school level) in relation to the population of the country.

8. *Remittances (REM/GDP$_{it}$)*: are remittances to their homes by emigrants working abroad (through formal channels).

9. *Total expenditure of government final consumption (Exp.Gov.Fin.Conc../GDP$_{it}$)*: The government expenditure ratio to GDP is taken by WDI as a measure of government involvement in the economy. The general government consumption includes all current government expenditure on purchase of goods and services (including employee compensation and government transfers). It also includes most of the expenses for national defense and security, but excludes government military expenses that is part of government capital formation.

The description of command (xtreg[20]), in Stata vs. 12,[21] to the use of methods (FE/RE).

[20] (http://www.stata.com/manuals13/xtxtreg.pdf#xtxtreg).

[21] To Stock and Watson (2008), STATA version 12 uses, NT - N - K - M degrees of freedom to the tests in small samples. Cluster-robust Huber/White standard errors are reported by the option Vce: xtreg ln_GDPgrow.p.c ttl_exp ttl_exp2, fe Vce (idcode grup). STATA reports T- small samples and F-tests with N − 1 degrees of freedom. Moreover, STATA multiplies cluster-robust covariance by N/(N − 1) to correct for degrees of freedom in small samples. Stock and Watson (2008), Heteroskedasticity-Robust Standard Errors for Fixed Effects Panel Data Regression, Econometrica, 76(1), 155–174. [advanced]

The xtreg command is suitable to the regressions into models with panel data. In particular, xtreg is more suitable to assess the regression of the random effect model (RE), using the estimator (GLS estimator), the results given by the matrix-weighted average of the between and within. The selection of the model (RE) requires that the evaluation is done with the GLS method by specifying the small samples with the Swamy-Arora evaluation and by evaluating the variance component at the individual level as a choice for evaluation.[22] The vce type of assessment (Robust) reports the type of standard error that derives from the conventional theory (asymptotic) and is a powerful evaluation when, within the group, there is a correlation (cluster) due to the lack of specificities, therefore the supportive methodology or the Jackknife method has been used.[23] Even FE requires regression to be evaluated with fixed-effects (within) and the GLS method. These two methods (fe, re) are considered more appropriate[24] for evaluating the panel data through Stata, in our case STATA vs. 12.

The Wald test: xttest3

Modified Wald test for heteroskedasticity GroupWise in the FE regression model

$$\text{H0} : \text{sigma(i)}\hat{}2 = \text{sigma}\hat{}2 \text{ for all i}$$
$$\text{chi2(24)} = \quad 956.05'; \quad \text{Prob} > \text{chi2} = \quad 0.0000$$

Testing for the correlation in the series:

The series correlation tests are applied in macro panels in long time series (over 20–30 years). It is not a problem in micro panels (just a few years). In our case we have only 11 years, so there is no serial correlation. The serial correlation causes the standard error of the coefficients to be smaller, while R^2 are currently higher.

FE model is used in the data panel for GDPgpc growth rate, dependent:

The Hausman test, Table 18, suggests if: Prob ch2 = 0.0000, smaller than 0.05 (<0.05), is considered important and suggests the Fixed Effects methods to be used. Therefore, in Table 19 (Chapter Four), the Fixed Effects (FE) method is used.

The Random Effects model is used in the data panel for FDI—dependent:

The Hausman test, Table 20, suggests if: Prob 0.156 > 0.05, bigger than 0.05 (>0.05), is considered important and suggests the Random Effects methods to be used. Therefore, in Table 22, our Case Study has used the Random Effects method (RE).

[22] See the additional attachment: xtreg, random effects (re), methods and formulas in more detail.

[23] Vce specification (Robust) chooses to use GLS.

[24] See Baltagi (2013, Chap. 2), reference: Baltagi, B.H., and L. Liu, Alternative Ways of Obtaining Hausman's Test Using Artificial Regressions, Statistics and Probability Letters, 77, 2007, 1413–1417; and Allison (2009), offers many examples that in the estimates are used fixed effects versus random effects.

