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**Article**

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# Investigating the Influence of Economic and Socio-Political Openness on Growth

**Lena Malešević-Perović[1], Vladimir Šimić[2], Vinko Muštra[3]**


## Abstract

*This paper investigates the influence of international openness on economic growth in a sample of 32 European economies. The usual approach in the literature on the topic is to observe the impact of trade openness on growth. We, however, broaden this standard approach and analyse not only economic aspect of openness but also socio-political aspect. In our empirical analysis we use the TSLS (two stage least squares) estimator, whereby in the first step we use the standard growth regression that includes, among other variables, openness, and in the second step we include different determinants to instrument openness. Our research, in general, shows that openness is an important determinant of growth in a set of investigated countries. Trade openness and financial openness influence growth positively. The influence of institutions on growth is manifested mainly indirectly – through its influence on trade and financial openness.*


**Keywords:** openness, growth, EU, institutions

**JEL Classification:** F43, C26, O4

## 1. Introduction

The main goal of this paper is to empirically investigate the influence of international openness on growth in a sample of 32 European economies (15 old EU members, 12 new EU members and five prospective EU members from the Balkans – Croatia, Bosnia and Herzegovina, F.Y.R.O.M., Serbia and Albania). All of the countries in the sample are enganged in the process of European integration, albeit at different stages.

The usual approach in the literature on the topic is to observe the impact of trade openness on growth, whereas we adopt a broader approach and analyse not only the economic aspect of openness (trade and financial openness) but also socio-political one. This paper, thus, represents a unique attempt to identify the impact of openness on

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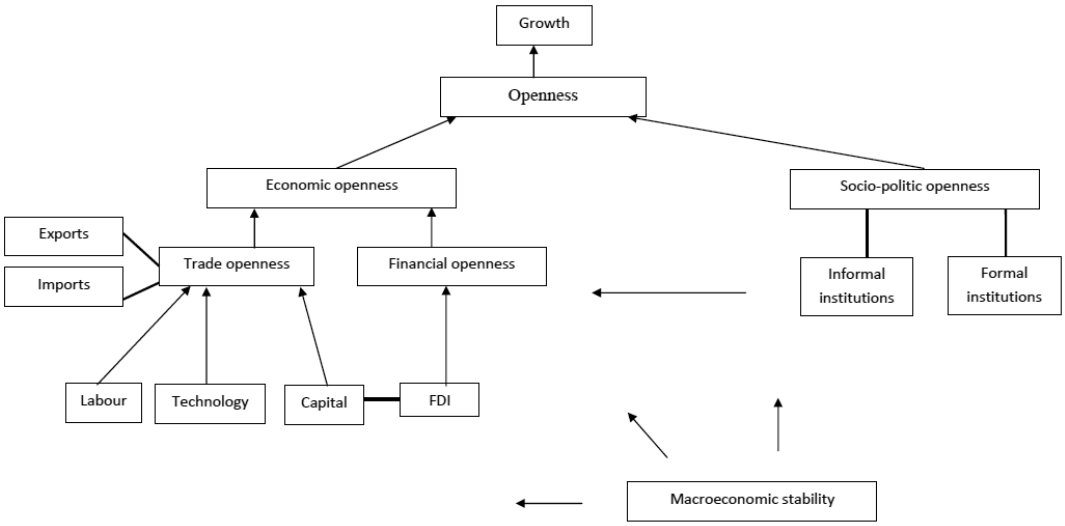
growth from a broader perspective. In doing so we first present theoretical background by identifying the channels through which various aspects of openness may be impacting growth, and take particular care of the potential inter connectedness between these different aspects. The identified theoretical links are then investigated empirically, using the two stage least squares estimator, whereby the model is evaluated in two steps. In the first one the influence of openness on growth is analysed through the standard growth regression, whereas in the second step we instrument openness by different variables and estimate their impact. It should be stressed that, in order to account for different aspects of openness, various indicators are used for proxying openness, such as the share of exports plus imports in GDP (a measure of trade openness), FDI per capita (which measures financial openness), Voice and accountability indicator from Worldwide Governance indicators (which serves as a proxy for formal aspect of institutional openness), and an indicator constructed from the data taken from World Values Survey (which serves as a proxy for informal aspect of institutional openness).

The paper is structured as follows. Section 2 provides theoretical background linking different aspects of openness and growth. Section 3 presents the modelling strategy, variable selection and the main results from the empirical investigation. Section 4 concludes.

## 2. Theoretical background

International openness can be defined as the extent of barriers to the free movement of ideas, goods and services and factors of production between countries. International openness can have an effect on economic growth insofar as these barriers affect incentives to innovate, affect the underlying productivity of that innovation, the dissemination of research discoveries across national boundaries, the allocation of resources between research and current production etc. (Cameron, Proudman and Redding, 1999). Given the above definition of international openness, openness need not necessarily be viewed narrowly - as trade openness, but could also refer to financial openness (as measured by foreign direct investment, FDI), particularly having in mind that trade and FDI are basically two ways of servicing foreign markets, and that they are already interlinked in a variety of ways. Namely, financial capital, in particular FDI flows, can also influence economic growth in the sense of facilitating spillovers of ideas across countries. Moreover, institutions also fit the above definition insofar as they serve in eliminating barriers to free movement of ideas, goods and services and factors of production. This is presented in the upper part of Diagram 1.

**Diagram 1: Schematic presentation of the impact of openness and its determinants on growth**




Next we briefly discuss the mechanisms through which trade, financial and institutional openness influence growth.

The theoretical literature on the relationship between trade and growth started growing with the development of theories of endogenous growth (Romer, 1986; Lucas, 1988; Grossman and Helpman, 1991). A number of papers provide evidence that trade has a positive impact on growth (see, for example, Grossman and Helpman, 1991; Romer, 1990; Rivera-Batiz and Romer, 1991; Dollar and Kraay, 2002). The mechanisms through which this impact takes place are various. Namely, trade encourages growth through providing access to a larger market (hence giving greater incentives to deliver new inventions); through increased productivity (productivity can be raised by learning from new goods produced abroad); by helping prevent the duplication of research efforts across countries, by providing access to investment, intermediate goods and new products etc. Majority of the literature documents a positive impact of trade on growth (see, for example, Frankel and Romer, 1999). However, it should also be stressed that a number of studies takes a sceptical view of this positive impact (see, for example Rodriguez and Rodrik, 1999).

The impact of financial openness is usually investigated through FDI flows. The literature does not provide a unison answer regarding the impact of FDI on growth. On the one side, FDI enables positive externalities through diffusion of new technologies and know-how. Given that this diffusion has significant spillover effects, FDI not only affects the productivity in the sectors attracting FDI, but also indirectly results in an increase in productivity in the whole economy (Rappaport, 2000; de Vita and Kyaw, 2009). FDI also enhances competitiveness and enables scale economy effects for local producers. On the other side, some authors suggest that in presence of the existing trade, prices, financial and

other distortions, FDI actually hurts the allocation of resources and slows down economic growth (Brecher and Diaz-Alejandro, 1977; Brecher, 1983; Boyd and Smith, 1992; Carkovic and Levine, 2002).

