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Essay on Growth and Globalization

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Vincenza Testa

Tutor
Chiar.ma Prof.ssa
Silvia Rita Angilella

Co-Tutor
Chiar.ma Prof.ssa
Annalisa Russino

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Introduction - *Essay on Globalization and Growth*

Globalization process can be defined as the worldwide growth of the relationships among countries that regards all the aspect of their connexions: economic, financial, legal, social and cultural systems are involved in this process of change. It is an aggregate concept that denotes increasing global linkages created through cross-border flows. More integration among countries depends on different factors: a strong reduction of transportation and communication costs, a removal of barriers and tariffs on goods, services and capitals, and a reduction of geographical restrictions on knowledge, people and cultural environment (Samimi et al. 2011).

For three decades, globalization seemed to be an unstoppable and persistent trend. There has been not only an increasing volume of transactions between developed countries, but also an increasing stream of financial flows from companies situated in developed countries to developing countries to ensure new and potential resources. This is the results of a combination of *pull* factors, like changes in policies and liberalizations of capital accounts and markets, and *push* factors like business cycle conditions and macroeconomic policies (deregulation and disintermediation) (Prasad et al. 2003).

Globalization has generated a wide debate around benefits and costs derived from it. The benefits highlighted are multiple. The perceived isolation of emerging countries reduces thanks to the circulation of new knowledge and communication media. The current level of interconnection would be impossible without a globalized system. Domestic savings may rise; capital-rich countries invest in capital-poor countries taking a higher return on capital. Cost of capital may be lower since a better global allocation of risk allows diversifying risks and encouraging firms to take more investments. As a consequence of the increasing of capital flows, the stock market would be more liquid, reducing the equity risk premium and the cost of capital. The financial sector is more developed than before; the access to international markets is easier, new instruments of investment are introduced and an improvement in domestic markets is realized in a

context with more regulation, new supervisory authorities and transparency rules. Barriers, tariffs and restrictions to the international markets are eliminated, allowing a better circulation of goods, services, financial instruments, workers and knowledge (Prasad et al. 2003). The costs of globalization are mainly related to its influence on growth volatility and effects on developing countries. Emerging countries can have problems in managing the capital inflows and the shifts of international capital flows. For this reason, many policymakers from developing countries have questioned the choice of entering into a financial integrated system, casting doubts on the fact that the benefits deriving from the higher long-term growth can overcome the costs deriving from larger financial instability (Lane and Milesi-Ferretti, 2008).

International organizations and more developed countries have written the rules of this process and applied them to all countries, not considering the original situation and costs that globalization can cause to developing countries (Kose et al., 2011, Stiglitz, 2002, Dowrick and Golley, 2004). In many cases, the benefits of globalization have been lower than expected. The unstoppable trend of change has not left enough time for countries to adapt their political, cultural and social environment to the new situation. Crises developed in the entire world cast doubts on the benefits of globalization generating the suspicion that the connections between countries may lead to instability and macroeconomic and market volatility (Dellas and Hess, 2002).

The last decade represented a new era of globalization. From the Eighties, most of the countries, especially the emerging ones, are moving quickly towards an opened system. The concern about the issues related to the globalization phenomenon increases accordingly (Samimi et al. 2011). The growing gap between rich and poor has impoverished an increasing number of people in developing countries; poverty rates are constantly rising. In Africa, after the independence from the European countries, the living expectations, that improved in the past, start to decrease. Most of emerging countries are unable to attract foreign investments. Asian and Latin American crisis of the past decades have been a threat for all the emerging economies end their political stabilities and the risk of a currency collapse could have affected the entire economy. Countries coming from the communist model hoped that the new globalized system would have led prosperity and growth. However, the reality showed that the globalized economy might be worse (Stiglitz, 2002). Specifically, entering in a globalized system

may produce risks. The costs deriving from low stability and high volatility are shown in the years of economic crises and may overcome the benefits. Opening to capital flows and trade flows without the right initial conditions may lead to potential risks (Kose et al., 2011). Even controlling for particular initial characteristics of the countries, globalization may not contribute to speed up the growth process (Edison et al.,2002).

As mentioned above, globalization, as a complex phenomenon, affects the economic, financial, legal, social and cultural systems. The effects are evident in the different environments, but they are also related, creating effects in the overall system interacting with each other. From the complexity of globalization derives the difficulty of measuring it (Samini et al. 2011). Over the years, several measures have been developed to capture the effects of the globalization phenomenon. In this thesis, I try to consider all the different aspects involved in the globalization process and all the sub-dimensions that can affect economic growth and macroeconomic volatility. I will provide a comparative analysis, starting from the existing literature, of the different globalization indices to verify whether overall globalization is able to influence growth or whether there are some specific aspect of globalization having an impact on it.

The thesis is structured as follows. The first chapter is an updated review of literature focused on globalization measures. The aim of this chapter is to consider all the different aspects involved in the globalization process and all the sub-dimensions that can affect economic growth and macroeconomic volatility. In particular, I analyze the different types of globalization measures, starting from the complex measures and arriving to specific sub-dimensions, identifying the different approaches used in the literature to find a proxy that well represents globalization. Different aspects of the globalization phenomenon may have distinct impacts on growth and affect differently the relationship leading to different conclusions. Comparing the alternative indices, it is possible to capture the dynamics between a specific aspect of the globalization phenomenon and growth. I will provide a comparative analysis of the different globalization indices proposed by the literature to verify whether a measure of overall globalization is related to growth or whether the relationship between growth and globalization is better captured by indices measuring specific aspects of globalization.

The second chapter provides an empirical analysis of a panel of countries to study the relationship between growth and globalization using both a static and a dynamic

approach. I focus on a 5-years panel of 183 countries from 1970 to 2014 in order to capture the impact that different indices of globalization may have on growth. Focusing on indices capturing different aspects of the globalization phenomenon is useful to understand how a specific sub-dimension may go along with the others or go to different directions. Firstly, I develop a static approach starting from the Barro (2003) growth model adapted by Dreher (2006) to focus on economic integration. I take into account the different globalization indices stressed in Chapter 1: a capital openness index, a financial integration index, a trade openness index, social and political globalization indices, a cultural proximity index and an economic freedom index. I run a Pooled OLS (POLS) model and then I include Fixed Effects (FE) if appropriate. The results highlight that generally the most complex measures, fail to capture the relationship between globalization and growth while simple indices, focused on specific sub-dimensions of the globalization phenomenon, are positively related to growth. Secondly, I take into account the possible endogeneity of the globalization measures in the static analysis. To address this problem I develop two different settings: a IV model in which the globalization indices are instrumented using different instruments, and a dynamic model using the Arellano-Bond estimator in which the endogenous variables are instrumented by their lags. The results are in line with those obtained in the static analysis. Furthermore, I introduce the hypothesis that the initial economic development can be crucial in the relation between globalization and growth. Firstly, I introduce an interaction between globalization indices and the initial level of GDP per capita to verify the hypothesis that globalization may affect growth in a different way depending on the level of economic development. This setting assumes that the general underline structure of the model is the same for all countries. Secondly, I develop an approach based on a stronger assumption: the level of economic development may affect all the slope coefficients of the estimated regression model. I focus on two sub-samples, developed and developing countries. I split the original sample using the average level of the initial GDP per capita; countries with initial average GDP level below the overall average initial GDP are classified as developing, otherwise as developed. The results show that the initial level of economic development is important to capture the benefits deriving from the globalization process in terms of growth. Countries with higher initial level of economic development catch more benefits from the globalization with respect to the poorer countries.

The third chapter is an empirical analysis of the relationship between macroeconomic cycle volatility and globalization in European countries. In that chapter, globalization is measured from a financial point of view using the financial integration indices stressed in the first chapter. Firstly, I focus on a sample of European countries to verify if financial integration developed during the decades affect macroeconomic volatility. Secondly, introducing some control groups, I compare countries that are part of the Euro zone with those that are not. That is, in my setting, the financial integration is represented by the fact of being part of the Euro zone. I aim to verify if being part of the Euro zone may affect the macroeconomic cycle volatility.

I analyze output volatility using two different measures: the standard deviation of the growth rate of GDP per capita and the standard deviation of the cycle of the same measures, obtained applying the Hodrick-Prescott filter. I try to address the problems highlighted by the literature explaining the difficulty in finding significant results in empirical analyses. The first issue is related to the fluctuation of volatility over the years. This may make difficult to find a significant relationship between globalization and macroeconomic volatility. The descriptive analysis on my sample confirm the presence of fluctuations over the considered periods. The second issue is represented by a possible non-homogeneity of the sample. Countries belonging to the same macro-region are affected by the same cyclical conditions. Thus, in a non-homogeneous sample, it is difficult to detect a significant relation between globalization and cycle volatility. To capture the effect due to regionalism, I collect a panel of European countries with similar features. The third issue is the different nature of the shocks, temporary or permanent, that may affect output volatility differently (Razin and Rose, 1992). Using a Hodrick-Prescott filter allows focusing on the temporary shocks. I start the analysis on 41 European countries from 1970 to 2014. I firstly apply the POLS and then, if fixed effects are detected, I use the within estimator. I start from the regression model by Kose et al. (2003). As regressors, I use the financial integration indices highlighted in the first Chapter. This general analysis does not provide significant results. Then, to verify if the regionalism phenomenon affects the dynamics between globalization and growth volatility, I develop alternative specifications. Firstly, I introduce in the previous model a dummy identifying the countries that are Euro members and I interact it with the financial integration indices. The aim is to estimate the change in cycle macroeconomic

volatility caused by globalization in the Euro zone. Secondly, I develop a Difference in Difference (DD) estimator in which I assume that, in the absence of an entry in the Euro, volatility would have had a parallel path in treated and not treated countries. The results show that globalization affect positively output volatility. In order to check the robustness of the results I develop two alternative settings. Firstly, I re-run all the previous model, POLS, FE and DD using as dependent variable the private consumption volatility. In the European countries the household final consumption expenditures represents 55% of the GDP. Thus, consumption volatility may provide a robustness check to the output volatility. All the previous results are confirmed. Secondly, in order to provide a strong DD model, I reduce the sample to the countries that are part of the European Union (EU) in which the parallel path assumption is more robust due the fact that these countries represent a more homogeneous sample. The analysis strongly confirms that globalization affect positively both output and consumption volatility.

Chapter 1 - *A survey of globalization indices*

Globalization is a complex phenomenon that affects the economic, financial, legal, social and cultural systems. The effects related to the global linkages are evident in the different environments, but these tend to be connected between them, creating effects in the overall system, interacting with each other and generating a network of people, ideas, data, goods and capitals (Clark, 2000).

Due the complexity of the connections involved in the globalization process, it becomes difficult to measure them empirically. Over the years, several measures have been proposed to capture the effects of the globalization phenomenon. Some scholars focus on complex indices obtained using statistical procedures that combine in only one index all the sub-dimensions related to the globalization process (Dreher, 2006, Gwartney and Lawson, 2003). Others prefer to concentrate specific aspects of globalization creating indices focusing on them (Chinn and Ito, 2008, Lane and Milesi-Ferretti, 2003). The aim of this chapter is to introduce different measures of globalization, to understand the differences among them, and to provide a preliminary descriptive analysis of the indices that are used in the next chapters. To this end, in the following sections, I present a descriptive analysis based on the sample of countries used for the analyses in this thesis. The sample covers the period 1970-2014 and includes 183 countries. The whole sample is split into two sub-samples on the basis of the average initial level of GDP per capita. Countries with an initial GDP per capital greater than the average level are labelled as *Developed*, while countries with an initial GDP per capital lower than the average level are considered as *Developing*.

In this thesis, I focus on both the overall measures of globalization and measures related to the sub-dimensions of the globalization phenomenon to provide a comparative analysis of the different indices used in the literature.

I analyze the different types of globalization measures, starting from the complex measures and arriving to the measures related to specific sub-dimensions, discussing the

different approaches used in literature to find a proxy that well represents globalization. Different aspects of the globalization phenomenon may have different impact on growth and affect the relationship in ways that may lead to different conclusions. Comparing the different indices, it is possible to capture the dynamics between a specific aspect of the globalization phenomenon and growth.

1 Complex Globalization indices

I start dividing the globalization indices used in the empirical analysis based on the method employed to construct them. The first group of indices are complex indices constructed using statistical procedures like Principal Component Analysis, PCA, that combines different sub-indices in order to synthetize in a single measure many aspects of a complex phenomenon.

The second group of indices used in the empirical analyses are simple indices. They are proxies representing specific dimensions used to capture defined aspects of the globalization process.

1.1 Dreher's indices

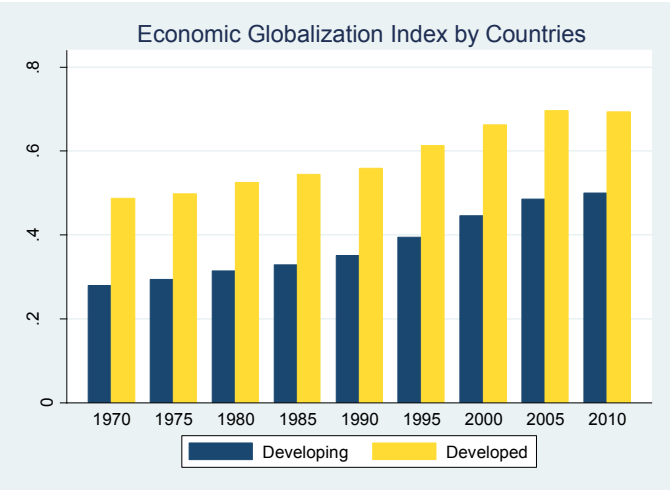
Dreher (2006) considers the overall impact of globalization on economic growth, highlighting that the effect of a single sub-dimension of globalization on growth can lead to misunderstanding the real relationship leaving aside some important aspects. The Overall Globalization Index he proposes aims to capture the complexity of the phenomenon.

