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Constitutional compliance and FDI in low-income countries: a k-means, panel and XGBoost analysis

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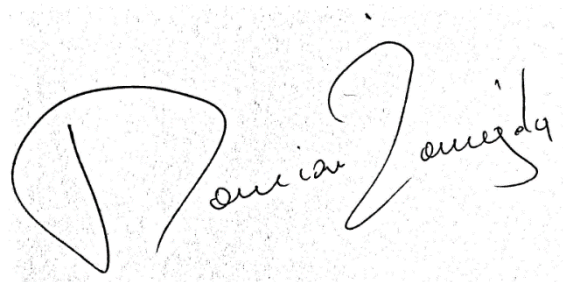
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Summary

What are institutional factors that may positively influence FDI? What do we know about the drivers of FDI in low-income countries? The available literature confirms the importance of FDI, mostly in the context of economic and social development. A growing number of empirical papers refer mostly to economic aspects that may matter in this perspective. At the same time we know quite little about various institutions that may affect FDI. In this paper we use econometric and machine learning apparatus to verify the relevance of constitutional compliance for FDI in low-income countries. The results imply that indeed constitutional compliance is relevant in this context, but this finding is subject to various caveats in economic modeling. Our conclusions may be also useful for policymakers.

Key Words

foreign direct investment, constitutional compliance, institutional economics, law & economics

Field of the thesis (codes according to the Erasmus program)

Economics (14300)

Thematic classification

The title of the thesis in Polish

Zgodność konstytucyjna i BIZ w krajach o niskich dochodach: analiza K-means, panelowa i XGBoost

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INTRODUCTION

Which institutions attract FDI? Is the effect similar for countries on various levels of economic development? The current literature clearly exposes economic relevance of FDI. It contributes to economic growth, poverty reduction, and the growth of human and technological capital (Aitken and Harrison, 1999; Alfaro, Chanda, Kalemli-Ozcan, and Sayek, 2004; Goldberg, 2004; Asiedu and Lien, 2011). With respect to institutions in the context of FDI, by so far, we have some knowledge about the importance of property rights, civil rights and the rule of law (Blanton, 2006; Adam and Filippaios, 2007; Staats and Biglaiser 2012). However, it still remains unclear whether violations of constitutions, in general, discourage FDI.

Taking the above into consideration, the core goal of the paper is to verify the importance of constitutional compliance of the executive for the actual levels of FDI. In this paper, we ask the following research questions: *Does constitutional (non)compliance exercised by the members of the executive matter for the level of FDI? Is the effect robust for countries of different levels of development as measure of e.g. GDP per capita?*

Our empirical study is based on a global sample of 78 countries for the period 1985-2014. Within the study we focus particularly on the relevance of constitutional compliance of the executive for FDI in low-income countries. We focus on low-income countries due to the special importance of FDI for low-income countries for their economic development, fighting poverty, supporting technological know-how and human capital development (Blomström and Kokko, 1998; Gohou and Soumare, 2012). Our methodology focuses on K-means algorithm, panel model and XGBoost. Based on K-means and set of control variables, the accuracy of the assignment to a group of specific fiscal status was checked. Next, we estimate models separately for each population fiscal status, distinguishing individual explanatory variables such as property rights, constitutional compliance, rule of law and civil liberties. Ultimately, we focus on the SHAP value analysis for the XGBoost model for low-income countries and the constitutional compliance variable. The results of the models, confirm that constitutional compliance is relevant factor of FDI in low-income countries. We also present the results for advanced and emerging countries, which are characterized by a relatively higher level of respect for the constitution in the analyzed period than low-income countries. In their case, it was possible to derive models suggesting a significant impact of respect for civil liberties on FDI.

The novelty of our research, based on econometric and machine learning tools, is multifold. Thanks to our approach, we extend the literature on the output of constitutional compliance with another aspect, which is FDI. We also contribute to the literature devoted to

FDI, by including more institutional factors than the available papers. We contribute to literature by emphasize the importance of respecting property rights in all countries, regardless of fiscal status. Additionally, for advanced and emerging countries, we see a special impact of respecting civil liberties. In the above-mentioned countries, where the level of respect for the constitution is relatively higher and characterized by lower volatility, investors are encouraged by high recognition and respect for civil liberties.

The article has the following structure: in Chapter 1 we provide the literature review on FDI and its potential drivers, including constitutional compliance. Chapter 2 includes data description, empirical methodology, explorative analysis, results and discussion. The next section concludes the article.

CHAPTER I
THEORY AND LITERATURE REVIEW

1.1. The relevance of foreign direct investments in literature

According to the definition proposed by the International Monetary Fund (IMF), foreign direct investment (FDI) can be taken as a sum of equity capital, reinvestment of earnings, and other capital. FDI is a decision of multinational enterprises (MNEs) or individuals to make an investment in a particular foreign country. FDI occurs when an investor starts a foreign business or purchases foreign assets in an foreign company (Duce and España, 2003).

The level of FDI in relation to GDP is characterized by an upward trend in the medium and long term with some volatility in the short term, see Figure 1. In particular, strong growth dynamics in emerging countries and low-income countries should be emphasized. The average value of the FDI to GDP ratio is lower in low-income countries than in advanced and emerging countries throughout most of the period show.

Figure 1. Relation of FDI to GDP and fiscal status of a country
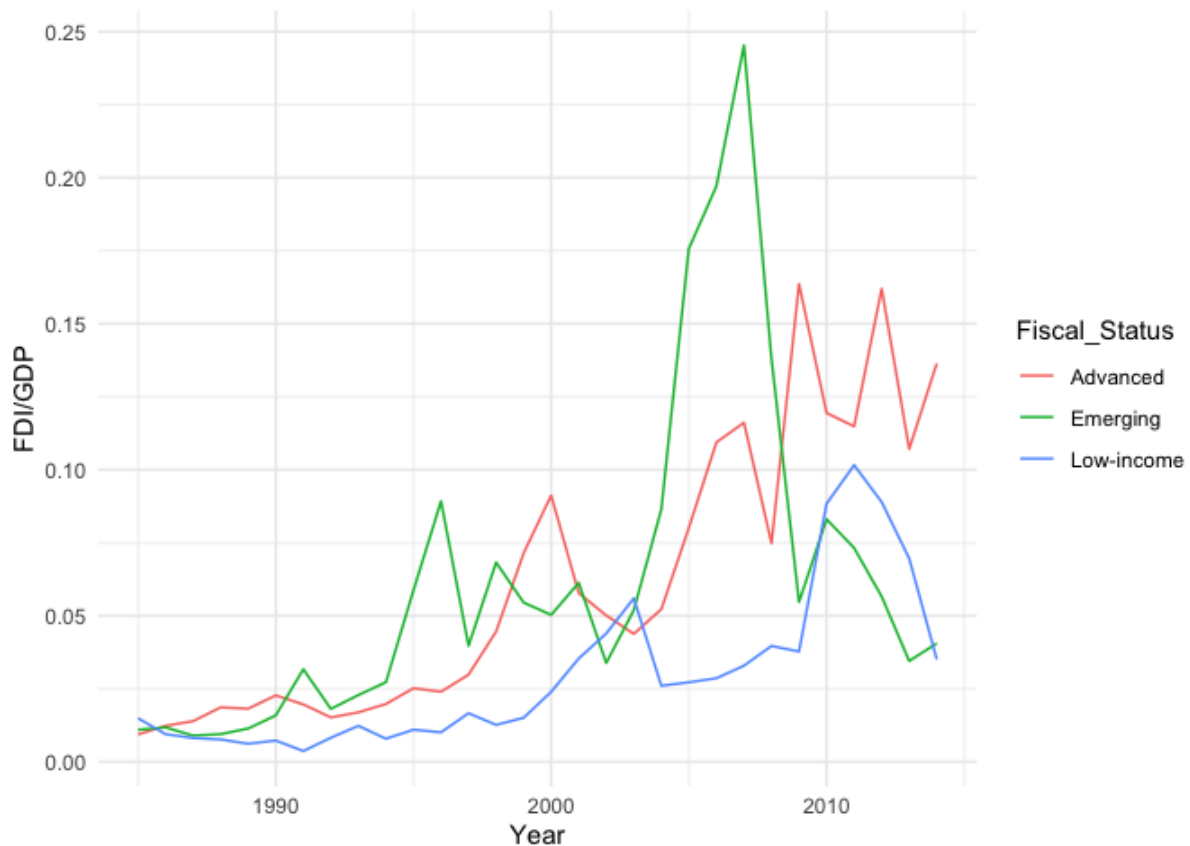
Source: Own calculation, based on the World Bank data and V-Dem dataset.

The literature lists various benefits of FDI inflows. First of all, an increase in the efficiency of resource allocation can be noticed due to increases of FDI. This statement is covered in well-established literature based on the example of monopolistic market structure, where the emergence of MNEs can dilute producer condensation ipso facto create a more competitive market structure. This improve the resource allocation, consumer's surplus and products quality (Mussa and Rosen 1978; Goldberg, 2004).

The advantages of the inflow of FDI are also technological flows which results directly in an increased productivity in the host country (Aitken and Harrison, 1999; Goldberg, 2004). Such technological spillover can take place either directly by, for example, licensing a particular technology, or indirectly through the companies observing each other causing spread of technology domestically. Additionally, knowledge transfers between employees are noticeable as a result of maintaining communication or reallocating employees from the country where the FDI comes from to the host country (Blomström and Kokko, 1998). What is more, based on a study by Gohou and Soumare (2012), an increase in FDI can help reduce poverty in a country by supporting the creation of new jobs in the private sector. Developing countries might be also attracted by potential access to new markets, managerial skills and employee training (Alfaro, Chanda, Kalemli-Ozcan and Sayek, 2004).

1.2. Relationships between constitutional compliance and FDI

Democracy is one of the oldest political systems, the beginning of which can be seen already in ancient Greece. It is based on the fact that the citizens decide about the most important matters in the state. The concept of constitution is inextricably linked with the democratic system but it is not exclusive to democracy. Constitution comes in the form of a legal act that defines the rights and obligations of citizens, as well as the principles that make up the state. Constitution system helps to ensure that governments are more stable, open and represent the will of the nation, i.e. according to Spiro (2021), they should support democracy.

According to Democracy Report 2021, in recent years there has been a sustained decline in liberal democracy, in particular in the Asia-Pacific region, Central Asia, Eastern Europe, and Latin America. Moreover, the level of democracy measured by the V-Dem institute in 2020 is the lowest in 30 years. Over the past decade, the number of liberal democracies has fallen from 41 to 32 which now represents only 14% of the world's population.

Considering the above, MNEs in search of a certain level of stability in a particular country may be influenced not only by macroeconomic indicators, but also by the level of

respect for human rights, property and civil liberties (Blanton, 2006). Increase in FDI can help reduce poverty in a country by supporting the creation of new jobs. Many countries with high poverty rates also show low levels of constitution compliance which hinders democracy. Seeing the positive aspects of increasing FDI, a country will be faced with a choice between increasing the level of democracy and the lost benefits of FDI (Asiedu and Lien, 2011).

In this paper, we try to find empirical evidence supporting the supposition that the level of compliance with the constitution by the government has a significant impact on the level of FDI. We measure the compliance with the constitution with the 'executive respects constitution' index from V-Dem dataset (2021). Based on a prior descriptive analysis (Annex 1) and the presented literature overview we expect to find a significant impact of constitutional compliance on FDI, especially in low-income countries, due to higher volatility and high value extremes.

Figure 2. Level of constitutional compliance per fiscal status of a country
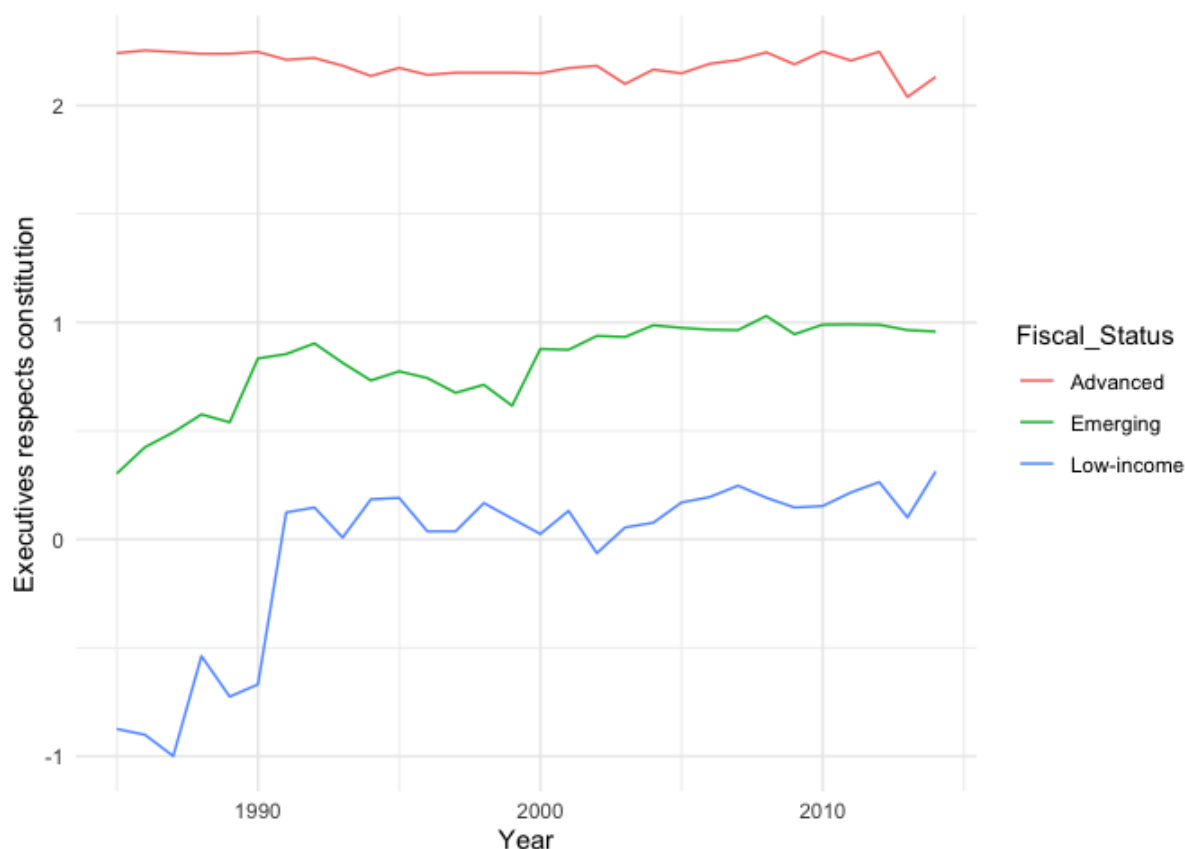
Source: Own calculation, based on the V-Dem dataset.

We analyze data from the V-Dem institute (2021) and we bring that the level of respect for the constitution varies significantly between countries. The greatest differences are observed between low-income countries, which have been characterized by relatively low values of the

variable since 1985, and advanced countries, for which the whole populated period represents high values. As presented in Figure 2. index values for advanced countries remain above 2 (Annex 1) and can be interpreted as members of the executive never or rarely violate the constitution, and facing legal charges when they do (V-Dem Codebook, 2021). Due to the low dynamics of the constitution compliance in developed countries throughout the period, we expect little or no impact on the level of FDI. In turn, we estimated the impact of civil liberties (V-Dem Dataset, 2021) on FDI with special focus on advanced countries. We verify the hypothesis that the variables have vastly varying impact depending on the fiscal status. We argue that in low-income countries constitutional compliance is an important subject with a positive impact on FDI, but we see possible scenarios where civil liberties might be violated with no change or in even rise in FDI inflows. Adam and Filippaios (2007) state that if an investor aims to exploit natural resources of the host country, a decrease in the degree of civil liberties may attract more inflow of FDI. On the other hand, if an investor needs to minimize the cost of operations, protection of civil liberties may give a rise to FDI level. We expect that in case of developed countries, any positive change in constitution compliance or civil liberties mostly increases FDI, or at least has no significant impact but negative actions do not attract FDI. In order to broaden the understanding of the influence of constitutional and democratic factors on FDI, we add another variable, rule of law, which includes a component that measures respect for the constitution, but also measures of compliance with high court, judiciary, high court independence, law transparency and predictable enforcement (V-Dem Codebook, 2021).