On the right-hand side of Diagram 1 we consider the impact of socio-political openness (measured by formal and informal institutions) on growth. While rarely applied in this type of investigation, our focus on this aspect of openness rests upon the increasing relevance of institutions for growth as recognised by vast economic literature (North, 1991; Acemoglu, Johnson and Robinson, 2004; Rodrik, Subramanian and Trebbi, 2004; Frey and Steiner, 2012). Institutions, generally defined as "constraints that human beings impose on themselves" (North, 1990), prohibit, permit or require specific type of action that are important for different aspects of openness (e.g. reducing transaction costs, for improving information flows and for defining and enforcing property rights, Jutting, 2003). The impact of institutional openness on growth, however, is not as straightforward as was the case with the preceeding two types of openness. Namely, the influence of institutions on growth is usually understood as the influence of institutional quality on growth. Here we argue that institutional openness, defined as a situation where civil and political rights are respected, also affects economic performance. As noted by Powell (2000), institutional openness encompasses how easy it is to contact the elected representatives from within the system. It therefore shapes how effective an action is for influencing political decisions and consequently economic outcomes. Institutional openness can, therefore, be simply understood as an individual freedom. In line with this Harms and Ursprung (2002) indicate that individual freedom can influence growth positively or negatively, depending on whether the negative effect working through increased political contestability of income and wealth outweighs the positive effect working through more efficient monitoring of politicians, bureaucrats and rent-seekers. Additionally, as put forward by Rodrik (1999), external shocks have long-term adverse effects on growth in societies that lack the institutional capacity to respond to them properly. More precisely, strong institutions of conflict management (proxied by indicators of the quality of governmental institutions, rule of law, democratic rights, and social safety nets) are needed to deal adequately with external shocks. More open economies are assumed to experience greater exposure to these shocks, which can, in turn, unleash social conflict that generates uncertainty harmful to economic growth. The proper structure of decision process (institutional openness) is, hence, required to reap growth benefits of economic openness and to stress the influence of institutions on external environment. Considering the complexity of the institutional openness definition, we focus on formal and informal dimension of institutional openness. Following Amin (1999) formal dimension is represented by rules, laws and organisations, and informal by habits of individuals, social norms and values.

The approach we adopt, as outlined in Diagram 1, is, hence, consistent with endogenous growth theories in that we investigate the impact of openness on growth, and differs from the mainstream approach in that we assess this openness in various ways. We have, thus far, presumed that openness influences growth. There are, however, reasons to believe that causality actually goes the other way - from growth to openness (see, for

example Frankel and Romer, 1999). In the empirical part of the paper we implement the instrumental variable approach to avoid this reverse causality problem. The lower part of Diagram 1, therefore, refers to potential variables used to instrument openness. We explain these links next, starting from the left part of the Diagram and moving to the right.

Trade openness can be analysed through the main determinants of aggregate supply: labour, capital and technology.

Labour influences openness through the impact of productivity on international trade. Namely, more productive labour force is expected to result in domestic products being more competitive in international markets, and this, in turn, increases trade (e.g. Grossman and Helpman, 1991). Furthermore, productivity improvements due to intra-industry or intra-firm resource reallocation (Melitz, 2003; Bernard, Redding and Schott, 2007) are also likely to stimulate growth. However, although many studies present reasons for increased productivity attributable to openness (correction of failures of resource allocation under protective policies, promotion of technical progress, increase of productive efficiency (Liu and Nishijima, 2012)), the heterogeneous firm literature offers a rationale as to why this influence need not always be positive. It suggests that the lack of knowledge regarding export markets and regulations in other countries could obstruct positive relation between productivity and openness (Lejour et al., 2009), thereby explaining why researchers are often not able to find the permanent positive effect (Nordas, Miroudot and Kowalski, 2006).

The main channel through which technology influences growth is international spillover of knowledge and investments in innovation, as established in a number of theoretical and empirical studies (Grossman and Helpman, 1991; Rivera-Batiz and Romer, 1991; Keller, 1996; Aghion and Howitt, 1998). Namely, technological spillovers result in increased labour productivity in the recipient country, higher production of new ideas and new applications in research and development (RandD). This increases RandD effectiveness, which stimulates economic growth because new technologies promote more efficient methods of production with a given amount of labour and capital. On the other hand, as argued by Stokey (1995) and Jones and Williams (2000), alongside positive externalities in the RandD process, there is also a possibility of some negative externalities, which makes the empirical assessment of the RandD contribution very doubtful (Pessoa, 2007).

The impact of capital on openness and, consequently, growth is investigated through the FDI. The impact of FDI is, therefore, investigated both indirectly (through its impact on international trade) and directly (through its impact on growth). The latter was explained before; hence here we explain only the former. The linkages between FDI and trade are complex, depending on whether FDI is considered to be a substitute (see, for example, Markusen, 1984) or a complement (see, for example, Helpman, 1984) to international trade. When a company decides to set up a foreign plant, it reduces its exports of goods to that market, which affects trade negatively. Trade and FDI are, in this case, substitutes. If, on the other hand, a company divides various production stages across different countries to take advantage of lower factor prices, FDI and trade will act as complements, and trade would, consequently, increase. Furthermore, the direction of causality between the two also

raises questions. As noted by Liu, Wang and Wei (2001), the existing literature suggests that many firms in manufacturing still follow the traditional gradual sequence of servicing foreign markets: first they trade in a foreign market (since trade is easier and less risky than FDI), and afterwards (after learning more about the economic, political, and social conditions and gaining more experience) they establish producing subsidiaries in the foreign market, which may, later on, begin to export.

Finally, the right-hand side of Diagram 1 assesses the influence of formal and informal institutions on growth. We have already explained the direct link between institutional openness and growth, but the fact that institutional factors affect trade and FDI openness should also be taken into account. Namely, weak growth gains from trade openness can often be explained by the lack of effective institutions. In particular, due to ineffective institutions, the gains from trade expansion need not be translated into economic diversification and growth. Inefficient institutional framework of the financial system may also explain weak transmission from trade openness to growth (Baliamoune-Lutz and Ndikumana, 2007). Empirical research by Dollar and Kraay (2002) suggests that good institutions are critical for the ability of a country to generate long-run growth gains from trade openness. Moreover, FDI flows, used as an indicator of financial openness can also be affected by different aspects of institutions. Good institutional environment can enhance investment in technology by effective patent protection (Andersen and Babula, 2008). Busse and Hefeker (2007), for example, find that different aspect of institutional quality (e.g. government stability, less internal and external conflict, less corruption, a lower level of ethnic tensions, higher levels of law and order, more democratic accountability, and the quality of the bureaucracy) have a positive and significant impact on FDI inflows.

So far we have outlined the links between different aspects of openness and growth (Diagram 1). In what follows we test these links empirically.