He starts from three different indices that measure single aspects of globalization: economic, social and political globalization. These are obtained combining other related sub-indices.

To construct the proxies, each variable is transformed to an index from zero to ten using the transformation $((V_i - V_{min})/(V_{max} - V_{min}) * 10)$; the higher the value, the more globalized is the country. All the indices are obtained through a PCA appropriately weighting the single measures to account for the data variability.

To measure **Economic Globalization**, he constructs two sub-indices. The first one measures the *Actual Flows* in percent of GDP. It contains variables like Trade, Foreign Direct Investment, Portfolio Investment and Income Payments to Foreign Nationals. The second one is *Restrictions* on trade and capital. It contains variables like Hidden Import Barriers, Mean Tariff, Taxes on International Trade in percent of current revenues, and Capital Account Restrictions. Figure 1 shows how Economic Globalization Index is higher in developed countries and it constantly increases.

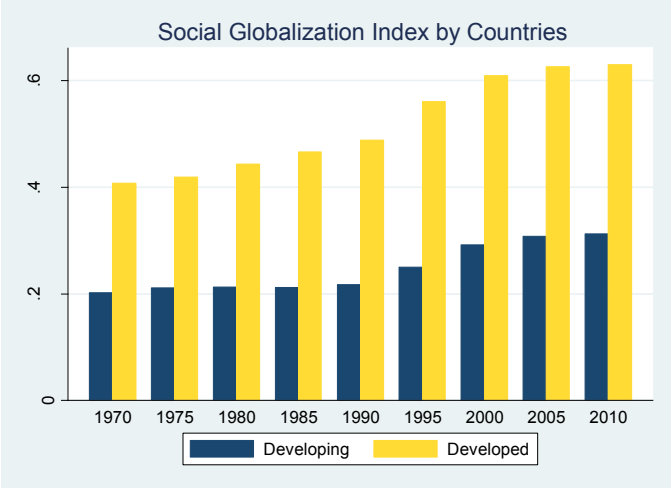
Figure 1. Economic Globalization Index



Economic Globalization Index in Developing and Developed Countries

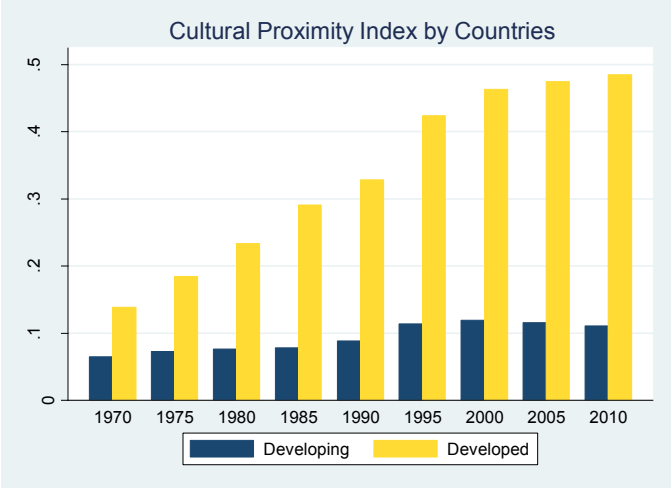
The second index of **Social Globalization**, is obtained from three measures. The first one is constructed using data on *Personal Contacts* and it is based on variables like Telephone Traffic, Transfers in percent of GDP, International Tourism, Foreign Population in percent of total population, and International Letters per capita. The second one measures the *Information Flows* and it uses data on Internet Users, Televisions and Trade in newspapers. The last one represents the *Cultural Proximity* measured as the dominance of products consumed all over the world. It is constructed using the Number of McDonald's restaurants per capita, the Number of Ikea per capita and Trade in books in percentage of GDP. In the empirical analysis, I will use both the overall Social Globalization index and the Cultural Proximity sub-index.

Figure 2. Social Globalization Index



Social Globalization Index in Developing and Developed Countries

Figure 3. Cultural Proximity Index



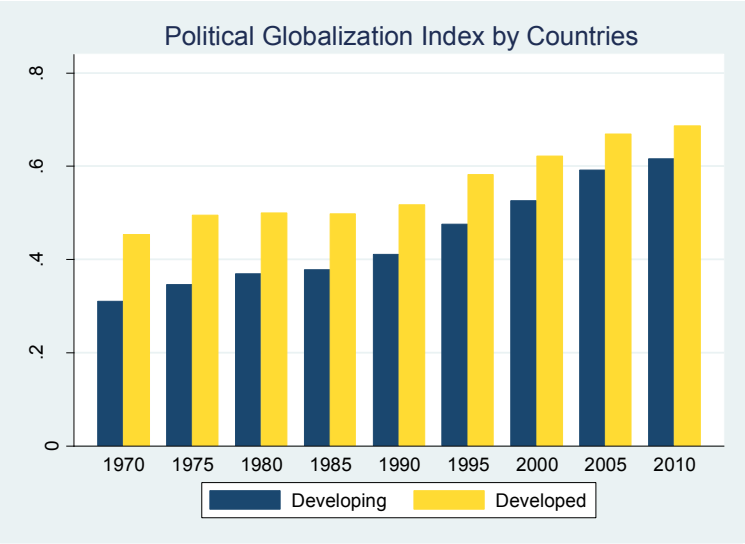
Cultural Proximity Index in Developing and Developed Countries

As it is shown in Figure 2, for the Developed sample the Social Globalization index is increasing while for Developing sample it is constant in the first periods until 1990 and then it grows. As before, from Figure 3, the Cultural Proximity index constantly increases in Developed samples, while for Developing ones increases between 1990 and 1995, in the other periods the index is almost constant but the gap between the two sub-samples is more emphasized.

The last index, measuring the degree of **Political Globalization,** is constructed using the Number of Embassies in a Country, the Number of International Organizations of which the country is a member, the Number of Participations in U.N. Security Council

Missions, and the number of International Treaties signed. Figure 4 shows that Political Globalization has been steadily increasing over the years in both the developed and the developing sub-samples.

Figure 4. Political Globalization Index



Political Globalization Index in Developing and Developed Countries

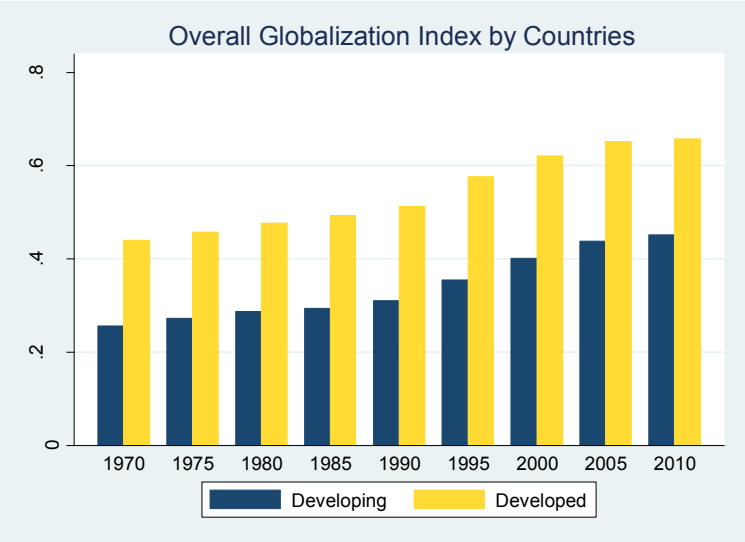
Table 1 reports the last version of the Dreher's indices released in 2017, the results of the PCA, and the weights of the single variables. We can observe from the table that the most important component are the Social and the Economic measures accounting, respectively, for the 37% and the 36% of the total variability. The Political sub-dimension is less relevant to determine the Overall index. In the following analyses I use the Overall index and the Economic, Political and Social indices, but also the sub-index Cultural Proximity to capture a specific aspect related to the consumption habits of people.

Table 1. Dreher's Globalization indices

Economic Globalization			**[36%]**
Actual Flows		(50%)	
Trade (percent of GDP)	(21%)		
Foreign Direct Investment, stocks (percent of GDP)	(28%)		
Portfolio Investment (percent of GDP)	(24%)		
Income Payments to Foreign Nationals (percent of GDP)	(27%)		
Restrictions		(50%)	
Hidden Import Barriers	(22%)		
Mean Tariff Rate	(28%)		
Taxes on International Trade (percent of current revenue)	(26%)		
Capital Account Restrictions	(24%)		
Social Globalization			**[37%]**
Personal Contact		(33%)	
Telephone Traffic	(25%)		
Transfers (percent of GDP)	(2%)		
International Tourism	(26%)		
Foreign Population (percent of total population)	(21%)		
International letters (per capita)	(25%)		
Information Flows		(36%)	
Internet Users (per 1000 people)	(37%)		
Television (per 1000 people)	(39%)		
Trade in Newspapers (percent of GDP)	(25%)		
Cultural Proximity		(32%)	
Number of McDonald's Restaurants (per capita)	(47%)		
Number of Ikea (per capita)	(47%)		
Trade in books (percent of GDP)	(6%)		
Political Globalization			**[27%]**
Embassies in Country	(25%)		
Membership in International Organizations	(27%)		
Participation in U.N. Security Council Missions	(22%)		
International Treaties	(26%)		

Figure 5 shows that the Overall globalization index, has been increasing reflecting the increase of its sub-components. The gap between the two sub-samples is almost constant

Figure 5. Overall Globalization Index



Overall Globalization Index in Developing and Developed countries

Dreher (2006) studies the relationship between globalization and growth. He uses a sample of 123 countries and he finds that globalization is positively related to growth. The dynamic analysis shows that the Overall Globalization index is positive and significantly associated with growth. When he tries to identify which component is more important specifying models including the three different sub-indices, he finds that only the Economic Index is significantly related to growth, while the Social and Political indices have no influence on the GDP growth rate.

1.2 Economic Freedom Index

The index proposed by Gwartney and Lawson (2003) is also a complex index; it is an attempt to revise previous indices of **Economic Freedom** enlarging the structure of the component in order to have a more comprehensive index that reflects also the legal and regulatory structure. It is not a pure proxy of the globalization phenomenon but it

contains a specific section that describes freedom to exchange and trade openness. It has elements that measure specific aspects of the international trade environment as taxes, mean tariffs, hidden import barriers, international capital. Generally, economic freedom and globalization seem to be closely related. Empirical studies suggest that economic freedom affects globalization rather than the opposite (Macedo et al. 2007). Following this result, I choose to use this complex variable as a proxy of the globalization phenomenon.

The economic freedom index is constructed collecting data in five key areas as shown in Table 2. The variables used are important to define the level economic freedom in a country in terms of personal choices, voluntary exchange, freedom to compete, protection of property rights and persons. If a country presents a high level of economic freedom, personal choices of the consumers are important to define which goods and services are produced and traded. In this context, the legal environment promotes economic freedom providing a system able to guarantee voluntary exchange, protection for consumers and of property rights. Moreover, the monetary system should promote access to sound money, money that has a purchasing power determined by markets and is independent of governments and political parties, to remove obstacles to trade. International trade and taxes, mean tariffs, hidden import barriers, international capital controls affect economic freedom and more generally globalization (Gwartney and Lawson, 2003). Economic freedom comprehends also political and civil liberties and the possibility to trade with foreign countries. The components of the index are the following,

Table 2. Economic Freedom index

Area I: Size of government: expenditures, taxes, and enterprises
A. General government consumption spending as a percentage of total consumption
B. Transfers and subsidies as a percentage of GDP
C. Government enterprises and investment as a percentage of GDP
D. Top marginal tax rate (and income threshold to which it applies)
Area II: Legal structure and security of property rights
A. Judicial independence: the judiciary is independent and not subject to interference by the government or parties in disputes (GCR)
B. Impartial courts: a trusted legal framework exists for private businesses to challenge the legality of government actions or regulation (GCR)
C. Protection of intellectual property (GCR)
D. Military interference in rule of law and the political process (ICRG)

E. Strength and impartiality of the legal system and popular observance of the law (ICRG)

Area III: Access to sound money

A. Average annual growth of the money supply in the last five years minus average annual growth of real GDP in the last ten years

B. Standard deviation of annual inflation in the last five years

C. Annual inflation in the most recent year

D. Freedom of citizens to own foreign currency bank accounts domestically and abroad

Area IV: Freedom to exchange with foreigners

A. Taxes on international trade

i. Revenue from taxes on international trade as a percentage of exports plus imports

ii. Mean tariff rate

iii. Standard deviation of tariff rates

B. Regulatory trade barriers

i. Hidden import barriers: No barriers other than published tariffs and quotas (GCR)

ii. Costs of importing: the combined effect of import tariffs, licence fees, bank fees, and the time required for administrative red-tape raises costs of importing equipment by (10 = 10% or less; 0 = more than 50%) (GCR)