According to the discussed literature, empirical studies show that the high level of protection of rule of law and civil liberties can impact MNE's decision to make new FDI. Despite the differences in literature, still most authors argue that the often-cited hypothesis by non-governmental organizations that lower democratic rights boost foreign investment does not hold (Harms and Ursprung, 2002; Busse, 2003; Staats and Biglaiser, 2012).

1.3. Determinants of FDI

1.3.1. Macroeconomic factors

FDI plays a huge role in globalization and economic growth, therefore many researchers undertake empirical work to search for FDI determinants. Much of the growth in FDI in developing countries is due to the greater involvement of MNEs. This is a great incentive for governments of low-income countries to pay attention to the potential of FDI in their

economies. Many low-income countries like Nigeria or Uganda now wish to extend the market price system and alleviate the external debt by attracting more investment (Obwona, 2001; Ayanwale, 2007). Hence, Blonigen (2005) poses the question, what makes foreign companies choose FDI forms instead of options such as exports or license agreements?

Among the available literature, one can find empirical research indicating the importance of certain factors for the emergence of international investments, and then factors shaping their dynamics (Aizenman and Noy, 2006). The study of FDI determinants can lead to the conclusion that FDI factors are often multifaceted and may be sensitive to country-specific externalities. The literature examines the factors influencing the level of FDI, both at the level of the company, its decision-making and external, such as taxes, respect for property rights, and interest rates (Blonigen, 2005). Individual indicators may focus on the former causes of the formation of MNEs and only then on the company's ongoing internal decisions about FDI activity.

The explanatory models focusing on internal determinants often do not take into account national predispositions that make them difficult to generalize or lead to partial conclusions. Ultimately, the presentation of statistical macroeconomic determinants allows for obtaining the most important determinants of FDI at the national level. Macroeconomic indicators are used by investors to measure current and future economic activity and opportunity.

According to Nunnenkamp (2002), despite the huge boom in globalization in recent years, traditional market-related factors such as GDP per capita, GDP growth and population size are still valid and support individual country selection for FDI. According to Vijayakumar, Sridharan and Rao (2010), who focused on the analysis of BRIC developing countries (Brazil, Russia, India and China), the local economies encourage foreign investors with the high growth potential of consumer markets, which are united by a large population. Market size measured in population size as FDI determinant, is also mentioned by Ayanwale (2007) who published research based on data from Nigeria.

GDP per capita might be the understood as a measure of economic development, as it is directly related to the level consumer demand, accumulated capital and purchasing power. A high level of GDP per capita may also be strongly correlated with the level of employee remuneration, and this goes hand in hand with qualifications. A high level of technology capital may encourage investors to acquire foreign firms, as argued by Kogut and Chang (1991).

There are many theoretical considerations and empirical evidence in the literature on the impact of economic openness on trade. The phenomenon commonly known as tariff jumping FDI is especially known and is discussed thoroughly in literature. Brander and Spencer

(1997) and Levinsohn (1989) focus their considerations on an optimal government solutions when the FDI tariff jumping is possible. For example, Flam (1994) presents different balances in models where both the government and the MNEs are parties to maximize their strategic goals. Blonigen and Ohno (1998) show complex models in which the activities of different MNEs depend on each other.

There are also areas where trade protection by imposing a tariff will not increase FDI. Situations where the optimal tariff that would not exceed the level causing a significant increase in FDI are presented in Ellingsen and Warneryd (1999). Although the possible market situations included in literature are numerous, Blonigen (2002) claims that the tariff-jumping dependencies of FDI apply only to MNEs from highly developed countries. On the other hand, trade openness may indicate the economy's openness to foreign markets and manifest in an activity that may facilitate and encourage MNEs to undertake FDI (Dollar, 1992; Blanton and Blanton, 2006). We conclude that the mentioned external dependencies of the FDI may cause great difficulties in empirical analysis.

1.3.2. Other drivers of FDI

Internal factors with focus on the former causes of the formation of MNEs and then on the company's ongoing strategic decisions about specific level of FDI activity are difficult to generalize and present unambiguous conclusions. Referring to the example presented by Morck and Yeung (1992) that high level of MNE's advertising, research and development spending are a supporting factor for FDI, because this assets are easy to scale on foreign operations and therefore their value can be maximized. Kogut and Chang (1991) indicate reasons why a significant share of foreign technological ownership can be acquired. Evidence from Japan were of particular importance, as they were, aimed at acquiring technology to gain a competitive advantage, which is strategic target dependent investment. What is more, theoretical considerations by Rugman (1977) emphasize the importance of FDI undertaken through MNEs aimed at also diversifying assets as part of risk management. This shows that there are various company-specific internal reasons for FDI.

Unstable economy and corruption may inflate the costs of running a business and, as a result, make FDI in a given country less attractive which is often concern in developing economies (Al-Sadig, 2009). OECD research (2001; 2002) also lists the importance of applying qualitative corporate governance to boost FDI flows to less developed countries. World Bank (2001) presents the main reasons for the Asian crisis, among them low levels of banking quality,

financial sector and weak corporate governance mechanism causing low transparency, corruption, poorly managed financial reporting systems and unsound jurisdictional segment. In this context, corporate governance is one of the key elements of securing an investment and its profits. Thus, it is recognized that bad corporate governance leads to volatility in FDI.

The quality of respect for the law, government's transparency and equality towards citizens can be an important issue in the understanding of MNEs' interest in taking up FDI activity in a given country. Theoretical considerations find very intuitive links between the quality of a country's stability and incoming FDI flows. Little protection of property rights creates a high risk of misallocation of MNEs' assets, thus lower likelihood of FDI. Research on US MNEs based in China shows that better protection of intellectual property, property, transaction respect, low government interference in business and lower levels of corruption encourage MNEs to invest as FDI (Du, Lu and Tao, 2008). The entity considering the decision to undertake an investment in a foreign country and its level may depend on the appropriate level of respecting property rights for purely material reasons. Nunnenkamp (2002) suggests also that the increase in investment in human capital through education attracts foreign countries and supports a higher inflow of FDI, which is also in line with the conclusions of Noorbakhsh, Paloni and Youssef (2001).

Empirical research encounters certain difficulties in finding reliable indicators reflecting the level of institutions in a given country which taken into account could be significant determinant of FDI. An example of empirical analysis based on corruption indicators in China and their correlation with FDI influences is the work of Wei (2000). On the basis of the presented data, a strong negative correlation between the level of corruption and FDI is argued. Kwok and Tadesse (2006) represent and defense the thesis that stimulating the improvement of the corruption situation in the country is possible through increase of FDI inflows.

High quality of institutions in the economies can lead to lower level of corruption and therefore minimize the negative impact on FDI inflows. From the other perspective low quality of institutions may lead to a certain 'libertarian' characteristic of the country and offer for example, certain tax incentives or low regulatory due to higher bargaining power of MNEs (Wang, Hong, Kafouros and Boateng, 2012). In such a situation, if an investor is looking for countries where his investments will be free from undesirable tax and regulatory constraints, it is possible that in the short-medium term he will choose a country with a low institutionalism. Therefore the we expect a significant impact on FDI, but results may vary depending on the fiscal status of the economies.

CHAPTER II.
EMPIRICAL ANALYSIS

2.1. Data and empirical design

We focus on the influence of factors such as respect for property rights, respect for the constitution by the executives, rule of law and the level of civil rights on the level of foreign investment flowing into a given country. The study of FDI determinants can lead to the conclusion that causes are often multifaceted and may be sensitive to country-specific externalities. In connection with the above, the work separately lists the various fiscal states of individual countries. The IMF presents a list that imposes a long-term indicator informing about the fiscal status. The categories available are advanced, emerging, and low-income. We expect different results depending on the fiscal status. In other words, the impact of executive respects constitution variable on FDI in low-income countries than in developed or developing countries may be different.

For the purposes of the study, the data published by IMF was introduced, which provides information on the fiscal status covering 78 countries in the years 1985–2014. The sample of countries is global and the only limitation is data availability. The analyzed period was also not limited by our assumptions, but by the availability of data for individual explanatory variables. Despite the limitations of data availability, we argue that the population of 78 countries in 1985-2014 provides strong empirical evidence for the purpose of our thesis. This is a very promising period to apply in the study, in terms of high variability in FDI levels between countries. It is also a period of increasing awareness of importance of constitutional compliance and civil liberties. Data serving as evidence for model estimation for each fiscal category is characterized by a lack of data for individual periods, as a result of which 3 independent unbalanced data sets were created and unbalancedness measures are presented in Annex 4. Despite some incentives for using undersampling methods to create balanced datasets, we choose unbalanced datasets to better reflect the actual distribution of population explanatory variables and increase reliance on estimators (Blanton and Blanton, 2006; Dal Pozzolo, Caelen, Johnson, and Bontempi, 2015).

2.1.1. Dependent variable

The data was made available by the World Bank and relates to direct investment resulting in capital flows between countries. FDI is, for example, an enterprise whose significant share (at least 10%), in the capital is owned by a foreign enterprise, which has control

and influence of management decisions on the actions of the enterprise in the resident country. Source data is expressed in the U.S. dollars but for the purposes of statistical modeling, we decided to divide the value of FDI into the value of GDP in a given country. Ultimately, the logarithm (FDI) is used in this work as a dependent variable as in most works by other authors (Blanton and Blanton, 2006; Erdogan and Unver, 2015). The use of the dependent variable delay was taken into account, but due to the low population size, lag(FDI) is not one of the variables from the set of control variables in the final model.

2.1.2. Independent variables

The first variable that was decided to be used in the explanatory models is the variable answering the question whether the citizens of a given state have the right to property and to what extent it is respected. Private property in its meaning includes the right to own, acquire, sell and inherit a property or land. A property rights restriction may result from the government's inability to maintain it, or possibly due to restrictions artificially imposed by the government. The variable 'Property rights' comes from V-Dem (2021) dataset and scales interval from low to high which corresponds to numeric values 0-1.

Another variable from the V-Dem resource is the answer to the question of whether executives, which are understood in a broader sense of heads of state, such as the head of state, government or the cabinet of ministers, respect the adopted constitution. Extremely low values are equivalent to rulers being able to violate the constitution without any legal consequences. Extremely high values are evidence of high constitutional compliance, the provisions of which are never questioned. In the study, special attention was paid to the 'Executive respects constitution' variable, because of the weight and multidimensional scope of the constitution that may affect many social and economic aspects. The variable is the biggest challenge at work due to the very low resources in the literature dealing with the impact of respect for the constitution by the state (executive). For modeling purposes, the variable was reduced from the form of a continuous variable to a 3-level ordered variable. We see advantages resulting from unsupervised K-means clustering (Hartigan and Wong, 1979) for the purposes of a subclass and showing up in better model results. Value ranges for individual levels were assigned automatically by clustering algorithms and based on diagnostics and descriptive analysis, individually for each fiscal category (Annex 4).

As a conclusion from the work of Staats and Biglaiser (2012), another variable is 'rule of law'. The index is the resultant of individual indicators included in the V-Dem database,

among others compliance with courts, compliance with jurisdiction, independence of the highest court, the level of quality and impartiality of public administration, corruption index, legal transparency, equality and the variable executive respects constitution as well. Due to the above, the rule of law is also considered in separate models. The use of variables together can lead to interdependence of the variables and the phenomenon of endogeneity. Rule of law is a continuous variable and scales interval from low to high which corresponds to numeric values 0-1.

Civil liberties in the sense of religious freedom, freedom of speech, freedom of the press, freedom to assemble, and freedom to petition the government is guaranteed by the constitution and the indicator which describes it from the V-Dem dataset is another explanatory variable. It is a continuous variable and scales interval from low to high which corresponds to numeric values 0-1. Such a component of the two above variables is considered in the models separately, together with a set of control variables. It is based on the claims of Adam and Filippaios (2007) about the positive impact of 'civil liberties' on FDI and is used to distinguish the impact on FDI depending on the fiscal status.

2.1.3. Control variables

The main purpose of the work is to look at the variables in the level of compliance and quality of law in individual countries, distinguishing between fiscal status. In order to estimate the models explaining the FDI level, one should also take into account a set of control variables, especially those that are extensively used in the models presented in the literature and which describe the macroeconomic and institutional aspects affecting the level of FDI.

In this paper, 5 variables are specified as the resource of the set of control variables, the first of which is the variable describing the level of wealth and development of a particular country. The authors decide to use 'GDP per capita'. The diversified level of GDP per capita in the selected population will be the equivalent of the level of economic development in the models, and its increase is associated to the higher consumer demand, accumulated capital and purchasing power. Ultimately, a variable based on V-Dem data was logged to reflect the skewed nature of the data in the population.

The second variable is 'GDP growth', which describes the dynamics of economic growth. The variable reflects the general change in economic activity that may have an impact on the level of FDI. High values of the variable may indicate the increasing business

attractiveness of a given country and new opening markets that a foreign investor is looking for.

Not only the level of market maturity and the aforementioned wealth may affect FDI, the key variable, according to other authors, also turns out to be the scale of the economy. In a given work, the authors use a variable showing the size of the 'Population'. Market size supports the economy of scale in terms of production and distribution, which makes it one of the main determinants of FDI. The size of the residual countries is measured by the logarithm of a country's population based on data from the V-Dem dataset.

'Trade openness' is measured as the sum of imports and exports divided by the GDP level in a given country based on data from the V-Dem dataset. This approach allows to measure the openness of the economy to foreign trade and thus constitutes an important element of macroeconomic control indicators. The variable based was logged to reflect the skewed nature of the data in the population.

The above 4 variables describe the macroeconomic conditions of individual countries. In a variant to them, the variable presented in V-Dem (Bizzarro, Hicken and Self, 2017) answers the question, to what level are political parties characterized by institutionalism? The assumption is that the level of institutionalism can have an impact on FDI and vary with fiscal status. The variable corresponds to a certain level of advancement of political institutions and the oppression of their structure. The number of political parties and the level of their interaction with each other may have an impact on the quality of institutions in the country as a whole. In the model we introduce 'Party institutionalization index' variable, where high values corresponds to high level of institutionalism in a given country and period.

2.2. Empirical methodology

The process of selecting control variables consists in particular in taking into account the suggestions from the literature. The final selection of control variables for this work is also validated by clustering methods. These five variables are expected to establish (with high efficiency) a distinction between developed and low-income countries. Nevertheless, the authors predict that emerging countries will create a certain link between the two categories in this paper. If so is true, the analysis for this group would be futile and, therefore, it will be omitted. Finally, the results of K-Means that proved their belonging to a given fiscal status were compared with the actual data.

Then, after excluding deviations that did not meet mentioned assumptions, we estimate panel models. The variable concerning the level of FDI in a given period and in a given country is an agent variable and its level is expected to depend on the specified explanatory variables. The set of explanatory variables includes the GDP growth rate, the level of GDP per capita, the size of the population, the variable describing the openness to international trade and the rate of institutionalization of political parties.

