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TO WHAT EXTENT CORRUPTION EFFECTS THE RETURNS OF
FINANCIAL ASSISTANCE?
An empirical analysis of the impact of corruption on the returns of EU
financial aid in the European Neighbourhood countries.

Supervisor: Prof. Andrés Rodríguez-Pose

Thesis presented by
Magdalena Lyubenova
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Statutory Declaration

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Abstract

This thesis sets out to examine the impact of corruption on the returns of EU financial assistance, focusing on the European Neighbourhood Policy and the involved Partnership countries. While the prevailing literature does not provide a clear answer of the conditional effect of corruption on financial appropriation, there are limited studies which effectively focus on proving the existence of any influence. Using fixed effects panel regression model, I conduct an empirical research for a total of 42 countries in the period 2007-2014. Despite the widespread belief that financial support fosters economic activity, this analysis finds that the effect is dependent upon corruption levels. The results of this study underline the importance of corruption having a direct impact on economic growth as well as being a moderator of the efficiency of the EU financial assistance provided to the Neighbourhood countries. The paper finds that the European funds have negative impact on the majority of Partnership states, while at the same time lower corruption can contribute to their positive effect. Finally, the study evaluates indirectly the success of the European Neighbourhood Policy and outlines the importance of EU to encounter the challenges in the region and to strenthen its role.

Keywords

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1 Introduction

A decade after launching the European Neighbourhood Policy (ENP), the European Union (EU) is far from meeting the initial policy objectives. In contrast to bringing more peace, security and democracy in the Southern Mediterranean and the Eastern Partnerships, these countries became an unstable zone, with conflicts threating not only the security in those regions but the safety of the EU borders as well. The last European Commission review, released in November 2015, "signals a major shift of paradigm in the EU's approach to its neighbours" (Delocour, 2015, p.1) but skepticism exists to what extent the EU will undertake strong position in the Foreign Policy affairs. According to the EU's High Representative for Foreign and Security Policy, Frederica Mogherini, the Neighbourhood today is a "region in flames, both to the East and to the South"[1] and it requires an urgent reassessment from the European Community.

From a global prospective, the Neighbourhood policy takes a key stance in the EU Foreign Policy. From the economic perspective, the ENP's emphasis on trade with the partnership countries will benefit the European internal market by pursuing Free Trade Agreements (FTAs) which further contribute to both parties' economic growth. Dismantling of the economic borders is only a trampoline to the implementation of the Deep and Comprehensive Free Trade Agreements (DCFTAs) which more extensively cover investments, public procurement and competition (Mohamadieh, 2012). On the other side, the potential success of the ENP can additionally strengthen the European role as a democracy and a rule of law promoter. The premise of shared European values and norms is considered to be the best expression of the EU Normative Power in its international relations (Manners, 2006a; Wichmann, 2007).

The pursuit of the above mentioned goals has been developed with the assistance of the main financial tool - the European Neighbourhood and Partnership Instrument (ENPI). This financial programme is similar to the European Multiannual framework, covering a seven-year period, and has become the most influential instrument, which EU applies to trigger countries' commitments to the wide range of the ENP's objectives. While theoretically the EU has created the accurate framework and a well-developed policy, recent analysis alerts for "real and much-needed strategic vision" (Delocour, 2015, p.1),

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[1] Frederica Mogherini, in March 2015, addressing the EU community in reviewing the ENP: http://europa.eu/rapid/press-release_SPEECH-15-4553_en.htm?locale=FR Retrieved on April 20,2016.

which improves the EU's "special relationship"[2] with the southern and eastern neighbours. While the Enlargement Policy inspired to a great extent the creation of the ENP, they significantly deviate especially in their final outcome. First, the EU has been criticized for the low amounts of money allocated to the partnership countries where at the same time corruption has been unprecedentedly high. Secondly, the main distinction between accession and ENP countries is locked in a phrase used by Romano Prodi[3], referring to this newly created partnership block of "sharing everything with the Union but the institutions". [4] Therefore, it is argued that the EU has lost leverage in demanding transformations and significant reforms in the Neighbourhood because it cannot offer the most significant part, the membership or the "carrot" of closer relations.

While taking into the consideration the existing theoretical and empirical studies pointing out in different directions, the thesis will attempt to assess the impact of corruption on the returns of the EU Financial aid in the ENP countries. Given the importance of both corruption and the European financial assistance, in this paper, I will address the indecisive literature to extract a firm conclusion of whether corruption weakens the relation between funds and economic growth. I conduct a quantitative research method by applying a fixed effects panel data regression - incorporating a sample of 15 Neighbourhood countries during the period 2007-2014. The novelty of this research lies in the attempt to assess the effect of the EU aid under the conditional presence of corruption determining how such interaction influence the economic growth. Moreover, this paper emphasizes on the European Neighbourhood Policy and adds to the very limited literature with further investigation of the success of the policy objectives and instruments in fostering economic activities in the Neighbourhood.

While framing the thesis through these principal questions there are a number of reasons that motivate this research. Firstly, with the Arab Spring upraising, Syrian and Eastern Ukrainian war and the high-tension in the South Caucuses, the EU faces a major security challenge. Moreover, recent terrorist attacks in Paris and Brussels, initiated by the growing group of Da'esh, poses a further threat to the European borders. Secondly, the political and economic struggles within the partnership countries led to an unprecedented migration flow, which so far resulted in disagreements between Member States over

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[2] Article 8 of the Treaty of the European Union
[3] Commission President 1999-2004
[4] Romano Prodi speech, 2002: http://europa.eu/rapid/press-release_SPEECH-02-619_en.htm Retrieved on April 23,2016.

refugees' asylum. Lastly, as a consequence of the economic crisis together with a number of cases of poorly managed EU money, the EU is in need of developing a strong incentive to proper allocation of payments for good projects, to support implementation and to improve monitoring. However, the recent assessment of the ENP indicates high level of corruption, bad implementation of policies and mismanagement of funds.

In order to provide an answer to our empirical question, the remainder of the thesis is structured in the following manner. The first part provides a short overview of the general literature framework on corruption and the impact of EU financial assistance on economic growth with further focus on their specific impact under the European Neighbourhood Policy. In the subsequent section, I present the methodology with a detailed explanation of the dataset, the description of dependent and independent variables applied in the quantitative analysis along with descriptive statistics. The following chapter outlines different methods applied for conducting the regression output. The next section is focusing on the final estimations as well as addressing an endogeneity issue and limitations of the research. Finally, the thesis includes a short discussion and conclusion following the empirical research.

2 Literature Review

2.1 The European Neighbourhood Policy

In 2004 Europe experienced the largest Enlargement since its beginning. Following this expansion, the European Union was challenged to deal with the southern and eastern neighbours for strategic, political and economic reasons. This set of 16 countries[5] have distinctive characteristics and while they are extremely different both culturally and geographically, they all share an EU border. This developed into the idea of constituting an innovative European project, forming a "ring of friends"[6]. Kleenmann identifies two reasons for the development of the European Neighbourhood Policy (ENP). On the one hand, due to the EU inability to enlarge further, it can provide additional instruments from the Enlargement Policy and therefore enjoy the success of a second alternative expansion. On the other hand, the EU recognizes the need to ensure a peaceful and prosperous circle of neighbours, an important prerequisite for the EU security (Kleemann, 2010). Dodini and Fanitini, additionally argue that while the big enlargement created a successful political and economic stability, the rationale for the creation of ENP seems as the only possible solution "exporting some of the benefits" from Europe without offering membership in exchange (Dodini and Fantini, 2006, p.508).

The development of the so-called at the time "Wider Europe", was launched in 2003, by the European Commission and quickly developed further into a political project, endorsed by the European Council. In May 2004, the European Neighbourhood policy is officially announced together with a strategic paper referring to the EU framework and area of cooperation. According to this document the EU creates stability and security, while promoting reforms in the neighbourhood: "strengthening democracy, rule of law, reform the judiciary and fight against corruption and organized crime" (European Commission, 2014, p.13).[7] Unless addressed with strong measures, these democratic reforms could be an impediment to the successful realization of the policy objectives. Therefore, following the experience of the enlargement, the EU realizes the importance of strong governments and proper allocation and management of financial assistance.

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[5] Algeria, Armenia, Azerbaijan, Belarus, Georgia, Egypt Arab Republic, Israel, Jordan, Libya, Lebanon, Moldova, Morocco, Syria, Tunisia, Ukraine, West Bank and Gaza (The occupied territory of Palestine)
[6] Romano Prodi, EU Commission President (1999- 2004) addressing the Neighbourhood countries in Brussels, 2002: "I want to see a "**ring of friends**" surrounding the Union and its closest European neighbours, from Morocco to Russia and the Black Sea."
[7] Communication from the Commission. (2003). European Neighbourhood Policy. Strategy Paper. Retrieved on April 20, 2016 from http://trade.ec.europa.eu/doclib/docs/2004/july/tradoc_117717.pdf .

The existing literature on the Neighbourhood Policy is still relatively incomplete. Due to the recent and fairly limited time since its beginning, the policy impact is to be seen in the long-run. Nevertheless, the emphasize of the prevailing studies is on the evolution of the policy and rationale for its existence today (Lavanex, 2004; Smith, 2005; Delcour and Tulmets, 2009). A significant part is also attributed to the EU Foreign policy making (Hill, 1993; Smith, 2008) and the EU capacity to promote democratic norms in the Neighbourhood (Bosse & Korosteleva, 2009; Pace, 2007; Sasse, 2013). While some authors focus further on the ENP impact (Schimmelfennig, 2006), others illustrate specific country reports and policy outputs (Sasse, 2008; Börzel & Pamuk, 2012; Lavanex et al., 2009). Due to the highly distinctive nature of the Neighbourhood countries, it is commonly argued that such country-specific emphasis provides profound insights about the policy impact. Nevertheless, while the ENP set up is similar to the EU Enlargement Policy, scholars are questioning whether the EU contribution to actual reforms will be similar to those following the enlargement (Börzel et al., 2008). Other scholars highlight that the EU incentives can exhibit an indirect influence on domestic actors and therefore lead to further transformations in the respective country's political system.

Scepticism about the success of the policy as a direct promoter of good governance exists and in many studies it is linked to the insufficient absorption of the EU aid (Borzel, 2010; Kleenmann, 2010). Finally, the studies are inconclusive about the degree of success attributed to the ENP in meeting the objective criteria as developed in 2004.

The added value of this thesis research is the exploration of the further impact of corruption on the successful appropriation of the EU financial assistance. While identifying the literature gap on the issue, the thesis will explore the interaction of corruption of the EU funding support and its effect on economic growth in the ENP countries.