C. Actual size of trade sector compared to expected size

D. Difference between official exchange rate and black market rate

E. International capital market controls

i. Access of citizens to foreign capital markets and foreign access to domestic capital markets. (GCR)

ii. Restrictions on the freedom of citizens to engage in capital market exchange with foreigners—index of capital controls among 13 IMF categories

Area V: Regulation of credit, labor, and business

A. Credit Market Regulations

i. Ownership of banks: percentage of deposits held in privately owned banks

ii. Competition: domestic banks face competition from foreign banks (GCR)

iii. Extension of credit: percentage of credit extended to private sector

iv. Avoidance of interest rate controls and regulations that lead to negative real interest rates

v. Interest rate controls: interest rate controls on bank deposits and/or loans are freely determined by the market (GCR)

B. Labor Market Regulations

i. Impact of minimum wage: the minimum wage, set by law, has little impact on wages because it is too low or not obeyed (GCR)

ii. Hiring and firing practices: hiring and firing practices of companies are determined by private contract (GCR)

iii. Share of labor force whose wages are set by centralized collective bargaining (GCR)

iv. Unemployment benefits: the unemployment benefits system preserves the incentive to work (GCR)

v. Use of conscripts to obtain military personnel

C. Business Regulations

i. Price controls: extent to which businesses are free to set their own prices

ii. Administrative conditions and new businesses: administrative procedures are an important obstacle to starting a new business (GCR

iii. Time with government bureaucracy: senior management spends a substantial amount of time dealing with government bureaucracy (GCR)

iv. Starting a new business: starting a new business is generally easy (GCR)

v. Irregular payments: irregular, additional payments connected with import and export permits, business licenses, exchange controls, tax assessments, police protection, or loan applications are very rare (GCR)

Economic Freedom Index: sub-indices. GCR= Global Competitiveness Report. ICRG = International Country Risk Guide.

The components of the Area I are representative of how much consumer's choices and markets affect the production and distribution process. As Government size increases, the economic freedom decreases. Area II is representative of the legal system: protection of property rights, the independence and impartiality of the judiciary system, the security of the enforcement of the contracts are crucial elements to improve economic freedom (Gwartney and Lawson, 2003).

Area III focuses on sound money defined as money that has a purchasing power determined by markets, and is independent of governments and political parties. Economic freedom is linked to the possibility that consumer have to access to sound money. It is also included the role of the inflation phenomenon in the pricing of goods (Gwartney and Lawson, 2003).

Area IV is an important component regarding the globalization phenomenon. Trade openness is a crucial element of economic freedom. In recent times, free movement of the capitals has given an important push to international trade: a large amount of the consumed products comes from abroad modifying the habits of the people. However, countries have retained some kind of restrictions limiting the global transactions in order to protect domestic trade from the foreign competition. This area measures the restrictions, such as tariffs, barriers, and capital controls, charged to limit international trade (Gwartney and Lawson, 2003).

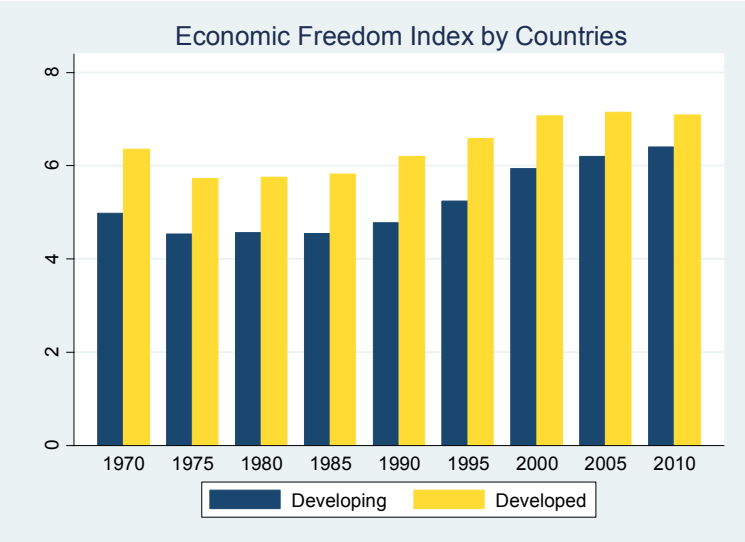
Area V includes measures related to restrictions on credit, labor and business. In particular, restraints on credit can affect the possibility to access to a foreign bank and the competition between domestic and foreign banks. While restrictions on business (like price controls, bureaucracy, additional payments related to the authorization to import

and export, and licenses) can limit the activity of the firms at national level but also the possibility to enter in globalized markets (Gwartney and Lawson, 2003).

To construct the Economic Freedom Index, Gwartney and Lawson try different strategies to aggregate the components of the overall index that synthetize all related sub-indices. Firstly, they assign equal weights to each component. Secondly, they construct the weights inversely with respect to the standard deviations distribution of the components. Thirdly, they follow a reasoned economic analysis, index by index, discussing the single weight should be assigned to each measure. Finally, in their most recent paper, they use a PCA to define the weights of each sub-indices. The authors discuss the problems found to construct the final index. Despite they have tried different methods, none of them seems completely acceptable. The last version of the index uses a PCA. This strategy is satisfactory from the statistical point of view, but can have the weakness of not considering the advices of the economic theory about the importance that some areas should have with respect to others.

Figure 6 shows the temporal pattern of the Economic Freedom index obtained through PCA. The index is decreasing until 1980 and then it increases over the years; in the three last periods, it is almost constant in the Developed sample, while in the sample of Developing countries it is constantly increasing from the Eighties.

Figure 6. Economic Freedom Index



Economic Freedom Index in Developing and Developed Countries

2 Simple Globalization indices

The following indices aim to represent a specific dimension of the globalization phenomenon. As stressed before, complex indices may create problems in the empirical application since they use a lot of information. The reason that leads to the use of more specific indices is that different aspects of the globalization phenomenon may have different impact on growth and affect the relationship between globalization and growth in a different way. Thus, an overall measure of globalization may fail to detect a relationship with growth because of the impact of counterbalancing forces.

The alternative is to focus on specific sub-dimensions of the globalization phenomenon. In this thesis, I use a simple index describing financial integration and trade openness.

2.1 Kaopen index

Chinn and Ito (2008) develop a new index of **Capital Openness** in order to overcome the previous measures unable to capture capital controls and their intensity. They criticize the binary variables based on the Annual Report on Exchang+e Arrangements and Exchange Restrictions (AREAER) made by the IMF and other aggregate measures that cannot allow to capture all the aspects of capital controls. They start from binary dummies described in the AREAER representing restrictions on foreign financial transactions; in particular, the above-mentioned variables indicate

- the existence of multiple exchange rates (k_1);
- restrictions on current (k_2) and capital account transactions (k_3);
- the obligation of the submission of export profits (k_4);

This classification was valid until 1996, afterwards the IFM modified the categories in order to capture the complexity of the capital control policies; especially for k_3 was indicated a list of 13 variables to take into account the capital account transactions (Chinn and Ito, 2008). They used this classification and the subsequent changes to construct the Kaopen index inverting the dummies in order to emphasize the financial openness rather that controls. Thus, dummies are equal to one if there are not capital account restrictions.

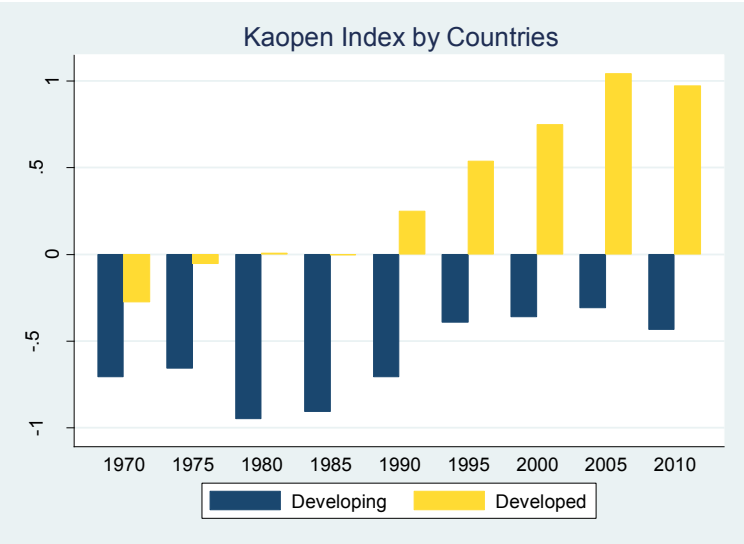
To capture the effect of capital controls they consider a 5-year period, including the years in which there were not controls, to construct the following index

$$SHAREk_{3,t} = \left(\frac{k_{3,t} + k_{3,t-1} + k_{3,t-2} + k_{3,t-3} + k_{3,t-4}}{5}\right)$$

To construct the Kaopen index they use a PCA, extracting the first standardized component of $k_{1,t}$, $k_{2,t}$, $SHAREk_{3,t}$ and $k_{4,t}$.

The aim of this index is to measure the intensity of capital controls taking into account the different types of restrictions that are related to foreign transactions (Chinn and Ito, 2008).

Figure 7. Kaopen Index



Kaopen Index in Developing and Developed Countries

Figure 7 shows that Kaopen in Developed countries is constantly increasing; it starts negative and then it becomes positive. For the developing sample, the index is always negative; it has his minimum in the Eighties and then it increases until 2005.

2.2 The Lane and Milesi-Ferretti's indices

Lane and Milesi-Ferretti (2003) study the dynamics of the increasing links among countries due to the financial integration. They provide a set of measures representing the composition of the **Flows of Capital** using foreign assets and liabilities considering them as drivers of the growth of international financial integration. They study the relation between rates of return on foreign investments and others returns and the relation between national and international rate of returns and the fluctuations of the exchange rate. Foreign assets and liabilities are used to measure global linkages of the countries. They can take advantages from this flow of capitals hedging the domestic investment risk, but, on the other hand, they could also cause an increase in volatility. Assets and liabilities are provided using the methodology of IMF and divided into categories

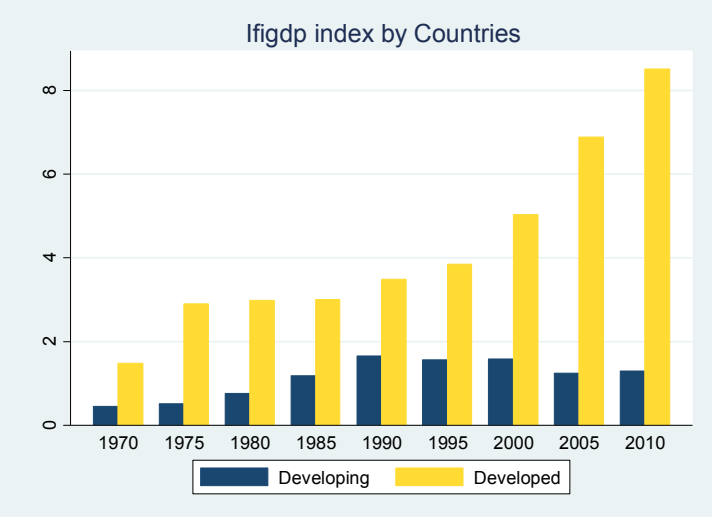
- foreign direct investment (FDI),
- portfolio equity investment,
- portfolio debt investment,
- other investment,
- derivatives,
- official reserves (provided just for assets)

The first measure of international financial integration that I use in this thesis is a measure based on the stocks of external assets and liabilities,

$$Ifigdp_{it} = \frac{FA_{it} + FL_{it}}{GDP_{it}}$$

where FA_{it} represents total external assets and FL_{it} represents total external liabilities. Total assets contain portfolio equity assets, FDI assets abroad, total debt assets, reserves, and derivatives assets. Total liabilities contain portfolio equity liabilities, FDI liabilities abroad, total debt liabilities and derivatives liabilities. These variables represent transitory capitals and are quite high for financial centers (Lane and Milesi-Ferretti, 2003)

Figure 8. Ifigdp Index



Ifigdp Index in Developing and Developed Countries

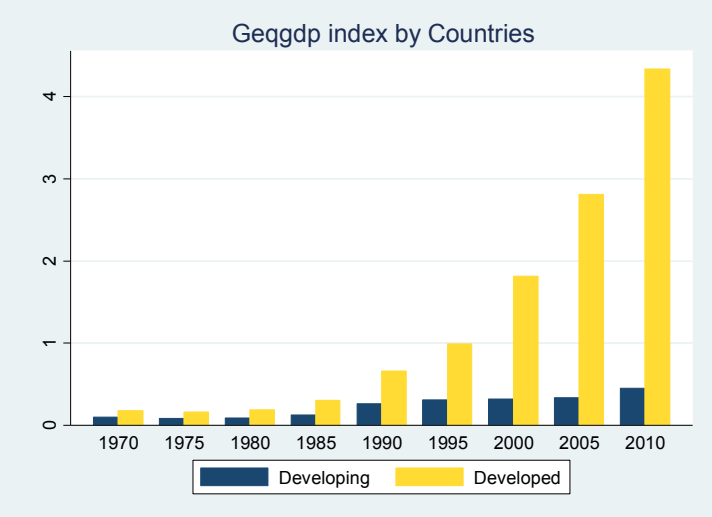
Figure 8 plots the evolution of the *Ifigdp index* over the period considered in the empirical analysis. Until 1985 the index is substantially constant in both samples, afterwards it starts to increase. Starting from 1990, it dramatically increases in the developed sample highlighting how much globalization and capital openness allow making investments abroad. For emerging countries after a peak in 1990, the index starts to decrease slowly. The figure shows a remarkable difference between them.