Referring to the previous sections of the paper which gathered final set of variables used in this analysis, we propose the following functional form, where individual variables potentially determine FDI:

$$log(FDI_{ti}) = \alpha + \beta_1 GDPgrowth_{it} + \beta_2 log(GDPC_{it}) + \beta_3 log(POP_{it})$$
$$+ \beta_4 log(TRDO_{it}) + \beta_5 PII_{it} + \beta_6 EV_{it}^* + e_{it}$$

[1]

where:

FDI — foreign direct investment is expressed as the level of inflow measured in US\$ to a given country divided by the level of GDP in the country i and in period t

GDP growth — the level of GDP growth in the country i with period t compared to the previous period t-1

GDPC — the level of GDP per capita in the US \$ in the country i and in the period t

POP — a measure of the population in the country i and in the period t

TRDO — the level of openness to trade calculated by the sum of imports and exports divided by the level of GDP measured in US \$ in the country and in the period t

PII — represents the party institutionalization index calculated as the sum of individual V-Dem indicators such as the number of party organizations, party branches, party linkages, distinct party platforms, and legislative party cohesion. The index was then converted to its CDF in order to range from 0 to 1

EV* — every single explanatory variable modeled separately. Set consists of property rights, executive respects constitution, civil rights, rule of law in the country i and in the period t. Last variable is the lagged level of FDI for the period t-1 and t-2. Each model differs with the explained variable and with the fiscal status of countries in a given population, as a result of which 15 models are modeled

Additionally, the variable assessing how much executive respects constitution is analyzed using the extreme gradient boosting model (hereinafter xgboost). We use the R package constructed by Chen, He, Benesty, Khotilovich, Tang and Cho (2015) based on the work of Friedman (2001). The resulting models after being broken down by fiscal status are

scrutinized according to SHapley Additive exPlanations (hereinafter SHAP values). SHAPs were firstly proposed by Lundberg and Lee (2017) and later extensively used by Lundberg, Erion and Lee (2018). They are known to provide a solution to difficulties in interpreting complex models like xgboost. Such an analysis allows, in particular, to look at the influence on the explained variable, noting the influence of each item from the studied population.

We recognize tree boosting as a highly effective and widely used machine learning method in practice (Friedman, 2001), which provides state-of-the-art results on many problems (Chen and Guestrin, 2016). In our work, we use xgboost and SHAP values for the interpretation of the results of low-income countries, which do not always maintain linear trends and may have different directions of influence depending on the very individual situation of a given country or the investor's aim of FDI (Adam and Filippaios, 2007). To achieve this we estimate xgboost and implement SHAP values which allow a more direct interpretation of the model. SHAP values shows the effect of each item in the population on the FDI. Thanks to this, we can see the distribution of, for example, the impact of the variable executive respects constitution on FDI and compare it with the results of panel models.

2.3. Empirical results

The models derived from the study suggest the significance of many explanatory variables with a different effect depending on the fiscal status of a given country. Thanks to the division into the fiscal status of the country targeted at FDI, provided by IMF, we are able to present 3 separate set of models explaining the level of FDI.

We conduct diagnostic tests in order to fully understand the characteristics of the obtained models and the reliability of the estimators. Tests describing the stationarity of the dependent variable, autocorrelation of residuals and FDI, heteroscedasticity, correctness of the panel model type selection and cross-sectional dependence test were performed for each of the 15 models and their results are fully presented in the Annex 4. Tests show that in each of the models, H0 which states that homoscedasticity can be rejected in favor of the alternative hypothesis of heteroscedasticity. We consider heteroscedasticity to does not cause bias in the coefficient estimates, but we note that it might make them less precise.

2.3.1. K-means clustering on the set of control variables

At the beginning, using K-means, the accuracy of the assignment to a group with a special fiscal status was checked. Having only the variables from the control group, such as the

level of economic growth, the level of GDP per capita, the size of the population, openness to international trade and the level of institutionalism, it was possible to associate individual clusters with the fiscal status category with high efficiency. K-means clustering includes all data without division into years in this step. Since the fiscal status is assigned to a given country and period and may change over time, we use K-means without using a crossing sample. We introduce sample with represents the full population with no fiscal status labelled.

Based on the analysis by the Silhouette, Elbow, Calinski-Harabasz and Gap statistics methods (Annex 3), the number of clusters was selected at the level of 3, which also corresponds to the number of fiscal categories divided into advanced, emerging and low-income countries.

Figure 3. Distribution of K-means clustering results with comparison to actual fiscal status

Source: Own calculation, based on the V-Dem dataset and The International Monetary Fund fiscal statuses.

As expected, advanced and low-income fiscal statuses can be correctly qualified for a given category with the help of K-means, with a given number of control variables. Emerging countries may be characterized by less extreme levels of control variables, which makes distinguishing them using unsupervised learning methods not so simple. 571 items from the population, i.e. nearly 72% of advanced countries, were correctly assigned to cluster number 3. 416 items from the population, i.e. 87% of low-income countries, were correctly assigned to cluster number 1. Due to the assumption of the Authors about the elimination of advanced items,

which were incorrectly assigned to a low-income cluster and vice versa, only one entry should be eliminated. The final distribution of the population broken down by fiscal status is shown in Chart 3. We check descriptive statistics of FDI among clusters and actual fiscal in Annex 4. In our best understanding, clusters which corresponds to specific fiscal statuses, describes populations in a greatly analogous way, in particular mean values, standard deviations and extreme values are close to the actual ones. The order of descriptive measures of FDI where the highest values are in emerging countries then in advanced and the lowest in low-income is also retained as a result of the clusters created by the K-mean algorithm.

2.3.2. Clustering on constitutional compliance

For interpretation purposes, a three-tier ordered variable executive respects constitution has been created within groups by fiscal status. Based on the analysis by the Silhouette, Elbow, Calinski-Harabasz and Gap statistics methods, the number of clusters is selected at the level of 3, which is consistent with the recommendations of the above methods, but it is also possible to easily interpret such an ordered variable. The descriptive analysis of the created clusters is presented and included in the Annex 1. along with the interpretation of the optimal number of clusters Annex 3. The clusters values vary depending on the fiscal status. This means that, for example, the cluster with the lowest values of the variable in advanced countries will have, on average, higher values than in the corresponding cluster in low-income countries.

2.3.3. Advanced economies

The level of FDI in advanced countries is appropriately differentiated (Annex 1). The vast majority of countries in the average calculated from the FDI level for all years of the population do not exceed 5%, with the distinction in particular of countries such as Cyprus or Luxembourg, where the FDI level is in relation to GDP, it is definitely higher compared to the whole population.

The correlation between FDI and other explanatory variables was analyzed, including with each other (Annex 2). The FDI variable shows no strong relationship. Only variables outside the set of the control variables occur with strong correlation relationships. We decide to estimate separate panel models due to the relationships between the explanatory variables, which are visible on the basis of the calculated correlations and at the stage of the very understanding of the variables. Explanatory variables outside the control variable set may contain common components in the form of common indexes.

The results for economically advanced countries show the significance of 4 control variables concerning economic conditions. All control variables show positive estimates which proves a positive influence on the level of FDI in a given country. Only model 5, in which the explained variable was delayed and used as an explanatory variable, shows no significance of the GDP per capita and Trade openness variables.

Table 1. Results on the set of advanced economies

Predictors	Model 1 Estimates	Model 2 Estimates	Model 3 Estimates	Model 4 Estimates	Model 5 Estimates
GDP growth rate	4.07 **	3.66 **	4.06 **	3.93 **	5.80 ***
log(GDP per capita)	0.91 ***	0.96 ***	0.86 **	0.75 **	0.13
log(Population)	2.89 ***	3.22 ***	3.30 ***	2.65 ***	2.13 ***
log(Trade openness)	0.99 ***	1.01 ***	0.99 ***	1.18 ***	0.35
Party institutionalization index	2.47	5.29 ***	3.83	1.93	5.72 **
Property rights	13.51 ***				
Executive respects constitution .L		0.09			
Executive respects constitution .Q		0.36			
Rule of Law			5.41		
Civil Liberties				15.01 ***	
Lagged log(FDI) t-1					0.40 ***
Lagged log(FDI) t-2					0.16 ***
Observations	794	794	794	794	674
R^2 / R^2 adjusted	0.262 / 0.228	0.243 / 0.207	0.241 / 0.206	0.257 / 0.223	0.410 / 0.377

Source: Own study, * $p<0.05$ ** $p<0.01$ *** $p<0.001$.

Model 1 is characterized by the property rights variable, which is significant when the p-value is below 0.001. According to the results, an increase in the level of respect for property rights has a positive impact on the amount of FDI in a given country. In the model, the institutionalization variable is not significant.

The variable describing the level of respect for the constitution by the executives is presented in two ways. When we talk about the value of .L, we mean linear relation of the

variable, and when we say .Q, we mean the square relation. In this case, the variable is not significant. The same happens in model number 3, where the variable rule of law is not significant at the p-value = 0.05 level. The difference is that in model 2 as the only one, all control variables are significant and with a positive sign, while in model 3 and 4 only economic variables. In model 4, the civil liberties index level has a positive effect on the FDI level with the p-value below 0.001. The last variable is the FDI lagging behind by one and two periods, and in both cases the historical value of FDI has a positive effect on FDI.

2.3.4. Emerging economies

FDI values in the emerging countries mostly range from 1 to 9% of GDP (Annex 1). The vast majority of countries in the average value calculated from the FDI level for all years of the population does not exceed 5%, with particular emphasis on countries such as Malta, where the level of FDI in relation to GDP is much higher compared to the population.

The correlation between the FDI and other explanatory variables is presented in the Annex 6. The FDI variable does not show any significant correlation with any of the variables. Strong correlation relations occur in property rights, civil liberties, executive respects the constitution and rule of law.

The results for economically developing countries indicate the significance of only 3 control variables relating to economic conditions. All significant control variables show positive estimates, which proves a positive effect on the level of FDI in a given country. Model 5, in which the explained variable was delayed and used as an explanatory variable, does not show the significance of GDP per capita and trade openness at the same time.

Model 1 is characterized by the property rights variable, which is significant when the p-value is below 0.001. According to the results, an increase in the level of respect for property rights has a positive impact on the amount of FDI in a given country. In the model, the level of institutionalization in the country shows a negative estimator, but the variable is not significant.

In the group of developing countries, the variables executive respects the constitution and rule of law are not significant at the p-value = 0.05 level. In model 4, the civil liberties index level has a positive effect on the FDI level with the p-value below 0.001. The last variable is the FDI lagging behind by one and two periods, and in both cases the historical value of FDI has a positive effect on FDI.

Table 2. Results on the set of emerging economies

Predictors	Model 1 Estimates	Model 2 Estimates	Model 3 Estimates	Model 4 Estimates	Model 5 Estimates
GDP growth rate	3.06 ***	3.01 ***	3.00 ***	3.01 ***	1.13 *
log(GDP per capita)	0.57 ***	0.63 ***	0.62 ***	0.67 ***	-0.17
log(Population)	0.11	0.25	0.28	-0.10	0.27
log(Trade openness)	0.96 ***	1.19 ***	1.18 ***	1.10 ***	0.43 ***
Party institutionalization index	-0.24	-0.08	-0.06	-0.43	0.23
Property rights	3.62 ***				
Executive respects constitution .L		0.12			
Executive respects constitution .Q		0.04			
Rule of Law			0.11		
Civil Liberties				1.46 ***	
Lagged log(FDI) t-1					0.54 ***
Lagged log(FDI) t-2					0.13 ***
Observations	740	740	740	740	658
R^2 / R^2 adjusted	0.280 / 0.246	0.242 / 0.206	0.242 / 0.206	0.254 / 0.219	0.558 / 0.534

Source: Own study, * $p<0.05$ ** $p<0.01$ *** $p<0.001$.

2.3.5. Low-income Countries

FDI values in low-income countries are mostly in the range of 1% to 3% of GDP (Annex 1), which places these countries much lower in terms of average FDI values over the period under review. More than half of the countries in the average calculated from the FDI level for all years of the population do not exceed 2%, with the distinction in particular of countries such as Liberia, Mongolia and Chad, where the level of FDI in relation to GDP is much higher compared to the studied population.

The correlation between FDI and other explanatory variables is examined in Annex 2. The FDI variable does not show any strong relationships. Only variables outside the set of the control variables occur with strong correlation relationships. The results show the significance

of various control variables concerning economic conditions and only in the case of low-income countries, with the significance of the variable describing the level of institutionalization in the country depending on a particular model. All economic and significant control variables show positive estimates, which indicates a positive effect on the level of FDI in a given country. The party institutionalization index variable is significant in the first 4 models and shows a negative estimator. Model 5, in which the response variable was delayed and used as the explanatory variable, shows only the population size as a significant control variable.

Table 3. Results on the set of low-income economies

Predictors	Model 1 Estimates	Model 2 Estimates	Model 3 Estimates	Model 4 Estimates	Model 5 Estimates
GDP growth rate	1.97	2.35 *	2.47 *	2.40 *	-0.31
log(GDP per capita)	0.53 *	0.71 **	0.48	0.54 *	0.23
log(Population)	2.47 ***	3.06 ***	3.21 ***	2.83 ***	2.11 ***
log(Trade openness)	0.05	0.42 *	0.46 *	0.40	-0.13
Party institutionalization index	-3.71 ***	-2.53 **	-3.06 ***	-3.15 ***	-1.49
Property rights	5.25 ***				
Executive respects constitution .L		0.08			
Executive respects constitution .Q		0.66 ***			
Rule of Law			0.06		
Civil Liberties				1.15	
Lagged log(FDI) t-1					0.36 ***
Lagged log(FDI) t-2					-0.00
Observations	478	478	478	478	381
R^2 / R^2 adjusted	0.360 / 0.325	0.332 / 0.294	0.304 / 0.265	0.308 / 0.270	0.351 / 0.303

*Source:* Own study, * $p<0.05$ ** $p<0.01$ *** $p<0.001$.

According to the results for model 1, an increase in the level of respect for property rights has a positive impact on the amount of FDI in a given country. In the model, the level of

institutionalization in the country shows a negative estimator and both variables are significant at the level of p-value = 0.001.

In the group of low-income countries, the variable executive respects the constitution is significant, while only its component is related to the square growth of the variable. The results say that if the level of the variable is squared to increase, it will have a positive effect on FDI.

Civil liberties and the rule of law are not significant at the p-value = 0.05 level. In model 5, the value of the FDI delay level by one period has a positive effect on the FDI level and the variable is significant. The opposite is true when the FDI lags two periods. All low-income models support the diagnostic test results, in particular Pasaran CD tests. The null hypothesis states that residuals across entities are not correlated across the countries. Cross-sectional dependence can lead to bias in model results.