2.2 Corruption and Economic Growth

Corruption "refers to acts in which the power of public office is used for personal gain in a matter that contravenes the rules of the game" (Jain, 2001, p73.) Even though most scholars apply different definitions, briefly corruption is an abuse of power for private gains (Svensson, 2005). As argued by the former President of the World Bank, Paul Wolfwitz, corruption generates $80 billion per year in costs for all developing countries, which accounts for the total financial aid that the same countries receive yearly (Wolfwitz, 2006). While the literature undoubtedly agrees on the significant impact of corruption on economic growth, there are various interpretations of what the net effect is. One major

school of theorists supports the negative implications of corruption. According to those studies corruption is the main source of disruption of all economic activities in a country (Mendez and Sepulveda, 2006; Mo, 2010; Izgorodin and Wen, 2015). Even though scholars refer to different channels in which higher levels of corruption prevent economic growth, they all apply empirical research to identify the negative impact of corruption on countries' welfare. One of the first study looking at the link between corruption and economic growth was conducted by Mauro (1995). He demonstrates two type of relationship flow: one, in which corruption decreases returns from private investments and thus indirectly reduces economic growth; and second, where corruption is beneficial to economic growth encouraging civil servants to be more productive in order to receive higher bribes. Therefore, he finds the effect of corruption on economic growth to be controversial.

In a study, in 2003, Aidt, also sheds a positive light on the impact of corruption on a country's growth. Indeed, Leff, Lui, Neck and Maher, developed much earlier a theory of the "efficient corruption". According to this school of economists, corruption captures the existing ineffective bureaucracy and insufficient public administration and creates rationale for corruption to accelerate trade between different agents (Aidt, 2003; Leff, 1964; Lui, 1985; Beck and Maher, 1986).

Due to the growing importance of institutional quality, the European Community emphasizes on developing sufficient instruments contributing to the good governance facilitating countries' sound transition (Kleemann, 2010). The fight against corruption is part of the EU good governance Agenda (European Commission, 2003). In the context of the Neighbourhood policy the fight against corruption is inextricably linked with the success of the ENP in promoting democracy and economic development in the regions. Similarly, to the accession process, the EU provides the "carrot" of closer relationship, in order to boost anti-corruption reforms in the Neighbourhood. In the form of Country Reports and Action Plans, the EU develops differentiated framework for every country to enhance the democratic principles. While studies refer to economic, political and cultural reasons leading to corruption evolution (Lambsdorff, 1999), the ENP in its core objectives refers to the fight against corruption (Börzel et al., 2008). Despite of the strong emphasis on the anti-corruption mechanisms, most of the country's reports still refer to issues like undemocratic elections, not sufficiently independent judiciary, little respect for civic

rights.[8] Along with that a growing literature identifies limited impact of corruption levels and its effect on the democratic and economic reforms (ibid).

According to the World Bank, Control of Corruption indicates prevalence of corruption in both southern and eastern neighbours. All countries suffer from exceptionally high level of corruption. With little exceptions (like Israel, Georgia, Jordan) the countries proved to be indeed very corrupt. However, some of them demonstrate higher levels even within the last 8 years, since the introduction of the Neighbourhood Policy. Nevertheless, these results do not come as a surprise. The literature on transitional economies identifies that in context of the Former Soviet Union countries (part of the Eastern Partnership today), most states are prone to experience high degrees of corruption which in turn is a long-lasting impediment to their economic growth (Sandholtz and Taagepera, 2005). Finally, the theoretical and empirical framework describes both positive and negative effect of corruption on economic growth, while in itself corruption is undoubtedly found to be significant for development. Due to its vast importance, more policies are oriented towards effective means of fight against corruption.

2.3 Financial Assistance and Economic Growth

The effectiveness of financial aid is widely discussed in the literature, however the degree of impact on economic growth is doubtful. On the one side, World Bank distinguishes between effectiveness of financial assistance and macroeconomic policies in the recipient country. Aid is found to spur growth and to have significant effect only in countries with the good policies. Hence, the influence of financial assistance is contingent to the economic policies' environment (Burnside and Dollar, 2000). On the other side, studies indicate that aid results in growth irrespectively of the policies (Hansen and Tarp, 2000). The implication of the literature refers to the importance of selective policies in bringing economic growth (Feeny, 2004).

In a similar manner, the European financial support allocated to the Neighbourhood Policy is designating significance to more policy-oriented tools. The main instrument in promoting good governance is the financial assistance[9] provided through the European Neighbourhood and Partnership Instrument (ENPI).[10] Replacing the previous financial

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[8] Individual Country Reports can be accessed under : http://eeas.europa.eu/enp/documents/progress-reports/index_en.htm (Retrieved on April 19, 2016)

[9] ENP policy promotes good governance based on: assistance (including technical), conditionality, political dialogue. (Kleemann, 2010)

[10] In 2014, the name is changed to European Neighbourhood Instrument(ENI).

programmes TACIS[11] and MEDA,[12] in 2007, the ENPI programme is increased with 32% in comparison to previous instruments (Commission Report, 2014, p. 11). Even though the 2007-2013 programming period amounted EUR 12 billion, only half of them were committed.

Overall the ENPI offers "a wide range of tools" to support the partnership countries (Commission Report, 2014, p. 11). Following the Arab Spring and the Syrian Civil war, the Neighbourhood policy went through significant transformations to provide a mix of available tools and aid in response to the needs of the Partnership countries. The biggest financial support is granted for Institutional Building: TAIEX, Twinning, and SIGMA.[13] The European financial assistance generates incentives for further dialogue and reinforcement of budget transparency and institutional supervision. Along with those tools, the EU initiates the Neighbourhood Investment Facility (NIF) instrument, which allows the EU Member States to leverage loans from the European Finance Institutions together with own contributions to grant pooled resources to the Neighbourhood. Lastly, the Cross-Border Cooperation (CBC) seeks to contribute to the close collaboration within local stakeholders (ibid). The most significant change in 2011 is the introduction of more conditionality.

"Increased EU support to its neighbours is conditional. It will depend on progress in building and consolidating democracy and respect for the rule of law. The more and the faster a country progresses in its internal reforms, the more support it will get from the EU." (European Commission, 2011, p. 3)

Despite references in the literature concerning similar strategies between the Neighbourhood and the Enlargement policy, one of the main differences is found exactly in the financial assistance (Kleenmann, 2010). According to Bendiek, accession countries receive almost two times more funding than the ENP states (Bendiek, 2008). However, the literature is still inconclusive in terms of general evaluation of the policy objectives. Moreover, due to significant differentiations between the states, most of the studies focus on specific countries (Kochladze and Pataraia, 2009) and argue that higher per capita funds are not certainly linked with higher growth (Kleemann,2010). While the new recent review

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[11] Technical Aid to the Commonwealth of Independent States
[12] Euro-Mediterranean partnership (MEsures D'Accompagnement)
[13] Twinning is one of the key instruments for institution building assistance. It contributes mainly to the development of efficient administrations.

of the ENP refers more directly to distinctive policies, the EU applied for a long time the "one-size-fits-all" approach, without taking into account different needs within the Partnership countries. According to this argumentation, the ENPI is not targeting tailor-made policies.

Moreover, the funds allocated by the European Union are found to differ significantly between countries, which creates further complexity of investigating the ENPI coherent effect on the targeted policies. Most country reports refer to the lack of transparency, unregulated funding and complexity of tracing the effect of those funds. Lastly, due to the lack of coherent, long-term vision and targeted policy approach with the neighbours, the ENPI fails to contribute to the development and economic growth in the region (Tocci and Cassarino, 2011).

2.4 Corruption, Financial Assistance and Economic Growth

While most of the studies investigate either corruption or financial aid independently, only few of them focus on their overall net effect on economic growth. The studies that attempted to investigate the impact of both factors on economic growth have done so by looking at the EU level only, focussing on the European Regional funds.

The literature emphasizing the positive effect of foreign aid on governance addresses concrete goals of improving anti-corruption activities and facilitating countries to overcome lack of resources (Knack, 1999). In contrast, the second common argument elaborates on the negative impact of financial assistance in presence of corruption. In other words, higher financial assistance disincentives countries to develop and to fight corruption: "aid weakens governmental accountability, by delaying the development of a healthy civil society underpinning democracy and the rule of law" (North, 1990, p.2). Furthermore, other studies on financial support and quality of governance discover a correlation between high aid levels and low quality of governance (Knack, 1999) arguing that development aid destroys institutions and prevents state-building (Djankov et al., 2008). In a similar manner, the European regions receiving the majority of Structural Funds are found to have only a marginal impact on the economic activity unless the quality of government is significantly improved (Rodriguez-Pose and Garcilazo, 2015; Ederveen et al., 2006).

Finally, in the context of the European Neighbourhood Policy, disparities in the EU aid within the southern and eastern partners, is driven by the policy outcomes in the

recipient country and therefore a potential presence of a moral hazard could reinforce further the corruption-funds nexus.

The key message from the variety of literature sources is that the extent to which corruption impacts the returns of financial assistance is contingent to a large number of control factors, research methods and more importantly the profile of the respective territory under consideration. However, while distinctive dynamics are accurate, both corruption and funds are recognized to have a significant influence in fostering countries' economic development. Due to lack of research regarding the most innovative Foreign Policy tool - the European Neighbourhood Policy, this empirical research will attempt to measure the impact of corruption on the returns of the EU financial aid in the Neighbourhood countries, with the help of a qualitative panel data analysis.

3 Methodology

In this section I will introduce the dataset applied in this empirical research. Furthermore, I will define the dependent and independent variables included in the regression model. The following section will provide descriptive statistics and finally, I will provide visual interpretation of the dependent variable.

3.1 Data

This dataset has been collected specifically for this study and it includes a number of variables measured yearly at national level. The dataset comprises of 42 countries – the EU 27 Member States[14] and the EU 15 Neighbourhood countries. Due to the absence of data for Syria, the country is excluded from the research. This is mainly done in order to prevent potential spurious effect deriving from missing values. Moreover, despite the large scope of countries included in the study, for the purpose of this thesis, I will focus only the 15 Neighbourhood states. The sample size includes higher number of countries in order to facilitate the construction of a large pool of observation. This will allow first, for additional degrees of freedom in the regression model and second, for achieving more reliable results.

The data is attained from the World Bank Database, with the following exceptions. The Control of Corruption index, is measured by the World Bank but it is part of a separate project led by Daniel Kaufmann called the World Government Indicators (WGI). Therefore it is collected from the WGI database.[15] The Transparency International Corruption index is accessed through their website[16] and finally the financial assistance allocated to the Neighbourhood is gathered from the European Commission Financial Transparency website.[17] The paper applies panel data regression method including 42 countries over the programming period 2007-2013 and additionally 2014.

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[14] Croatia is not included in the analysis because it was not a member of the EU in 2007.

[15] WGI database: http://info.worldbank.org/governance/wgi/index.aspx#home Retrieved on April 23, 2016.

[16] http://files.transparency.org/content/download/1842/12378/file/2014_CPISources_EN.pdf. Retrieved on April 16, 2016.

[17] European Commission, Financial Transparency System: http://ec.europa.eu/budget/fts/about_en.htm Retrieved on April 16, 2016.

3.2 Definition of Variables

3.2.1 Dependent Variable

The dependent variable in our model is constructed in the following way. Originally, in the dataset I have the values of the real GDP per capita measured in purchasing power standards (PPS). However, the dependent variable is further calculated in STATA based on equation 1.

$$GrowthGDPpc_{i,t} = \left(\frac{GDP_{i,t} - GDP_{i,t-1}}{GDP_{i,t-1}}\right) * 100 \tag{1}$$

The justification for this dependent variable is based mainly on the literature on effects of EU structural funds on growth. Hagen and Mohl (2001) provide useful econometric research on the EU Cohesion policy and economic growth where they use the same dependent variable. Nevertheless, some models include direct estimate of the GDP growth (Izgorodin and Wen, 2015), to avoid the problem of missing a whole year from the dataset. Finally, from econometrics perspective, all of the measurements are recommended to be conducted in the statistical software used for calculations of the model in order to keep consistency.