The second index I used is a measure that involves the equity market and capitals abroad,

$$Geqgdp_{it} = \frac{(PEQA_{it} + FDIA_{it} + PEQL_{it} + FDIL_{it})}{GDP_{it}}$$

where $PEQA_{it}$ is the stock of portfolio equity assets, $PEQL_{it}$ is the stock of portfolio equity liabilities, $FDIA_{it}$ is the stock of foreign direct investment asset and finally $FDIL_{it}$ is the stock of foreign direct investment liabilities. It is a measure of the level of equity considering both foreign investments and portfolio investments (Lane and Milesi-Ferretti, 2003)

Figure 9. Geqgdp Index



Geqgdp Index in Developing and Developed Countries

Figure 9 shows the temporal pattern of the index. The 1990 period marks a significant difference with the past in the developed sample. With respect to the *Ifigdp Index* the growth is larger and faster, more than tripling its value. In emerging countries, there is a slight increase over time.

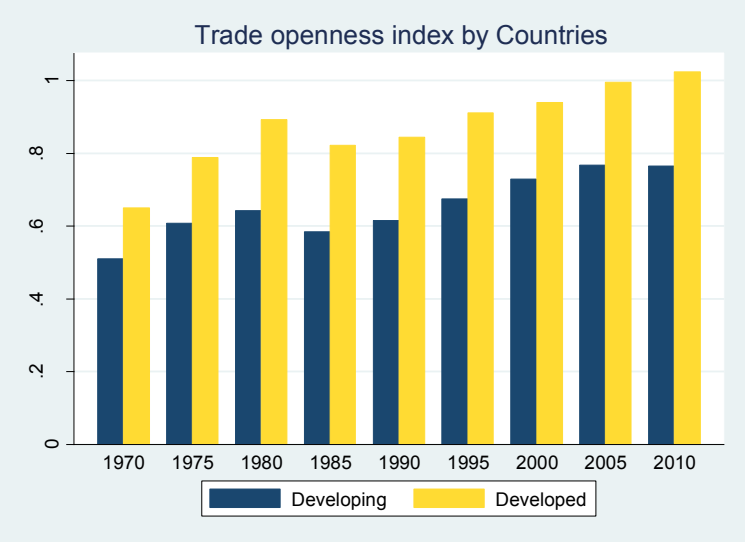
Lane and Milesi-Ferretti (2003) analyze the features that can influence international asset exchanges and possible costs and benefits deriving from it. As the account openness grows, the international assets cross-holdings grow. Secondly, they examine the relationship between trade in assets and trade in goods and services. Trade in goods may affect directly assets trade since it involves financial transactions and consumers who accept to buy foreign goods that produce cross-border financial transactions may accept to invest in foreign assets reducing the home bias present in equity markets.

Summarizing their results, they found that variables like trade openness, the level of GDP per capita, and variables measuring financial market's depth, like Stock Market Capitalization, are positively associated to international financial integration.

2.3 Trade Openness index

It describes how much a country is open to **Foreign Trade**. It is used in many papers (Barro, 2003, Dreher, 2006) to simply describe the trade openness. It is obtained from the World Bank database. It is the sum of exports and imports of goods and services measured as a share of GDP.

Figure 10. Trade Openness Index



Trade Openness in Developing and Developed Countries

Figure 10 shows that the Trade openness is constantly increasing since 1985 in both Developed and Developing sample.

3 Review of the indices

The indices highlighted before represent attempts to measure the globalization phenomenon. Simple and complex indices have both advantages and disadvantages.

Through complex indices scholars try to capture the different sides of the globalization synthetizing them in one single index. In order to evaluate this kind of indices, several aspects should be considered. Firstly, the number of sub-indices involved. When many sub-indices are used, the complexity of the obtained index increases and it becomes difficult to understand the meaning of the constructed index and which aspect,

among the different components, is relevant. Some variables can be redundant and they may add complexity to the analysis without giving relevant extra information. Thus, in this case it is recommended to discard some of them (Jolliffe, 1972). At the same time, a large number of information may be not available for some countries and for some periods and this may reduce the temporal and spatial extent of the index (Samimi, 2011).

Secondly, the method used to establish the weight of the sub-indices. The complex index presented in this thesis are constructed using a PCA. The main purpose of the PCA is to reduce the size of data that are closely related to each other, trying to preserve as much as possible the variations between them. This is accomplished transforming the data into a new set of variables, the Principal Components (PCs), using weights obtained maximizing the variance of these components. The advantage of the PCA is due to the fact that PCs are able to capture the variability among the variables reducing the dimension and keeping as much variation as possible. However, this statistical technique has been criticized in the empirical work since it can be difficult to interpret the PCs (Zou et al., 2006). In addition, it is important to consider just the sub-indices that are really necessary. Adding sub-indices with insignificant weights may increase complexity and it may lead to weak indices (Samimi, 2011). This issue is not present in the construction of the Dreher's index and of the Economic Freedom Index. Those indices are built using a lot of sub-indices but all of them have an important weight in the final index. The general advantages and disadvantages related to the PCA may be attributed to the complex indices used in the following analysis. However, the proposed indices have distinct levels of complexity depending on the initial number of variables used to obtain the final index.

Thirdly, the geographical adjustment. It may be important to control for the geographical features of the countries to better understand the globalization process (Samimi, 2011). For example, geographical features influence trade intensity and transportation costs. Panama's trade intensity is much higher than that of the United States due its geographical position, but that does not mean that the globalization level of Panama is much higher than that of the United States (Dreher et al. 2009). Correcting for the geographical factors may increase the efficiency of the index to measure globalization. Dreher's index does not make any geographical adjustment.

Finally, the dimensions of globalization involved. The first important dimension is the economic one. Usually it covers the flows of capital and goods and the restriction on

them. The second is the social dimension that typically involves data about culture and information flows among people. The last dimension is the political one. It considers the participation to international treaties and organizations. Considering all these aspects, the Dreher's index is a very complete index (Samimi, 2011).

Single indices are constructed in order to capture a specific aspect of the globalization phenomenon. With respect to the previous indices, they do not suffer from the weaknesses deriving from the PCA. The trade and financial openness indices analyzed before may be divided into *de jure* and *de facto* measures. For instance, measures of stock of capital flows usually try to capture the de facto financial openness, while measures of legal restrictions, indicating how much a country is closed to the foreign markets by law, represent de jure measures of financial openness (Prasad et al., 2003). However, since they are specific measures, they may not contain all the information needed to define the whole openness degree, and they may not be able to capture precisely the real level of globalization (Samimi, 2011). For instance, financial openness measures based on restrictions on foreign transactions may not grasp the degree of openness. It may be inappropriate to use them as proxy of the globalization phenomenon considering them as overall measures of globalization.

Chapter 2 - *Economic growth and Globalization*

1 Introduction

From the Eighties, many changes have happened in the international economic context: national economic policies aimed at increasing the level of integration, advance the technological progress, access new markets, reduce transportation and communication costs and financial innovations stimulated cross-border capital flows.

In this scenario, globalization becomes a growing phenomenon with a persistent trend. From an economic and financial point of view, the potential benefits that globalization may allow to achieve are many. Firstly, the augmentation of domestic savings. Capital-rich countries can invest in capital-poor countries getting a higher return on capital. Secondly, the possibility to incur a lower cost of capital. A better global allocation of capital allows risk diversification and encourage firms to take more investments. Because of the capital flows increase, the stock market would be more liquid, reducing the equity risk premium and the cost of capital (Prasad et al. 2003). Thirdly, the transfer of knowledge and technology. People movements and new technology related to the information flows make easier the diffusion of knowledge across countries. The integration generates an improvement of management practices and production processes even in those countries that do not have the appropriate basic skill but, through the circulation of knowledge, they became able to develop them. This process may have positive implications on productivity growth, (Grossman and Helpman, 2015). Fourthly, the development of the financial sector makes the access to international markets easier. New instruments of investment are introduced and improvements in domestic markets are realized in a context with more regulation, new supervisory authorities and transparency rules. Finally, the elimination of barriers and tariffs, or other restrictions to international transactions, allows a better circulation of goods, services, financial instruments, workers and knowledge (Prasad et al . 2003).

Besides the benefits that countries can achieve entering in a global financial system, there are costs that they can expect to pay. The greater interconnection between countries

can lead to economic fluctuations generated by the economic crises alternated with growth period. When the system is globalized the effects of these instabilities are propagated in an endemic way. The volatility of the economic performances can be related to it. Furthermore, the single markets are pushed to achieve certain standards and adopt precise rules in terms of regulation and transparency, giving up their peculiarities and losing autonomy (Prasad et al. 2003).

Scholars have discussed about the relationship between globalization and growth; the literature section reports the different point of views related to the topic. One important step discussed by scholars and stressed in the first chapter of this thesis is the difficulty to find a proxy to measure the globalization process. As a complex phenomenon that influences many aspects of the modern society, it needs different measures that capture all the aspects. As emphasized in the previous chapter, many studies focus on a single sub-dimension of globalization like trade openness, capital account openness, financial integration, social and political globalization. Others focus on an overall concept of the globalization that comprehends all the single ones. I try to overcome this partial point of view considering the effects of globalization on economic growth providing a comparative analysis of the different indices used in the literature taking into account one by one the economic, financial, social and political aspect. Each of these features may be related to growth differently and may have a distinct impact in terms of increase of the growth rate.

Some scholars have developed measures obtained by statistical procedures that, starting from a high number of globalization components, reduce the data and obtain a synthetic index that summarizes all the components. Others have used measures aimed to capture single aspects of integration. Using these different indices representing distinct aspects of the integration process, I will provide a general overview of the phenomenon trying to understand how growth and globalization interact and which aspect is crucial for this interaction.

This work aims to study globalization as a complex phenomenon that has changed the links among countries; it tries to understand the effects of globalization on developed and developing countries and to establish a possible relationship between globalization and economic growth. Considering globalization as a complex phenomenon that affects financial, economic, social, political and cultural aspects, I start from the debate about the

contribution that globalization may provide to increase the performance of a single country. The existing empirical evidence suggests that is difficult to establish a strong causal relation between economic growth and globalization due to the complexity of the relationships involved (Rodrik, 1998, Kose et al., 2011, Stiglitz, 2002). I try to provide a more complete representation of the relationship between globalization and growth with respect to studies focusing on single aspects. Moreover, I provide a comparison of results across single measures and countries.

I start from the Barro (2003) growth model in the new version developed by Dreher (2006) more focused on economic integration. I analyze the relationship between globalization and growth taking into account all the different sub-dimensions of the globalization process and their effects on growth. Globalization is a long-term phenomenon and it needs a few years to give a significant contribution to the economic environment. As Barro suggests, I use a 5-years panel database that is extended from 1970 to 2014 and it covers 183 countries. With respect to the Dreher's analysis, I extend the time-period and the number of countries to compensate the lack of data due to data availability. I take into account different globalization indices: a capital openness index, a financial integration index, a trade openness index, social and political globalization indices, a cultural proximity index and an economic freedom index. All the above mentioned indices capture a specific feature of the globalization process and can be linked up to growth differently. In order to capture these possible influences, the indices have been used one by one in different regressions.

Furthermore, I introduce the idea that the initial level of economic development can have a key role to explain the relationship between globalization and growth. The initial GDP per capita, used as a control variable in the general model, helps to capture this assumption considering that the underlying relationship of the model is the same for all the countries. In this setting, the initial level of GDP per capita will only change the intercept of the estimated model. Nevertheless, the initial economic development may also affect the slope coefficients of the estimated regression model. That is, different level of initial economic development may change the underlying relationship of the model. Under the hypothesis that only the slope coefficient of the globalization variable is affected, the effect of the initial level of GDP per capita can be estimated including an interaction between the globalization variable and the initial level of GDP per capita. In

the more pervasive case where the entire model is affected it is necessary to identify separate sub-samples. I follow both strategies. In the last part of the paper I analyze two sub-samples, developed and developing countries, obtained splitting the overall sample by the average initial level of GDP per capita. Using the two sub-samples, I verify if economic growth is affected by globalization in a different way for countries with different levels of economic development and countries with higher levels of GDP per capita can benefit more from globalization, with respect to countries with a lower level of GDP per capita. One of the problem often blamed on developing countries is that they enter into a globalized market without the right initial conditions that can ensure stability and then they are unable to capture the benefits from the integration process, only bearing the costs arising from it (Kose et al., 2011). The response of developed and developing countries may be different and may depend on the features of the countries. Developed countries may catch more benefits than the developing ones, because they have infrastructures (economic, social, markets etc.) able to adapt to the changes coming from the integration process. This analysis allows figuring out differences across countries and capturing the different reaction of the GDP growth rates that could be lost analyzing one large sample containing all the countries. In this further analysis, the aim is twofold. On the one hand, I aim to show that the initial level of economic development is essential to understand the relationship between globalization and the GDP growth rate. On the other hand, I want to verify if entering in a globalized system could be an important step in developing markets that aspire to reach the higher levels of economic development and stability achieved by developed economies. In other words, I try to understand whether globalization can be a key factor to promote growth when a country has a low level of economic development.