## 3. Empirical investigation

In this section of the paper we investigate the impact of different aspects of openness on growth, as well as the determinants of trade and financial openness. The analysis is conducted using a sample of 32 European economies (15 old EU members, 12 new EU members and five prospective EU members from the Balkans – Croatia, Bosnia and Herzegovina, F.Y.R.O.M., Serbia and Albania, i.e. EU27+5Balkan). This study represents a unique attempt to test the impact of openness on growth in a sample of countries engaged in a process of economic and political integration in Europe. Within this we distinguish between old members (EU15), new members (EU12), the whole of EU (EU27) and the full sample (EU27+5Balkan).

### 3.1 Variable selection

Selection of the variables follows Diagram 1. All the selected variables are explained below.

Given the complexity of the institutional openness definition we use two different proxies, one for formal and one for informal dimension. For informal institutions we follow Tabellini (2007) and use the results from World Values Survey as a proxy for social openness. More precisely, we use the answers to the following questions:

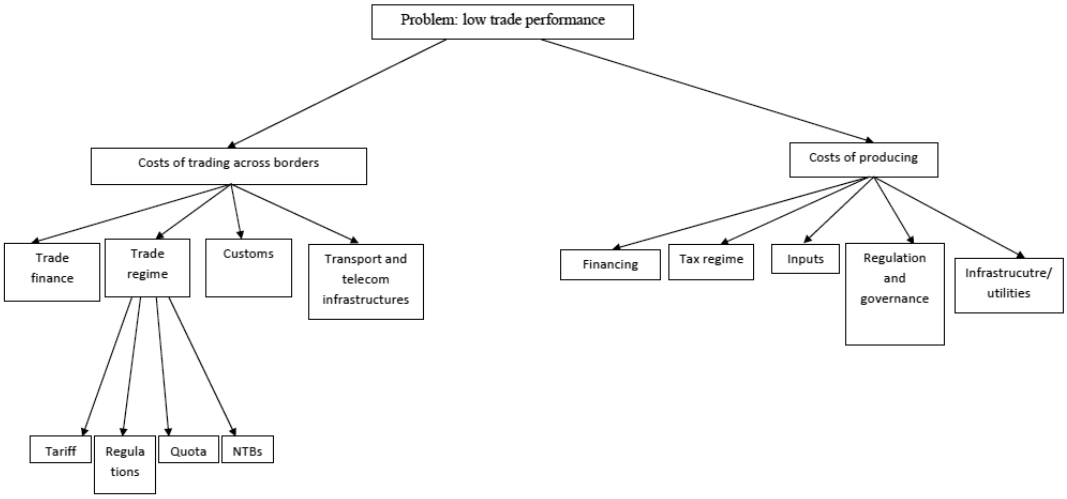
- A035. - Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important? Please choose up to five.
- A129 - On this list are various groups of people. Could you please sort out any that you would not like to have as neighbours?
- C002 - When jobs are scarce, employers should give priority to (nation) people over immigrants.

Our proxy (WVS) is then created by combining the answers to these questions, so that we use the percentage of people whose answer to question 1 (A035) was: Tolerance and respect for other people, the percentage of people that did not mention: Immigrants, in answering question 2 (A129) and the percentage of people that did not agree with the third question (C002).

The formal aspect is measured by the Worldwide Governance Indicator (WGI) (Kaufmann, Kraay and Mastruzzi, 2010). The WGI is a long-standing research project to develop cross-country indicators of governance. It consists of six composite indicators of broad dimensions of governance covering: Voice and Accountability (VA), Political Stability and Absence of Violence/Terrorism (PS), Government Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (RL), and Control of Corruption (CC). In our empirical analysis we will use WGI as an instrument for measuring the indirect impact of institutions on growth (through its influence on trade and financial openness). The composite indicator Voice and Accountability will be used as a measure of the direct influence of institutional openness on growth. This indicator is defined as perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. These aspects are considered as good representatives of institutional openness, given the theoretical discussion and definition presented in Section 2.

As indicated earlier, the literature that investigates how openness affects growth tipically focuses on international trade only. Therefore, in the next step we consider the segment of international trade in more detail, as presented in Diagram 2 below.

**Diagram 2: Growth diagnostics adjusted for trade**




**Source:** Hallaert and Munro (2009), Figure 3, p. 25

Our starting point for the analysis of international trade is the decision tree taken from Hallaert and Munro (2009), who adjusted the growth diagnostics approach for a more detailed investigation of trade. Diagram 2 identifies, as the main constraints to trade expansion, the following: financing of trade and production, trade regime, trade customs/ habits, traffic and other infrastructure, tax regime, inputs and rules and governance. However, if we want to empirically test the above-identified links, the unavailability of the data appears as an immediate problem. Therefore, in order to reduce the choice of variables dictated by Diagram 2, we cross-referenced them with the data from Enterprise Survey (reported by the World Bank), and used only those variables that are recognised by the exporters and investors as the most constraining ones for doing business. More precisely, from Enterprise Survey we collected the data on the number of firms in each of the countries in our sample (for which the data were available) that indicated the main obstacles to doing business. After averaging the data across countries, we ranked constraints from the largest to the smallest. This procedure resulted in recognition of the following main obstacles to trade and investment: Access to finance, Inadequately educated labour force, Political instability, Practices of the informal sector, Corruption and Customs and trade regulations. These obstacles dictate our choice of variables which will be used as determinants of openness. Accordingly, we use the following:

- Access to finance is measured by variable Private credits (PRIV_CRED), which stands for the amount of loans provided by banks and other financial institutions to private sector, expressed as a percentage of GDP. The data are obtained from Database on Financial Development and Structure, compiled by Beck, Demigurc-Kunt and Levine (2010).

- Corruption, as well as trade regime and customs duties are covered by the variable WGI, which accounts for the impact of formal institutions. Namely, since, as explained earlier, WGI contains the indicator CC (which refers to the control of corruption), as well as the indicator RQ (which refers to regulatory quality), the inclusion of individual indicators for corruption and trade regime and customs duties would result in multicollinearity. Inclusion of custom duties as an individual variable would be also impractical as this variable varies very little. Namely, in EU27 countries all the customs duties are unified, and in consequence, the only source of variability would be due to the five EU non-members in our sample.
- The informal sector is also contained in variable WGI. Namely, informal dimension, defined by habits of individual social norms and values (Amin, 1999) can be recognised in several WGI componenets: VA captures perceptions of the extent to which a country's citizens are able to participate in selecting their governments as well as freedom of expression, freedom of association and a free media, while PS measures perceptions of the likelihood that the government will be destabilised or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
- Adequacy of education of work force is accounted for by the variable EDU, which stands for the rate of high school enrolment. This rate is calculated as a share of all enroled in high school in total population of the relevant age group which officially corresponds to that level of education. The data are obtained from World Development Indicators.
- Political/macroeconomic (in)stability is accounted for by including the real effective exchange rate (REER), which is obtained from the World Development Indicators, and expressed as an index based in 2005.

The labour dimension of trade openness is proxied by productivity (PROD), defined as productivity of labor per employed person (US$, 2010). We use the data from The Conference Board Total Economy Database, January 2011, available at http://www.conference-board.org/data/economydatabase.

Technological development is measured by the share of research and development (RandD) expenditures in GDP, obtained from World Development Indicators.

As for FDI, they are measured in per capita terms and in US$. The data are available from World Development Indicators.