3.2.2 Corruption Variable

Due to the ambiguity of corruption definitions, different ranking systems exists. Along with that there is no direct way of measuring corruption and, therefore, two indirect indices have been commonly applied in studies. One of them is the Corruption Perception Index (CPI) and the other one is the Control of Corruption (CC), part of the World Governance Indicators (WGI)[18]. Both indices are aggregate, combining information from different sources. The former is developed by Transparency International and uses 11 data sources to measure corruption in the public sector, based on experts' opinions. In 2010, Kaufmann, Kraay and Mastruzzi derive a second, complimentary index - Control of Corruption (Kaufmann et al, 2010). This indicator utilizes "a broader definition of corruption and include most cross-country indices reporting ranking of countries on some aspect of corruption" (Svensson, 2005). This index comprises of the same 11 data sources, applied in comprising the CPI score, plus 14 additional sources and it captures corruption in both public and private field. Even though both indices use different weighting schemes,

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[18] WGI consists of six aggregate indicators: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law and control of corruption. In this study I will incorporate only the control of corruption.

researchers prove high correlation between the two scores, around 0.96 and 0.98 (Treisman, 2007). However, for the purpose of this research, I will focus on both of them in the first part of my analysis to evaluate their impact in this specific study. The Control of Corruption index , takes a value between -2.5 and 2.5, while the CPI is measured between 0 (highly corrupt) and 100 (highly clean). [19] In other words, for both indices, high corruption numbers indicate low level of corruption. Since previous empirical studies do not provide a clear result about the impact of corruption on economic growth, I suspect that the sign of the corruption coefficient could be both positive and negative. The graphs below provide an overview of the ranks of the ENP countries, according to the World Bank and Transparency International, respectively.

Graph 1. Control of Corruption Index in percentile: 100% indicates no corruption
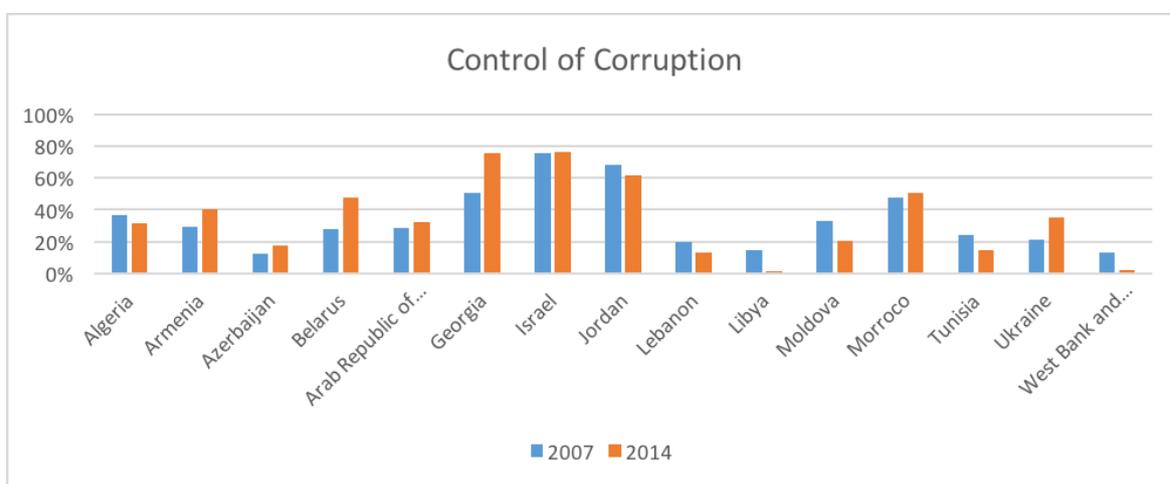
Graph 2. Corruption Perception Index: 100 points indicates no corruption

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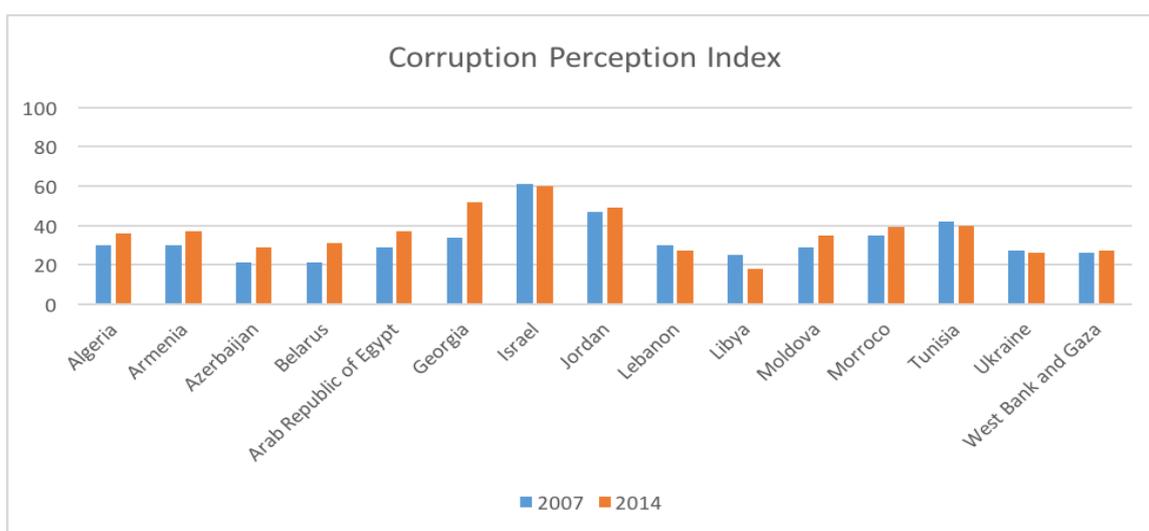
[19] Before 2012, CPI was scored between 0 and 10.

While we can see similar trends in both graphs, there are differences in the levels specifically in Lebanon, Libya and West Bank and Gaza. Therefore, we will perform further tests in order to decide which index will be relevant for this paper.

3.2.3 Financial Assistance

The financial assistance (*FundsEU15*) is the second variable of interest applied in the regression. Following Mohl and Hagen model, I estimate the financial assistance in percentage terms of the nominal GDP of each country for every period (Mohl and Hagen, 2010). However, since this research is only focused on the effect the EU aid allocated to the Neighbourhood, a dummy variable is created to capture the effect of the partnership countries. The dummy takes the value of 1 for the EU 15 countries and 0 for the EU 27 Member States. Therefore, the coefficient of the financial assistance will only account for the effect of funds in the ENP countries. As mentioned in the literature chapter, the financial aid allocated to the Partnership states is significantly smaller when compared to the European Regional and Development funds. According to personal collection of the financial data, using the financial transparency website, between 2007-2014 a total amount of almost 6 billion euro was allocated to those regions The data from the EU official website for financial transparency provides per country's allocation of funds under the ENPI.[20] Graph 3 below provides detailed information about the spread of funds between all 15 ENP countries.

Graph 3. Average Financial Assistance under ENPI, measured in millions.

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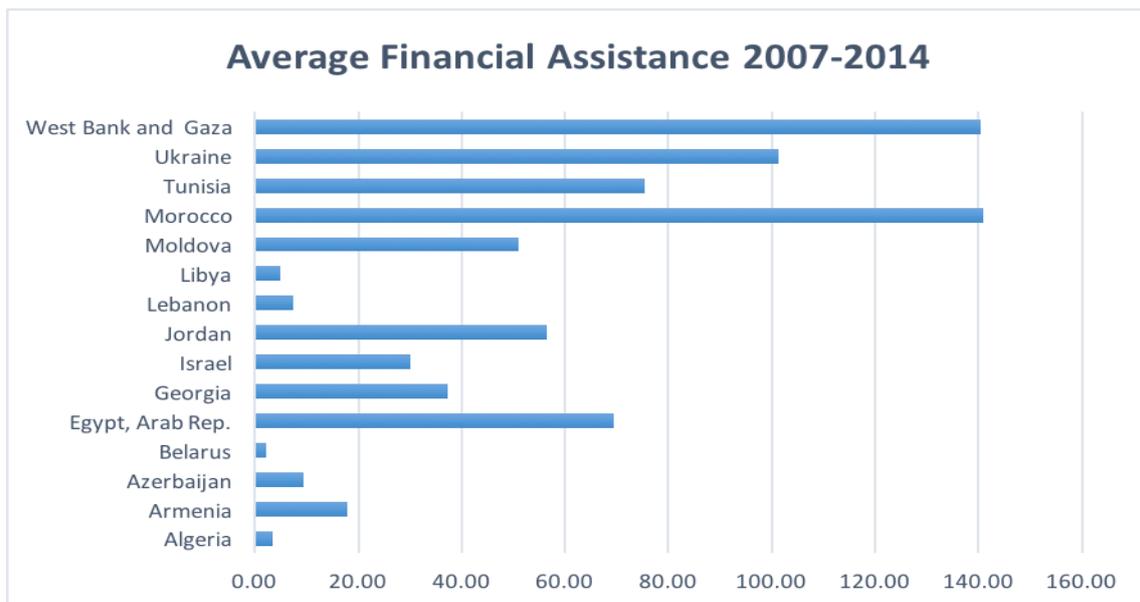
[20] Additionally, I searched for MEDA, TACIS and ENI (since 2014 is included in the research). In many cases the financial assistance continued beyond the lifespan of the designated tool.

The graph clearly indicates significant differences in the allocation of funds. The appropriation of funds, as elaborated earlier depends on the EU conditionality principle and hence, country's progress. Therefore, it appears that better governments' performance is somehow correlated with financial support. However, while Libya and Lebanon receive lower than the average funds, the West Bank and Gaza is the biggest recipient of funds and yet all three of them experience a lot of corruption. Therefore, the relationship between the financial assistance and corruption is not straightforward.

Lastly, following the literature framework, I expect the coefficient sign of the funds variable to be negative or positive, contingent to the countries' policies and projects. Higher amount of funds is assumed to stimulate economic growth. However, misappropriation of money could also have negative impact on growth (Ederveen et al., 2006; Rodríguez-Pose and Garcilazo, 2015).

3.2.4 Interactive Term

The interactive term is created in order to address the complicated relationship between corruption and funds in the regression model. The introduction of this interaction represents an effort to determine to what extent the presence of corruption influence the returns of financial assistance on economic growth. This composite variable, as presented in equation (2) and (3) is generated by simple multiplication of the above explained variables:

$$CCFundsEU15_{i,t} = CC_{i,t} * FundsEU15_{i,t} \tag{2}$$

$$CPIFundsEU15_{i,t} = CPI_{i,t} * FundsEU15_{i,t} \tag{3}$$

The interactive term measures the conditional effect of the EU financial aid in the Neighbourhood with respect to corruption levels. The expected coefficient of this term is unclear, as it strongly depends on the effect from the two composite variables: corruption and funds. Indeed, the interactive variable can no longer be interpret before estimating the final coefficients. By including this term, we have to account for partial effect of both corruption and financial assistance on growth (only when holding the rest of the control variables fixed). Therefore, I suspect again negative and positive sign of the coefficient.