2 Literature review

As a complex phenomenon, globalization may affect many aspects of the economy like trade, economic development, financial sector, monetary and macroeconomic policies and so on. Many economists and policymakers have been interested in the characteristics and implications of the globalization process. Some of them study the effect of globalization on inequality (Beer and Boswell, 2001). Rogoff (2006) and Bernanke

(2007) are interested in the implications of globalization for the conduct and effectiveness of monetary policy. Heinemann (2000) showed as globalization affects also government budget policies.

The literature on the relationship of globalization and growth is wide. Due the complexity of the phenomenon, the choice of the variable used as a proxy of globalization becomes important. On the one hand, scholars have been using proxies like imports and exports, foreign assets and liabilities, restrictions on payments for capital transactions, taxes on international trade, portfolio investment and so on. Each of these proxies is an attempt to measure a specific sub-dimension of the globalization process. On the other hand, complex measures of globalization have been created, using a large number of sub-indices, with the aim to describe the complexity of the phenomenon.

Foremost, this kind of literature moves from an extensive literature about economic growth and its determinants. Differences about growth rates across countries are huge and, consequently, also the living standards of inhabitants from different countries. The neo-classical growth model supports the idea of an absolute convergence in the growth rates. Countries with access to the same technology, with the same population growth rate and savings propensity, and only differing in terms of their initial capital-labor ratio, should converge to the same steady-state. This means that poor countries will grow relatively faster than rich ones since the first ones are more distant from the common steady-state. The conditional convergence hypothesis points out that countries having the same technology and population growth rates but differing in savings propensities and initial capital-labor ratio, should converge to the same growth rate, but not necessarily to the same capital-labor ratio. In other words, it is not claimed that economies farther than a common steady-state grow faster, but that an economy grows as fast as it is farther away from its stationary state (Barro, 2003). The model used in this paper starts from a growth model à la Barro (2003), where the negative association between growth and the initial level of per capita GDP supports the conditional convergence hypothesis. In the original model, Barro considers a set of regressors (life expectancy, educational level, trade openness and others) representing the features of the countries that clarify the conditional nature of the relationship.

I group the literature according to the specific sub-dimension of globalization analyzed. Firstly, I discuss the literature about financial integration and capital account

openness. Secondly, I focus on trade openness and import-export flows with foreign countries. Afterwards, I discuss the literature about economic globalization as a whole. Finally, considering the importance of the stage of economic development in the relationship between globalization and growth, I present papers focused on the trade-off between benefits and costs deriving from the globalization process, some of which are specific of the developing countries.

Many studies focus on financial integration and its effect in terms of economic development. They usually measure globalization using foreign assets and liabilities. The path of financial integration of a single country depends on its financial system, economic development, and trade openness. When a financial system is developed, that is when its financial market is open to the other markets, it attracts foreign assets and liabilities. However, financial integration involves risks. Emerging countries can have problems in managing the capital inflows and the shifts of international capital flows. For this reason, many policymakers from developing countries have questioned the choice of entering into a financial integrated system, casting doubts on the fact that the benefits deriving from the higher long-term growth can overcome the costs deriving from larger financial instability (Lane and Milesi-Ferretti, 2008).

After the last financial crises of 2007, cross-border financial flows start to decrease in relation to the overall GDP. This is the results of two factors. Firstly, it is diminishing the flow of capitals from and to developed countries, which reflects the decrease of banks cross-border capital flows. Secondly, developing countries have increased their weight in the overall GDP since they have lower foreign assets and liabilities comparing to the developed ones (Lane and Milesi-Ferretti, 2017)

Analyzing financial globalization some economists focused on the capital account and capital market liberalization and its relationship with the economic performances of the countries. Entering in a globalized system produces risks linked to the rising in liquidity to which borrowers have access that tends to increase the negative effects of any shift of the international markets. The costs deriving from low stability and high volatility are shown in the years or economic crises and tend to overcome benefits. The empirical evidence does not suggest the existence of a causal relation between the removal of existing capital control and the rate of growth (Rodrik, 1998). Opening of capital flows without the right initial conditions may lead to potential risks (Kose et al., 2011). Edison

et al. (2002) do not support the idea that financial integration can contribute to speed up the growth process even controlling for particular initial characteristics of the countries.

From a macroeconomic point of view, when developing countries liberalize their stock market, the total factor productivity and investments increase and the cost of capital decreases (Henry 2003). Chari and Henry (2002) provide evidence that liberalization does increase the possibility to share the risk globally.

Other scholars focus their attention on trade openness, a sub-dimension of globalization. Trade promotes growth: scale economies, comparative advantages and technology transfer are benefits associated to trade openness. Growth rates post liberalization are larger than the previous ones; trade openness policies have a positive effect on economic growth (Wacziarg and Welch, 2008). There is also a controversial argument about the presence of restrictions on trade. Part of the literature suggests that trade barriers may promote growth especially in emerging countries (Yanikkaya, 2002). The level of growth and the benefits of openness depend also on features of the single country like the level of economic development, the trade specialization, and the time-period. The evidence suggests that these benefits are different in countries at a different development stage. Over the 1980s the effect of trade openness starts to be smaller than the previous decades and the most evident benefits are observed in developed countries (Dowrick and Golley, 2004).

Due to the complexity of the globalization phenomenon, scholars have started to create indices summarizing distinct aspects of integration. Gwartney and Lawson (2003) have constructed an index of economic freedom that includes different concepts like human interaction, political freedom, capital and trade openness, and civil liberties. This index offers a good measure to compare the economic freedom and to highlight differences across countries. Using a PCA, they create an aggregate index representing all the sub-dimensions of the economic freedom.

Dreher (2006) considers globalization as a complex phenomenon to be measured using many sub-indices. He acknowledges that limiting the attention on a specific sub-dimension can lead to biased estimations and to detect a relationship with growth that can be just apparent since important aspects of globalization are omitted from the regression model. He starts from three sub-indices. An economic globalization index constructed starting from flows of goods, capital and services, restrictions on trade and tariffs. A social

globalization index representing the spread of information, ideas, persons. A political globalization index based on government policies and relations with foreign countries. He argues that an overall measure of globalization can capture the relationship with growth that could be lost including separately different measures representing the sub-dimensions. He finds that globalization can help to promote growth. As highlighted in the first chapter, the use of the PCA in the empirical work has been criticized (Zou et al., 2006). When many sub-indices are used, some variables can be redundant and they add complexity to the analysis without providing useful extra information. Thus, in this case it has been recommended to discard some of them (Jolliffe, 1972). Additionally, using a global measure can be confounding: all the different sub-dimensions of globalization can lead growth in different directions and affect it in a different way. The overall effect can therefore be misunderstood and the contributions of every single dimension are likely to be omitted (Dreher, 2006)

The open question about the trade-off between costs and benefits deriving from the globalization process, has led many economists to focus on developing countries. Some scholars find a positive relationship between globalization and growth in African countries (Bhaskara Rao and Vadlamannati, 2011). However, these findings should be analyzed critically. They try to explain the role that globalization, combined with investment policies, can play to increase the growth rate in poor African countries. Nevertheless, to sustain a long run rate of growth, complementary policies (reduction of government expenditures and inflation rate) have to be implemented (Bhaskara Rao and Vadlamannati, 2011). In developing countries, to maintain these policies in the long-run can be problematic.

The recent events deriving from financial crises have generated doubts on the potential benefits of financial globalization, especially in poor countries. The benefits suggested by economic theory may not materialize. From an empirical point of view, financial globalization has not generated greater performances in emerging countries. Developing countries need specific policies based on the features of a single economy to reach the promised benefits (Rodrik and Subramanian, 2009). Some researchers have emphasized that potential risks are significant with respect to the benefits for middle-income countries (Stiglitz, 2002). Others have highlighted that financial globalization is

a key step for emerging markets that want to reach higher levels of income and stability (Fisher, 1998).

Starting from the existing literature, the aim of the paper is to compare the different measures of globalization and their relationship with growth. Since every aspect of globalization represented by a specific index can be related to growth in a different way, a comparative analysis of them will be provided. In the last part of the paper, analyzing the sub-samples of developed and developing countries, the focus moves on the possibility that the stage of economic development can be crucial in the relationship between globalization and growth.

3 Methodology

I analyze the different degree of integration across economies with a descriptive analysis of the sample. I construct two sub-samples to understand the features of the different countries and to compare them. I split the overall sample by the average initial level of GDP. In particular, analyzing the differences in term of growth and globalization can help to understand if these features play an important role in a global scenario and how these differences are distributed across countries with a different economic development. The sub-samples will be used in the last part of the paper to provide a complete and differentiated analysis of developed and developing countries.

The empirical analysis moves from the Barro (2003) growth model. In the original model, he considers a set of regressors (life expectancy, educational level, trade openness and others) representing the features of the countries that show the conditional nature of the growth rates. This model has been modified and adapted by Dreher (2006) to analyze the relationship between economic growth and globalization. I start from the Dreher's model and I modify it using different sub-indices catching several aspects of the globalization phenomenon. The result is a comparative analysis showing up the difference response of the economic growth to changes in the several sides of integration.

I construct a 5-years panel database in which all variables, except for the initial level of GDP that is the level at the beginning of each period, are averages over 5-years. The collected data cover 44 years from 1970 to 2014. Taking 5-years averages, I obtain

nine observations for each variable and each country. This panel structure allows to catch the long-run effects of globalization on growth. The model is the following:

$$GDP\_grw_{it} = \alpha_0 + \alpha_1 G_{it} + \alpha_2 X_{it} + \eta_i + \theta_t + \varepsilon_{it} \quad (1)$$

where i represents the individual unit, countries, and t represent the time unit, 5-years period. The model is used to estimate the relationship between globalization and economic growth, assuming that the error term is not correlated with the explanatory variables.

GDP_grw_{it} is the growth rate of GDP[1]. G_{it} indicates the different globalization indices used one by one in order to capture the contribution of specific dimensions of the overall globalization phenomenon: an economic freedom index and an overall globalization index, social and political globalization indices, a cultural proximity index, two financial integration indices, trade and capital openness indices. Some of them are composite measure, including many sides of the globalization phenomenon; others are simple measures of one specific side.

The equation relates growth to globalization and to other control variables (X_{it}). Controls are included following the classical growth model. Specifically, X_{it} is a vector containing several macroeconomic control variables:

- $IGDP_i$, the initial level of GDP per capita that allows controlling for the initial economic development and to verify the convergence hypothesis;
- Social indices, like *Life expectancy, Fertility rate* and *Schooling rate*;
- Economic variables like *Government expenditures*, *Inflation*, *Trade;*
- An index of *Democracy,* that takes into account civil liberties, strong rule of law, the level of electoral democracy and the degree of independency of the judiciary system. It is included to point out that political and institutional quality may have an impact on growth performances (La Porta et al. 1999);
- A financial market variable, *Deposit money bank assets to GDP,* highlighting the important role played by financial markets for economic growth (King and Levine, 1993).

[1] It is calculated as $\ln X_t - \ln X_{t-1}$

Fixed temporal effects θ_t are considered. In order to adjust for the possibility that the observations are correlated over time, i.e. $cov(G_{it}, \theta_t) \neq 0$, where G_{it} is the vector of regressors. I introduce in the model a full set of dummies for each time-period. In the panel dataset, I have more countries than periods. Thus, I run the model including dummies per period to absorb the time effect. Standard errors are clustered by countries. If the time-period effects are fixed, the dummies completely remove the bias caused by the correlation between observations in the same time-period. Conversely, if the time-period effects are not fixed, the estimates clustered by countries are still biased. (Petersen, 2009).

At a preliminary level, I perform a pooled OLS (POLS) regression analysis. This model does not take into account the panel structure of the data and assume the absence of country unobserved heterogeneity. A pooled analysis involves the estimation of a single equation for all data. It is obtained using the least squares estimators OLS on all available observations. The pooled model gives a correct estimation of the parameters when there are no individual or temporal effects correlated with the explanatory variables. Otherwise, the resulting OLS estimates are biased and inconsistent and pooled estimates tend to overestimate or underestimate the slope of the regression line.

These individual effects are called fixed effects (FE) if they are constant over time. In our setting, they are specific characteristics of a region which are not captured by the other variables[2], and which may have a role in explaining the greater or lower rate of growth. When the unit unobserved heterogeneity is constant over time, I can use a fixed effect model to remove it and to obtain unbiased results. If the regressors are correlated with the time invariant part of the errors, i.e., $cov(G_{it}, \eta_i) \neq 0$, the pooled regressions give us biased and inconsistent estimates of the parameters. I run a Within Group estimator obtained by regressing $(y_{it} - \overline{y_i})$ on $(x_{it} - \overline{x_i})$ [3] .The fixed effects model, therefore, takes into account the variability within the units of analysis, not giving any weight to the variability between entities since the means $\overline{y_i}$ and $\overline{x_i}$ are subtracted from the observations [4].