Figure 4. Distribution of SHAP values as the result of xgboost
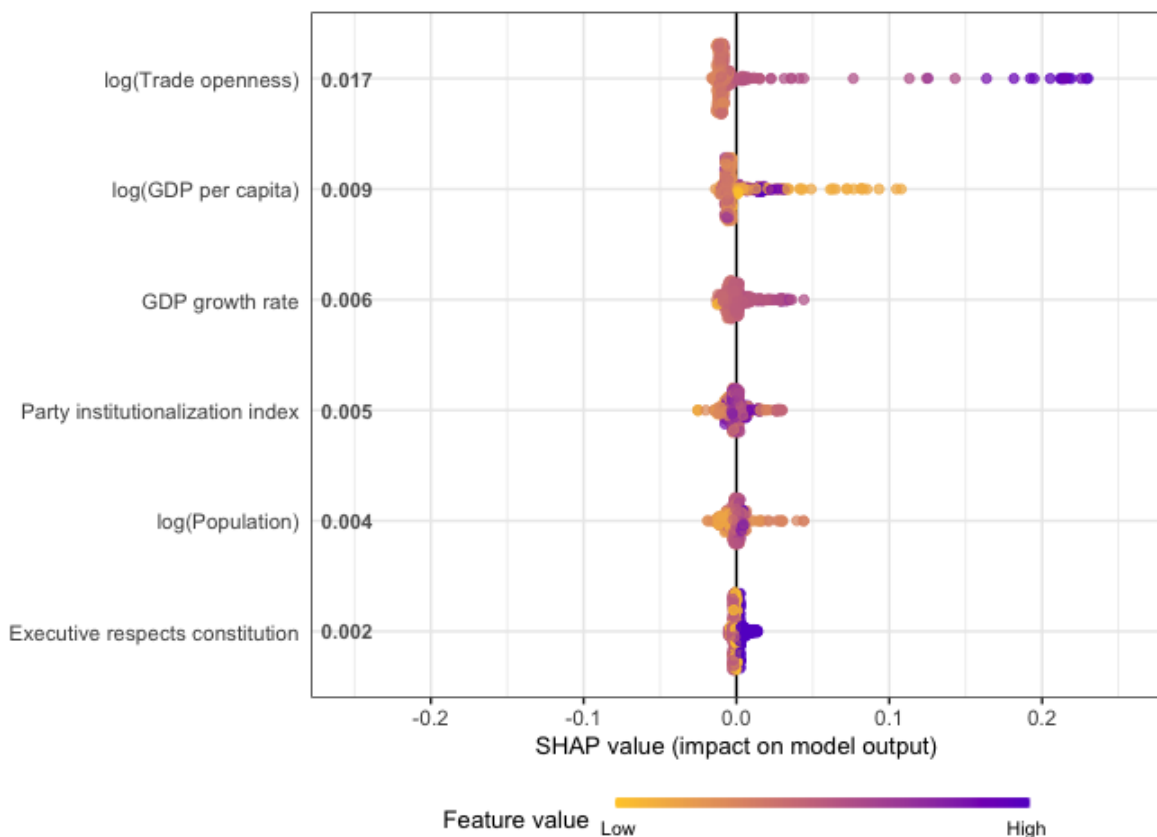
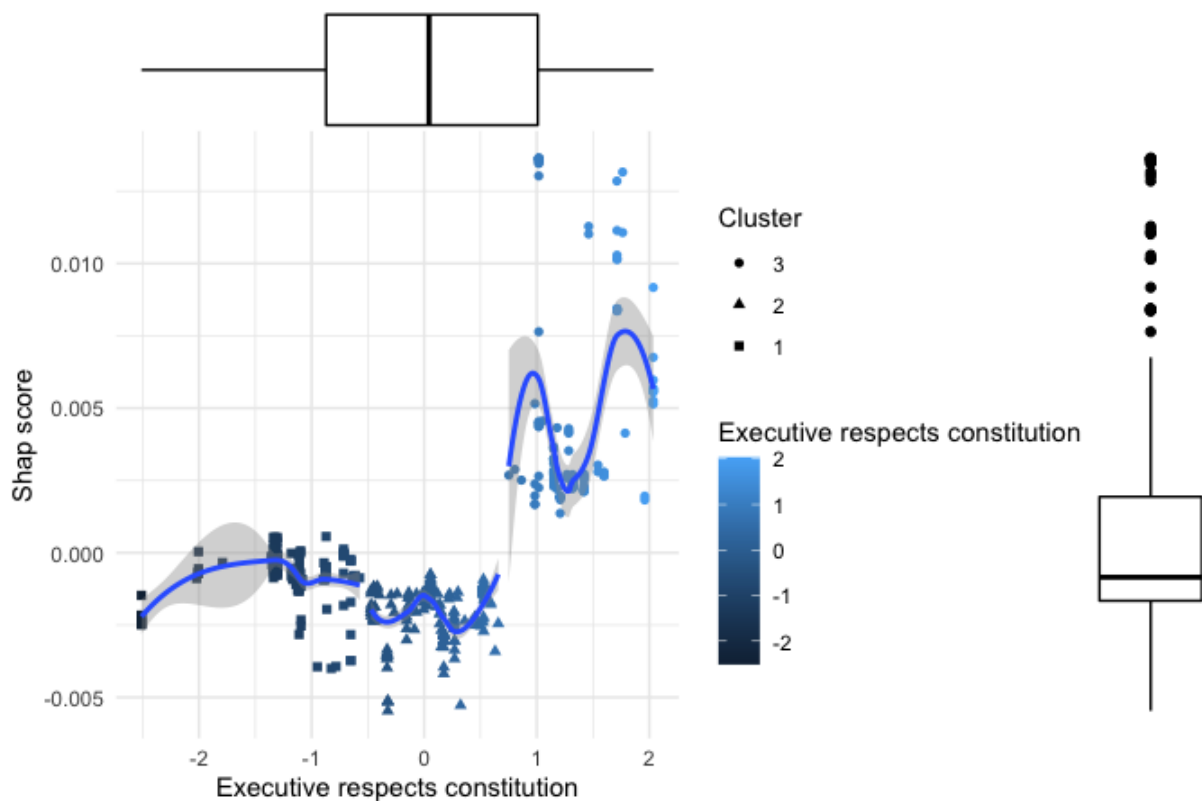*Source:* Own calculation, based on the V-Dem dataset.

In order to better understand the impact of the variable executive respects constitution, we use maching-learning methodology, namely xgboost. As the results of xgboost without postprocessing are difficult to interpret, SHAP values are shown visually on the Chart 4 and

specific values are revealed in Annex 5. The model takes into account all control variables and only the executive respects constitution in the aforementioned three-level ordered clusters form.

Figure 4 shows the distribution of the SHAP analysis results, where each point on the graph is responsible for the impact of a single item in the population on the explained variable. The analysis helps to understand the impact of, for example, the trade openness variable on FDI. Although a strong accumulation of the negative impact of the variable on FDI can be noticed, individual extremely high values of the trade openness variable had a highly positive impact on the inflow of FDI to a particular country and period.

The results of the influence of other control variables on FDI are much less clear-cut. On the other hand, we pay attention to the SHAP values for executive respects constitution, the interpretation of which shows further empirical evidence on the impact on FDI.

Figure 5. Distribution of SHAP values of executive respects constitution as the result of xgboost

Source: Own calculation, based on the V-Dem dataset.

The boxplot interpretation results show that the median SHAP values for executive respects constitution are negative (Figure 5). This means that at least half of the population of low-income countries is characterized by the level of the explaining variable negatively affecting FDI.

On the other hand, thanks to SHAP, we can see that the results are highly differentiated depending on the cluster to which a given variable value has been classified. Both clusters with lower values of executive respects constitution usually have a negative impact on FDI, where the remaining cluster with the highest values of the variable in the population has only a positive effect on FDI inflows with an average level of 0.0046. Such a SHAP distribution is also characterized by an average impact on the explained variable with a value of 0.002 (Annex 5).

2.4. Discussion

The (aforementioned) literature of authors such as Nunnenkamp (2002), Obwona (2001), Vijayakumar, Sridharan and Rao (2010), Dollar (1992) and Blanton and Blanton (2006) was crucial in identifying the set of control variables that proved to be successful as the determinants of FDI not only across their analyses but also in this paper. Additionally, all the levels of correlation were examined, and no significant correlations were detected in the groups of GDP per capita, GDP growth, population, trade openness, party institutionalization index, as well as in relation to the dependent variable. The lack of correlation with the dependent variable may reduce the effects of a possible endogeneity phenomenon. Besides, the K-means method has shown high efficiency in clustering countries broken down by fiscal status. It was possible to indicate that the control variables enable to distinguish countries according to their fiscal status using unsupervised learning, with an exception of emerging countries, whose values of the variables are much more disperse. Based on the descriptive analysis, countries, grouped by their fiscal status, illustrate highly differentiated ratios of their FDI inflows to their GDPs.

Given this, the results of modelling panel data are presented separately depending on the fiscal status. Each model is characterized by a single, different explanatory variable, thanks to which the impact on FDI was surveyed without the risk of an endogeneity problem.

The most important conclusions concern low-income countries. To begin with, the variable concerning respect for the constitution resulting from the 3-level clustering shows a significant and positive square trend in relation to the FDI value. This implies that the variable does not have a linear relationship, but a quadratic one. Consequently, it alters the interpretation of the impact of the variable on the dependent variable and suggests that only a significant increase in the variable 'executive respects constitution' has a perceptible impact on FDI. The literature on the subject, especially the paper of Asiedu and Lien (2011), further indicates that countries need to accept the lost benefits of high FDI inflows (i.e. the reduction of poverty) or concern about their level of democracy. Since low-income countries are characterized by the

highest levels of poverty and, at the same time, relatively lower levels of preserving high-value democracy, taking into account democracy-supporting indexes as constitutional compliance should enable them to recognize the ways of improvement through rising FDI. The results from the panel model were supported by the xgboost analysis using the SHAP values method. SHAP values imply that positions in the cluster with the highest values of executive respects constitution in the low-income population have a highly positive impact on FDI inflows. The results of the model based on data from the population of low-income countries depict a correlation between the level of FDI and the square executive respects constitution increase.

Then, in regard to low-income countries, 4 out of 5 models recorded a significance of the variable according to the level of institutionalization with a negative sign. At first, such a result seems not to be aligned with the majority of the subject literature. Scholars point out an encountered difficulty in empirical proving, which creates room for some exceptions or differences depending on the studied period or the exact characteristics of the countries. However, there is no disagreement among the authors as Al-Sadig (2009), Du, Lu and Tao (2008) on the significance of the negative impact of corruption, a poorly managed financial system or a faulty judicial system on FDI. Conversely, this does not exclude conclusions about the party institutionalization index variable, which only determines a certain level of advancement of political institutionalization by measuring the number of parties in a given country, the number of interactions between parties and, e.g. the consistency of ideology among parties. Certain high values of a the variable may, e.g. lead to a slower decision-making among institutions, but not necessarily to their defective and unstable nature. Hence, an increase in the index may be perceived as a sign of high formalities and a rection of the bargaining power of MNEs (Wang, Hong, Kafouros and Boateng, 2012).

Given this and the results of model No. 5 (which reveals the significance of the impact of the lagged FDI only in the case of a delay by one period), we note that in the case of low-income countries, the short-term nature of FDI can be expected. Considerations claiming that FDI depends on past returns from the FDI are presented by Wang, Hong, Kafouros and Boateng (2012). Yet, those assumptions fall short of the required evidence. In addition, the lack of a strong institutional barrier and the cohesion among political parties may also be equated with certain facilitations in the framework of running a business, e.g. lack of political lobby suggesting a high level of taxes. On the other hand, the lack of significance of the delay of the variable explained by two periods suggests that it is possible that the FDI from two years ago never manifests already established strategic plans for subsequent periods. Still, there is no

strong evidence for an unequivocal interpretation of the results for the above two variables. That being so, we suggest that the expansion of the topic due to the high interpretative value.

What is more, distinctive to low-income countries is their disregard of the civil liberties variable depicted by the insignificance. The variable assumes a higher degree of respect for civil rights that supersedes the mere alignment with the constitution. Therefore, among its components are the respect of the rule of law, freedom of speech, and the right to be free from government intervention (V-Dem Codebook, 2021).

The fundamental property rights variable proved to be significant and with a positive sign in every population, regardless of fiscal status. Such a result is consistent with the considerations of Blonigen (2005). Besides, in advanced and emerging countries, the dependent variable delayed by both one and two periods also bears significance – the FDI investments have a strong autocorrelation character.

The results of the panel models are consistent in terms of the influence of trade openness in the population of advanced and emerging countries. Thus, the create the positive influence of the variable on FDI, which is further consistent with the suggestions of Dollar (1992), Blanton and Blanton (2006). In the case of low-income countries, we observe that the variable lacks significance unless it maintaina relatively higher levels of p-value. That being so, the results of xgboost interpreted with SHAP values reveal that such discrepancy in panel models may be due to a more complex relationship between trade openness and FDI. The outcomes of the xgboost model demonstrate that, while the impact of the average values of the explanatory variable is low or even negative, relatively higher values have a very high and positive impact on the inflow of FDI.

The significance of the civil liberties variable and its positive impact on the inflow of FDI takes place in the models for advanced and emerging countries. The positive influence of democracy-linked variables is also confirmed in considerations of by the scholars (Harms and Ursprung, 2002; Busse 2003). The rule of law and the executive respects constitution indexes remain not significant in the models for advanced and emerging countries. For countries in the advanced and emerging population to benefit from the increase in FDI resulting from the growth of democratic factors, it is necessary to boost the civil liberties variable. Indeed, the rise of the components of the above variables contributes to the increase in the civil liberties variable itself and further supports FDI inflows. However, alone, the rule of law and constitutional compliance is not sufficient to show statistical significance as a determinant of FDI in developed countries.

CONCLUSIONS

FDI are considered as one of essential drivers of economic progress. The available literature identified a range of their determinants of economic, political and sociological nature. At the same time, by so far, institutional factors have been included just in a narrow scope of this strand of research. The main goal of this study was to analyze the importance of constitutional compliance of the executive for the levels of FDI. The empirical part of our research covers the global sample of 78 countries in the period 1985-2014. We particularly focus on the mechanisms between constitutional compliance and FDI in low-income countries. A battery of econometric and machine learning tools were used to get a deep and robust insight into our research problem. Our results bring interesting implications.

The most important implications of our study are as follows. With focus on low-income countries we show the significance of a constitutional compliance as factor with positive impact on FDI. Our extension of the conclusions from the panel models to the XGBoost analysis confirms that there is a non-linear relationship between the variables. Consequently square increase in respect for the constitution translates into an increase in FDI. In the low-income populated countries, we also see that the panel model results do not present consistent conclusions for the trade openness variable. In turn, the SHAP values analysis of the XGBoost model explains, that only much higher values of this control variable have a positive effect on FDI. Our analysis demonstrates a negative impact of the level of institutionalism on FDI only in the case of low-income countries. In all populated economies, a high level of respect for property rights is an incentive for the foreign investor. In advanced and emerging countries it was possible to derive models suggesting a significance of civil liberties on FDI. Moreover, the results of panel models indicate GDP per capita and GDP growth as prominent FDI drivers. The size of the economy, measured in this study by the size of the population depicts importance as the determinant of FDI except emerging countries.

Our research brings a multifold contribution to the literature. Namely, it enriches the literature on the consequences of constitutional (non)compliance with a new thread, related to FDI. Additionally, the article represents also a value-added to the literature on the drivers of FDI. The multifaceted influence on FDI is noted in this study. We show that constitutional compliance may, depending on its level, affect the volume of FDI inflows in low-income countries, while in more developed countries, compliance with the constitution is taken as a high-level factor with a lower risk of deterioration and has no additional impact on FDI. On the other hand, the models include the rule of law, which not only includes respect for the

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constitution, but also extends it to include additional factors supporting the quality of institutions in the country. Ultimately, the civil liberties variable, which consists of constitutional compliance, rule of law and more, demonstrates importance as an incentive for investors in set of advanced and emerging countries.

This study can be further extended in various ways. One of the options is to include characteristics of the country, where FDI come from – political system, socio-economic indicators, fact whether it is a neighborhood country, etc. Another point well-worth investigating would be about particular sectors that seem to be the most attractive in terms of investments. It may also be of great importance to broaden the considerations of the investor's intentions - whether FDI is aimed only at generating returns on investment, or whether FDI will result in new technology gain, human capital growth and access to the country's natural resources.