3.2.5 Additional Control Variables

As a first control variable, I include the lagged natural logarithm of the initial level of GDP per capita ($\ln GDP_{i,t-1}$), following the traditional neoclassical growth model, based

on the β convergence (Barro and Sala-i-Martin 1992). The key assumption is that similar economies converge with the same growth pace and steady-state levels. Meaning that after controlling for the other independent variables, a negative coefficient of the initial GDP will indicate that poorer countries can catch-up more rapidly and grow rather than the more developed ones. In other words, it will proof the β convergence.

The second explanatory variable is the Gross Fixed Capital Formation measured as a percentage of GDP ($Invest_{i,t}$). This variable is taken as a proxy to investment and applied in a number of regressions in regards to GDP growth. The investment ratio coefficient is expected to have positive and significant value.

Thirdly, the openness variable ($Openness_{i,t}$) is calculated as a proxy of total trade (imports and exports together) in percentage terms of GDP. High level of openness implies high concentration on international trade and intensive economic growth. Since most of the Neighbouhood countries are huge exporters (mainly oil) we expect positive sign.

The next independent variable is government consumption expenditure ($GovExp_{i,t}$). This variable is measured as a percentage of GDP and the sign of this term is difficult to forecast. Nonetheless, based on previous studies we expect to see an adverse affect on growth in our regression. This is often justified by the neoclassical (Solow) theory, which finds higher spending to have only transitory effect on growth, while exogenous technology is the sole determinant of growth.

The growth of population is the next control variable ($Pop_{i,t}$). Since the dependent variable is measured in per capita terms, I expect negative sign of the population coefficient. This relationship has been discussed by Malthus (1789), who discovers long time ago the negative impact of large nations leading to low standard of living.

The last two variables follow the endogenous growth theory, which claims that governments can contribute to economic development by investing in human capital and innovation. The proxy for human capital in this model is the gross enrolment ratio for tertiary school ($Educ_{i,t}$). Higher attainment of tertiary schooling is expected to stipulate growth, however studies have proved the adverse as well (Islam, 1995). The last variable, used as a proxy to innovation, is the number of patents application per thousand inhabitants ($Patent_{i,t}$). The innovation is commonly accepted as the most significant objective fostering growth.

Due to significant allocation of funds and government expenditure on infrastructure, especially in the EU, some researchers include an infrastructural proxy to

explain a growth model. However, a study by Crescenzi and Rodriguez-Pose (2013) finds very little evidence that investment in transport infrastructure is indeed a fundamental determinant of economic growth. (Crescenzi and Rodriguez-Pose, 2013). Along with this reason, due to lack of data and a suitable proxy in the ENP countries, this study will not include such variable.

As a result of the existing literature and data availability, the final regression model will take one of the following two forms, depending on the significance of the corruption variable.

$$GowthGDPpc_{i,t} = \alpha + \beta_1 CC_{i,t} + \beta_2 FundsEU15_{i,t} + \beta_3 CC_{i,t} * FundsEU15_{i,t} +$$
$$\beta_4 lnGDP_{i,t-1} + \beta_5 Invest_{i,t} + \beta_6 Openness_{i,t} + \beta_7 GovExp_{i,t-1} + \beta_8 Pop_{i,t-1} +$$
$$\beta_9 Educ_{i,t-1} + \beta_{10} LNPatents_{i,t} + \varepsilon_{i,t} \tag{4}$$

$$GowthGDPpc_{i,t} = \alpha + \beta_1 CPI_{i,t} + \beta_2 FundsEU15_{i,t} + \beta_3 CPI_{i,t} * FundsEU15_{i,t}$$
$$+ \beta_4 lnGDP_{i,t-1} + \beta_5 Invest_{i,t} + \beta_6 Openness_{i,t} + \beta_7 GovExp_{i,t-1} + \beta_8 Pop_{i,t-1} +$$
$$\beta_9 Educ_{i,t-1} + \beta_{10} LNPatents_{i,t} + \varepsilon_{i,t} , \tag{5}$$

where $\varepsilon_{i,t}$ s the idiosyncratic error

The subsequent table summarized the expected signs of all explanatory variables:

Table 1. Expected coefficient signs

Independent variable	Expected sign
$CC_{i,t}$ / $CPI_{i,t}$	$\beta_1 > 0$ or $\beta_1 < 0$
$FundsEU15_{i,t}$	$\beta_2 > 0$ (not necessarily)
$CC_{i,t} * FundsEU15_{i,t}$ / $CPI_{i,t} * FundsEU15_{i,t}$	$\beta_3 =$ Not clear
$lnGDP_{i,t-1}$	$\beta_4 < 0$
$Invest_{i,t}$	$\beta_5 > 0$
$Openness_{i,t}$	$\beta_6 > 0$
$GovExp_{i,t}$	$\beta_7 < 0$ (*not necessarily*)
$Pop_{i,t}$	$\beta_8 < 0$
$Educ_{i,t}$	$\beta_9 > 0$ (*not necessarily*)
$Patents_{i,t}$	$\beta_{10} > 0$

3.3 Descriptive Statistics

Table 2. Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
GDPpc	335	25982.78	16012.63	3394.27	98459.52
GDP(%)	293	2.99	8.69	-61.43	108.33
CC	336	0.49	1.03	-1.61	2.53
CPI	335	53.37	20.75	15.00	94.00
Funds (%)	333	1.03	1.15	0.000017	4.79
FundsEU15 (%)	333	0.08	0.31	0	2.61
CCFundsEU15	333	-0.04	0.24	-2.99	0.15
CPIFundsEU15	333	2.68	9.45	0.00	86.18
LNL1GDPpc	294	9.94	0.70	8.13	11.47
Invest (%)	327	23.81	6.32	11.48	46.88
Openness (%)	336	106.24	52.38	37.41	374.15
GovExp (%)	327	19.32	4.01	8.50	32.23
Pop (%)	335	0.54	0.99	-2.26	3.65
Educ (%)	257	60.22	19.56	10.57	116.62
Patents	306	3136	8106	2	49240
LNPatents	306.00	6.35	1.96	0.69	10.80

In the above presented table, I have included all variables, together with the those created in STATA, like the growth of GDP per capita and the natural log of the initial GDP (LNL1GDPpc). These statistics captures the variations of the selected variables in the selected period between 2007-2014, across all 42 countries. Most of the independent variables are kept in its original form, even though the literature often refers to taking natural logarithm to all terms. The reason for that is based on the selection of variable for the dataset. The majority of variables in this analysis is measured in growth levels or in percentage terms of the GDP.

First of all, the table exhibits great deviations in the growth levels of real GDP per capita: between -21% to + 108%. However, this does not come as a surprise because in our dataset we have captured very developed countries like the European 27 Member States and 15 Neighbourhood countries, most of them quite unstable in the last couple of years, due to political and economic tensions, in some cases even war. Along with that the timespan of this analysis includes the 2008 financial crisis, which further anticipates differences in GDP per capita within and outside of the European Union.

Secondly, the corruption as discussed in the previous section is measured within -2.5 and +2.5. Denmark is the only country to achieve 2.53, having almost no corruption. The other corruption index fluctuates between 0 and 100 points, where 100 is reached only in the absence of any corruption.

The EU financial aid is displayed in the subsequent two rows: the first one represents total financial assistance from all 42 countries as a percentage of the respective nominal GDP. The second row represents the funds allocated only to the 15 Neighbourhood countries. As a result, we can discover a significant difference in the financial assistance provided to the EU Member States – up to 5% in some countries, while in the Neighbourhood is twice less – up to 2.5% of the GDP per capita. This distribution of funds is in line with the argumentation provided in the literature and discussed earlier in this paper.

While investment and government expenditure appear to be in reasonable variations around 10 % to 30% or 40%, the variable of total trade (openness) illustrates significant discrepancies. A closer look at the dataset provides explanation. Only Luxembourg appears to explain these numbers of almost 300% of the GDP dedicated to total trade. For all the other countries in our sample, the variations are between 30% to 150%. Nevertheless, since Luxembourg is a small country, we can expect that it is hugely dependent upon trade.

Additionally, the population variable is measured in terms of annual growth, therefore, I will directly apply it in our model. The variations between - / + 3% are also in line with the literature. Finally, the last two variables are more dynamic. The first one, the enrollment ratio of tertiary education, displays great deviations. On the one side, this variable has almost 100 missing values and on the other, the tertiary education is more developed and has a more central role in the European Union than it does in the Neighbourhood. It is crucial to keep this in mind when we explain further in the paper the impact of this variable. Finally, the number of patents appear to vary a lot within different states and for this reason, I will additionally consider the natural logarithm of the variable in the regression model.

Graph 4. Annual GDP per capita growth 2007-2014

Graphs by group(country)
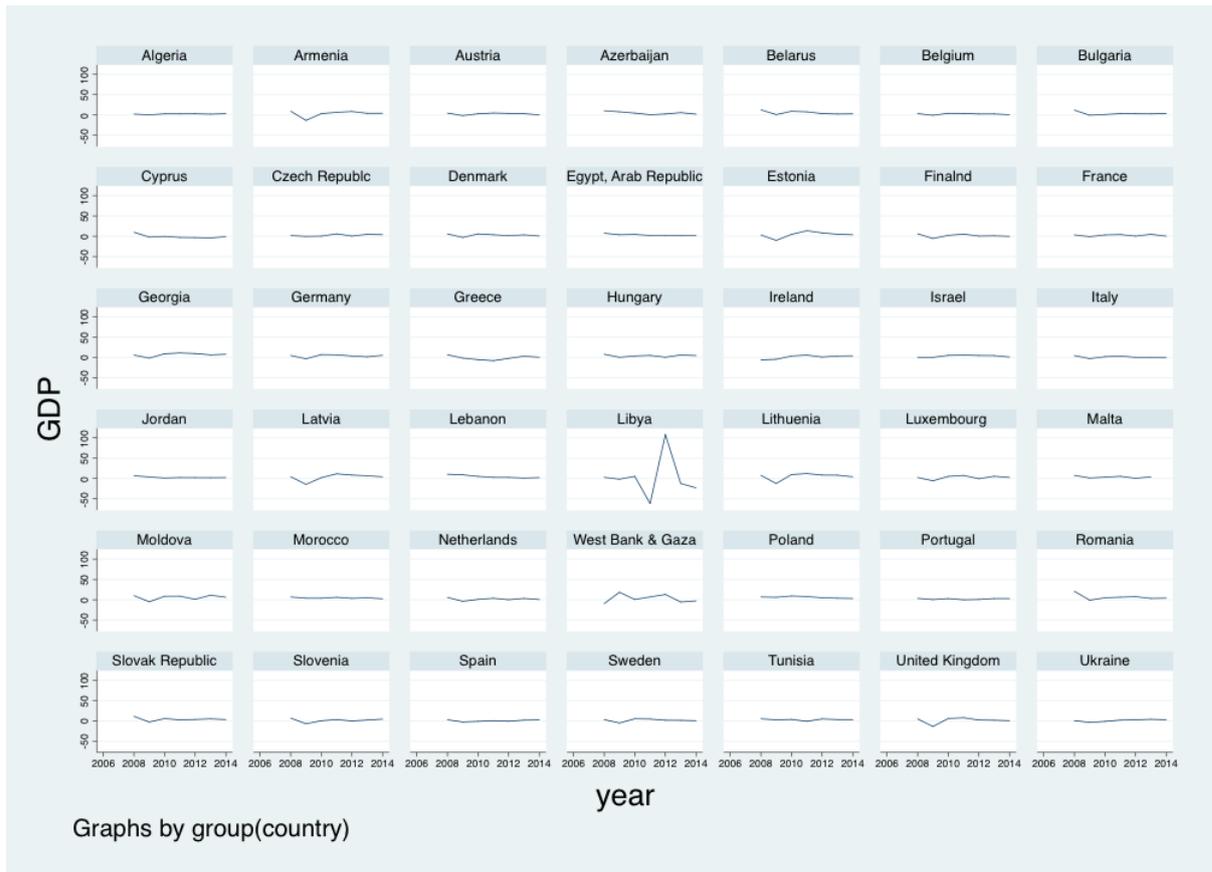
The graph represents the annual GDP per capita growth in the period of 2007-2014. As mentioned previously, we expect some fluctuations in the first one or two periods due to the economic crisis, which is captured in this model. However, the graph outlines Libya as the country with the highest peaks. This could be explained with the Civil War at the beginning of 2011, which resulted in 60% contraction of the economy. Within the next 8 months, the war was over and the country followed a rapid growth the subsequent year of around 100%. The rest of the countries display relatively stable growth levels, without extreme deviations like Libya. Nonetheless, the timespan of this research is limited within 8 years, which prevents it from reaching more sophisticated conclusions.