[2] The endogeneity problem is due to omitted variables

[3] y_{it} is the dependent variable, the GDP growth rate, i.e. GDP_{it}, X_{it} is the vector of regressors representing the different globalization indices, i.e. G_{it}

[4] $\overline{y_i}$ and $\overline{x_i}$ are the mean of a specific country.

To verify the presence of fixed or random effects, I run an over-identification test. It allows running an Hausman test with robust standard errors. (Wooldridge, 2013). The hypotheses of the test are

$$H_0: cov(G_{it}, \eta_i) = 0$$
$$H_1: cov(G_{it}, \eta_i) \neq 0$$

Under H_0 the random effect estimator is consistent and efficient (also the pooled estimator is consistent), while under H_1 the consistent and efficient estimator is the fixed effects estimator. In general, when I detect the presence of fixed effects I use this specification in the estimation.

Moreover, the model may suffer from a simultaneity bias making the globalization variables endogenous and the estimates biased. To address this issue a two-stage least squares estimator (2SLS) is run. I use two kind of instruments. La Porta et al. (1999) prove that countries with different legal origin have different property rights protection. This may affect a country economic openness. Common law countries have a more important protection of property rights; consequently, people are more confident to conclude commercial exchanges and this have a positive impact on open markets. Conversely, civil law countries give more protection to the central State and less to the people. This may have a negative impact to the markets (Edison et al., 2002). As first instrumental variable (IV), I use an index that measures the Legal Structure and Security of Property Rights, *Legprop*[5]. The higher the value of the variable, the more open to international markets is a country. Additionally, geography may affect globalization. Countries with poor agricultural lands generate economic institutions that are not available to generate trade in the open markets (Easterly and Levine, 2003). Conversely, countries with better geographical allocations are more opened to free markets since they tend to not limit the competition and exploit the local people. (Easterly and Levine, 2003). As second IV, I use the logarithm of the Rural population, *Rur_pop* [6].

[5] The index ranges from 0-10 where 0 corresponds to "no judicial independence", "no trusted legal framework exists", "no protection of intellectual property", "military interference in rule of law", and "no integrity of the legal system" and 10 corresponds to "high judicial independence", "trusted legal framework exists", "protection of intellectual property", "no military interference in rule of law", and "integrity of the legal system" (Quality of Government Database, 2017)

[6] Rural population refers to people living in rural areas as defined by national statistical offices. It is calculated as the difference between total population and urban population (WDI, World Bank Databank)

Additionally, I consider a dynamic specification. The reason that leads to construct a dynamic model is that growth may be affected by its lags. If the growth rate of per capita GDP at time *t* depends on its past values, following a dynamic approach may avoid misspecification. The model becomes the following,

$$GDP\_grw_{it} = \beta_0 + \beta_1 GDP\_grw_{it-1} + \beta_2 G_{it} + \beta_3 X_{it} + \eta_i + \theta_t + \varepsilon_{it} \qquad (2)$$

In a dynamic environment, POLS and FE analysis generate biases due to endogeneity. In fact, starting from an AR(1) model with fixed effects

$$y_{it} = \rho y_{it-1} + \eta_i + \varepsilon_{it} (3)$$

and taking the first differences to eliminate η_i, I obtain

$$\Delta y_{it} = \rho \Delta \mathrm{y}_{it-1} + \Delta \varepsilon_{it} \qquad (4)$$

The pooled OLS estimation of (4) is problematic because, since $Cov(\Delta y_{it-1}, \Delta \varepsilon_{it}) \neq 0$, the endogeneity problem persists. Even the within transformation obtained subtracting the group mean is not an answer and give us biased results,

$$(y_{it} - \bar{y}_i) = \rho\left(y_{it-1} - \bar{y}_{i(-1)}\right) + (\varepsilon_{it} - \bar{\varepsilon}_i)$$

where

$$Cov[(y_{it-1} - \bar{y}_i), (\varepsilon_{it} - \bar{\varepsilon}_i)] = Cov[y_{it-1}, (\varepsilon_{it} - \bar{\varepsilon}_i)] = -Cov(y_{it-1}, \bar{\varepsilon}_i) \neq 0$$

Therefore, the model presents a negative distortion of the estimates that decreases as T increases.

The endogeneity problem can be addressed using the IV approach where the right-hand-side variables are instrumented by their lags. Considering that after the first differences transformation, due to the presence of the first lag of the dependent variable as an explanatory variable, I lose the first two periods, starting from $t = 3$ to instrument $\Delta \mathrm{y}_{it-1}$ I can use y_{it-2}. When $t = 4$, to instrument $\Delta \mathrm{y}_{it-1}$, I can use y_{it-2} and y_{it-3}. For the fifth period I can use y_{it-2}, y_{it-3} and y_{it-4} and so on. In this way, the instruments are relevant since $Cov(y_{it-2}, \Delta \mathrm{y}_{it-1}) \neq 0$, $Cov(y_{it-3}, \Delta \mathrm{y}_{it-1}) \neq 0$ and $Cov(y_{it-4}, \Delta \mathrm{y}_{it-1}) \neq 0$ and are exogenous since $Cov(y_{it-2}, \Delta \varepsilon_{it}) = 0$, $Cov(y_{it-3}, \Delta \varepsilon_{it}) = 0$ and $Cov(y_{it-4}, \Delta \varepsilon_{it}) = 0$. In the following table I show a brief example for the first unit

ID	t	Δy_{it}	Δy_{it-1}	IVs
1	1	-	-	-
1	2	$\Delta y_{12} = y_{12} - y_{11}$	-	-
1	3	$\Delta y_{13} = y_{13} - y_{12}$	$\Delta y_{12} = y_{12} - y_{11}$	y_{11}
1	4	$\Delta y_{14} = y_{14} - y_{13}$	$\Delta y_{13} = y_{13} - y_{12}$	y_{11}, y_{12}
1	5	$\Delta y_{15} = y_{15} - y_{14}$	$\Delta y_{14} = y_{14} - y_{13}$	y_{11}, y_{12}, y_{13}
…	…	…	…	…

The model uses a Generalized Method of Moments (GMM) to solve the system of equations and to find the estimates. It is called *Difference GMM*. The advantages of using this model are several: the omitted variable problem due to unobserved country-specific effects are eliminated, the IV approach removes problems related to the endogenous right-hand-side variables and allows to avoid measurement error biases (Bond et al., 2001).

The model proposed by Arellano and Bond is planned for a situation in which:

- the time period considered in the sample are smaller than the individual units (*small T and large N*);
- the model is dynamic;
- regressors may be endogenous regressors;
- there are fixed effects, heteroskedasticity and autocorrelation within individual units but not between them (Roodman, 2006).

This kind of model can suffer from a small sample bias as detected by Blundell and Bond (1998) and give downward estimates. To verify if our model is affected by this bias, I run the dynamic model together with pooled OLS model, that is upward biased, and the Within Group model, that instead is downward biased. If the estimates from the difference GMM are in the range of the previous estimates, I can consider the obtained results correct (Roodman, 2006).

This approach allows solving the possible endogeneity problem of some variables. I consider as endogenous the *Fertility rate*, the *Investment rate*, the *General Expenditure* and the *Globalization Indices* since for all of them there can be a reversal causality: that is, variables can influence growth but also growth at the same time can affect them. As predetermined, I consider the *Schooling rate* and the *Life expectancy* rate since they may

depend on growth, but with lags; that is the reversal causality in this case is not contemporaneous. The exogenous variables are the remaining ones.

I use the second and the third lag[7] of the endogenous variables as instruments to avoid the proliferation of instruments (Roodman, 2009) and I apply the two-step estimator since it is more efficient than the one-step. Both estimators may be problematic: the one-step standard errors can suffer of heteroskedasticity and serial correlation problems, while the two-step step standard errors, when the panel is large, are consistent but downward biased. It is possible to correct this second bias applying the finite-sample correction. Using the robust GMM, the two-step is more efficient than the one-step. Thus, in the analysis, I use the two-step estimator. Since my panel is unbalanced with missing data that create gaps in the instrument series, I use the difference GMM model with orthogonal deviations. In this way when the model computes the differences, it subtracts the average of the future observations instead of subtracting the previous observation that it would have returned a missing field (Roodman, 2006).

Finally, I introduce the idea that the initial level of economic development may have a key role to explain the relationship between globalization and growth. Two approaches are developed. Firstly, I specify a more conservative setting assuming that the general underline structure of the model, except the relationship between growth and globalization, is the same for all countries. I introduce an interaction between the globalization indices and the initial level of GDP per capita to verify the hypothesis that globalization may affect growth in a different way depending on the level of economic development (i.e., countries with more developed economic, institutional, financial and political environment may catch more benefits from the globalization process).

Secondly, I assume that the level of economic development may affect all the slope coefficients of the estimated regression model. In this case, the impact is much more pervasive: different level of initial economic development may change the entire underline structure of the model. Thus, developed and developing countries growth rates react in a complete different way and they need to be estimated in two separate regressions. This second approach involves the use of two sub-samples, developing and

[7] The choice of the lags is obtained accordingly to the Hansen and the stationarity tests. I run the stationarity tests for AR(1), AR(2) and AR(3) in order to verify if series of instruments are stationary; otherwise the estimates could be biased. The Arellano-Bond procedure in Stata offers also a Hansen test in level and difference to control the exogeneity of the instruments.

developed countries, built on the basis of the average initial per capita GDP. Countries with initial average GDP level below the overall average initial GDP are classified as developing, otherwise as developed.

As mentioned before, I intend to verify if the initial economic development can be relevant to explain the relationship between growth and globalization and it can have important implications on the base model. In the base model estimated using the overall sample, the initial per capita GDP is included in order to control for the level of economic development. In the sub-samples analysis, I separate the countries based on their initial economic development to verify the response of the GDP growth rate to variation of globalization indices focusing on countries having the same characteristics. Separating the sample implies that the model is not unique as before, but it changes at different level economic development. Under this scenario, the initial per capita GDP affects not only the constant term, but also the slope coefficients, modifying the all structure of the model. Thus, the implications cannot be the same for countries with different level of economic development. The aim is to verify whether globalization can be a key factor that developing countries can exploit to reach a higher level of economic growth.

4 Data

The data cover the period 1970-2014 and they extend to 183 countries. Since data are not available for all countries or years, the dataset is unbalanced and the number of observations depend on the considered variables.

As mentioned before, I use 5-years averages, except for the initial GDP that is the level at the beginning of each period.

The dependent variable is the *GDP growth rate*[8] (*GDP_grw*)

The regressors are the globalization indices and control variables. As mentioned before, some globalization indices are obtained as synthesis of different measures and others are simple measure of one specific side of globalization.

The first index is an *Overall Globalization Index* (*Oglob*). It is constructed by Dreher (2006) taking into account a global concept of globalization starting from different

[8] Data are in constant 2010 U.S. dollars. It is obtained as $\ln X_t - \ln X_{t-1}$

variables that from time to time are considered in order to obtain proxies representing all the aspects that compose the globalization phenomenon. It is achieved from a principal component analysis of sub-indices: 1) the *Economic Globalization Index* (*Eglob*), that involves data representing trade openness, restrictions, actual flows, foreign direct investment; 2) the *Social Globalization Index* (*Sglob*), that involves data about the flows of information, people, cultural globalization, personal contact and so on; 3) the *Political Globalization Index* (*Pglob*), that considers the diplomatic relationship between countries. The sub-indices are additionally used in separated regressions. From the Dreher's database, I also collect *Cultural proximity* (*Cult_prox*), that is a variable representing the level of cultural integration considering the expansion of global brands like McDonald's and Ikea per capita and the trade in books.

The second index I use is the complex index obtained by Gwartney and Lawson (2003): the *Economic Freedom Index* (*Ec_fr*), obtained through PCA combining variables that refer to personal choice, voluntary exchange, freedom to trade, persons and property right protection, regulation of credit and business. As explained in the previous Chapter, it is not a pure proxy for the globalization phenomenon but it contains specific measures of the international trade as taxes, mean tariffs, hidden import barriers, international capital controls.

To focus on financial integration, I use two indices constructed by Lane and Milesi-Ferretti (2003). They introduced a volume-based measure obtained as

$$Ifigdp_{it} = \frac{FA_{it} + FL_{it}}{GDP_{it}}$$

where FA_{it} represents total external assets and FL_{it} represents total external liabilities. Total assets contain portfolio equity assets, FDI assets abroad, total debt assets, reserves, and derivatives assets. Total liabilities contain portfolio equity liabilities, FDI liabilities abroad, total debt liabilities and derivatives liabilities. The second measure of financial integration provided by Lane and Milesi-Ferretti (2006) focuses on portfolio equity,

$$Geqgdp_{it} = \frac{(PEQA_{it} + FDIA_{it} + PEQL_{it} + FDIL_{it})}{GDP_{it}}$$

where $PEQA_{it}$ is the stock of portfolio equity assets, $PEQL_{it}$ is the stock of portfolio equity liabilities, $FDIA_{it}$ is the stock of foreign direct investment asset and finally $FDIL_{it}$ is the stock of foreign direct investment liabilities.