REFERENCES

Adam, A., & Filippaios, F. (2007). Foreign direct investment and civil liberties: A new perspective. European Journal of Political Economy, 23(4), 1038–1052. https://doi.org/10.1016/j.ejpoleco.2006.08.006

Ahrens, H., & Pincus, R. (1981). On Two Measures of Unbalancedness in a One-Way Model and Their Relation to Efficiency. Biometrical Journal, 23(3), 227–235. https://doi.org/10.1002/bimj.4710230302

Aitken, B. J., & Harrison, A. E. (1999). Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela. American Economic Review, 89(3), 605–618. https://doi.org/10.1257/aer.89.3.605

Aizenman, J., & Noy, I. (2006). FDI and trade - Two-way linkages? The Quarterly Review of Economics and Finance, 46(3), 317–337. https://doi.org/10.1016/j.qref.2006.02.004

Al-Sadig, A. (2009). The effects of corruption on FDI inflows. Cato Journal, 29, 267-294. https://EconPapers.repec.org/RePEc:cto:journl:v:29:y:2009:i:2:p:267-294

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., & Sayek, S. (2004). FDI and economic growth: the role of local financial markets. Journal of International Economics, 64(1), 89–112. https://doi.org/10.1016/s0022-1996(03)00081-3

Asiedu, E., & Lien, D. (2011). Democracy, foreign direct investment and natural resources. Journal of International Economics, 84(1), 99–111. https://doi.org/10.1016/j.jinteco.2010.12.001

Ayanwale, Adeolu B. (2007) FDI and economic growth : evidence from Nigeria. AERC research paper 165, 1-42. https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/2677

Bizzarro Neto, F., Hicken, A., & Self, D. (2017). The V-Dem Party Institutionalization Index: A New Global Indicator (1900-2015). SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2968265

Blanton, S. L., & Blanton, R. G. (2006). Human Rights and Foreign Direct Investment. Business & Society, 45(4), 464–485. https://doi.org/10.1177/0007650306293392

Blomstrom, M., & Kokko, A. (1998). Multinational Corporations and Spillovers. Journal of Economic Surveys, 12(3), 247–277. https://doi.org/10.1111/1467-6419.00056

Blonigen, B. A. (1997). Firm-specific assets and the link between exchange rates and foreign direct investment. The American Economic Review, 447-465. https://EconPapers.repec.org/RePEc:aea:aecrev:v:87:y:1997:i:3:p:447-65

Blonigen, B. A. (2002). Tariff-jumping antidumping duties. Journal of International Economics, 57(1), 31–49. https://doi.org/10.1016/s0022-1996(01)00135-0

Blonigen, B. A. (2005). A Review of the Empirical Literature on FDI Determinants. Atlantic Economic Journal, 33(4), 383–403. https://doi.org/10.1007/s11293-005-2868-9

Blonigen, B. A., & Ohno, Y. (1998). Endogenous protection, foreign direct investment and protection-building trade. Journal of International Economics, 46(2), 205–227. https://doi.org/10.1016/s0022-1996(97)00042-1

Brander, J. A., & Spencer, B. J. (1987). Foreign direct investment with unemployment and endogenous taxes and tariffs. Journal of International Economics, 22(3-4), 257–279. https://doi.org/10.1016/s0022-1996(87)80023-5

Busse, M. (2003). Democracy and FDI. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.384480

Chen, T., He, T., Benesty, M., Khotilovich, V., Tang, Y., & Cho, H. (2015). Xgboost: extreme gradient boosting. R package version 0.4-2, 1(4), 1-4. https://CRAN.R-project.org/package=xgboost

Chen, T., & Guestrin, C. (2016). XGBoost. Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining. https://doi.org/10.1145/2939672.2939785

Cushman, D. O. (1988). Exchange-rate uncertainty and foreign direct investment in the United States. Weltwirtschaftliches Archiv, 124(2), 322–336. https://doi.org/10.1007/bf02706782

Pozzolo, A. D., Caelen, O., Johnson, R. A., & Bontempi, G. (2015). Calibrating Probability with Undersampling for Unbalanced Classification. 2015 IEEE Symposium Series on Computational Intelligence, 159-166. https://doi.org/10.1109/ssci.2015.33

Desai, M. A., Foley, C. F., & Hines, J. R. (2004). Foreign direct investment in a world of multiple taxes. Journal of Public Economics, 88(12), 2727–2744. https://doi.org/10.1016/j.jpubeco.2003.08.004

Dierickx, I., & Cool, K. (1989). Asset Stock Accumulation and Sustainability of Competitive Advantage. Management Science, 35(12), 1504–1511. https://doi.org/10.1287/mnsc.35.12.1504

Dollar, D. (1992). Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976-1985. Economic Development and Cultural Change, 40(3), 523–544. https://doi.org/10.1086/451959

Du, J., Lu, Y., & Tao, Z. (2008). Economic institutions and FDI location choice: Evidence from US multinationals in China. Journal of Comparative Economics, 36(3), 412–429. https://doi.org/10.1016/j.jce.2008.04.004

Duce, M., & España, B. D. (2003). Definitions of Foreign Direct Investment (FDI): a methodological note. Banco de Espana, 6(2), 43-49. https://www.researchgate.net/publication/228588548_Definitions_of_Foreign_Direct_Investment_FDI_a_methodological_note

Ellingsen, T., & Wärneryd, K. (1999). Foreign Direct Investment and the Political Economy of Protection. International Economic Review, 40(2), 357–379. https://doi.org/10.1111/1468-2354.00019

Erdogan, M., & Unver, M. (2015). Determinants of Foreign Direct Investments: Dynamic Panel Data Evidence. International Journal of Economics and Finance, 7(5), 82-95. https://doi.org/10.5539/ijef.v7n5p82

Flam, H. (1994). EC members fighting about surplus VERs, FDI and Japanese cars. Journal of International Economics, 36(1-2), 117–131. https://doi.org/10.1016/0022-1996(94)90060-4

Foreign direct investment, net inflows (BoP, current US$). Source: https://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD

Friedman, J. H. (2001). Greedy function approximation: A gradient boosting machine. The Annals of Statistics, 29(5) , 1189-1232. https://doi.org/10.1214/aos/1013203451

Froot, K. A., & Stein, J. C. (1991). Exchange Rates and Foreign Direct Investment: An Imperfect Capital Markets Approach. The Quarterly Journal of Economics, 106(4), 1191–1217. https://doi.org/10.2307/2937961

Global development finance 2001: overview (English). Global development finance Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/626561468141294522/Global-development-finance-2001-overview

Gohou, G., & Soumaré, I. (2012). Does Foreign Direct Investment Reduce Poverty in Africa and are There Regional Differences? World Development, 40(1), 75–95. https://doi.org/10.1016/j.worlddev.2011.05.014

Goldberg, L. S. (2004). Financial-Sector Foreign Direct Investment and Host Countries: New and Old Lessons. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.596589

Harms, P., & Ursprung, H. W. (2002). Do civil and political repression really boost foreign direct investments? Economic inquiry, 40(4), 651-663. https://doi.org/10.1093/ei/40.4.651

Hartman, D. G. (1982). Tax policy and foreign direct investment in the United States. National Tax Journal, 37(4), 475–487. https://doi.org/10.1086/ntj41791979

Hartigan, J. A., & Wong, M. A. (1979). Algorithm AS 136: A K-Means Clustering Algorithm. Applied Statistics, 28(1), 100-108. https://doi.org/10.2307/2346830

Kogut, B., & Chang, S. J. (1991). Technological Capabilities and Japanese Foreign Direct Investment in the United States. The Review of Economics and Statistics, 73(3), 401. https://doi.org/10.2307/2109564

Kwok, C. C. Y., & Tadesse, S. (2006). The MNC as an agent of change for host-country institutions: FDI and corruption. Journal of International Business Studies, 37(6), 767–785. https://doi.org/10.1057/palgrave.jibs.8400228

Levinsohn, J. A. (1989). Strategic trade policy when firms can invest abroad: When are tariffs and quotas equivalent? Journal of International Economics, 27(1-2), 129–146. https://doi.org/10.1016/0022-1996(89)90081-0

Lundberg, S. M., & Lee, S. I. (2017, December). A unified approach to interpreting model predictions. In Proceedings of the 31st international conference on neural information processing systems, 4768-4777. https://www.researchgate.net/publication/317062430_A_Unified_Approach_to_Interpreting_Model_Predictions

Lundberg, S. M., Erion, G. G., & Lee, S. I. (2018). Consistent individualized feature attribution for tree ensembles, arXiv Electronic Journal. https://arxiv.org/abs/1802.03888v3

Morck, R., & Yeung, B. (1992). Internalization. Journal of International Economics, 33(1-2), 41–56. https://doi.org/10.1016/0022-1996(92)90049-p

Mussa, M., & Rosen, S. (1978). Monopoly and product quality. Journal of Economic Theory, 18(2), 301–317. https://doi.org/10.1016/0022-0531(78)90085-6

Noorbakhsh, F., Paloni, A., & Youssef, A. (2001). Human Capital and FDI Inflows to Developing Countries: New Empirical Evidence. World Development, 29(9), 1593–1610. https://doi.org/10.1016/s0305-750x(01)00054-7

Nunnenkamp, P. (2002). Determinants of FDI and Economic Growth in Developing Countries. The Journal of World Investment & Trade, 595–613. https://doi.org/10.1163/221190002x00409

Obwona, M. B. (2001). Determinants of FDI and their Impact on Economic Growth in Uganda. African Development Review, 13(1), 46–81. https://doi.org/10.1111/1467-8268.00030

OECD (2002), Foreign Direct Investment for Development - Maximising Benefits, Minimising Costs, https://www.oecd.org/investment/investmentfordevelopment/1959815.pdf.

Oman, C. (2001), "Corporate Governance and National Development", OECD Development Centre Working Papers, No. 180, OECD Publishing, Paris, https://doi.org/10.1787/113535588267.

Rugman, A. M. (1977). Risk, direct investment and International diversification. Review of World Economics, 113(3), 487–500. https://doi.org/10.1007/bf02696589

Spiro, Herbert John. "constitution". Encyclopedia Britannica, 5 Aug. 2021, https://www.britannica.com/topic/constitution-politics-and-law. Accessed 26 August 2021.

Staats, J. L., & Biglaiser, G. (2011). Foreign Direct Investment in Latin America: The Importance of Judicial Strength and Rule of Law1. International Studies Quarterly, 56(1), 193–202. https://doi.org/10.1111/j.1468-2478.2011.00690.x

Vijayakumar, N., Sridharan, P., & Rao, K. C. S. (2010). Determinants of FDI in BRICS Countries: A panel analysis. International Journal of Business Science & Applied Management (IJBSAM), 5(3), 1-13. https://www.researchgate.net/publication/41055093_Determinants_of_FDI_in_BRICS_countries_a_panel_analysis

Wang, C., Hong, J., Kafouros, M., & Boateng, A. (2012). What drives outward FDI of Chinese firms? Testing the explanatory power of three theoretical frameworks. International Business Review, 21(3), 425–438. https://doi.org/10.1016/j.ibusrev.2011.05.004

Wei, S. J., & Shleifer, A. (2000). Local corruption and global capital flows. Brookings papers on economic activity, 2000(2), 303-354. https://doi.org/10.1353/eca.2000.0021

List of abbreviations

FDI   -   Foreign Direct Investment

MNE   -   MultiNational Enterprises

GDP   -   Gross Domestic Product

OECD   -   Organisation for Economic Co-operation and Development

SHAP   -   SHapley Additive exPlanations

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Annex 1. Descriptive statistics of the relations of FDI to GDP

Below we present descriptive statistics for advanced countries (Table 1). The level of the FDI to GDP ratio is varied and ranges from 0.00 (Japan) to 0.43 (Cyprus). The countries with the highest level of FDI include Cyprus, Netherlands, Luxembourg and Belgium.

Table 1. Advanced countries descriptive statistics of the relation of FDI to GDP relation

Country	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Count	Years (Min-Max)
Australia	0.01	0.02	0.03	0.03	0.04	0.07	29	1985-2014
Austria	0.00	0.00	0.01	0.03	0.02	0.26	29	1985-2014
Belgium	0.01	0.04	0.06	0.13	0.17	0.46	28	1985-2012
Canada	0.00	0.01	0.02	0.03	0.04	0.09	30	1985-2014
Cyprus	0.01	0.02	0.06	0.43	0.10	2.80	30	1985-2014
Czech Republic	0.02	0.02	0.04	0.05	0.07	0.10	22	1993-2014
Denmark	0.00	0.01	0.01	0.03	0.03	0.22	27	1985-2014
Estonia	0.03	0.05	0.08	0.08	0.10	0.22	21	1994-2014
Finland	0.00	0.01	0.02	0.03	0.06	0.11	26	1985-2014
France	0.00	0.01	0.02	0.02	0.02	0.04	30	1985-2014
Germany	0.00	0.00	0.01	0.02	0.03	0.13	27	1985-2014
Greece	0.00	0.01	0.01	0.01	0.01	0.02	29	1985-2014
Iceland	0.00	0.01	0.02	0.05	0.06	0.32	24	1985-2014
Ireland	0.00	0.02	0.09	0.11	0.22	0.38	29	1985-2014
Israel	0.00	0.01	0.01	0.02	0.03	0.09	30	1985-2014
Italy	0.00	0.00	0.01	0.01	0.01	0.03	28	1985-2014
Japan	0.00	0.00	0.00	0.00	0.00	0.00	25	1985-2014
Latvia	0.02	0.03	0.04	0.04	0.05	0.09	19	1995-2014
Lithuania	0.01	0.02	0.04	0.04	0.05	0.08	19	1995-2014
Luxembourg	0.12	0.15	0.22	0.32	0.47	0.76	12	2002-2014
Netherlands	0.01	0.02	0.07	0.14	0.19	0.87	30	1985-2014
New Zealand	0.00	0.01	0.02	0.02	0.04	0.06	26	1985-2014
Norway	0.00	0.01	0.02	0.03	0.04	0.06	26	1986-2014
Portugal	0.00	0.01	0.02	0.03	0.05	0.10	30	1985-2014

Country	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Count	Years (Min-Max)
Singapore	0.04	0.10	0.15	0.15	0.19	0.26	30	1985-2014
Slovenia	0.00	0.01	0.02	0.02	0.02	0.08	21	1993-2014
Spain	0.01	0.02	0.02	0.03	0.03	0.07	30	1985-2014
Sweden	0.00	0.01	0.02	0.04	0.06	0.23	28	1985-2013
Switzerland	0.00	0.01	0.02	0.03	0.04	0.12	29	1985-2014
United Kingdom	0.01	0.02	0.02	0.04	0.05	0.10	30	1985-2014

Source: Own calculation, based on the World Bank data and V-Dem data set.

Descriptive statistics for emerging countries (Table 2) show differentiation in FDI levels and range from 0.01 (e.g. Sri Lanka) to 0.62 (Malta). The countries with the highest level of FDI include Malta, Equatorial Guinea, and Montenegro.

Table 2. Emerging countries descriptive statistics of the relation of FDI to GDP relation

Country	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Count	Years (Min-Max)
Argentina	0.01	0.01	0.02	0.02	0.03	0.08	29	1985-2014
Armenia	0.00	0.03	0.05	0.05	0.07	0.12	23	1992-2014
Brazil	0.00	0.01	0.02	0.02	0.03	0.05	30	1985-2014
Bulgaria	0.00	0.01	0.04	0.07	0.08	0.31	25	1990-2014
Chile	0.02	0.05	0.06	0.06	0.08	0.12	25	1990-2014
Colombia	0.01	0.02	0.03	0.03	0.04	0.07	30	1985-2014
Costa Rica	0.01	0.03	0.04	0.04	0.06	0.08	30	1985-2014
Croatia	0.00	0.03	0.04	0.04	0.05	0.08	20	1995-2014
Ecuador	0.00	0.01	0.01	0.01	0.02	0.03	29	1985-2014
Equatorial Guinea	0.00	0.04	0.10	0.23	0.18	1.62	29	1985-2014
Georgia	0.00	0.05	0.07	0.08	0.09	0.19	19	1994-2014
Hungary	0.03	0.05	0.07	0.12	0.09	0.50	21	1991-2014
India	0.00	0.00	0.01	0.01	0.01	0.04	30	1985-2014
Indonesia	0.00	0.01	0.01	0.01	0.02	0.03	25	1985-2014
Jamaica	0.01	0.02	0.04	0.04	0.05	0.10	27	1987-2014
Malaysia	0.00	0.03	0.04	0.04	0.05	0.09	30	1985-2014
Malta	0.01	0.02	0.08	0.62	0.35	4.49	29	1985-2014
Mauritius	0.00	0.01	0.01	0.02	0.03	0.06	29	1985-2014
Mexico	0.01	0.02	0.02	0.02	0.03	0.04	30	1985-2014

Country	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Count	Years (Min-Max)
Montenegro	0.10	0.12	0.17	0.19	0.22	0.37	8	2007-2014
Pakistan	0.00	0.01	0.01	0.01	0.01	0.04	28	1985-2014
Panama	0.01	0.02	0.07	0.06	0.09	0.16	28	1985-2014
Paraguay	0.00	0.01	0.01	0.01	0.01	0.04	29	1985-2014
Peru	0.00	0.02	0.04	0.03	0.05	0.07	28	1985-2014
Poland	0.00	0.02	0.03	0.03	0.04	0.06	25	1990-2014
Romania	0.00	0.01	0.02	0.03	0.03	0.09	25	1990-2014
Sri Lanka	0.00	0.01	0.01	0.01	0.01	0.03	30	1985-2014
Uruguay	0.00	0.01	0.01	0.03	0.05	0.12	29	1986-2014

Source: Own calculation, based on the World Bank data and V-Dem data set.

Descriptive statistics for low-income countries (Table 3) show a variation in the FDI level and ranges from 0.01 (e.g. Kenya) to 0.31 (Liberia). The countries with the highest level of FDI include Liberia, Mongolia and Chad.