4 Empirical Results

In this chapter I analyse, first of all, the benefits of applying panel data model and secondly, I evaluate different estimation techniques and regressions in search of the best model for this study. Furthermore, I investigate possible explanations behind the final regression results and their further impact. Finally, I discuss important misspecification tests and briefly potential endogeneity in the model.

In this paper, I estimate the impact of corruption on the returns of EU financial aid with by applying panel data technique in STATA software. In other words, I have available observation for cross-sectional unit across time periods. Moreover, for every panel unit of observation, I have a corresponding value and thus the data is strongly balanced. Generally, panel data allows researches to capture more dynamic processes and to control for different types of omitted variable bias. One of the major benefits of this method allows researchers to account for individual, in our case country-specific heterogeneity. In other words, when we keep some of the variables constant, controlling their effect, we can observe the effect of variables that change over time but not across entities (Wooldridge, 2002). As a consequence, I find this method useful for conducting this analysis.

4.1 Corruption tests

In Table 1, I have included the results from the preliminary test in this analysis. Due to ambiguity in the literature regarding the corruption measurements, I have decided to include both corruption indices and to test their specific effect in a few fixed effects (FE) regressions.

Table 3. STATA output fixed effects regression: testing for CPI and CC

	CPI	CC	CPI	CC
Ln of initial Real GDP per capita	-24.742***	-21.090***	-20.762***	-17.347***
	(0.000)	(0.000)	(0.000)	(0.000)
1 Lag of Government Consumption	0.4143***	0.363***	0.692***	0.593***
	(0.016)	(0.039)	(0.000)	(0.002)
Gross Fixed Capital Formation	0.370***	0.350***	0.493***	0.466***
	(0.000)	(0.000)	(0.000)	(0.000)
Total Trade (Openness)	0.219***	0.216***	0.216***	0.218***
	(0.000)	(0.000)	(0.000)	(0.000)
FundsEU15	-16.040***	2.124	-	-
	(0.001)	(0.267)		
CPI	0.223***	-	0.269***	-
	(0.003)		(0.000)	
CPI*FundsEU15	0.456***	-	-	-
	(0.002)			
CC	-	3.671*	-	3.245*
		(0.073)		(0.86)
CPI*FundsEU15	-	4.84**	-	-
		(0.022)		
1 Lag FundsEU15	-	-	3.602*	3.106
			(0.93)	(0.157)
1 Lag of population growth	-	-	-0.969	-0.801
			(0.138)	(0.231)
Ln of Patents			-1.482*	-1.565*
			(0.96)	(0.76)
Constant			159.48***	139.04***
			(0.000)	(0.000)
R2 within	0.481	0.463	0.552	0.529
Observations	284	284	262	262

*Notes: * means significance at 10% p-value, ** - significance at 5%, *** -significance at 1%. In parenthesis I have reported the p-values. Standard Errors are robust.*

In order to distinct between the Control of Corruption and the Corruption Perception indices, I am testing their impact in two comparable and simple fixed effects regressions with robust option. The first regressions' output between CPI and CC is displayed in the first two columns. With the exception of the financial assistance provided to the ENP countries, all the other variables are significant. Moreover, when using the CPI index all independent variables are significant at 1%. However, we can detect that with the use of Control of Corruption, the effect of the CC coefficient is becoming significant only

at 10%. Along with that one of the main variables of interest (*FundsEU15*) is not significant at all. Even though these results provide evident justification for using the CPI index, I proceed with the last two columns of table 1 to test once again the significance levels of the variables of interest. This time, I include a lag of the financial assistance and population growth, natural logarithm of patents and I exclude the interactive term of corruption and funds. Similarly, to the first case, these two regressions diverge in their output. The control of corruption coefficient is significant only at 10%, while the lagged financial assistance is not significant at all. As a consequence of those two sets of regressions, reported in table 1, I will proceed further with the model using only the Corruption Perception Index.

4.2 Pooled OLS, Fixed and Random effects estimations

The first and most basic model of panel data is estimated by Pooled Ordinary Least Squares (POLS). The simplicity of the method is consistent with its main assumption about the errors terms, which have to be independent and identically distributed (iid). In other words, the independent variables are uncorrelated with the errors in the same period. However, such approach might be misleading and might create potential bias of the estimators. The Pooled OLS will be applied only as a starting point of the empirical study, following previous consideration in the literature (see table 4).

The second technique of panel data, applied often in studies, is called fixed effect (FE) model. With fixed effects, the unobserved constant over time effect is removed from the residual and it allows for the country's specific effects to be correlated with the regressors. In this case, the main assumption is strict exogeneity of the explanatory variables and hence the main disadvantage of this model is the elimination of all time-invariant unobserved effect. Since the model of this study does not include constant variables, I apply the fixed effects model (see table 4).

In contrast to the fixed effects case, the random effects (RE) estimation technique, assumes that the unobserved individual or country-specific effect is not correlated with the explanatory variables. Moreover, strict exogeneity and no correlation between the unobserved effects and independent variables is assumed as well (Wooldridge, 2002). This method applies Generalized Least Squares (GLS) estimations. Therefore, the random effects allow two different calculations, between estimators and within estimators, while fixed affects provide results only within the country-specific set of observations. The estimations of the RE model are exhibit in the table below.

Table 4. STATA estimations from Pooled OLS, Fixed and Random effects

	POLS	**FE**	**RE**
CPI	0.042	0.2888***	0.050
	(0.150)	(0.000)	(0.149)
1 Lag FundsEU15	-8.999	-22.01***	-10.072
	(0.314)	(0.47)	(0.318)
1 Lag CPI*FundsEU15	0.238	0.679***	0.273
	(0.340)	(0.20)	(0.312)
Ln of initial Real GDP per capita	-2.963***	-26.76***	-3.503***
	(0.002)	(0.000)	(0.002)
Gross Fixed Capital Formation	0.184***	0.488***	0.237***
	(0.000)	(0.000)	(0.000)
Total Trade (Openness)	0.269***	0.242***	0.036***
	(0.000)	(0.000)	(0.000)
1 Lag of Government Consumption	-0.009	0.583***	0.024
	(0.932)	(0.004)	(0.845)
1 Lag of Tertiary Education	-0.002	0.0584	0.005
	(0.927)	(0.263)	(0.809)
Ln of Patents	0.428***	-1.764*	0.565***
	(0.041)	(0.075)	(0.029)
Constant	20.747***	213.34***	21.634***
	(0.012)	(0.000)	(0.028)
R^2 within	0.576	0.579	0.358
Observations	234	235	235

*Notes: * means significance at 10% p-value, ** - significance at 5%, *** -significance at 1%. In parenthesis I have reported the p-values. Standard Errors are robust.*

The preliminary step in order to decide between Pooled OLS and the rest of the models, is to identify the significance of the coefficients. As shown on the table, the most important variables of this analysis like corruption, financial assistance and the correspondent interactive term are not significant under POLS even at 10%. However, before rejecting this model, we must check this results with a test to ensure that our initial assumption is correct. For that purpose, I apply a test for the intercepts for each country coefficient to see if they are all equal. If they are not, it is more convenient to apply FE or RE. The results are presented in the Annex I. Based on the results (Prob>F = 0.000), I can reject the null hypothesis of equal coefficients and proceed further with fixed and random effects.

The subsequent two columns of table 4, exhibit the results from FE and RE. The estimations of the key variables have noticeably improved with the fixed effects model. All

coefficients, except the coefficient on tertiary education, are significant. However, similarly to the above mentioned case, it is always important to support these observations with empirical justification. The generally accepted method of choosing between fixed effects and random effects is by running Hausman test (Hausman, 1978). The test examines whether the coefficients estimated by the RE estimator are equal to those estimated by the FE model. If the resulted p-value (Prob>chi2) is larger than 5%, I can precede with random effects, if I cannot reject the null I have to continue with fixed effects. The results of the test are presented in the Annex I. Based on the p-value = 0.000, I can safely reject the null hypothesis and continue our further estimations with fixed effects model.

Applying the fixed effects model transforms the regression in the following way:

$$GowthGDPpc_{i,t} = \alpha + \beta_1 CPI_{i,t} + \beta_2 FundsEU15_{i,t-1} + \beta_3 CPI_{i,t} * FundsEU15_{i,t-1} +$$
$$\beta_4 lnGDP_{i,t-1} + \beta_5 Invest_{i,t} + \beta_6 Openness_{i,t} + \beta_7 GovExp_{i,t-1} + \beta_8 Pop_{i,t-1} +$$
$$\beta_9 Educ_{i,t-1} + \beta_{10} LNPatents_{i,t} + \mu_t + \lambda_t + \varepsilon_{i,t}$$

,where μ_t will test for country-specific and λ_t for time effects.