As alternative measure of financial integration, I use the Chinn and Ito (2008) capital openness index (*Kaopen*) assessing the extent of capital controls. The index is based on the IMF classification of the restriction on cross-border financial transactions. It takes into account restrictions on capital and current account transactions, the existence of a multiple exchange rate and a variable describing the surrender of export proceeds if required. The final index is obtained by a principal component analysis.

Finally, I use Trade openness, (*Exp_imp*), obtained from the World Bank database. It is the sum of exports and imports of goods and services measured as a share of GDP. It is a level index representing how much a country is opened to foreign trade.

Additionally, control variables are introduced into the model to avoid endogeneity problems. The level of the *Initial GDP per capita,* (*iGDP*)*,* measures of the initial level of economic development. It is the logarithm of GDP at the beginning of each period. I expect negative estimates of this variable based on the convergence hypothesis. Thus, higher growth rates will be detected in the presence of low levels of starting economic development. *Life expectancy* (*Life*), *Fertility rate* (*Fertility*)*,* and *Schooling* (*Lsc*)*,* are social indices. The first one indicates the average number of years a newborn infant would live. The second one indicates the number of children that would be born to a woman if she were to live to the end of her fertility years. Both are obtained from the World Bank database and both are logarithmic transformations. The last one is a measure provided by Barro and Lee (2013) of the percentage of completed secondary schooling attained by the population of each country. Furthermore, I introduce a set of macroeconomic variables typically used in growth models. *General government final consumption expenditures* (*Gen_exp*) is a macroeconomic index including all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures. *Inflation* (*Infl*) is the annual growth rate of the GDP implicit deflator; it shows how the rate of price changes in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency. *Investment (Invest)* represents the gross domestic savings calculated as GDP less final consumption expenditure (total consumption). *Trade* is a proxy to highlight the commercial activity of a country. It is measured as the annual growth rate of imports of goods and services. Aggregates are based on constant 2010 U.S. dollars. Imports of goods and services

represent the value of all goods and other market services received from the rest of the world. All the macroeconomics variables described are collected from the World Bank database. I also introduce a variable representative of the financial markets. In particular *Deposit money bank assets to GDP* (*Dbagdp*), denotes claims on domestic real non-financial sector by deposit money banks as a share of GDP. It is a proxy used to highlight the activity of financial markets collected from the Financial Development and Structure Database. It represents the level of development of financial markets. It is introduced to take into account the relationship between financial development and economic growth (King and Levine, 1993). To underline the role of the institutional quality, I introduce a *Liberal Democracy index,* (*Dem*) emphasizing the importance of protecting individual and minority rights against the tyranny of the state and the tyranny of the majority. It considers negatively those government systems in which politics may influence the quality of democracy limiting it through political acts. It takes into account: civil liberties, the strength of rule of law, the independence of the judiciary system, the existence of a system that may limit the exercise of executive power and the level of electoral democracy. The index is collected from the Quality of Government Database and it is included in the model to highlight the impact that political and institutional quality can have on economic growth (La Porta et al. 1999).

As IVs I use two variables. Firstly, an index that measures the Legal Structure and Security of Property Rights, *Legprop*. It is defined into the Quality of Government Database (2017) in a range 0-10, where 0 corresponds to "no judicial independence", "no trusted legal framework exists", "no protection of intellectual property", "military interference in rule of law", and "no integrity of the legal system" and vice versa, 10 corresponds to "high judicial independence", "trusted legal framework exists", "protection of intellectual property", "no military interference in rule of law", and "integrity of the legal system". Secondly, I use logarithm of the Rural population, *Rur_pop*. It is collected from the WDI from World Bank Databank and it refers to people living in rural areas.

In Appendix C, Table 1 describes data sources and Table 2 reports the variable definition.

5 Empirical Results

5.1 Descriptive and preliminary analysis

A preliminary analysis of correlation is conducted. It is important to highlight that this kind of analysis represents an initial step that. It is carried out to check the direction of the relationship between the variables and not to underline a causal relationship between them. The results are reported in the following tables.

Table 1. Correlation matrix

Variables	GDP_grw	Oglob	Eglob	Pglob	Sglob	Ec_fr	Cult_prox	Ifigdp	Geqgdp	Kaopen	Exp_imp
GDP_grw	1										
Oglob	0.0948	1									
Eglob	0.1519	0.9013	1								
Pglob	0.029	0.6919	0.4048	1							
Sglob	0.0578	0.9496	0.834	0.5229	1						
Ec_fr	0.1895	0.7345	0.7088	0.4167	0.7141	1					
Cult_prox	0.0188	0.8638	0.6922	0.5678	0.9085	0.6389	1				
Ifigdp	-0.0521	0.1175	0.1225	-0.108	0.2112	0.1615	0.1416	1			
Geqgdp	0.0058	0.2561	0.2979	0.0627	0.2571	0.2358	0.2058	0.3812	1		
Kaopen	0.0532	0.6652	0.6551	0.3579	0.6478	0.7342	0.6149	0.0543	0.2252	1	
Exp_imp	0.1285	0.3976	0.5925	-0.109	0.4166	0.3625	0.2626	0.2525	0.2991	0.2679	1

Correlation matrix of the overall sample. N = 879

All globalization indices are positively correlated with the rate of growth of GDP excepting for *Ifigdp*. At this preliminary level of the analysis, I observe that, generally, the globalization proxies and the GDP growth rate are positively associated.

Below I can observe descriptive statistics. Since I have missing data, for consistency with the subsequent results, the descriptive analysis, tables and graphs, is conducted on the reduced sample of countries used in the regression analysis. Table 2 shows the statistics of the overall sample and Table 3 and 4 show the statistics of the two subsamples to capture differences between the two groups of countries.

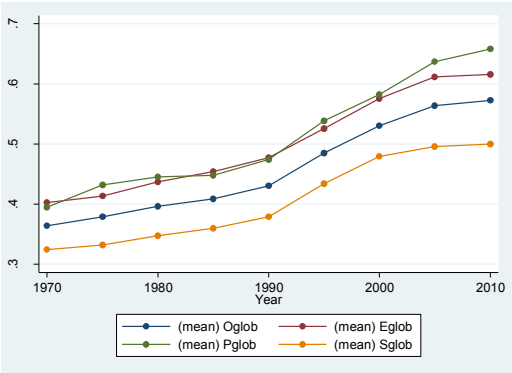
Table 2. Descriptive statistics

Variables	Obs	Mean	Median	Std. Dev.	Min	Max
GDP_grw	357	0.016984	0.018104	0.027449	-0.11739	0.094858
Oglob	357	0.479589	0.432848	0.17361	0.128071	0.899465
Eglob	356	0.469403	0.460311	0.177632	0.086158	0.941149
Pglob	356	0.613478	0.604901	0.210042	0.162299	0.970704
Sglob	356	0.398738	0.353723	0.203494	0.066493	0.89419
Ec_fr	311	5.883505	5.84	1.205239	2.47	8.84
Cult_prox	357	0.274562	0.10838	0.286009	0.01	0.9518
Ifigdp	356	0.18095	0.1108	0.188472	-0.04287	1.112875
Geqgdp	344	0.234336	0.127235	0.300879	-0.04287	2.35272
Kaopen	357	-0.09602	-0.34154	1.34804	-1.8889	2.389668
Exp_imp	361	0.61027	0.54619	0.314424	0.084226	1.973215

Descriptive statistics of the overall sample.

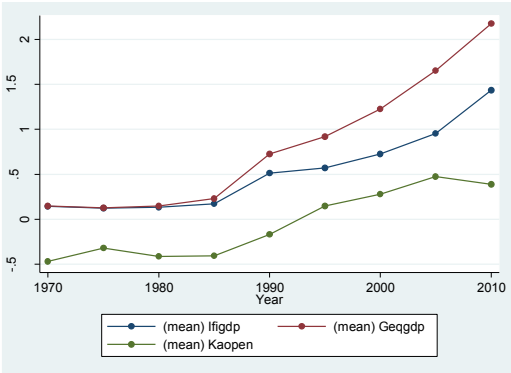
The following graphs may help to understand the evolution over the years of the globalization indices. I show the graphs only for the overall sample.

Figure 1. Dreher's indices



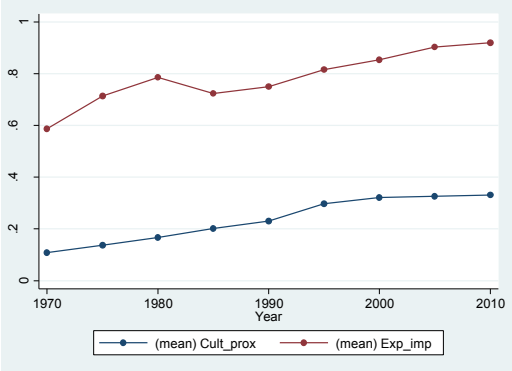
Dreher's indices

Figure 2. Lane and Milesi-Ferretti's indices and Kaopen index



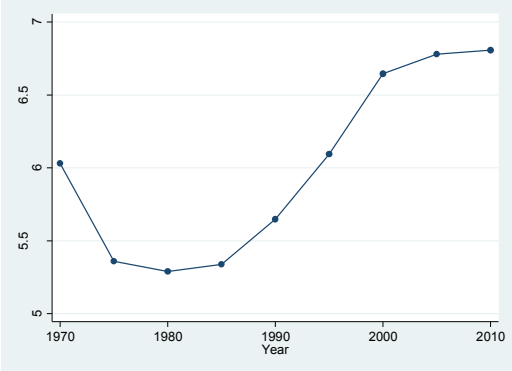
Lane and Milesi-Ferretti's indices and Kaopen index

Figure 3. Cultural Proximity and Export-Import index



Cultural Proximity and Export-Import indices

Figure 4. Economic freedom index



Economic Freedom index

The indices are grouped according to the range of values they may assume to show the evolution over time. In general, most of the indices are increasing over the period considered 1970-2010 with few small exceptions. The only variable showing a clear decline is the Economic Freedom index (*Ec_fr.*), decreasing in the time period 1970-1985.

Below the principal statistics for developed and developing countries.

Table 3. Descriptive statistics

Variables	Obs	Mean	Median	Std. Dev.	Min	Max
GDP_grw	228	0.020107	0.02169	0.025055	-0.0576	0.085905
Oglob	228	0.555096	0.526852	0.165478	0.233008	0.899465
Eglob	228	0.537601	0.515761	0.165084	0.148475	0.941149
Pglob	228	0.678481	0.672668	0.204295	0.162299	0.970704
Sglob	228	0.486425	0.448933	0.196952	0.173568	0.89419
Ec_fr	218	6.188119	6.195	1.196776	2.47	8.84
Cult_prox	228	0.364877	0.33417	0.31399	0.01	0.9518
Ifigdp	226	0.207248	0.126886	0.204307	0.014282	1.023457
Geqgdp	219	0.286328	0.175728	0.34865	0.019428	2.35272
Kaopen	226	0.232495	-0.13001	1.421641	-1.8889	2.389668
Exp_imp	229	0.616633	0.54906	0.324874	0.124463	1.973215

Descriptive statistics of the developed sample.

Table 4. Descriptive statistics

Variables	Obs	Mean	Median	Std. Dev.	Min	Max
GDP_grw	129	0.011464	0.013151	0.030564	-0.11739	0.094858
Oglob	129	0.346133	0.356187	0.084622	0.128071	0.525295
Eglob	128	0.347925	0.342434	0.127536	0.086158	0.629316
Pglob	128	0.497691	0.490715	0.166202	0.173563	0.890585
Sglob	128	0.242546	0.235958	0.089589	0.066493	0.466248
Ec_fr	93	5.169462	5.15	0.883782	2.8	7.54
Cult_prox	129	0.114937	0.07108	0.111617	0.01	0.4124
Ifigdp	130	0.135232	0.09237	0.147074	-0.04287	1.112875
Geqgdp	125	0.143247	0.098353	0.153526	-0.04287	1.112875
Kaopen	131	-0.66278	-0.97613	0.983394	-1.8889	2.389668
Exp_imp	132	0.599232	0.540655	0.296305	0.084226	1.697024

Descriptive statistics of the developing sample.

Comparing the GDP growth rates, I observe that developed countries have on average a higher rate in the considered period and at the same time growth volatility is more or less the same in both subsamples. With respect to the globalization indices, developed countries experienced, on average, higher values of these indices showing that developed countries are more globalized than the emerging ones. Especially the indices of financial integration are clearly higher in developed countries. I compare the mean of the globalization indices between the two groups of countries considering that they have different variances.

Table 5. Mean comparison tests.

	Oglob	Eglob	Pglob	Sglob	Ec_Fr	Cult_Prox	Ifigdp	Geqgdp	Kaopen	Exp_Imp
P-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	0.0007	0.0000	0.0000

Mean comparison test based on the hypothesis of different variance between the two samples.

The results from the Table 5 show that the null hypothesis that there are no differences between the averages is rejected: developed and developing countries have significantly different mean level of globalization.