In addition, we include the Herfindahl-Hirschman (HH) index to account for the impact of export concentration. Namely, as argued by Rodrik (1998), countries that export only a few commodities are presumably more exposed to external risk than countires with a diversified set of exports. The HH index is calculated as a sum of squares of exports of each product in total exports. The data are obtained from the UN Commodity Trade Statistics Database (UN Comtrade), and the used nomenclature is SITC 1: 3 digit. Thus, we have accounted for all the important factors which might arise as constraints of openness and which were suggested by Diagram 2 and the Enterprise Survey.

The variables that we will also need in our analysis are the variables of growth regression (see explanation in Section 3.2) and these are growth rate of GDP per capita (ΔGDP), GDP per capita in the initial period ($GDP_{t0}$ - usually this variable is in empirical studies replaced by variable GDPgap (because in panel data the initial GDP per capita does not vary), which we calculate as a share of GDP per capita of a country in the average GDP per capita in EU27 countries), population growth rate (POP) and investment rate (INV). The last variable is calculated as the share of gross investment in long term assets in GDP. All the mentioned data are obtained from the World Development Indicators.

### 3.2 Modelling approach

Since the goal of this paper is not just identification of the determinants of openness, but also growth as the ultimate objective, the starting point of our emipirical analysis is growth regression. The literature lists a large number of variables that may be included in this type of regressions. Our initial specification includes the basic determinants of the steady state, namely initial GDP level, investment rate, high school enrolment rate and population growth. This is in line with Levine and Renelt (1992) and Sala-i-Martin (1997) which are the two most significant studies investigating robustness of individual variables in growth regressions. While their approaches differ, they set the control variables, i.e. the variables that are included in all growth regressions, in a very similar way, and these variables are exactly the variables accounted for in growth regeression in the present study. In addition, given the aim of the present study, and in line with the endogenous theories of growth, we include also the variable OPENNESS, as presented in the equation below.

$$\Delta GDP_{it} = \alpha_0 + \alpha_1 GDP_{t0} + \alpha_2 OPENNESS_{it} + \alpha_3 INV_{it} + \alpha_4 POP_{it} + \alpha_5 EDU_{it} + w_{it} \quad (1)$$

where w stands for regression error, α are parameters to be estimated, *i* stands for a country and *t* for a period. Since there is a strong possibility that the link between openness and growth goes also in the other direction (endogeneity problem) we treat this issue by using the TSLS (two stage least squares) estimator, i.e. by estimating the model in two steps. Therefore, in the second step we consider the determinants of openness, as presented in equation 2.

$$OPENNESS_{it} = W_{it}\delta + \varepsilon_{it} \quad (2)$$

$$W = \begin{bmatrix} PRIV_CRED \\ WGI \\ HH \\ PRODUCTIVITY \\ REER \\ FDIpc \\ RandD \end{bmatrix} \quad (3)$$

$$OPENNESS = \begin{bmatrix} \frac{X+M}{GDP} \\ FDIpc \\ VA \\ WVS \end{bmatrix} \quad (4)$$

where W is a vector of variables that influence openness, δ are the parameters to be estimated and ε is the regression error. As can be seen in equation 3, we instrument openness with variables that we consider to be the main candidates for its determinants, as elaborated in Section 3.1. This selection of variables refers primarily to the determinants of trade openness (measured by the openness indicator (X+M)/GDP). However, since we want to keep the width of our approach and to account for all aspects of openness presented in Diagram 1, we use, as a measure of openness, different indicators (equation 4). These include: a share of exports and imports in GDP, FDI per capita, VA indicator and WVS indicator. We use the first indicator to estimate the impact of trade openness on growth, the next indicator measures the impact of financial openness and the following two indicators measure the impact of formal and informal dimension of institutional openness. Unlike trade openness, to account for determinants of financial openness (measured by FDIpc) we take into consideration WGI, PROD, REER and RandD. Finally, it should be noted that institutional openness (formal and informal) is not instrumented, because institutions are in the literature recognised as fundamental determinants of growth (Acemoglu, Johnson and Robinson, 2004). Therefore, in these cases the analysis is conducted in only one step – the growth regression, in which openness is measured by VA indicator for formal and WVS indicator for informal dimension of institutional openness. For easier understanding we outline our approach in Table 1 below.

**Table 1: Choice of the openness measure and potential determinants of openness**

| | **Measure of openness (OPENNESS)** | | | |
|---|---|---|---|---|
| | **(X+M)/GDP** | **FDIpc** | **VA** | **WWS** |
| **PRIV_CRED** | √ | | | |
| **WGI** | √ | √ | | |
| **HH** | √ | | | |
| **PROD** | √ | √ | | |
| **REER** | √ | √ | | |
| **FDIpc** | √ | | | |
| **R&D** | √ | √ | | |

### 3.3 Results

The model that we estimate is explained in more detail in section 3.2, and here we only present the results of empirical analysis. As indicated before, in addition to estimating growth regression, we analyse how access to finance, institutional development, export concentration, productivity, foreign direct investment and research and development (technology) influence openness.

Because of potential endogeneity of regressors we use the TSLS estimator, which enables us to obtain consistent parameters. Namely, as discussed before, there is a possibility of reverse causality going from growth to (trade and financial) openness, and this should be taken into account. Indeed, our tests (not reported, but available upon request) suggest that trade and financial openness cannot be treated as exogenous (the null hypothesis of exogeneity is rejected). It is precisely for this reason that we adopt the instrumental variable approach whereby we instrument openness with a number of variables, as indicated by Equations 2 and 3. Tables 2-5 report results of our empirical estimations. The lower part of Tables 2 and 3 contains diagnostic tests that check the quality of chosen instruments[1]. Hansen J statistic is high in all specifications, indicating that the instruments are valid i.e. that our instrument set is appropriate (we have excluded variable PRIV_CRED from our anaylsis since the tests indicated that it was a bad instrument). In addition, Kleibergen-Paap rk LM and rk Wald statistic indicate that we can reject the null of underidentification. Kleibergen-Paap Wald rk F statistic, furthermore, rejects the null hypothesis that the instruments are weak. Moreover, the Anderson-Rubin Wald test and Stock-Wright LM test reject their null hypothesis and indicate that the endogenous regressors are jointly relevant.

In addition, since preliminary testing (Arellano-Bond test for autocorrelation and Pagan and Hall, Breusch-Pagan/Godfrey/Cook-Weisberg and White/Koenker tests of heteroskedasticity) indicated that there is a problem of autocorrelation and heteroscedasticity, all the results reported in Tables 2-5 contain heteroscedasticity and autocorrelation robust standard errors. In Tables 2-5, the results are reported for different groups of countries (EU27+5Balkan, EU27, EU15 and EU12). We use annual data for the period 1995-2009 and apply the two-stage-least-squares estimator. In addition we test whether these established empirical relationships prevail in the period 2005-2009 when the integration process in Europe formally embraced the countries from Central and Eastern Europe. We use Stata command *ivreg2*, which can be applied to both cross-section and panel data. Our data is organised in a panel, i.e. a cross-section of time series, which enables us to take advantage of the greater variation in the data, since variables vary in two dimensions.