Table 12. cor. Log_GDPpc., FDI, HC, FDI * HC, Dom.Inve., FDI * Dom. Inves., Remittances (obs = 210)

log_GDPgro ~ ë, logGDP ~ l, IHD, HC, IHD_HC, GCFC ~ f IHD_GCFC remita ~ m								
log_GDPgro ~ ë	1.0000							
logGDP_initial	−0.4141	1.0000						
FDI	0.1602	−0.1198	1.0000					
HC	−0.0182	−0.4776	−0.0586	1.0000				
FDI_HC	0.1962	−0.2552	0.9578	0.1771	1.0000			
Dom..Inv ~ f	0.3390	−0.2953	0.1318	−0.0382	0.1430	1.0000		
FDI_Dom.Inv.	0.2062	−0.1643	0.9801	−0.0640	0.9425	0.2815	1.0000	
Remitances ~ m	0.1709	−0.4186	0.1645	0.1809	0.2194	0.0782	0.1771	1.0000

Table 13. corlog_GDPgpc, logGDP_initial, FDI, HC, FDI * HC, Dom.Invest., FDI * Dom.Invest, Remitances (obs = 210)

log_GDPgrow ~ e, logGDP ~ l, FDI, HC, FDI_HC, Dom.Inv ~ f, FDI * Domestic Investment, REM ~ m								
log_GDPgrow ~ e	1.0000							
logGDP_initial	−0.4141*	1.0000						
	0.0000							
FDI	0.1602	−0.1168	1.0000					
	0.0202	0.0581						
HC	−0.0182	−0.4731*	−0.0728	1.0000				
	0.7930	0.0000	0.2382					
FDI * HC	0.1962	−0.2490*	0.9618*	0.1464	1.0000			
	0.0043	0.0000	0.0000	0.0173				
Dom.Inves ~ f	0.3390*	−0.3168*	0.1087	−0.0506	0.1229	1.0000		
	0.0000	0.0000	0.0779	0.4126	0.0460			
FDI * Dom.Invest.	0.2062	−0.1704	0.9785*	−0.0763	0.9478*	0.2580*	1.0000	
	0.0027	0.0055	0.0000	0.2168	0.0000	0.0000		
Remitances ~ m	0.1709	−0.4259*	0.1361	0.1774	0.1903	0.1184	0.1572	1.0000
	0.0131	0.0000	0.0271	0.0038	0.0019	0.0546	0.0105	

Results after the final certification of the tests are presented in chapter IV, Tables 16, descriptive statistics, Table 19 FE method, and Table 22 RE method.

Correlation Matrices

See Tables 12 and 13.

Chart representation of variables used in a 24 country—panel (graphical-scatter plot, Stata. vs. 12). Source: WDI, 2015, Graphic 1–14, by the author.

See Charts 1, 2, 3, 4, 5 and 6 and Graph 7.

Interaktion between variables (Y-X):

See Charts 8 and 9 and Graph 10.

Interaction between log, _GDPpc log and initial log_GDP (negative)

See Graph 11.