Table 5. STATA final output from fixed effects model

	COUNTRY FE	TIME FE	TIME & COUNTRY FE
CPI	0.2888***	0.297***	0.297***
	(0.007)	(0.000)	(0.007)
1 Lag FundsEU15	-22.013***	-22.228***	-22.229***
	(0.004)	(0.15)	(0.005)
1 Lag CPI*FundsEU15	0.679***	0.669***	0.669***
	(0.001)	(0.005)	(0.003)
Ln of initial Real GDP per cap	-26.758***	-46.50***	-46.498***
	(0.000)	(0.000)	(0.000)
Gross Fixed Capital Formation	0.488***	0.539***	0.539***
	(0.000)	(0.000)	(0.000)
Total Trade (Openness)	0.242***	0.132***	0.133***
	(0.000)	(0.000)	(0.000)
1 Lag of Goven. Consumption	0.584***	-0.130	-0.130
	(0.001)	(0.493)	(0.461)
1 Lag of Tertiary Education	0.058	0.064	-0.064
	(0.142)	(0.158)	(0.194)
Ln of Patents	-1.764	-0.462	-0.462
	(0.207)	(0.493)	(0.742)
Constant	20.747***	429.75***	429.751***
	(0.012)	(0.000)	(0.000)
year=2009		-1.573**	-1.572
		(0.065)	(0.229)
year=2010		2.767***	2.767***
		(0.001)	(0.011)
year=2011		4.533***	4.533***
		(0.000)	(0.000)
year=2012		4.002***	4.002***
		(0.000)	(0.001)
year=2013		6.388***	6.388***
		(0.000)	(0.000)
year=2014		6.847***	6.847***
		(0.000)	(0.000)
R2 within		0.73	0.73
Observations	234	235	235

*Notes: * means significance at 10% p-value, ** - significance at 5%, *** -significance at 1%. In parenthesis I have reported the p-values. Standard Errors are robust.*

The first column of table 5 presents the results under country-specific effects, the second one captures time effects and the final column both of them together. Taking into account country's heterogeneity or country-specific effects allows distinctive behavior across the countries of observation and respectively for the time effects. This is essential for the model, as referred previously in the study, there exists significant heterogeneity between the Neighbourhood countries of interest and accounting for this additional inconsistency can deliver a more sophisticated model.

The results presented in the table are the outcome of literature suggestions together with a number of tests based on the significance of the explanatory variables. First of all, I use lags of the financial assistance and the interactive term due to the lagging effect of funds as suggested by (Mohl and Hagen, 2010). Indeed, this is intuitive because it takes time before certain projects develop and begin to generate economic growth. In a similar manner, the EU Structural funds are also applied in models together with their delayed effect. This is specifically valid for expenditure on human capital. If money is to be spend on education and trainings, it will take time to perceive and measure this impact on growth levels. Additionally, to the presented results in table 5, Annex II displays further tests with different lags. However, the EU financial assistance coefficient exhibits significance only until the second lag. Before proceeding to analyse the significance of the coefficients I am testing for the presence of time fixed effects.

In order to decide between the last two models, a test is conducted with a null hypothesis of whether all the coefficients through the years are jointly equal to zero (see Annex I). Since the test provides p-value (Prob>F=0.000) of less than 5%, I reject the null hypothesis and allow the time effects in the regression. As a consequence, the final model should include one of the last two columns, which indeed have almost identical results. Nevertheless, due to the discussed heterogeneity of the countries, I will allow for both country and time effects in the regression.

$$GowthGDPpc_{i,t} = 429.75 + 0.297CPI_{i,t} - 22.229\,FunsEU15_{i,t-1} + 0.669CPI_{i,t} *$$
$$FundsEU15_{i,t-1} - 46.498lnGDP_{i,t-1} + 0.539Invest_{i,t} + 0.133Openness_{i,t} -$$
$$0.130GovExp_{i,t-1} - 0.064Educ_{i,t-1} - 0.462LNPatents_{i,t} \quad\quad\quad (6)$$

Even though the final outcome of the regression does not provide significance for all estimators, we find the main variables highly significant. Therefore, the above obtained model provides a good estimate of the true population model in this paper.

First of all, the CPI coefficient is significant and positive, as expected and supported in the literature (Mendez and Sepulveda, 2006; Mo, 2010). This outcome illustrates that countries with low corruption levels tend to foster rapid economic growth. Secondly, the financial assistance allocated to the southern and eastern neighbours is highly significant but it has negative effect on the development in those countries. There are two potential explanations for these results. On the one side, the funds could be invested in projects without significant returns on economic growth and hence in projects that are less welfare-improving. On the other side, it is also possible that the financial support was mismanaged and provided gains only to public authorities and not to real projects. In contrast to expectations, this final result is in line with Ederveen's study (2006), who finds similar results for the European Structural funds in countries with poor institutions. Similarly, a study by Rodriguez-Pose and Garcilazo (2015) finds that the regions receiving the bulk of EU funds have only a marginal impact on economic growth unless the quality of government is significantly improved. The outcome of both studies identifies that institutional quality is an important impediment to economic growth. Likewise, in this research, as discussed in the previous chapter, corruption is a fundamental aspect of the countries' profiles in the Neighbourhood and, indeed, bad quality of governance could explain misappropriation of the European funds.

Proceeding further with the coefficients of table 5, the interactive term is also significant at 1% and in the next subchapter I will estimate the precise effect of both corruption and funds on growth. Additionally, the coefficient of the initial level of GDP per capita is negative, supporting the convergence theory. Along with that Gross Capital Formation and Total Trade appear to take a very significant part of the EU 15 economies, in contrast to the proxies for human capital, government expenditure and innovation in the regions. The insignificant estimation of the coefficient for tertiary education reveals that higher level of education in the Neighbourhood is not fundamental for countries' economic growth. The interpretation of this outcome might be linked with that fact that most of the partnership states are experiencing high economic volatilities and political tensions. Due to that reason, the percentage of people engaging in education is still limited and as discovered not significant determinant of growth in the regions. Similar explanation provides insights about the effect of patenting. Along with that I suspect that the choice of

a proxy might not be able to capture the effect of innovation. Due to the distinct development stages in the Neighbourhood, it is relevant to account for possible hurdles in applying for patents or a procedure which is not well-known to the public. Indeed, another suitable proxy could be the government expenditure on Research and Development.

4.3 Partial effect estimation

In this subchapter I provide the precise estimated effect of corruption and financial assistance in the ENP countries based on the last regression coefficients in equation 6. Along with that I present the specific impact of those two variables on economic growth in the Neighbourhood. The following technique is applied similarly in a study by Izgorodin and Win, when they evaluate the impact of corruption on the returns of EU Regional and Development funds (Izgorodin and Win, 2005).

First, I estimate the partial effect of corruption: $\frac{\partial GDP_{i,t}}{\partial CPI_{i,t}} = \beta_1 + \beta_3 * FundsEU15_{i,t-1}$,

where $\beta_1 = 0.297$ and $\beta_3 = 0.669$.

In order to provide calculations for every country, I will take the average value of the total funds allocated in 2007-1014. In this way, I would be able to assess the partial impact of corruption on the annual GDP per capita growth, taking into account the mean value of the EU aid. The results obtained in table 6 demonstrate the impact of 1-unit increase in the CPI score on annual real GDP growth per capita.

Table 6. Effect of 1-unit increase in the CPI score on real GDP per capita growth.

COUNTRY	IMPACT OF 1 UNIT INCREASE IN THE CPI SCORE
Algeria	0.30
Armenia	0.41
Azerbaijan	0.31
Belarus	0.30
Egypt, Arab Republic	0.32
Georgia	0.49
Israel	0.31
Jordan	0.42
Lebanon	0.31
Libya	0.30
Moldova	0.81
Morocco	0.39
Tunisia	0.41
Ukraine	1.04
West Bank & Gaza	1.34

Source: own report

In order to interpret the results from the table I apply the following logic. For example, in Algeria a unit increase in the CPI score will result into 0.30 percentage points increase in the GDP per capita, holding the financial assistance with an average value for the period 2007-2014. The first observation from the table is that all values have positive impact on the economic activity. Therefore, higher CPI score or less corruption is significant determinant of GDP growth in the ENP countries. For most of the countries this effect is relatively small (below 1 percentage point), except for Ukraine and the Occupied territories of Palestine which demonstrate higher returns. In conclusion, I find the impact of corruption strongly positive on the economic growth.

Secondly, I will apply the same technique to estimate the effect of the financial payments in the Neighbourhood. The partial effect of the EU aid is equal to the following:

$\frac{\partial GDP_{i,t}}{\% \partial Funds_{i,t}} = (\beta_2 + \beta_3 * CPI_{i,t})/100$, where $\beta_2 = -22.229$ and $\beta_3 = 0.669$.

Following the same procedure, I use the average value of the Corruption Perception Index for the same 8-year period for each country. Applying this method will provide the partial effect of financial assistance on annual real GDP per capita growth, keeping a mean value for the CPI. This time however, I divide the results by 100 in order to have consistent results, since the CPI is only an index and not number estimated in percentage terms, like the EU funds, which are calculated as a percentage of the nominal GDP (see table 7).

Table 7. The effect of 1% increase in the financial assistance allocated for ENP.

COUNTRY	IMPACT OF 1% INCREASE IN THE EU FUNDS	THE SAME IMPACT ASSUMING 1 UNIT HIGHER CPI	THE SAME IMPACT 10 UNITS HIGHER CPI
Algeria	-0.010	-0.002	0.059
Armenia	-0.015	-0.008	0.052
Azerbaijan	-0.059	-0.055	0.005
Belarus	-0.048	-0.042	0.019
Egypt, Arab Rep.	-0.015	-0.008	0.052
Georgia	0.065	0.072	0.132
Israel	0.179	0.186	0.246
Jordan	0.099	0.106	0.166
Lebanon	-0.035	-0.028	0.032
Libya	-0.075	-0.068	-0.008
Moldova	-0.035	-0.028	0.032
Morocco	0.019	0.025	0.085
Tunisia	0.092	0.099	0.159
Ukraine	-0.055	-0.048	0.012
West Bank & Gaza	-0.035	-0.028	0.032

Source: Own report

The above presented table estimate the effect of a 1% increase in the European financial payments (measured as a percentage of nominal GDP) on annual real GDP growth per capita. The results imply the following, for example: 1% increase in the funds allocated for Algeria result in 0.01 decrease in the GDP per capita, keeping the CPI score with an average value. While this is less intuitive, this outcome is relevant to the final estimations from the obtained regression model. As explained earlier, there are two

potential causes for these results: misappropriation of funds or payments allocated ineffectively in countries without bringing more welfare. For that reason, the financial assistance is not fostering the expected objectives, namely, an economic growth. Moreover, countries with high corruption levels and low quality of institutions hamper the impact the funds as well. The table reveals, indeed, a robust negative effect of EU aid on economic growth as observed in the majority of ENP countries. Therefore, I include two additional rows, where I assume that the average of Corruption Indices is increased with 1 and 10 units, respectively. As a consequence, the new estimations can provide valuable insights about perspective policies of the European Union towards the Neighbourhood countries. The outcome of the 1-unit increase in CPI score display almost irrelevant change when compared to the original results. However, the last column indicates much more significant increase and strong effect on the economic activity. As revealed, 10 units higher CPI score is associated with positive impact of financial assistance on real GDP growth for all countries, except Libya (which experiences the worst corruption levels).