[1] Since tests for assessing instrument validity and other related tests are not readily available in general econometric textbooks, we give additional explanations in the Appendix. The authors thank an anonimous referee for pointing this out.

**Table 2: Openness variable: (X+M)/GDP**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| (X+M)/GDP | 0.02*** (0.000) | 0.01*** (0.000) | 0.02*** (0.007) | 0.02 (0.859) | 0.01*** (0.010) | 0.01*** (0.010) | 0.01* (0.079) | -0.015 (0.217) |
| GDPgap | -0.39 (0.219) | -0.36 (0.437) | -0.43 (0.718) | -1.14 (0.458) | -0.81 (0.134) | -0.76 (0.264) | 0.51 (0.758) | 3.12 (0.209) |
| INV | 0.17*** (0.003) | 0.17** (0.027) | 0.09 (0.282) | 0.28*** (0.001) | 0.17** (0.037) | 0.19* (0.083) | 0.16 (0.254) | 0.40** (0.015) |
| POP | -1.45*** (0.000) | -1.49*** (0.000) | -1.09** (0.030) | -0.99 (0.393) | -1.60*** (0.001) | -1.66*** (0.003) | -1.49* (0.059) | -4.33** (0.037) |
| EDU | 0.17 (0.915) | 0.26 (0.893) | -0.68 (0.696) | 10.72 (0.154) | -1.68 (0.628) | -2.34 (0.515) | -0.17 (0.943) | -7.85 (0.571) |
| WGI | 39.70*** (0.006) | 40.68*** (0.007) | 41.79* (0.068) | 10.52 (0.700) | 91.00*** (0.000) | 88.85*** (0.001) | 30.01 (0.424) | 49.59 (0.355) |
| HH | 201.73** (0.017) | 184.88** (0.030) | 329.76 (0.101) | 378.73*** (0.000) | 217.29* (0.098) | 206.33* (0.093) | 674.92 (0.175) | 437.40*** (0.000) |
| PROD | 82.29*** (0.000) | 71.78*** (0.009) | 63.03 (0.128) | 135.88** (0.024) | 167.69*** (0.000) | 157.36*** (0.001) | 27.55 (0.675) | 87.04 (0.509) |
| REER | -127.42*** (0.000) | -126.13*** (0.000) | 92.92 (0.125) | -87.84** (0.022) | 64.43 (0.394) | 69.89 (0.451) | -12.70 (0.964) | 46.37 (0.595) |
| FDIpc | 23.39*** (0.000) | 24.61*** (0.000) | 19.25*** (0.000) | 6.59 (0.290) | 20.51*** (0.000) | 21.81*** (0.000) | 18.42*** (0.004) | 4.16 (0.400) |
| R&D | -6.53 (0.205) | -9.33* (0.099) | -29.63*** (0.000) | 25.86 (0.143) | -20.50** (0.020) | -25.11*** (0.005) | -39.05*** (0.000) | 29.06 (0.220) |
| 1995-2009 | √ | √ | √ | √ | | | | |
| 2005-2009 | | | | | √ | √ | √ | √ |
| EU27+5Balkan | √ | | | | √ | | | |
| EU27 | | √ | | | | √ | | |
| EU15 | | | √ | | | | √ | |
| EU12 | | | | √ | | | | √ |
| *No. of obs.* | 210 | 196 | 127 | 69 | 87 | 82 | 54 | 28 |
| *Uncentered R2* | 0.9256 | 0.9249 | 0.9430 | 0.9698 | 0.9403 | 0.9451 | 0.9505 | 0.9872 |
| *First stage partial R2* | 0.5897 | 0.6025 | 0.5504 | 0.5024 | 0.6328 | 0.6670 | 0.5617 | 0.7340 |
| *Hansen J-statistic chi2* | 3.045 (0.693) | 3.334 (0.648) | 7.561 (0.182) | 7.378 (0.194) | 3.440 (0.632) | 3.496 (0.624) | 5.974 (0.308) | 7.427 (0.190) |
| *Kleibergen-Paap rk LM statistic chi2* | 24.79*** (0.000) | 24.64*** (0.000) | 22.47*** (0.001) | 11.64* (0.078) | 14.00** (0.029) | 13.97** (0.030) | 9.99 (0.125) | 7.47 (0.279) |
| *Kleibergen-Paap rk Wald statistic chi2* | 18.086*** (0.000) | 203.59*** (0.000) | 106.33*** (0.000) | 91.23*** (0.000) | 150.81*** (0.000) | 191.15*** (0.000) | 69.67*** (0.000) | 205.04*** (0.000) |
| *Kleibergen-Paap Wald rk F statistic* | 28.56*** (0.000) | 32.03*** (0.000) | 16.19*** (0.000) | 12.78*** (0.000) | 21.96*** (0.000) | 27.58*** (0.000) | 9.25*** (0.000) | 20.75*** (0.000) |
| *Anderson-Rubin Wald test chi2* | 22.36*** (0.001) | 21.79*** (0.001) | 49.41*** (0.000) | 26.08*** (0.000) | 9.40 (0.153) | 8.09 (0.231) | 21.22*** (0.001) | 58.48*** (0.000) |
| *Stock-Wright LM S statistic chi2* | 14.25** (0.027) | 13.59** (0.034) | 12.02* (0.061) | 7.41 (0.284) | 5.79 (0.447) | 6.24 (0.397) | 6.52 (0.367) | 7.11 (0.310) |

**Note:** p-values in parenthesis. *, ** and *** refer to 10, 5 and 1 percent level of significance, respectively.

The first five rows of Table 2 refer to variables that are part of growth regression, while the middle part of the table presents the results of openness determinants. Symbol √ indicates the period and group of countries that the results refer to. For example, in column 1 √ indicates that the results are given for the whole period (1995-2009) and EU27+5Balkan countries.

Given a remarkably strong match of the estimated results for the EU27+5Balkan (columns 1 and 5) and EU27 (columns 2 and 6) group of countries we interpret the obtained estimations together. Our results suggest that in both groups of countries and in both periods trade openness exerts a statistically significant and positive impact on growth. In the growth regression (upper part of the table) investment and population variables are also significant and of the expected signs, while the education and GDP gap do not exert a significant impact on growth. Turning to the estimated results for trade openness determinants, we observe a statistically significant and positive impact of formal institutions (WGI), export concentration (HH), productivity (PROD) and FDI per capita (FDIpc), in both periods: 1995-2009 (columns 1 and 2) and 2005-2009 (columns 5 and 6). This suggests that trade openness is increased through a larger FDI, better institutional development and higher productivity, as well as higher export concentration (lower diversification), pointing further to an indirect impact of these variables on growth. The impact of real exchange rate is statistically significant and negative for the period 1995-2009, while in the period 2005-2009 this variable is not statistically significant. RandD expenditures exert a statistically significant and negative influence on trade openness, with the exception of the 2005-2009 period for the EU27+5Balkan sample.