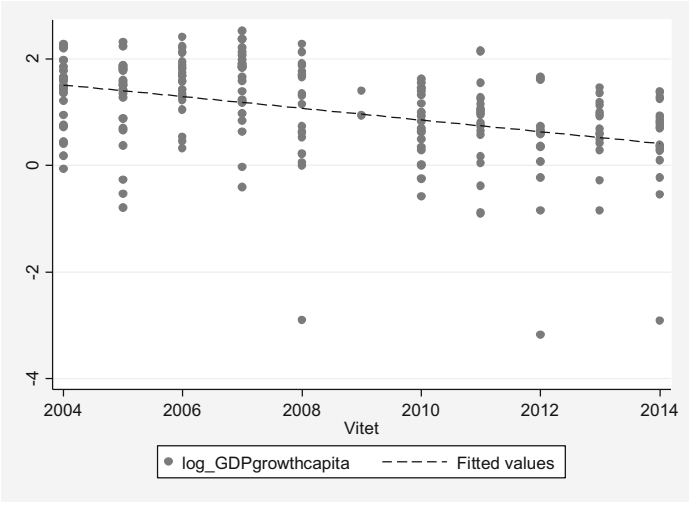


Chart 1. Growth rate of GDP per capita in 24 European countries in 2004–2014

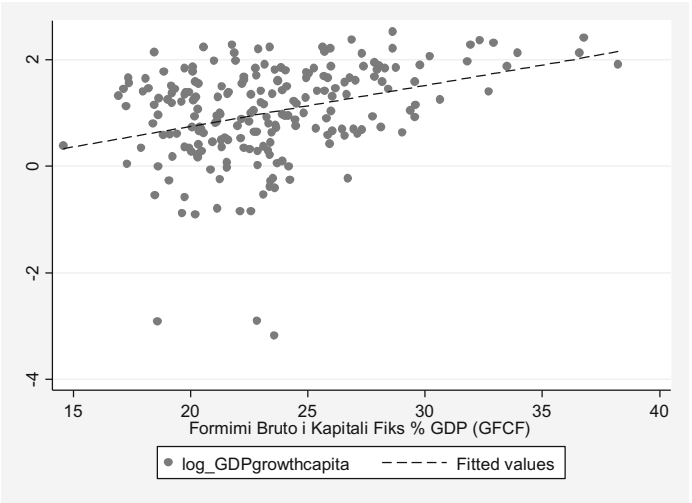


Chart 2. LoG_GDPgpc/domestic investments/GDP

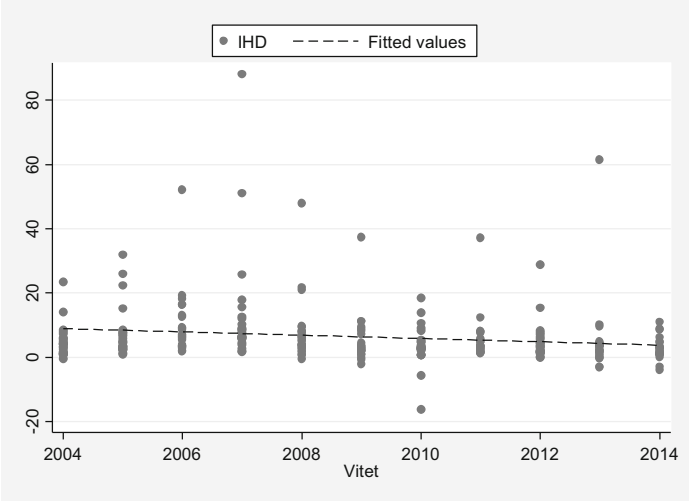


Chart 3. FDI/GDP in US $ (2004–2014)