Table 3. Low-income countries descriptive statistics of the relation of FDI to GDP relation

Country	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Count	Years (Min-Max)
Benin	0.00	0.00	0.00	0.01	0.02	0.03	16	1986-2014
Burkina Faso	0.00	0.00	0.00	0.01	0.01	0.04	23	1992-2014
Burundi	0.00	0.00	0.00	0.01	0.00	0.05	18	1985-2014
Cameroon	0.00	0.00	0.01	0.01	0.02	0.04	25	1985-2014
Central African Republic	0.00	0.00	0.01	0.01	0.02	0.06	24	1987-2014
Chad	0.00	0.02	0.03	0.07	0.05	0.46	24	1985-2013
Dominican Republic	0.01	0.02	0.03	0.03	0.04	0.06	30	1985-2014
Gabon	0.00	0.02	0.03	0.03	0.04	0.07	22	1985-2014
Guinea-Bissau	0.00	0.00	0.01	0.01	0.02	0.04	30	1985-2014
Kenya	0.00	0.00	0.00	0.01	0.01	0.03	30	1985-2014
Liberia	0.00	0.08	0.10	0.31	0.57	1.03	15	2000-2014
Mali	0.00	0.00	0.02	0.02	0.03	0.06	25	1985-2014
Mongolia	0.00	0.01	0.05	0.08	0.09	0.44	25	1986-2014
Niger	0.00	0.01	0.01	0.03	0.04	0.12	21	1990-2014

Country	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Count	Years (Min-Max)
Nigeria	0.01	0.02	0.02	0.02	0.02	0.05	18	1992-2014
Rwanda	0.00	0.00	0.01	0.01	0.02	0.04	29	1985-2014
Senegal	0.00	0.01	0.01	0.01	0.02	0.03	25	1988-2014
Tanzania	0.00	0.01	0.03	0.03	0.04	0.06	27	1988-2014
Togo	0.00	0.01	0.02	0.03	0.04	0.19	26	1985-2014
Uganda	0.00	0.02	0.03	0.03	0.04	0.07	25	1988-2014

Source: Own calculation, based on the World Bank data and V-Dem data set.

Clusters which corresponds to specific fiscal statuses (Table 4), describes populations in a highly analogous way, in particular means, standard deviations and maximum values are close to the actual ones. Based on the average value of FDI to GDP, emerging countries are characterized by the highest level compared to advanced and low-income countries. In the clusters analysis, the relation is also valid.

Table 4. Fiscal statuses and corresponding K-means clusters descriptive statistics for FDI to GDP relation

Fiscal Status	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Std	Count	Years (Min-Max)
Advanced	0	0.01	0.02	0.06	0.05	2.80	0.19	794	1985-2014
Emerging	0	0.01	0.03	0.07	0.05	4.49	0.27	740	1985-2014
Low-income	0	0.00	0.02	0.03	0.03	1.03	0.09	478	1985-2014

Cluster	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Std	Count	Years (Min-Max)
1 (Low-income)	0	0.00	0.01	0.02	0.03	0.50	0.04	644	1985-2014
2 (Emerging)	0	0.02	0.05	0.12	0.09	4.49	0.32	559	1985-2014
3 (Advanced)	0	0.01	0.02	0.05	0.04	2.80	0.18	809	1985-2014

Source: Own calculation, based on the World Bank data and V-Dem data set.

In each population by fiscal status, the variable respect for the constitution is presented in the form of a 3-level ordered variable. The ranges are determined by the K-means algorithm and (Table 5), in our opinion, such a grouping of values shows better results in modeling. Low-income countries are characterized by the lowest values of the variable, which is synonymous

with relatively lower respect for the constitution compared to the advanced and emerging countries.

Table 5. Executive respects constitution descriptive statistics among K-means clusters

Advanced Countries

Cluster	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Std	Count
1	0.612	1.6185	1.779	1.6600	1.826	1.906	0.2656	351
2	2.003	2.1040	2.363	2.3161	2.440	2.654	0.1916	280
3	2.807	2.8940	2.945	3.0922	3.330	3.375	0.2229	163

Emerging Countries

Cluster	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Std	Count
1	-2.480	-1.572	-1.251	-1.1499	-0.523	-0.263	0.5720	96
2	-0.196	0.524	0.739	0.7033	0.918	1.141	0.2752	345
3	1.166	1.351	1.498	1.6235	1.857	2.493	0.3898	299

Low-income Countries

Cluster	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Std	Count
2	-2.511	-1.307	-1.1095	-1.1449	-0.8710	-0.573	0.4069	156
3	-0.471	-0.153	0.0560	0.0666	0.2700	0.658	0.3287	194
1	0.752	1.150	1.3180	1.3461	1.4815	2.035	0.3071	128

Source: Own calculation, based on the V-Dem data set.

Annex 2. Correlation matrix analysis

Correlation matrix is calculated for each numerical variable involved in further modeling (Figures 1-3). The colors are responsible for the level and direction of correlation, exact values have been assigned to each item. The correlation matrix characterizes no color if p-value <0.01. The lack of correlation with the dependent variable may reduce the effects of a possible endogeneity phenomenon. We do not find any strong correlations in the group of control variables, i.e. among GDP per capita, population, trade openness, GDP growth and party institutionalization index

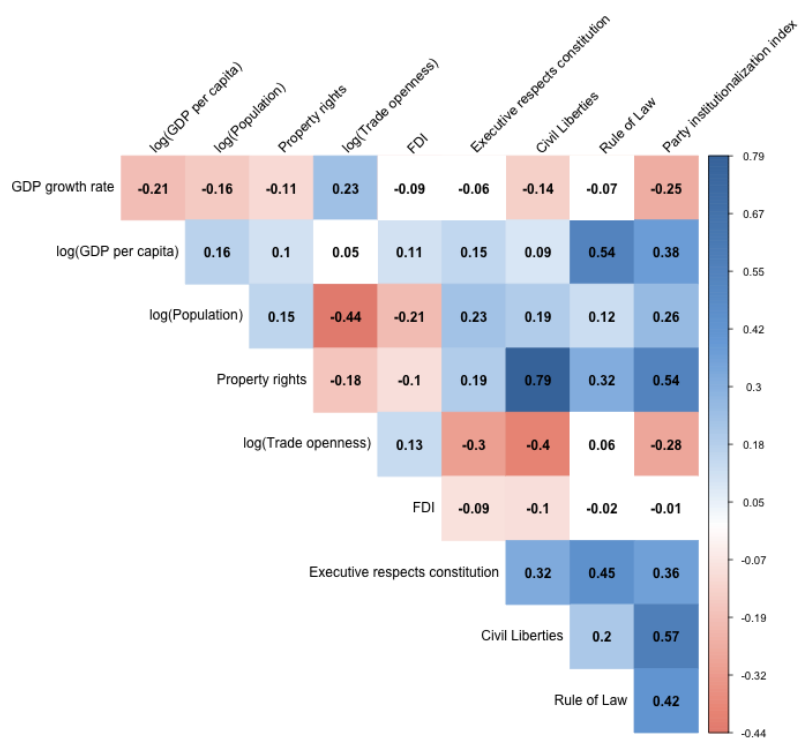Figure 1. Correlation matrix – advanced countries
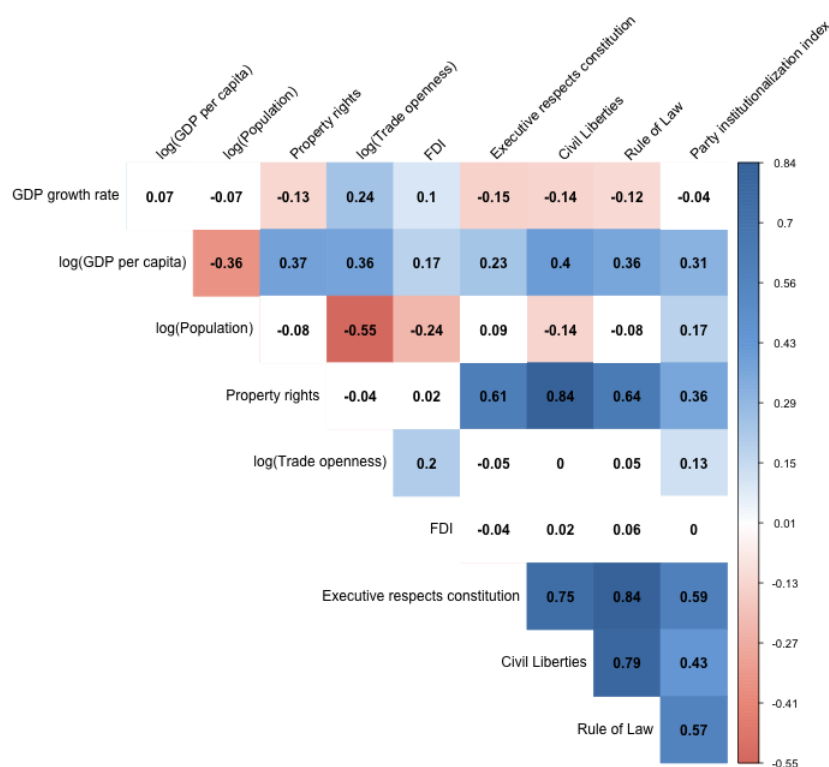
Source: Own calculation, based on the V-Dem data set.

Figure 2. Correlation matrix - emerging countries
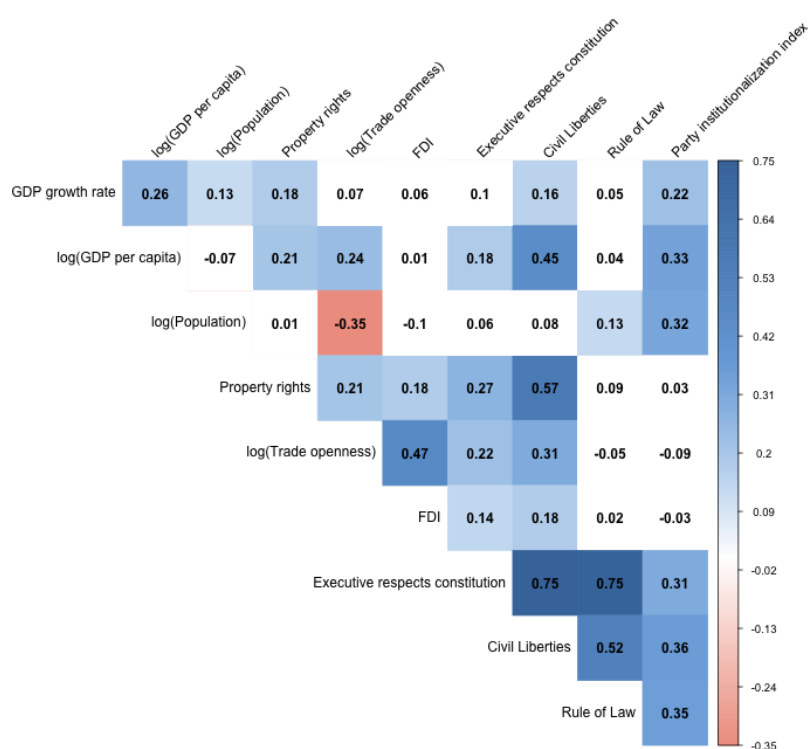
Source: Own calculation, based on the V-Dem data set.

Figure 3. Correlation matrix – low-income countries

Source: Own calculation, based on the V-Dem data set.

Annex 3. K-means clustering – optimal number of clusters

For the purposes of the analysis of control variables using the K-means method, we choose the number of clusters corresponding to the number of fiscal statuses. Additionally, such a choice is supported by the analysis of the optimal number of clusters using the silhouette, the elbow method, gap statistic and the Caliński-Harabasz index (Figure 4). The aforementioned methods suggest a different number of clusters, while the number of 3 used does not significantly differ and does not cause a significant error in our perception.

Figure 4. K-means optimal number of clusters for control variables analysis
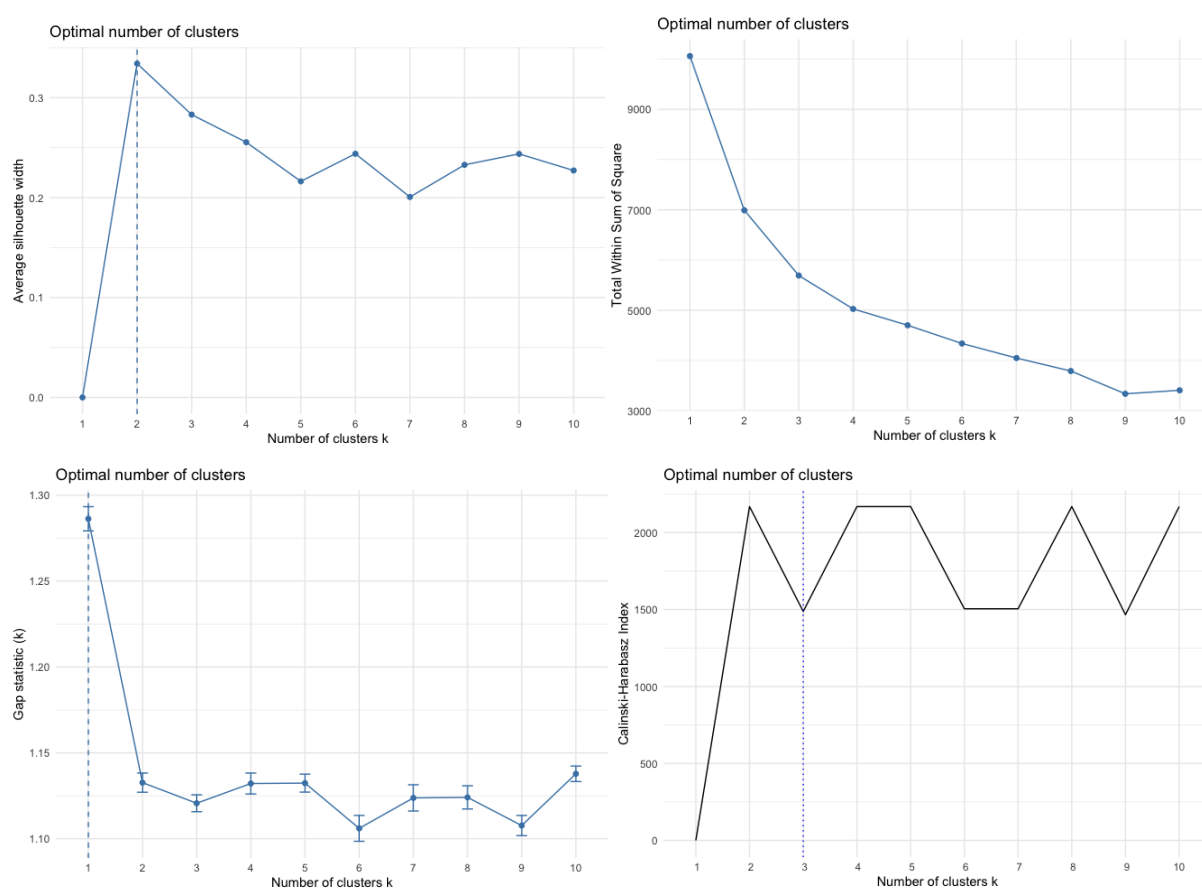
Source: Own calculation, based on the V-Dem data set.

Based on the V-Dem Codebook (2021), we present a verbal interpretation of the numerical values of the variable regarding respect for the constitution (Table 6). The values overlap due to the different intervals used by the V-Dem institute over the years

Table 6. Interpretation of executive respects constitution in continuous form

Responses	Min (1985-2014)	Max (1985-2014)
(0): Members of the executive violate the constitution whenever they want to, without legal consequences	-3.368	-1.101
(1): Members of the executive violate most provisions of the constitution without legal consequences, but still must respect certain provisions.	-2.032	-0.132
(2): Somewhere in between (1) and (3). Members of the executive would face legal consequences for violating most provisions of the constitution, but can disregard some provisions without any legal consequences.	-0.642	0.976
(3): Members of the executive rarely violate the constitution, and when it happens they face legal charges.	-0.427	2.440
(4): Members of the executive never violate the constitution.	1.566	3.416

Source: Own calculation, based on the V-Dem data set.