In the period under investigation some of the countries in our sample have been in the EU the whole period, some joined later, and some (Balkan countries) have not joined yet. It can be argued that even without the formal integration process the economic ties (through trade and financial links) have been strong between these countries, and that their joint analysis makes sense. However, in order to take account of the fact that both groups of countries anaylsed so far (EU27+5Balkan and EU27) include rather heterogeneous countries which have entered the EU at various points in time and may hence be more or less integrated with each other, we next investigate the two groups, EU15 and EU12, separately. The EU15 group has been integrated throughout the whole period 1995-2009; hence the results in columns 3 and 7 can be taken as an indication of whether the achieved level of political and economic integration process attenuates or reduces the effects of various aspects of openness on economic growth. The results for the EU15 sample suggest that the impact of trade openness on growth is statistically significant and positive (column 3). The same can be concluded for this group of countries when only the 2005-2009 period is considered (column 7). In the growth regression (upper part of the Table) only population variable is statistically significant in both the whole period and the 2005-2009 period. The other variables in growth regression are not statistically significant. As for the openness instruments, the results are significant and positive for the impact of formal institutions (WGI) and FDI per capita (FDIpc). This suggests that in the EU15 group trade openness is increased through a better institutional development and a larger FDI and both results

are in accordance with expectations. RandD expenditures, on the other hand, significantly and negatively impact openness. This result is not in line with expectations. Other potential determinants are not statistically significant. When it comes to the 2005-2009 period, only FDIpc and RandD variables are statistically significant, with the same signs as before, while the impact of institutions is not statistically significant.

In the EU12 group of countries our main variable of interest, openness, appears not to be statistically significant, which suggests that openness does not exert any influence on growth in this group of countries. The only significant variable impacting growth in the 1995-2009 period is investment, while in the period 2005-2009 it is investment and population variables that are statistically significant and of the expected signs. Openness is significantly influenced by export concentration (HH), productivity (PROD) and real exchange rate in the 1995-2009 period (column 4), while in the period 2005-2009 (column 8) it is only the export concentration variable that exerts a statistically significant impact on openness. The finding of insignificant coefficient on openness may suggest that the impact of openness on growth may be muted by the lower level of integration achieved in comparison to the old EU members. However, given that the impact is also insignificant in the 2005-2009 period, after the formal EU accession of the EU12 countries, it may be more likely that the relatively low number of observations does not allow a precise estimation of the impact of openness on growth.

In sum, trade openness is found to be an important determinant of growth, and the positive impact of openness appears to be attenuated by:

- stronger formal institutions – supporting the idea that they help dealing with external shocks;
- export concentration – indicating that greater concentration of exports on a few commodities, i.e. specialisation influences trade positively;
- productivity – suggesting that productivity improvements lead to higher openness and growth, possibly through increased competitiveness and/or intra-industry and intra-firm resource allocation;
- FDI per capita – speaking in favour of FDI being a complement rather than substitute to international trade.

These findings are in line with theoretically expected links put forward in Section 2. RandD expenditures and real exchange rate seem to affect trade openness negatively, albeit to a somewhat lesser degree. A negative influence of RandD can be explained through the influence of spatial dimension of technological spillovers. Namely, knowledge derived from RandD investment is likely to spill over from one country to another (Jaffe, 1986 and 1989). When deciding whether to invest in RandD or not, national decision-makers have to take into account this high mobility of technology. On the one hand economic actors and decision-makers need to invest in RandD to increase technological capacity and improve competitivensss, while on the other hand similar results could be achieved relying solely on technological spillovers (Rodriguez-Pose, 2001). The negative impact of RandD can be

taken to suggest the strong influence of technological spillovers. As for the exchange rate, an increase in real exchange rate leads to an increase in exports and a decrease in imports, which can influence trade openness measure (exports+imports in GDP) in either direction depending on the price elasticity of exports and imports. In EU15 countries the exchange rate, expectedly, looses significance since majority of these countries shares a common currency. Moreover, productivity and HH index are also not an important determinant, suggesting that export specialisation and higher productivity play a more important role for the less developed European countries' trade. Indeed this is confirmed by the EU12 results.

Since a distinctive characteristic of this paper is an analysis of other aspects of openness and their impact on growth we, following the links identified in Diagram 1, widen the analysis by taking into account the influence of financial openness and (formal and informal) institutions. We use FDI per capita as a measure of financial openness, with the idea that the larger the indicator the greater the openness. FDI per capita is instrumented via institutions, productivity, real effective exchange rate and RandD expenditure. The results are given in Table 3.

**Table 3: Openness variable: FDIpc**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| FDIpc | 1.32*** | 1.23*** | 0.98** | 1.53* | 1.38** | 1.36** | 1.37* | -2.48*** |
| | (0.004) | (0.002) | (0.022) | (0.090) | (0.027) | (0.025) | (0.083) | (0.000) |
| GDPgap | -1.43*** | -1.10*** | -1.59 | -1.77 | -2.40** | -1.94* | -2.57 | 4.22*** |
| | (0.001) | (0.006) | (0.338) | (0.148) | (0.035) | (0.093) | (0.483) | (0.008) |
| INV | 0.14** | 0.181*** | 0.10 | 0.215** | 0.07 | 0.155 | 0.10 | 0.44*** |
| | (0.011) | (0.009) | (0.282) | (0.032) | (0.553) | (0.304) | (0.622) | (0.000) |
| POP | -2.04*** | -2.33*** | -1.85** | -1.97 | -2.01*** | -2.39*** | -2.48*** | -3.96*** |
| | (0.000) | (0.000) | (0.023) | (0.135) | (0.005) | (0.004) | (0.002) | (0.007) |
| EDU | 0.14 | -0.04 | -1.02 | 4.94 | 4.80 | 3.70 | 5.01 | -8.71 |
| | (0.950) | (0.985) | (0.567) | (0.571) | (0.407) | (0.536) | (0.406) | (0.303) |
| WGI | 2.12*** | 2.04*** | 1.93*** | 1.70*** | 2.70*** | 2.60*** | 1.83** | 3.06*** |
| | (0.000) | (0.000) | (0.003) | (0.001) | (0.000) | (0.000) | (0.039) | (0.005) |
| PROD | 3.74*** | 4.27*** | 5.14*** | 1.84 | 3.04* | 3.35* | 3.33 | -6.23* |
| | (0.000) | (0.000) | (0.000) | (0.131) | (0.059) | (0.059) | (0.211) | (0.073) |
| REER | 0.47 | 0.362 | -0.85 | 3.28*** | -0.20 | -0.68 | 3.16 | 2.94 |
| | (0.681) | (0.752) | (0.712) | (0.000) | (0.946) | (0.830) | (0.622) | (0.452) |
| R&D | -0.14 | 0.024 | -0.29 | -0.73** | -0.38 | -0.29 | -0.45** | 0.100 |
| | (0.368) | (0.869) | (0.129) | (0.044) | (0.124) | (0.272) | (0.027) | (0.865) |
| 1995-2009 | √ | √ | √ | √ | | | | |
| 2005-2009 | | | | | √ | √ | √ | √ |
| EU27+5Balkan | √ | | | | √ | | | |
| EU27 | | √ | | | | √ | | |
| EU15 | | | √ | | | | √ | |
| EU12 | | | | √ | | | | √ |
| *No. of obs.* | 211 | 197 | 128 | 69 | 87 | 82 | 54 | 28 |
| *Uncentered R2* | 0.9706 | 0.9717 | 0.9787 | 0.9889 | 0.9805 | 0.9801 | 0.9854 | 0.9934 |
| *Partial R2* | 0.1971 | 0.2283 | 0.1591 | 0.5487 | 0.2000 | 0.1971 | 0.1334 | 0.3244 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Hansen J-statistic chi2* | 0.629 (0.889) | 1.490 (0.684) | 4.041 (0.257) | 1.880 (0.597) | 0.268 (0.966) | 0.450 (0.929) | 1.179 (0.758) | 2.79 (0.425) |
| *Kleibergen-Paap rk LM statistic chi2* | 18.79*** (0.000) | 20.92*** (0.000) | 12.01** (0.017) | 10.21** (0.037) | 5.35 (0.253) | 4.98 (0.289) | 5.45 (0.244) | 7.94* (0.093) |
| *Kleibergen-Paap rk Wald statistic chi2* | 47.36*** (0.000) | 57.00*** (0.000) | 22.90*** (0.000) | 64.25*** (0.000) | 18.19*** (0.001) | 17.18*** (0.001) | 12.13** (0.016) | 54.75*** (0.000) |
| *Kleibergen-Paap Wald rk F statistic* | 11.33*** (0.000) | 13.60*** (0.000) | 5.32*** (0.000) | 13.97*** (0.000) | 4.08*** (0.004) | 3.82*** (0.007) | 2.53* (0.053) | 9.29*** (0.000) |
| *Anderson-Rubin Wald test chi2* | 14.70*** (0.005) | 14.62*** (0.005) | 18.80*** (0.000) | 17.76*** (0.001) | 9.51** (0.049) | 7.90* (0.095) | 9.97** (0.040) | 29.11*** (0.000) |
| *Stock-Wright LM S statistic chi2* | 9.48** (0.050) | 9.66** (0.046) | 9.30*** (0.005) | 6.94 (0.139) | 5.18 (0.269) | 5.64 (0.227) | 4.73 (0.316) | 6.89 (0.141) |