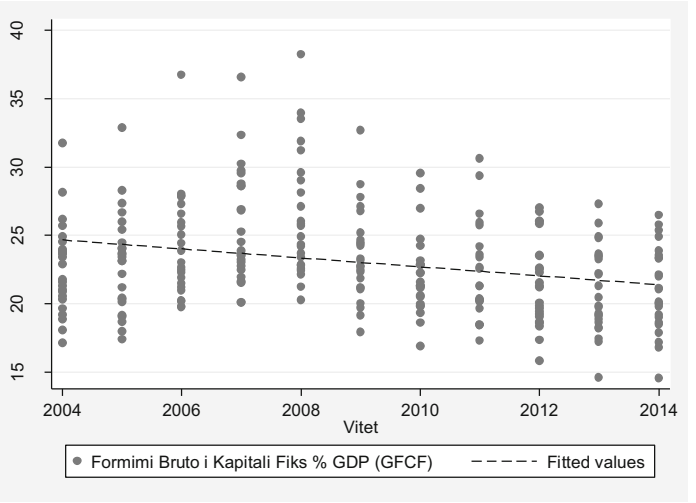


Chart 4. Domestic investments/GDP

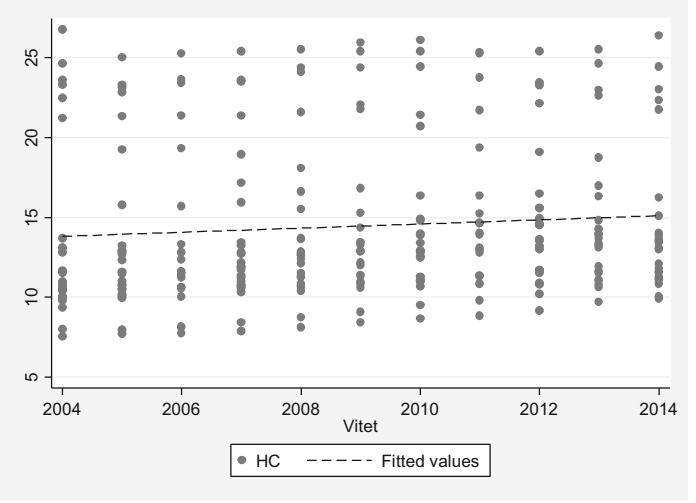


Chart 5. Human capital/population

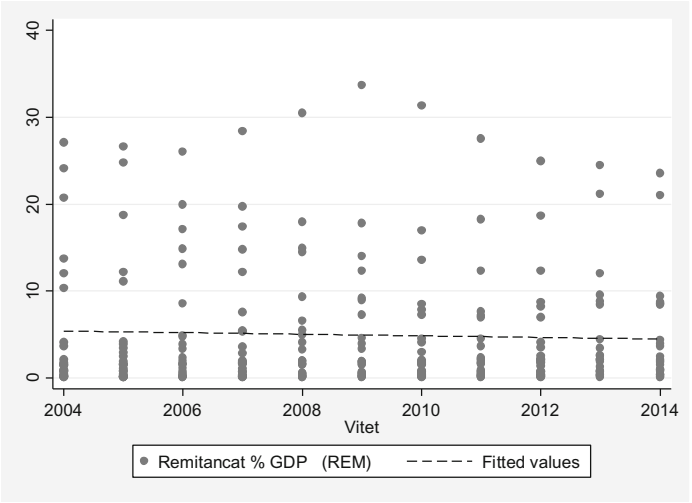
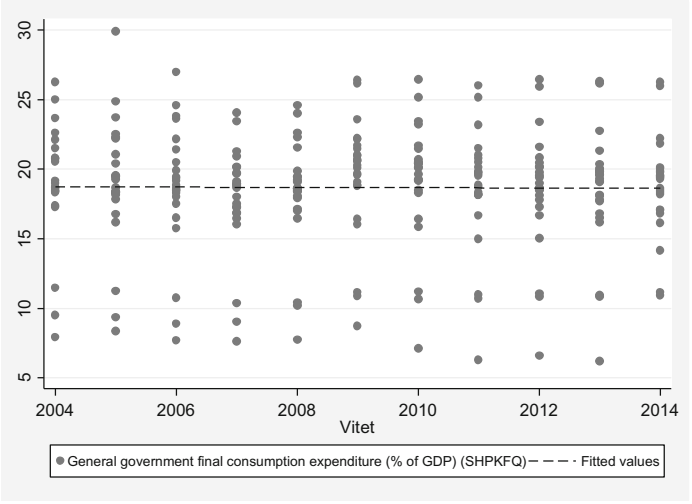