4.4 Misspecification Tests

In order to confirm the validity of the estimations, a preliminary test is conducted in order to see if there exists a heterogeneity within the constant and the slopes of the coefficients, fluctuating across the countries. The results from the test, confirm the already suspected presence of heterogeneity. The null of no homogeneity is strongly rejected (p-value=0.000) and we account for this heterogeneity by adding "cluster" option in the regression. Along with that, as recommended by Stock and Watson, we add "xtivreg2" option which is a bias-adjusted estimator of the covariance matrix of the coefficients and provide more efficient and robust results (Stock and Watson, 2002). Subsequently, I have to check for serial correlation. However, due to the small number of time series applied in this model, including only 8 years, it is not required to run this test. As argued in the literature, the serial correlation can create potential problem with macroeconomic data of more than 20 years (Wooldridge, 2002).

Subsequently, I test for multicollinearity (also called collinearity), which predicts possible correlation not only with the dependent variable but also between the explanatory variables. Multicollinearity can increase significantly the standard errors and can provide spurious results. There are different ways to conduct these tests. The most common one is the Variance Influential Factor (VIF) test which provides different values starting with 1, which means 0 correlation and until 10, the results are accepted. However, if higher values

of VIF are not associated with high standard errors it is also acceptable to proceed with the model without taking out the problematic variable. In general, higher than 10 values should be a signal to consider taking some of the variables out of the model. As presented in the Annex I all variables applied in the model have values below 10, so we can safely assume no multicollinearity (Wooldridge, 2002). Additionally, I also refer to a second test looking at the correlation between the coefficients (see Annex I).

4.5 Endogeneity

When discussing the impact of corruption and financial assistance on economic growth, it is important to consider a potential problem of endogeneity and causality. In other words, what is the direction of the relationship between the variables: better quality of institutions and low level of corruption lead to higher income per capita or the reverse. Additionally, countries with better absorption capacity of financial assistance stipulate economic activities or generally developed countries tend to receive the bulk of financial assistance. Many studies touch upon this subject and two methods seem to be broadly acknowledged in the literature.

The first method accounts for potential endogeneity by incorporating an instrumental variable (IV), which does not have any impact on the dependent variable. The instrumental variable is not part of the initial model and it is simultaneously correlated with the suspected endogenous variable (for which it corrects the effect) and uncorrelated with error term in the regression. Maoro (1995), among the first ones to address the issue of endogeneity between government institutions and economic growth. He uses an external instrument to treat the causality and applies an index called "ethnolinguistic fractionalization", which simple measures the probability of two arbitrary people in a country to end up in the same group. Later in 2001, Acemoglu, Johnson and Robinson use different instrumental variable in order to cure potential endogeneity. They use settlers' mortality rates at the time of early colonization to justify different institutional quality of former colonies. Nevertheless, both methods create very sophisticated models, which are rarely reproduced for other countries and indeed, it is very difficult to discover good instrument to treat endogeneity.

The second method is called Generalized Method of Moments (GMM) estimation generating dynamic panel model. Hagen and Mohl (2011) apply this method in their analysis on the impact of structural funds on economic growth. The authors highlight the importance of considering possible endogeneity in the case of the EU Regional funds.

According to their research, endogeneity can occur because the structural funds in itself are based on criteria which uses exactly the performance of the countries, their GDP in comparison the EU average. Additionally, if the unobserved impact is constant over time, the fixed effects model with individual and time effect can correct for omitted variables bias. However, if those effects are not constant over time, the study implies the use of instrumental variable or the two-step dynamic GMM model. Yet, no good external instrumental variable is found so far (Hagen and Mohl, 2001). Baugelsdijk and Eijffinger (2005) also apply the panel the GMM model including an interaction term of corruption and financial assistance. Even though they expected that corruption weakens the relation between the EU structural funds and economic growth, they prove the opposite that corruption effects positively the relationship of the two variables.

Due to limited number of observations and the absence of reliable instrumental variable, this study will not provide neither the GMM nor the IV model. Previous researchers have found that GMM perform poorly with small amount of observations and indeed provides spurious estimations (Izgorodin and Win, 2005). Lastly, the application of the fixed effects model allows us to draw reliable results while taking into account countries' heterogeneity and time effects.

4.6 Limitations

The analysis examined in-depth in this paper suffers from potential limitations, due to some traditional drawbacks of regression estimations. Therefore, we must look at these results with a degree of caution.

First of all, our final regression is based on 235 number of observations and therefore the estimators may not be asymptotically and normally distributed. Very often, regressions with small number of observations suffer from omitted variable bias or unobserved heterogeneity and even though we attempt to consider this problem with the use of fixed effect model, the impact might be only partially captured. Moreover, I have included only an eight-year timeframe, including the effect of the economic crisis, which in many countries resulted in a long stagnated period of at least a few years.

Secondly, the selection of control variables is mostly based on the neoclassical economic theory, as suggested in the prevailing literature on the EU Structural Funds and corruption impact on economic growth. However, since very little studies have captured the same impact in the Neighbourhood, other variables could possible provide more insights and encounter more accurately the effects in the region.

This leads us to the third drawback of the analysis and that is the poor availability of data for the 15 Neighbourhood countries. One of the reasons to exclude the Syria is due to absence of any data for that country. Most of those transitional economies are still confronting severe difficulties: changing political regimes, going through civil wars and uprisings, therefore, it poses serous challenge to compile a dataset with relevant information which could result in sufficient and well-developed analysis.

Furthermore, the final regression output does not provide insights about the causal relationship between the dependent variable, economic growth, and the independent variables of interest, corruption and EU financial aid. Even though the literate has outline the importance of addressing the endogeneity problem (Mauro,1995; Hagen and Mohl, 2011), due to limited amount of observations and no proper instrumental variables neither the GMM model nor the IV was applied.

Lastly, the final regression findings put the validity of the endogenous growth theory under question. Indeed, the final estimations provide no significance to the innovation proxy, which could mean that technology development is not the main predictor of economic growth in the ENP countries. Another explanation, however, could be that the choice of proxy is poor and that number of patents per million inhabitants does not capture the real effect of innovation in the Neighbourhood. As outline in the studies, government expenditure on R&D could be a better predictor of growth.

5 Conclusion

An overarching consensus among distinctive policy makers and stakeholders is that the EU has to ensure better and more coherent approach towards the Southern and Eastern Partnerships in order to secure peace and stability not only in the regions but also within the European Union. Most of the Neighbourhood countries are directly exposed to territorial occupations, frequent conflicts and even war. Along with that "bad governance, untransparent and ineffective state institutions, corruption and frequent violations of civil and political liberties are the rule rather than the exception in most of the partner countries" (Schumacher, 2015). Consequently, the institutional building and fight against corruption is high on the ENP agenda and, yet, weaknesses of the policy instruments and lack of reforms are still present in the yearly Country Reports by the Commission. Furthermore, the EU aid towards the Neighbourhood faces similar constraints of transparency, accountability and management to the EU Structural funds. As a consequence, the European Neighbourhood Policy confronts substantial challenges and it is seemingly on a crossroad of prospects. Even though the last review of the ENP addressed challenging areas, "the absence of a clear end-goal is (still) hugely problematic" (ibid). Moreover, no direct anti-corruption initiatives and institutions are created in order to tackle corruption risks. Similarly, the EU does not have a clear mechanism of controlling the use of the provided funds. Despite the common EU anti-corruption and integrity standards, no single case is found to accuse a partnership country of mismanagement of funds.

Therefore, the attempt in this research was to review the extent to which, if at all, the impact of corruption weakens the returns from the EU financial assistance. Apart from the shortcomings and limitations of the applied model, the results from the quantitative analysis report a clear answer. Indeed, the presence of corruption hampers economic growth in the majority of countries and more importantly it does influence the returns from financial assistance as well. Up until the end of 2014, the European funds are found to have negative impact on the economic activities in almost every partnership state. Moreover, the results indicate that a potential progress in corruption levels can amplify positive outcome for these economies. Finally, we look at those results with a degree of caution and consider a second possibility that some of the funds were invested in projects without significant or maybe long-term impact on economic growth for which we cannot account in this quantitative study.

Apart from the empirical analysis, this research provides an overview of the existing literature. Due to limitations of studies capturing the particularity of the Neighbourhood countries, the paper compares key works focused on the European Union and the impact of the Cohesion Policy and corruption activities on economic growth. Research in the field does not provide a straightforward answer. However, the majority of the studies conclude that higher corruption activities hinder development and therefore it is a negative phenomenon, rather than efficient. Additionally, the financial assistance is found to be a significant determinant of growth only when funds are appropriated effectively, in countries with good policies.

In conclusion, while the study emphasizes on the direct impact of corruption on the returns of EU funds it also evaluates indirectly the success of the European Neighbourhood policy in meeting its central objective of developing economic activities in the region. In the light of the new approach towards the Neighbourhood, this paper outlines the importance of EU to encounter the challenges in the region and to strengthen its normative power as a democracy promoter.

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ANNEX(ES)

ANNEX I

//* Testing variables coefficients for Pooled OLS

      test LNL1GDP CPI FundsEU15 CPIFundsEU15 Invest Openness GovExp pop
LNPatents Educ

  (1) LNL1GDP = 0

  (2) CPI = 0

  (3) FundsEU15 = 0

  (4) CPIFundsEU15 = 0

  (5) Invest = 0

  (6) Openness = 0

  (7) GovExp = 0

  (8) pop = 0

  (9) LNPatents = 0

  (10) Educ = 0

       F(10,   151) =   24.20

          Prob > F =   0.0000

//* Testing for Random and Fixed effects

. hausman fixed random

	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	random	Difference	S.E.
LNL1GDP	-26.7582	-3.503266	-23.25493	3.428637
CPI	.2887809	.0503696	.2384114	.071679
L1CPIFund~15	.6794657	.2727339	.4067318	.0899789
L1FundsEU15	-22.01307	-10.07194	-11.94113	4.331088
Invest	.4880307	.2367486	.2512821	.0415271
Openness	.241985	.0355668	.2064182	.01836
L1GovExp	.5837932	.0237944	.5599987	.1564012
LNPatents	-1.764384	.5645675	-2.328951	.9517578
L1Educ	.0584103	.0050222	.0533881	.0476992

               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(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)

              =   128.41

        Prob>chi2 =   0.0000

//* Testing for time fixed effects
. testparm i.year

```
( 1)  2009.year = 0
( 2)  2010.year = 0
( 3)  2011.year = 0
( 4)  2012.year = 0
( 5)  2013.year = 0
( 6)  2014.year = 0

      F(  6,   38) =   15.52
           Prob > F =    0.0000
```

//* Testing for Heteroscedasticity
. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

```
chi2 (39)  =    1134.29
Prob>chi2 =      0.0000
```

// * Testing for Collinearity
vif

```
    Variable |      VIF       1/VIF
-------------+----------------------
    LNL1GDP |     5.57    0.179516
        CPI |     4.48    0.223170
   L1GovExp |     1.98    0.505984
   FundsEU15 |     1.93    0.517384
   LNPatents |     1.92    0.520154
    Openness |     1.53    0.655268
      L1Educ |     1.46    0.684868
      Invest |     1.28    0.784012
-------------+----------------------
    Mean VIF |     2.52
```