**Note:** p-values in parenthesis. *, ** and *** refer to 10, 5 and 1 percent level of significance, respectively.

As was the case in Table 2, Table 3 reports the results for different groups of countries (EU27+5Balkan, EU27, EU15, EU12), as well as for two time periods (1995-2009 and 2005-2009). This again allows us to test whether the impact of financial openness is robust over different group of countries, time periods and possibly over the achieved level of economic and political integration.

The results for EU27+5Balkan and EU27 countries in columns 1 and 2 (for the whole period) and 5 and 6 (for the last 5 years) reveal that financial openness exerts a statistically significant and positive impact on growth in both groups of countries and in both examined periods. The only difference in the estimated growth regression is that in the later period investment loses statistical significance. In both periods the other two significant variables are GDPgap and population. As for the determinants of financial openness only institutions and productivity have a statistically significant impact, with both variables affecting financial openness positively and thus indirectly exerting a positive influence on growth.

In the EU15 sample financial openness is found to be statistically significant and positive in its impact on growth in both examined periods. In the growth regressions the only other significant variable is population which exerts the expected negative influence on growth. Turning to the determinants of financial openness we can observe a statistically significant and positive impact of institutions on financial openness in both periods, whilst productivity is statistically significant only in the whole period and RandD expenditures only in the later period.

The results for the EU12 group provide mixed and confusing evidence regarding the impact of financial openness on growth. In column 4 we can see that FDIpc exerts a statistically significant and positive impact on growth when the whole period 1995-2009 is examined. In this period investment also impacts growth significantly and positively, while the other variables are statistically insignificant. As for the determinants of financial openness the statistically significant variables are institutions, productivity and RandD expenditures, with the first two variables impacting openness positively and the third exerting a negative influence. The estimated results for the later period 2005-2009 (when the formal accession of EU12 was already accomplished) in column 8 suggest that all the variables in growth regression

except education are statistically significant. However, the impact of financial openness in this period turns strongly negative suggesting that FDIpc in this group of countries in the later period is growth depressing. As for determinants of financial openness, institutions and productivity exert a statistically significant influence with a negative coefficient on the productivity variable. We are, thus, left with mixed evidence on the impact of financial openness on growth in the EU12 group of countries. As suggested earlier when dealing with trade openness, caution is needed here as the number of observations is relatively low and the changing signs and significances may not be precisely estimated.

Taking the evidence from Table 3 together it may be concluded, with only one exception related to the EU12 group, that financial openness impacts growth positively, and this applies to both the whole period and the later period. Moreover, productivity and institutions are the main determinants of this aspect of openness, indicating that countries with a more productive labour force and better/more open institutions attract more FDI, which, in turn, exerts a positive impact on growth through diffusion of new technologies and know-how.

As suggested earlier institutions may play an indirect as well as a direct role in influencing growth. In Tables 2 and 3 we investigated the indirect influence of institutions on growth through their impact on trade and financial openness. However, as suggested by Diagram 1, openness of formal and informal institutions may be impacting growth directly also. Therefore, in Tables 4 and 5 we report the results from estimating the impact of formal and informal institutions on growth.

**Table 4: Openness variable: VA**

| | (4) | (3) | (1) | (2) | (8) | (7) | (5) | (6) |
|---|---|---|---|---|---|---|---|---|
| VA | 0.35<br>(0.626) | 0.71<br>(0.571) | 0.37<br>(0.706) | 0.48<br>(0.860) | 2.69<br>(0.191) | 0.75<br>(0.794) | 0.63<br>(0.774) | -3.367<br>(0.542) |
| GDPgap | -0.53<br>(0.151) | -0.541<br>(0.245) | 1.15<br>(0.105) | -1.12<br>(0.223) | -0.96<br>(0.327) | -0.23<br>(0.830) | 2.28**<br>(0.026) | 0.36<br>(0.873) |
| INV | 0.22***<br>(0.000) | 0.253***<br>(0.000) | 0.14*<br>(0.056) | 0.279***<br>(0.000) | 0.30***<br>(0.000) | 0.31***<br>(0.000) | 0.35**<br>(0.033) | 0.264**<br>(0.017) |
| POP | -1.41***<br>(0.000) | -1.42***<br>(0.000) | -0.56<br>(0.233) | -1.41***<br>(0.008) | -1.28**<br>(0.029) | -1.46**<br>(0.015) | -1.54**<br>(0.036) | -1.57<br>(0.302) |
| EDU | -0.62<br>(0.714) | -0.92<br>(0.614) | -0.86<br>(0.499) | 9.57<br>(0.167) | -7.27*<br>(0.093) | -8.87**<br>(0.039) | -5.63<br>(0.140) | 4.81<br>(0.781) |
| 1995-2009 | √ | √ | √ | √ | | | | |
| 2005-2009 | | | | | √ | √ | √ | √ |
| EU27+5Balkan | √ | | | | √ | | | |
| EU27 | | √ | | | | √ | | |
| EU15 | | | √ | | | | √ | |
| EU12 | | | | √ | | | | √ |
| *No. of obs.* | 299 | 262 | 147 | 115 | 122 | 105 | 59 | 46 |
| *Uncentered R2* | 0.6978 | 0.7008 | 0.5826 | 0.7711 | 0.6664 | 0.7136 | 0.5402 | 0.7756 |

**Note:** p-values in parenthesis. *, ** and *** refer to 10, 5 and 1 percent level of significance, respectively.

The evidence reported in Table 4 is not in line with our expectations of the direct impact of formal institutions on growth. This finding of no significant relationship seems to be robust across different samples of countries (EU27+5Balkan, EU27, EU15 and EU12) and both time periods (1995-2009 and 2005-2009). Regarding other variables, in the estimated growth regression investment and population appear to be statistically significant, with investment exerting a positive and population a negative influence on growth in most of the investigated samples.