Chart 6. Remittances/GDP



Graph 7. General government consumption final expenditures/GDP

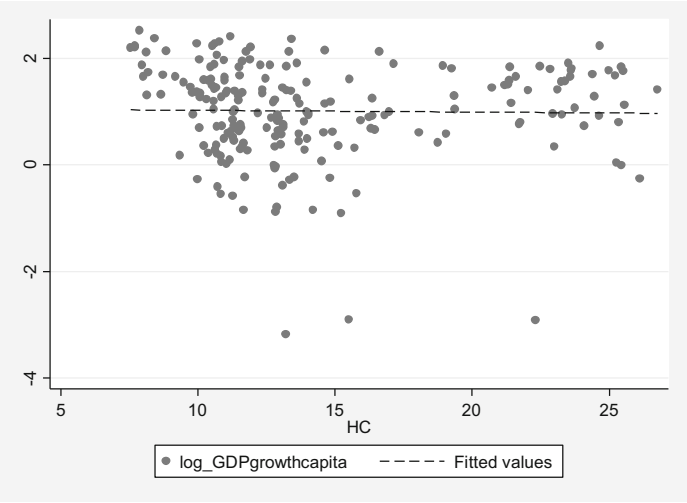


Chart 8. GDP growth rate per capita and human capital

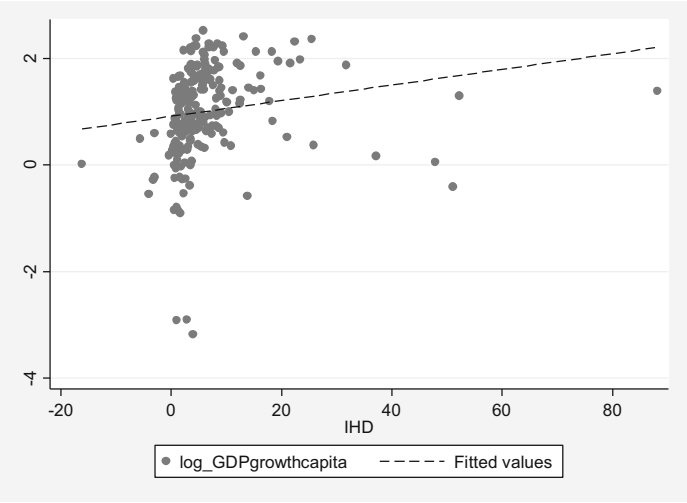
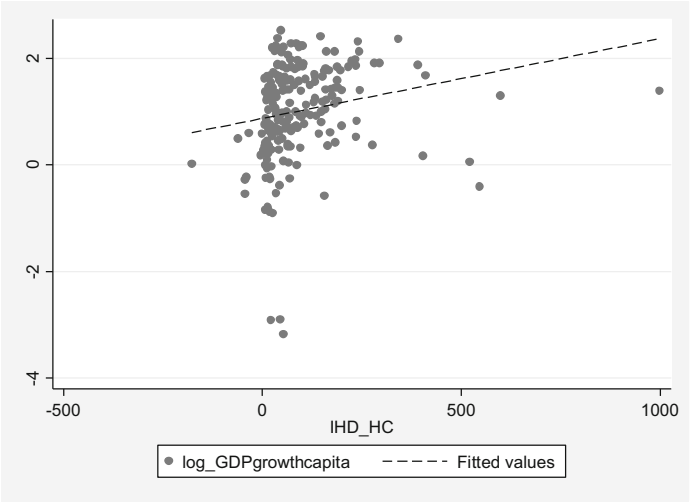
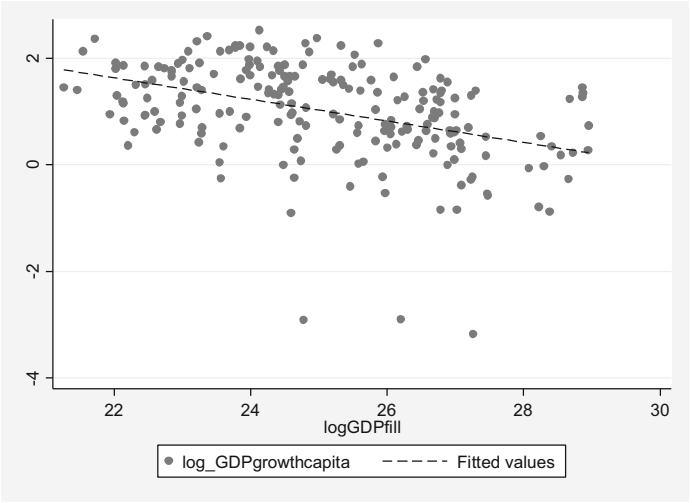


Chart 9. FDI/GDP (dependent) and Log_GDPGpc (independent)



Graph 10. Log_GDP pc and FDI in interaction with HC



Graph 11. Logging GDPgpc per capita and log_GDP_initial)\(lfitlog_GDPgpc logGDP_initial)

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