Constitutional compliance is measured by 'executive respects constitution variable' from the V-Dem data set (2021) in continuous form and to obtain the best performance of the models, we group the variable using the K-means method. We choose 3 as a number of clusters, such a choice is supported by the analysis of the optimal number of clusters using the silhouette, the elbow method, gap statistic and the Caliński-Harabasz index. The aforementioned methods suggest a different number of clusters, while the number of 3 used does not significantly differ and does not cause a significant error in our perception. Optimal number of clusters analysis is performed for advanced, emerging and low-income countries separately (Figures 5-7).

Figure 5. Advanced countries – Executive respect constitution K-means optimal number of clusters analysis
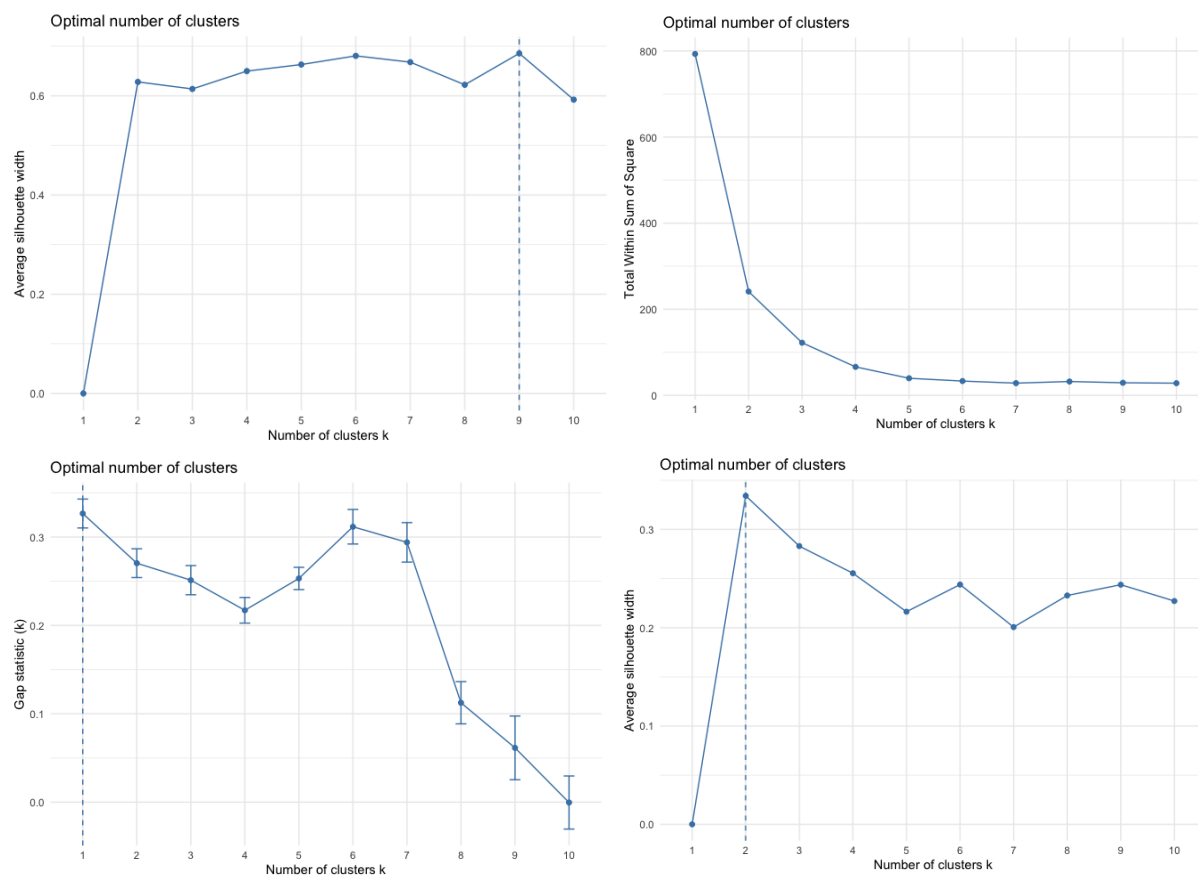
Figure 6. Emerging countries – Executive respect constitution K-means optimal number of clusters analysis
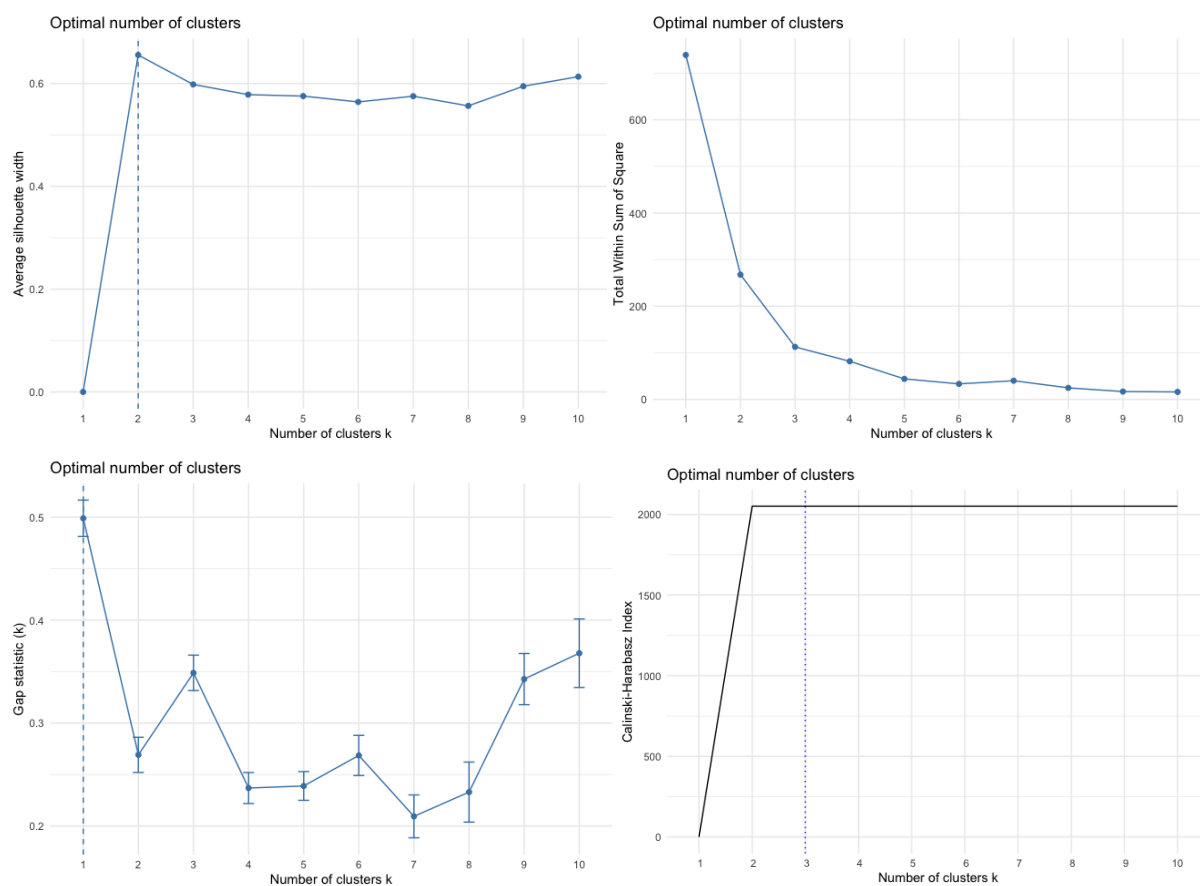
Figure 7. Low-income countries – Executive respect constitution K-means optimal number of clusters analysis
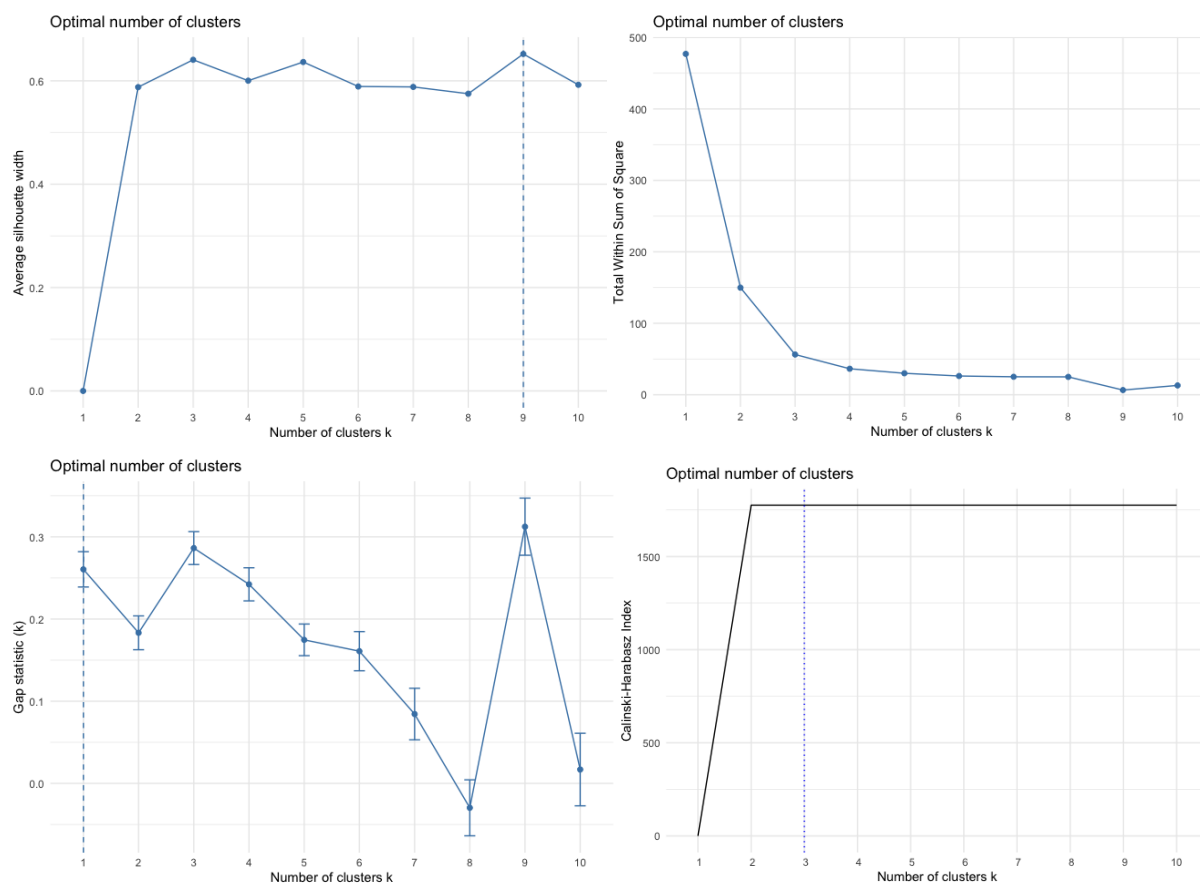

Source: Own calculation, based on the V-Dem data set.

Annex 4. Diagnostics of panel models

In this section, we present all panel model diagnostic test results. Data sets introduced in this paper are time series, and aggregated annually, the Augmented D-F test was performed to check the stationarity of the explained variable. All tests with the p-value = 0.01 level reject the null hypothesis in favor of the alternative hypothesis about the series stationarity (Table 7).

Table 7. Augmented Dickey-Fuller Test results

Data	statistic	p.value	alternative
Advanced	-7.652979	0.01	stationary
Emerging	-10.335342	0.01	stationary
Low-Income	-8.919398	0.01	stationary

Source: Own calculation, based on the World Bank data and V-Dem data set.

F test for individual effects is executed (Table 8) with the following assumption: If the p-value is less than 0.05 then the fixed effects model is more preferable over pooled model. Models presented in this work, all pass the test with the fixed effect model as the result.

Table 8. F test for individual effect results

Model	statistic	p.value	alternative
Advanced Markets 1	16.474998	0.0000000	significant effects
Advanced Markets 2	15.949869	0.0000000	significant effects
Advanced Markets 3	16.679851	0.0000000	significant effects
Advanced Markets 4	17.346845	0.0000000	significant effects
Advanced Markets 5	2.367510	0.0000880	significant effects
Emerging Markets 1	9.139062	0.0000000	significant effects
Emerging Markets 2	8.677321	0.0000000	significant effects
Emerging Markets 3	8.304761	0.0000000	significant effects
Emerging Markets 4	8.986223	0.0000000	significant effects
Emerging Markets 5	1.742691	0.0119223	significant effects
Low-Income Markets 1	13.680470	0.0000000	significant effects
Low-Income Markets 2	15.178622	0.0000000	significant effects

Model	statistic	p.value	alternative
Low-Income Markets 3	15.071646	0.0000000	significant effects
Low-Income Markets 4	13.639387	0.0000000	significant effects
Low-Income Markets 5	3.046884	0.0000242	significant effects

Source: Own calculation, based on the World Bank data and V-Dem data set.

We undertake the autocorrelation test for residuals (Table 9) and separately for the autocorrelation of the FDI variable (Figures 8-10). The results for models no. 5 containing the delayed FDI show a p-value> 0.05. This means that we reject H0 in favor of the alternative hypothesis: there is autocorrelation. In the case of the FDI time series for low-income countries, we see a significant autocorrelation (lag = 2), the remaining lags are significantly distant or insignificant.

Table 9. Durbin-Watson test for error autocorrelation

Model	statistic	p.value	alternative
Advanced Markets 1	1.684265	0.0000038	true autocorrelation is greater than 0
Advanced Markets 2	1.802871	0.0025567	true autocorrelation is greater than 0
Advanced Markets 3	1.809816	0.0033734	true autocorrelation is greater than 0
Advanced Markets 4	1.727034	0.0000549	true autocorrelation is greater than 0
Advanced Markets 5	2.076308	0.7606691	true autocorrelation is greater than 0
Emerging Markets 1	1.750556	0.0003103	true autocorrelation is greater than 0
Emerging Markets 2	1.703812	0.0000256	true autocorrelation is greater than 0
Emerging Markets 3	1.710553	0.0000365	true autocorrelation is greater than 0
Emerging Markets 4	1.710594	0.0000361	true autocorrelation is greater than 0
Emerging Markets 5	2.063090	0.7607001	true autocorrelation is greater than 0
Low-Income Markets 1	1.780689	0.0078872	true autocorrelation is greater than 0
Low-Income Markets 2	1.751868	0.0031270	true autocorrelation is greater than 0
Low-Income Markets 3	1.682507	0.0002419	true autocorrelation is greater than 0
Low-Income Markets 4	1.696401	0.0004170	true autocorrelation is greater than 0
Low-Income Markets 5	2.086357	0.7609509	true autocorrelation is greater than 0

Source: Own calculation, based on the World Bank data and V-Dem dataset.