**Table 5: Openness variable: WVS**

| | (4) | (3) | (1) | (2) |
|---|---|---|---|---|
| WVS | -0.03<br>(0.561) | -0.029<br>(0.621) | -0.07**<br>(0.039) | -0.006<br>(0.944) |
| GDPgap | 0.82<br>(0.224) | 0.548<br>(0.542) | 0.58<br>(0.330) | 1.55<br>(0.197) |
| INV | 0.11<br>(0.179) | 0.17**<br>(0.024) | -0.01<br>(0.900) | 0.11<br>(0.254) |
| POP | -1.50**<br>(0.021) | -0.38<br>(0.807) | 4.95***<br>(0.000) | -2.35*<br>(0.077) |
| EDU | 4.36<br>(0.288) | 5.39<br>(0.167) | 5.36**<br>(0.013) | 22.86***<br>(0.003) |
| 1995-2009 | √ | √ | √ | √ |
| 2005-2009 | | | | |
| EU27+5Balkan | √ | | | |
| EU27 | | √ | | |
| EU15 | | | √ | |
| EU12 | | | | √ |
| *No. of obs.* | 45 | 40 | 20 | 20 |
| *Uncentered R2* | 0.6216 | 0.6498 | 0.9528 | 0.6927 |

**Note:** p-values in parenthesis. *, ** and *** refer to 10, 5 and 1 percent level of significance, respectively. This table does not contain the results for the last five years because the World Values Survey was not undertaken in that period in our sample of countries.

Table 5 reports the results of our estimations of the impact of openness of informal institutions (as represented by the WVS variable) on growth in different samples of countries and for the period 1995-2009. Before interpreting the estimated regressions it should be stressed that these results should be taken with great caution given the small number of observations. This small number of observations is a consequence of the World Value Survey being conducted only sporadically. The results suggest that the statistically significant impact of institutional openness can be observed only for the sample of the old EU members (EU15) and with an unexpected - negative impact on growth. In this sample of countries we also observe a significant but positive impact of population, and the same

applies to education. Institutions in other samples do not exert a significant influence on growth. In the sample EU27 we can observe a statistically significant and positive impact of investment on growth. In other samples investment is not significant. It should also be mentioned that in the EU12 group education variable is significant and positive. However, given the small number of observations in Table 5 we are not very confident about the obtained results.

In summary, even though the theory suggests that openness of formal and informal institutions should be treated as an important determinant of growth, our empirical investigation does not confirm this (the only exception are the results for EU15 when WVS is used as a measure of openness). This is hardly surprising given that, as indicated above, it is very hard to properly measure these variables. A longer available WVS series should enable a better estimation; hence we leave this issue to be tackled empirically in the future. The results from Tables 2 and 3 are more indicative in this sense, i.e. institutions affect growth primarily indirectly – via their impact on trade and financial openness, i.e. through eliminating barriers to free financial and trade flows.

## 4. Concluding remarks

This paper investigates empirically the impact of international openness on growth in a sample of 32 European economies, with openness defined broadly - to account not only for the usual trade openness, but also to account for other aspects like financial openness and institutional openness. The results indicate that international openness plays an important role in affecting growth. This is true for trade and financial openness; whereas institutional openness is found to be of importance only indirectly – via its impact on trade and FDI flows. More precisely, we find that the the positive impact of trade openness is attenuated by stronger formal institutions (supporting the idea that they help dealing with external shocks), export concentration (indicating that greater concentration of exports on a few commodities, i.e. specialisation influences trade positively), productivity (suggesting that productivity improvements lead to higher openness and growth, possibly through increased competitiveness and/or intra-industry and intra-firm resource allocation) and FDI per capita (speaking in favour of FDI being a complement rather than substitute to international trade). Moreover, we find that export specialisation and higher productivity play a more important role for the less developed European countries (EU12). Financial openness is also found to impact growth positively, with productivity and institutions as its main determinants, indicating that countries with a more productive labour force and better/more open institutions attract more FDI, which, in turn, exerts a positive impact on growth through diffusion of new technologies and know-how. Institutions, as indicated before, exert their influence on growth primarily indirectly, whereas their direct influence is not confirmed by the data.

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**Appendix**

For diagnostic testing we use several tests, reported in Tables 2 and 3. These are explained below.

*Hansen J statistic* is a test of overidentifying restrictions. The joint null hypothesis is that the instruments are valid i.e. uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. Under the null, the test statistic is distributed as chi-squared in the (L-K) overidentifying restrictions (where L-K is the number of overidentifying restrictions).

*Kleibergen-Paap rk LM statistic chi2* and *Kleibergen-Paap rk Wald statistic chi2* are tests for underidentification, while *Kleibergen-Paap Wald rk F statistic* tests weak identification. The underidentification tests test the null hypothesis of whether the matrix of reduced-form coefficients on the L1 excluded instruments has rank equal to K1-1 where K1 is the number of endogenous regressors. Under the null (that the equation is underidentified) the statistic is distributed as chi-squared with degrees of freedom equal to (L1-K1+1). A rejection of the null indicates that the matrix is full column rank; i.e. that the model is identified. Weak identification arises when the excluded instruments are correlated with the endogeous regressors but only weakly. When errors are assumed to be i.i.d., the test for weak identification automatically reported by *ivreg2* is an F version of the Cragg-Donald Wald statistic. Stock and Yogo (2005) have compiled critical values for the Cragg-Donald F statistic for several different estimators, and the same critical values are used for the Kleibergen-Paap tests (details can be found in Kleibergen and Paap, 2006; Cragg and Donald, 1993).

Additional two statistics provide inference for testing the significance of the endogenous regressors in the structural equation being estimated, and these are *Anderson-Rubin Wald test chi2* and *Stock-Wright LM S statistic chi2* tests. The null hypothesis tested in both cases is that the coefficients of the endogenous regressors in the structural equation are jointly equal to zero and that the overidentifying restrictions are also valid. The tests are equivalent to estimating the reduced form of the equation (with the full set of instruments as regressors) and testing that the coefficients of the excluded instruments are jointly equal to zero. Both statistics are distributed as chi-squared with L1 degrees of freedom, where L1 is the number of excluded instruments (details can be found in Anderson and Rubin, 1949; Stock and Wright, 2000).