//* Correlation Matrix

```
. matrix Vb = e(V)

. matrix list Vb

symmetric Vb[9,9]
                LNL1GDP          CPI     FundsEU15        Invest      Openness      L1GovExp
LNPatents        L1Educ            _
> cons
   LNL1GDP     .89394655
       CPI     -.0191382     .00083107
 FundsEU15     1.0213156    -.00771158     4.2287625
    Invest     .00587189     .00020844     .01818773     .00238405
  Openness    -.00212574     .00001543    -.00196401     -.0000187     .00004809
  L1GovExp     .00946569    -.00151708    -.05409842    -.00055999     .00001558      .0102796
 LNPatents    -.06446136     .00120267    -.01679287     .00007216     .00072206    -.00432143
.0416748
    L1Educ    -.00310487     .00009934     .00401705     .00015403     6.550e-06    -.00023827
-.0006757     .00027219
     _cons    -7.4099279     .15492055    -9.2811924    -.12350347     .0105257    -.15532114
.35942023     .01331729        67.60
> 4724


.
. matrix Cb = corr(Vb)

. matrix list Cb

symmetric Cb[9,9]
                LNL1GDP          CPI     FundsEU15        Invest      Openness      L1GovExp
LNPatents        L1Educ            _
> cons
   LNL1GDP             1
       CPI    -.70214449             1
 FundsEU15     .52528807    -.13008226             1
    Invest     .12719336     .14808452     .18113993             1
  Openness    -.32420673     .07719752    -.13772233    -.05522415             1
  L1GovExp     .09874341    -.51904217    -.25947154    -.11311942      .0221634             1
 LNPatents    -.33396957     .20435752    -.04000199     .00723985     .51004214    -.20878671
1
    L1Educ    -.19904517     .20887025     .11840348     .19121217     .05725379    -.14244653
-.20062393             1
     _cons     -.9531685     .65358441    -.54891944    -.30763303      .1845993     -.1863176
.21412985     .09817288
>     1
```

ANNEX II

//* testing FE with lags of Funds and CPIFundsEU15

```
xtreg  GDP LNL1GDP CPI CPIFundsEU15 FundsEU15 Invest Openness L1GovExp LNPatents L1Educ,
fe
```

```
Fixed-effects (within) regression          Number of obs      =        235
Group variable: countrynum                 Number of groups   =         39

R-sq:  within  = 0.5533                     Obs per group: min =          1
       between = 0.2287                                    avg =        6.0
       overall = 0.1156                                    max =          7
                                            F(9,187)           =      25.74
corr(u_i, Xb)  = -0.9836                     Prob > F           =     0.0000
------------------------------------------------------------------------------
        GDP |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    LNL1GDP |  -25.30481   3.695179    -6.85   0.000    -32.5944   -18.01521
        CPI |   .2818088   .0822617     3.43   0.001    .1195285    .4440891
CPIFundsEU15 |   .0411652     .41794     0.10   0.922   -.7833181    .8656484
  FundsEU15 |  -.3346169   15.03221    -0.02   0.982   -29.98913     29.3199
     Invest |   .4516088    .071904     6.28   0.000    .3097615    .5934561
   Openness |   .2359561   .0209915    11.24   0.000    .1945455    .2773667
   L1GovExp |   .5847192   .2011993     2.91   0.004     .187807    .9816314
   LNPatents |  -2.308392    .968401    -2.38   0.018   -4.218787    -.397997
     L1Educ |   .0294724    .052184     0.56   0.573   -.0734727    .1324175
      _cons |   205.9749   36.74719     5.61   0.000    133.4826    278.4672
-------------+----------------------------------------------------------------
    sigma_u |   18.59217
    sigma_e |    3.04169
        rho |  .97393254   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(38, 187) =     5.85              Prob > F = 0.0000
```

```
xtreg  GDP LNL1GDP CPI L2CPIFundsEU15 L2FundsEU15 Invest Openness L1GovExp LNPatents
L1Educ, fe
```

```
Fixed-effects (within) regression          Number of obs      =        199
Group variable: countrynum                 Number of groups   =         39

R-sq:  within  = 0.5733                     Obs per group: min =          1
       between = 0.1879                                    avg =        5.1
       overall = 0.1002                                    max =          6
                                            F(9,151)           =      22.54
corr(u_i, Xb)  = -0.9899                     Prob > F           =     0.0000
------------------------------------------------------------------------------
        GDP |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    LNL1GDP |  -32.73146   4.774076    -6.86   0.000   -42.16408   -23.29885
        CPI |   .3264447   .0890977     3.66   0.000    .1504057    .5024838
L2CPIFundsEU15 |   .6875066   .2758204     2.49   0.014    .1425409    1.232472
L2FundsEU15 |  -24.45105    10.4273    -2.34   0.020    -45.0533   -3.848788
     Invest |   .3383159   .0995478     3.40   0.001    .1416294    .5350024
   Openness |   .2699721   .0230557    11.71   0.000    .2244186    .3155256
   L1GovExp |   .5751762   .2352004     2.45   0.016    .1104674    1.039885
   LNPatents |  -3.630883   1.220948    -2.97   0.003   -6.043231   -1.218535
     L1Educ |   .0624438   .0615184     1.02   0.312   -.0591042    .1839918
      _cons |   283.3904   46.80292     6.05   0.000    190.9172    375.8636
-------------+----------------------------------------------------------------
    sigma_u |  23.457392
    sigma_e |  2.8737024
        rho |  .98521387   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(38, 151) =     5.45              Prob > F = 0.0000
```

```
. xtreg  GDP LNL1GDP CPI L3CPIFundsEU15 L3FundsEU15 Invest Openness L1GovExp LNPatents
L1Educ, fe

Fixed-effects (within) regression          Number of obs    =        165
Group variable: countrynum                 Number of groups =         39

R-sq:  within  = 0.3902                     Obs per group: min =          1
       between = 0.2634                                    avg =        4.2
       overall = 0.2176                                    max =          5

                                           F(9,117)         =       8.32
corr(u_i, Xb) = -0.9886                     Prob > F         =     0.0000

------------------------------------------------------------------------------
         GDP |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     LNL1GDP |  -25.42543   3.623344    -7.02   0.000    -32.60127   -18.24958
         CPI |   .1638631   .0643917     2.54   0.012     .0363386    .2913875
L3CPIFundsEU15 |   .0183168   .2368875     0.08   0.938    -.4508265    .4874601
  L3FundsEU15 |  -3.432325   9.443663    -0.36   0.717      -22.135    15.27035
      Invest |   .2529977   .0822524     3.08   0.003     .0901011    .4158944
    Openness |   .0968752   .0256701     3.77   0.000     .0460369    .1477135
    L1GovExp |  -.0829724   .2225545    -0.37   0.710    -.5237299    .3577852
    LNPatents |   -1.62662   .9750298    -1.67   0.098    -3.557615    .3043758
      L1Educ |    .050671   .0481189     1.05   0.294     -.044626    .145968
       _cons |   241.2605   36.58744     6.59   0.000      168.801     313.72
-------------+----------------------------------------------------------------
     sigma_u |  15.124146
     sigma_e |   1.8693603
         rho |   .98495266   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(38, 117) =     4.86          Prob > F = 0.0000

. xtreg  GDP LNL1GDP CPI L1CPIFundsEU15 L1FundsEU15 Invest Openness L1GovExp LNPatents
L1Educ L1pop,
> fe

Fixed-effects (within) regression          Number of obs    =        234
Group variable: countrynum                 Number of groups =         39

R-sq:  within  = 0.5759                     Obs per group: min =          1
       between = 0.2489                                    avg =        6.0
       overall = 0.1283                                    max =          7
                                           F(10,185)        =      25.12
corr(u_i, Xb) = -0.9811                     Prob > F         =     0.0000

------------------------------------------------------------------------------
         GDP |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     LNL1GDP |  -25.30353   3.738558    -6.77   0.000    -32.67922   -17.92784
         CPI |   .3007639    .079951     3.76   0.000      .143031    .4584968
L1CPIFundsEU15 |   .6793268   .2893757     2.35   0.020     .1084262    1.250227
  L1FundsEU15 |  -21.73712   11.00769    -1.97   0.050    -43.45386   -.0203839
      Invest |   .5269895   .0750247     7.02   0.000     .3789755    .6750034
    Openness |   .2297127   .0218812    10.50   0.000     .1865439    .2728815
    L1GovExp |   .6360779    .201842     3.15   0.002     .2378699    1.034286
    LNPatents |   -1.62664   .9903835    -1.64   0.102    -3.580538     .327258
      L1Educ |   .0432485   .0527689     0.82   0.414    -.0608577    .1473548
       L1pop |  -1.204773   .7710843    -1.56   0.120    -2.726022    .3164759
       _cons |   198.1115   36.87223     5.37   0.000     125.3674    270.8556
-------------+----------------------------------------------------------------
     sigma_u |  17.200953
     sigma_e |   2.9577049
         rho |   .97128227   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(38, 185) =     5.96          Prob > F = 0.0000
```

//* Final Regression Output

```
. xtreg  GDP LNL1GDP CPI L1CPIFundsEU15 L1FundsEU15 Invest Openness L1GovExp LNPatents
L1Educ i.year,
> fe cluster (country)
```

Fixed-effects (within) regression   Number of obs   =   235
Group variable: countrynum   Number of groups   =   39

R-sq: within = 0.7297   Obs per group: min =   1
       between = 0.3362   avg =   6.0
       overall = 0.1240   max =   7

                                            F(15,38)   =   44.02
corr(u_i, Xb) = -0.9913   Prob > F   =   0.0000

                          (Std. Err. adjusted for 39 clusters in country)

               | Robust
          GDP | Coef.   Std. Err.   t   P>|t| [95% Conf. Interval]
---------------+--
      LNL1GDP | -46.49785   4.890645   -9.51   0.000   -56.39845   -36.59726
          CPI | .2970862   .1033513   2.87   0.007   .0878623   .5063101
L1CPIFundsEU15 | .668726   .2105125   3.18   0.003   .2425656   1.094886
   L1FundsEU15 | -22.22829   7.465679   -2.98   0.005   -37.34177   -7.114814
       Invest | .5387019   .1188083   4.53   0.000   .2981871   .7792167
     Openness | .1327887   .030356   4.37   0.000   .0713363   .1942411
     L1GovExp | -.1304368   .1753193   -0.74   0.461   -.4853522   .2244786
    LNPatents | -.461933   1.395269   -0.33   0.742   -3.286507   2.362641
       L1Educ | -.0638245   .0483129   -1.32   0.194   -.1616289   .0339799
               |
         year |
         2009 | -1.572618   1.286843   -1.22   0.229   -4.177696   1.032459
         2010 | 2.76705   1.035302   2.67   0.011   .6711912   4.862909
         2011 | 4.53323   1.022238   4.43   0.000   2.463818   6.602643
         2012 | 4.002442   1.085026   3.69   0.001   1.805922   6.198963
         2013 | 6.387821   1.253469   5.10   0.000   3.850306   8.925336
         2014 | 6.847072   1.348141   5.08   0.000   4.117904   9.57624
               |
        _cons | 429.7506   52.1546   8.24   0.000   324.1691   535.332
---------------+--
      sigma_u | 27.852903
      sigma_e | 2.4124004
          rho | .99255419   (fraction of variance due to u_i)

```