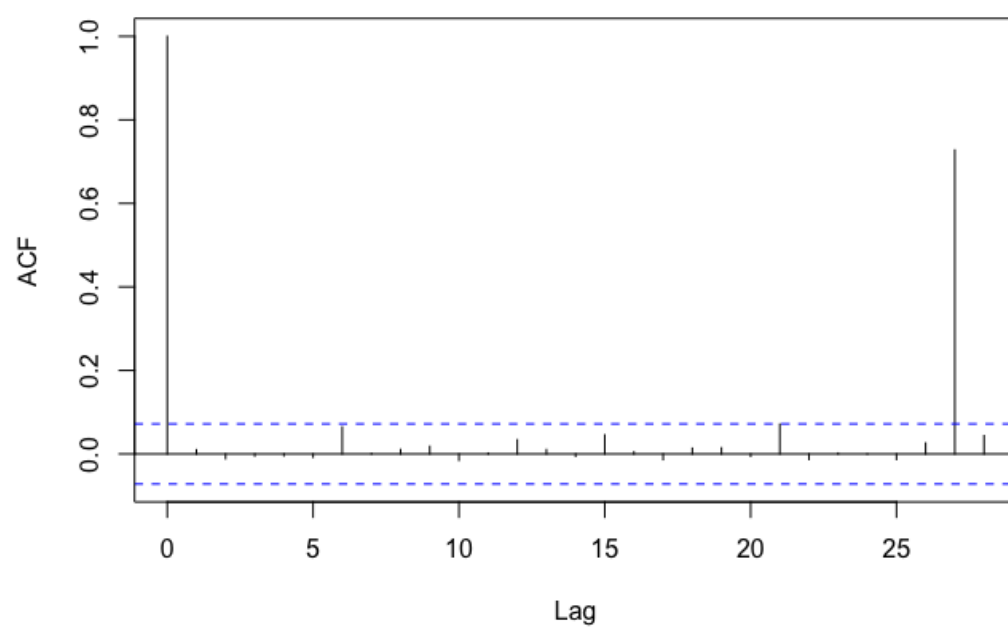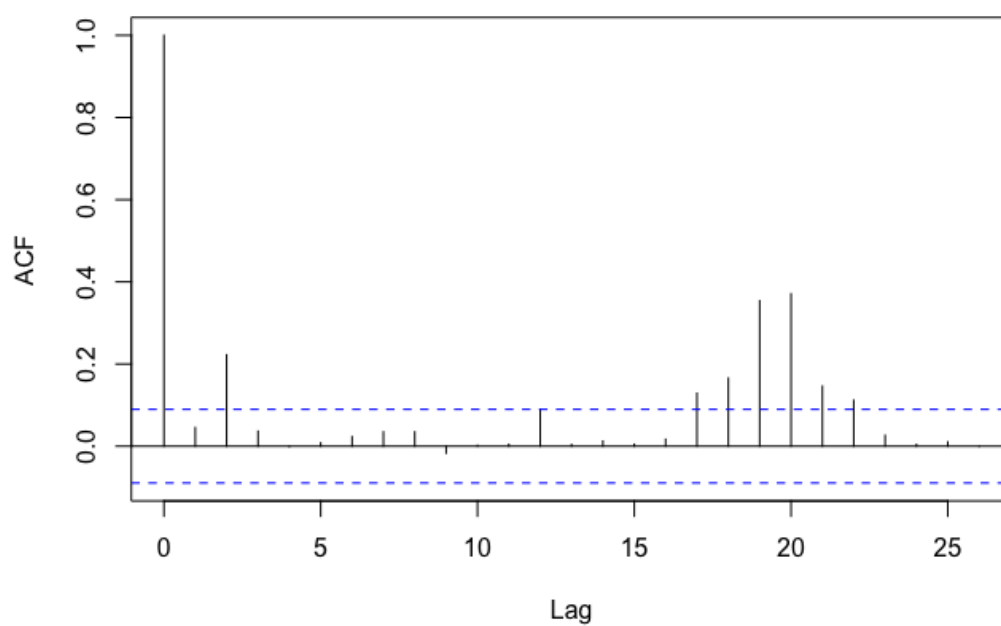Figure 8. Advanced countries: AFC test for FDI autocorrelation
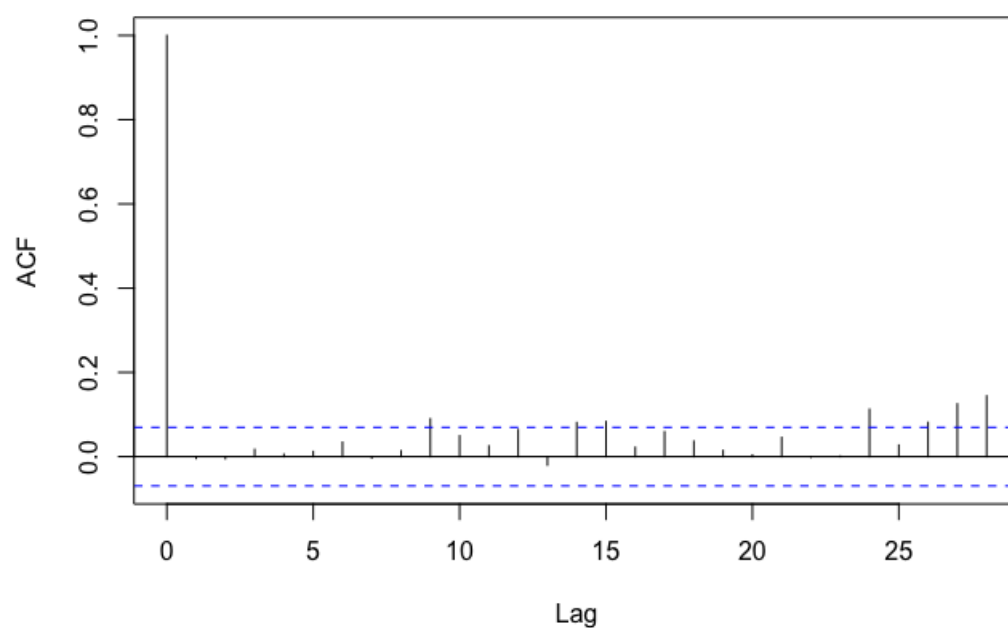
Source: Own calculation, based on the World Bank data and V-Dem dataset.

Figure 9. Emerging countries: AFC test for FDI autocorrelation

Source: Own calculation, based on the World Bank data and V-Dem dataset.

Figure 10. Low-income countries: AFC test for FDI autocorrelation

Source: Own calculation, based on the World Bank data and V-Dem dataset.

Tests for cross-sectional dependence are performed with the B-P / LM (Table 10) and Pasaran CD (Table 11) methods. The null hypothesis states that residuals across entities are not correlated across the countries. Cross-sectional dependence can lead to bias in model results. In this paper, the presented models are a topic for consideration in terms of the cross-sectional dependence problem. However, in particular, the Pesaran CD test does not show a cross-sectional dependence for all models in the low-income fiscal status category.

Table 10. Breusch-Pagan LM test for cross-sectional dependence in panels results

Model	statistic	p.value	alternative
Advanced Markets 1	1154.3808	0.0000000	cross-sectional dependence
Advanced Markets 2	1145.7397	0.0000000	cross-sectional dependence
Advanced Markets 3	1193.5195	0.0000000	cross-sectional dependence
Advanced Markets 4	1110.2003	0.0000000	cross-sectional dependence
Advanced Markets 5	584.9108	0.0000017	cross-sectional dependence
Emerging Markets 1	1013.6416	0.0000000	cross-sectional dependence
Emerging Markets 2	1065.0910	0.0000000	cross-sectional dependence
Emerging Markets 3	1055.5528	0.0000000	cross-sectional dependence
Emerging Markets 4	1094.1381	0.0000000	cross-sectional dependence
Emerging Markets 5	416.9466	0.0762981	cross-sectional dependence
Low-Income Markets 1	268.9943	0.0001417	cross-sectional dependence
Low-Income Markets 2	291.8274	0.0000028	cross-sectional dependence
Low-Income Markets 3	312.8194	0.0000000	cross-sectional dependence
Low-Income Markets 4	307.6146	0.0000001	cross-sectional dependence
Low-Income Markets 5	251.3412	0.0019035	cross-sectional dependence

Source: Own calculation, based on the World Bank data and V-Dem data set.

Table 11. Pesaran CD test for cross-sectional dependence in panels results

Model	statistic	p.value	alternative
Advanced Markets 1	9.2466676	0.0000000	cross-sectional dependence
Advanced Markets 2	8.9709847	0.0000000	cross-sectional dependence
Advanced Markets 3	9.9034393	0.0000000	cross-sectional dependence
Advanced Markets 4	7.8189262	0.0000000	cross-sectional dependence
Advanced Markets 5	4.7256216	0.0000023	cross-sectional dependence
Emerging Markets 1	8.7997181	0.0000000	cross-sectional dependence
Emerging Markets 2	8.9938050	0.0000000	cross-sectional dependence
Emerging Markets 3	8.9112867	0.0000000	cross-sectional dependence
Emerging Markets 4	8.9082489	0.0000000	cross-sectional dependence
Emerging Markets 5	3.6659110	0.0002465	cross-sectional dependence
Low-Income Markets 1	0.6445428	0.5192235	cross-sectional dependence
Low-Income Markets 2	1.7527652	0.0796423	cross-sectional dependence
Low-Income Markets 3	0.3485871	0.7273993	cross-sectional dependence
Low-Income Markets 4	0.1414324	0.8875283	cross-sectional dependence
Low-Income Markets 5	0.8543279	0.3929233	cross-sectional dependence

Source: Own calculation, based on the World Bank data and V-Dem data set.

For descriptive purposes, population sets were described using a two measures of unbalancedness (Table 12). Measures gamma and nu from Ahrens and Pincus (1981) where the highest value is 1 which stands for perfectly balanced. The lowest values of gamma and nu are observed in the case of Low-Income Markets model number 5, where as a result of the delay of the dependent variable we have the smallest population.

Table 12. Unbalancedness descriptive statistics

Par	Advanced Markets 1	Advanced Markets 2	Advanced Markets 3	Advanced Markets 4	Advanced Markets 5
gamma	0.9606178	0.9606178	0.9606178	0.9606178	0.9226780
nu	0.9739773	0.9739773	0.9739773	0.9739773	0.9477114

Par	Emerging Markets 1	Emerging Markets 2	Emerging Markets 3	Emerging Markets 4	Emerging Markets 5
gamma	0.9312935	0.9312935	0.9312935	0.9312935	0.9078305
nu	0.9687509	0.9687509	0.9687509	0.9687509	0.9604348

Par	Low-Income Markets 1	Low-Income Markets 2	Low-Income Markets 3	Low-Income Markets 4	Low-Income Markets 5
gamma	0.9617027	0.9617027	0.9617027	0.9617027	0.8152963
nu	0.9676605	0.9676605	0.9676605	0.9676605	0.9033043

Source: Own calculation, based on the World Bank data.

In order to check whether there is heteroscedasticity, the Breusch-Pagan test is performed with the p-value = 0.05 (Table 13). In each model, test results states that homoscedasticity can be rejected in favor of the alternative hypothesis of heteroscedasticity.

Table 13. Studentized Breusch-Pagan test results

Model	statistic	p.value	alternative
Advanced Markets 1	41.44376	0.0000002	heteroscedasticity
Advanced Markets 2	47.52470	0.0000000	heteroscedasticity
Advanced Markets 4	44.66838	0.0000001	heteroscedasticity
Advanced Markets 4	42.79787	0.0000001	heteroscedasticity
Advanced Markets 5	25.01180	0.0007552	heteroscedasticity
Emerging Markets 1	14.88885	0.0211391	heteroscedasticity
Emerging Markets 2	15.64785	0.0285358	heteroscedasticity
Emerging Markets 4	16.65083	0.0106559	heteroscedasticity
Emerging Markets 4	12.82154	0.0459591	heteroscedasticity
Emerging Markets 5	39.94607	0.0000013	heteroscedasticity
Low-Income Markets 1	40.15676	0.0000004	heteroscedasticity
Low-Income Markets 2	28.59355	0.0001716	heteroscedasticity
Low-Income Markets 4	25.40770	0.0002869	heteroscedasticity
Low-Income Markets 4	31.91254	0.0000170	heteroscedasticity
Low-Income Markets 5	63.37545	0.0000000	heteroscedasticity

Source: Own calculation, based on the World Bank data and V-Dem data set.

The Hausman test is executed (Table 14) to decide whether the fixed effect will eventually be used in the study or whether the random effects: If the p-value is less than 0.05 then the fixed effects model is more preferable over the random effects model. As a result of conducting the test separately for each model, only the p-values for the Emerging Markets 1, 2 and 4 models are above the assumed level. After considering the results of the Hausman Test, we decide to use an approach in which all models will be estimated based on fixed effects with no exceptions.

Table 14. Hausman Test results

Model	statistic	p.value	alternative
Advanced Markets 1	261.9891969	0.0000000	one model is inconsistent
Advanced Markets 2	77.3743333	0.0000000	one model is inconsistent
Advanced Markets 3	144.1208107	0.0000000	one model is inconsistent
Advanced Markets 4	348.4310688	0.0000000	one model is inconsistent
Advanced Markets 5	72.8543005	0.0000000	one model is inconsistent
Emerging Markets 1	4.1258640	0.6596481	one model is inconsistent
Emerging Markets 2	13.1107664	0.0694551	one model is inconsistent
Emerging Markets 3	25.1470124	0.0003207	one model is inconsistent
Emerging Markets 4	0.5967202	0.9964549	one model is inconsistent
Emerging Markets 5	34.8528921	0.0000119	one model is inconsistent
Low-Income Markets 1	88.5992373	0.0000000	one model is inconsistent
Low-Income Markets 2	65.7490552	0.0000000	one model is inconsistent
Low-Income Markets 3	59.1511551	0.0000000	one model is inconsistent
Low-Income Markets 4	66.1719846	0.0000000	one model is inconsistent
Low-Income Markets 5	54.8094842	0.0000000	one model is inconsistent

Source: Own calculation, based on the World Bank data and V-Dem data set.

The Breusch-Godfrey / Wooldridge test for serial correlation indicates a problem with the great majority of models. For all fiscal status countries models no. 5 perform best, in which the dependent variable delay was applied (Table 15), which is in line with the expectations based on the methodology in the literature and similar studies examining the determinants of FDI.

Table 15. Breusch-Godfrey/Wooldridge test for serial correlation in panel models results

Model	statistic	p.value	alternative
Advanced Markets 1	196.833069	0.0000000	serial correlation in idiosyncratic errors
Advanced Markets 2	199.494550	0.0000000	serial correlation in idiosyncratic errors
Advanced Markets 3	207.036773	0.0000000	serial correlation in idiosyncratic errors
Advanced Markets 4	194.944885	0.0000000	serial correlation in idiosyncratic errors
Advanced Markets 5	20.295475	0.0092741	serial correlation in idiosyncratic errors
Emerging Markets 1	215.740395	0.0000000	serial correlation in idiosyncratic errors
Emerging Markets 2	228.632134	0.0000000	serial correlation in idiosyncratic errors
Emerging Markets 3	228.084494	0.0000000	serial correlation in idiosyncratic errors
Emerging Markets 4	225.552466	0.0000000	serial correlation in idiosyncratic errors
Emerging Markets 5	6.477477	0.3718777	serial correlation in idiosyncratic errors
Low-Income Markets 1	45.583815	0.0000619	serial correlation in idiosyncratic errors
Low-Income Markets 2	51.116059	0.0000079	serial correlation in idiosyncratic errors
Low-Income Markets 3	56.972902	0.0000008	serial correlation in idiosyncratic errors
Low-Income Markets 4	57.499843	0.0000007	serial correlation in idiosyncratic errors
Low-Income Markets 5	2.845090	0.5840747	serial correlation in idiosyncratic errors

Source: Own calculation, based on the World Bank data and V-Dem data set.

Annex 5. XGBoost results descriptive statistics

The XGBoost model results for low-income countries are presented in the form of SHAP values. The exact mean SHAP values for individual explanatory variables are presented in Table 16. Additionally, we present a descriptive analysis of the SHAP value for the variable concerning respect for the constitution, broken down by clusters (Table 17).

Table 16. Low-income Xgboost SHAP values descriptive statistics

Explanatory variables	Mean SHAP values
log(Trade openness)	0.0171619
log(GDP per capita)	0.0091771
GDP growth rate	0.0058457
Party institutionalization index	0.0048036
log(Population)	0.0042972
Executive respects constitution	0.0023251

Source: Own calculation, based on the World Bank data and V-Dem data set.

Table 17. Low-income executive respects constitution descriptive statistics among clusters

Cluster	Min	1st Qu.	Median	Mean	3rd Qu.	Max	Std	Count
1	-0.0040	-0.0009	-0.0007	-0.0008	-0.0003	0.0006	0.0008	156
2	-0.0055	-0.0024	-0.0018	-0.0020	-0.0013	-0.0008	0.0009	194
3	0.0014	0.0023	0.0027	0.0046	0.0053	0.0136	0.0036	128

Source: Own calculation, based on the World Bank data and V-Dem data set.