5.2 Results

As described in the methodology section, I run the static model (1) in which G_{it} represents the different globalization indices used one by one in order to capture the contribution of specific aspects of globalization on growth. Firstly, I run Pooled OLS regressions (Table 17 in Appendix A); secondly, I run both the FE model and the RE model and I compare the two performing an over-identification test. The results are the following,

Table 6. Over-identification tests

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Oglob	**Eglob Pglob Sglob**	**Eglob**	**Ec_Fr**	**Cult_Prox**	**Ifigdp**	**Geqgdp**	**Kaopen**	**Exp_Imp**
P-value	0.0074	0.0118	0.0062	0.0000	0.0001	0.0001	0.0000	0.0078	0.0092
	FE	**FE**	**FE**	**FE**	**FE**	**FE**	**FE**	**FE**	**FE**

Over-identification tests

All regressions have a $p - value < 0.05$ highlighting the presence of fixed effects, thus I can exclude the validity of the POLS regressions and I introduce the FE model that takes into account the panel structure of the database. The presence of FE excludes the use of the RE model. The different indices are included one by one to analyze the relationship of every single aspects of the globalization phenomenon with economic growth. An exception is made for the Economic, Political and Social globalization indices created by Dreher that are used to obtain the Overall Globalization Index; I first used the Overall Index and then its sub-component, in order to understand if the sub-indices may be different related to growth. Finally, I use the last one complex measure about economic freedom and the simple indices about financial globalization and trade openness. The results are reported in Table 7

Table 7. Fixed effects regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**
Oglob	0.0446								
	(0.0416)								
Eglob		0.0199	0.0388						
		(0.0313)	(0.0300)						
Pglob		-0.0226							
		(0.0205)							
Sglob		0.0319							
		(0.0257)							
Ec_fr				0.00681**					
				(0.00292)					
Cult_prox					0.0182*				
					(0.00968)				
Ifigdp						0.000939			
						(0.00152)			
Geqgdp							0.0129**		
							(0.00640)		
Kaopen								0.00484***	
								(0.00169)	
Exp_imp									0.0228*
									(0.0136)
iGDP	-0.0614***	-0.0613***	-0.0600***	-0.0669***	-0.0612***	-0.0586***	-0.0594***	-0.0607***	-0.0595***
	(0.0135)	(0.0132)	(0.0129)	(0.0142)	(0.0128)	(0.0119)	(0.0119)	(0.0128)	(0.0124)
Lsc	0.0522	0.0475	0.0559*	0.0700*	0.0448	0.0639*	0.0543*	0.0536	0.0552
	(0.0342)	(0.0336)	(0.0335)	(0.0374)	(0.0345)	(0.0328)	(0.0322)	(0.0339)	(0.0352)
Life	0.0805**	0.0875***	0.0819**	0.0950*	0.0840***	0.0716**	0.0748**	0.0746**	0.0741**
	(0.0327)	(0.0319)	(0.0325)	(0.0498)	(0.0316)	(0.0341)	(0.0322)	(0.0329)	(0.0333)
Fertility	-0.00706	-0.0100	-0.00817	-0.0103	-0.00857	-0.00764	-0.0125	-0.0106	-0.00740
	(0.0121)	(0.0123)	(0.0122)	(0.0120)	(0.0122)	(0.0120)	(0.0125)	(0.0127)	(0.0117)
Invest	0.136***	0.137***	0.133***	0.184***	0.138***	0.151***	0.144***	0.152***	0.135***
	(0.0366)	(0.0369)	(0.0357)	(0.0435)	(0.0373)	(0.0397)	(0.0391)	(0.0406)	(0.0379)
Gen_exp	-0.0239	-0.0233	-0.0242	-0.00262	-0.0230	-0.0307	-0.0285	-0.0300	-0.0236
	(0.0378)	(0.0380)	(0.0377)	(0.0435)	(0.0384)	(0.0387)	(0.0388)	(0.0391)	(0.0397)
Infl	0.00143	0.000224	0.000633	-0.00124	0.00144	0.00213	0.00234	-0.000148	0.00246
	(0.00544)	(0.00624)	(0.00591)	(0.00739)	(0.00560)	(0.00500)	(0.00485)	(0.00635)	(0.00460)
Trade	0.00123***	0.00120***	0.00122***	0.00142***	0.00122***	0.00132***	0.00130***	0.00125***	0.00127***
	(0.000338)	(0.000341)	(0.000341)	(0.000369)	(0.000333)	(0.000319)	(0.000319)	(0.000314)	(0.000326)
Dbagdp	0.00676	0.00590	0.00704	0.0132*	0.00577	0.0114	0.0112	0.0112	0.0108
	(0.00581)	(0.00571)	(0.00571)	(0.00701)	(0.00582)	(0.00717)	(0.00717)	(0.00753)	(0.00733)
Dem	-0.0234	-0.0224	-0.0225	-0.0161	-0.0231	-0.0232	-0.0205	-0.0204	-0.0247
	(0.0165)	(0.0164)	(0.0162)	(0.0166)	(0.0162)	(0.0160)	(0.0158)	(0.0150)	(0.0158)
Constant	0.157	0.143	0.144	0.109	0.160	0.181	0.182	0.194	0.172
	(0.131)	(0.131)	(0.127)	(0.179)	(0.131)	(0.136)	(0.133)	(0.135)	(0.135)
Observations	357	356	356	311	357	361	362	357	361
R-squared	0.422	0.430	0.424	0.517	0.427	0.437	0.442	0.454	0.444
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Countries	86	85	85	76	86	86	86	85	85

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*

The indices described by Dreher (regressions 1, 2 and 3) are not significant in this case. The *Economic Freedom index* is significant at 5% level and positive, highlighting the positive relationship between globalization and growth. The initial GDP is also significant and negative. Thus, higher growth rates will be detected in the presence of low levels of starting economic development, supporting the conditional convergence hypothesis (Barro, 2003). *Cultural Proximity* is positive related to growth. It explain how much a country is included in a globalized system from a cultural point of view. It is an important perspective since it contains variables like the number of Ikea or McDonald's, which are clear examples of how the economy is increasingly interconnected and people

make their purchases following international brands. Therefore, also the cultural perspective is important to explain economic growth.

Among measures of financial integration, those provided by Lane and Milesi-Ferretti (2006), *Ifigidp* and *Geqgep*, have a different behaviour; only the second one is significant at 5%. Both measures consider foreign assets and liabilities in the numerator, but the second one is focused on the equity market, adding the stock of portfolio equity assets and liabilities. The last measure is positively related to growth, highlighting a significant connection between the financial integration and growth: when the equity market increases its volume of transactions the economic performances of a country improves. *Kaopen,* measuring the capital account openness of a country, is positive and strongly significant at 1% level; when the capital account openness increases, the GDP per capita growth rate increases too.

Trade openness, measured by exports and imports, is positively related to the economic growth. Trade openness is an important piece of the entire globalization process and its positive impact on growth tends to validate the theories stating that scale economies, comparative advantages and technology transfer are benefits associated to trade openness.

As stressed in the methodology section, to control for the possible endogeneity of the globalization variables due to reversal causality I use an IV model. The results confirm more or less the previous findings (Table 8)

Among the Dreher's indices *Cult_prox,* and *Eglob* are still significant. As before, the overall index is not significant. This difference among the Dreher's indices highlights the difficulty of complex indices to capture a significant relationship between globalization and growth. *Cult_prox and Eglob* are obtained combining a limited number of sub-indices and therefore they are able to capture a specific aspect of the globalization phenomenon. Even *Kaopen* is significant and positively related to growth, confirming the importance of the financial integration on economic growth. The Hansen tests confirm the validity of the instruments used. I do not reject the null hypothesis of exogeneity of the instruments.

Table 8. Fixed effects regressions with IV

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**
Oglob	0.338							
	(0.241)							
Eglob		0.257**						
		(0.110)						
Ec_fr			0.00849*					
			(0.00464)					
Cult_prox				0.0474*				
				(0.0287)				
Ifigdp					0.0912			
					(0.0782)			
Geqgdp						0.0700**		
						(0.0343)		
Kaopen							0.0186**	
							(0.00912)	
Exp_imp								-0.194
								(0.161)
iGDP	-0.0893***	-0.0717***	-0.0670***	-0.0642***	-0.0503***	-0.0610***	-0.0707***	-0.0260
	(0.0281)	(0.0165)	(0.0145)	(0.0143)	(0.0112)	(0.0101)	(0.0207)	(0.0281)
Lsc	0.0218	0.0446	0.0137	0.0372	0.0229	0.0434	-0.0190	0.0856
	(0.0429)	(0.0444)	(0.0338)	(0.0311)	(0.0384)	(0.0410)	(0.0537)	(0.0574)
Life	0.125	0.0946	-0.0148	0.0752	0.0123	0.0232	0.0427	0.00476
	(0.0982)	(0.0666)	(0.0579)	(0.0636)	(0.0544)	(0.0566)	(0.0594)	(0.0782)
Fertility	0.00409	-0.0183	-0.0150	-0.00702	-0.0242	-0.0441**	-0.0164	-0.00910
	(0.0173)	(0.0164)	(0.0133)	(0.0150)	(0.0217)	(0.0217)	(0.0175)	(0.0198)
Invest	0.146***	0.112***	0.155***	0.147***	0.109**	0.105**	0.186***	0.341**
	(0.0490)	(0.0418)	(0.0382)	(0.0453)	(0.0490)	(0.0497)	(0.0522)	(0.157)
Gen_exp	-0.0351	-0.0552	-0.0239	-0.0420	-0.0508	-0.0699	-0.00183	-0.00238
	(0.0608)	(0.0518)	(0.0450)	(0.0549)	(0.0557)	(0.0571)	(0.0620)	(0.0790)
Infl	0.00172	-0.00340	-0.000932	0.00153	0.00469	0.00673**	-0.00424	0.00223
	(0.00701)	(0.00799)	(0.00566)	(0.00542)	(0.00446)	(0.00265)	(0.00913)	(0.00718)
Trade	0.00150***	0.00157***	0.00167***	0.00175***	0.00191***	0.00180***	0.00142***	0.00230***
	(0.000338)	(0.000310)	(0.000281)	(0.000281)	(0.000265)	(0.000277)	(0.000325)	(0.000515)
Dbagdp	0.00894	0.0158**	0.0132**	0.00923	0.00778	0.00545	0.0116	0.0193**
	(0.00747)	(0.00766)	(0.00630)	(0.00757)	(0.00746)	(0.00696)	(0.00925)	(0.00785)
Dem	-0.0271	-0.0121	-0.0296*	-0.0254	-0.0116	0.00327	-0.0136	-0.00492
	(0.0198)	(0.0199)	(0.0156)	(0.0179)	(0.0243)	(0.0306)	(0.0207)	(0.0362)
Observations	278	278	279	278	278	265	280	283
R-squared	0.391	0.367	0.581	0.480	0.477	0.402	0.401	-0.110
Number of id	62	62	62	62	62	61	62	63
Hansen test	0.0735	0.2389	0.0721	0.0627	0.0957	0.0037	0.5033	0.2221

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*
IVs: Legal Structure and Security of Property Rights and logarithm of the Rural population.

My findings support the hypothesis that globalization can promote growth: for most of the sub-indices used, I find a positive association. On the contrary, the Dreher's *Overall Globalization index* is not significant. A possible explanation can be that that index, obtained from a PCA, is a complex index including variables that may push in different directions. *Cult_prox* and *Eglob,* that are more specific sub-indices, do not fail to capture the relationship between globalization and growth Other indices, like *Ec_Fr* and *Kaopen*, obtained following the same procedure, but combining a lower number of sub-indices, are significantly positive. Indices like *Geqgdp* and *Kaopen* shows how financial integration is important to reach high levels of economic development. I cannot confirm the key role played by the size of financial markets for economic growth (King and

Levine, 1993) and the impact that political and institutional quality may have on growth (La Porta et al. 1998) since *Dbagdp* and *Dem* are not significant. The initial GDP is always negative and strongly significant aligned with the literature assuming the existence of conditional convergence (Barro, 2003).

However, as discussed in the methodology section, economic growth may be affected by its past levels, therefore I develop a dynamic model. In order to take into account the possible upward bias of the GMM estimation, I report in Table 18 and 19 of Appendix A, the POLS and FE regressions for the dynamic model to have a range for GMM estimation. As suggested by Roodman (2006) if the estimates from GMM are in the range POLS-FE, the results are not biased.

Table 9. Arellano – Bond regressions (1)

	(1)	(1a) Orthog	(2)	(2a) Orthog	(3)	(3a) Orthog	(4)	(4a) Orthog	(5)	(5a) Orthog
VARIABLES	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**
L.GDP_grw	-0.0838	-0.0865	-0.168	-0.0447	-0.115	-0.0756	-0.262	-0.122	-0.111	-0.0232
	(0.118)	(0.159)	(0.105)	(0.147)	(0.147)	(0.129)	(0.159)	(0.138)	(0.109)	(0.163)
Oglob	0.219**	0.0933								
	(0.0945)	(0.0832)								
Eglob			0.0237	0.0317	0.136*	0.0800				
			(0.0557)	(0.0542)	(0.0741)	(0.0603)				
Pglob			-0.0561	-0.0711						
			(0.0439)	(0.0434)						
Sglob			0.0542	0.0224						
			(0.0632)	(0.0605)						
Ec_fr							0.0202***	0.0105*		
							(0.00518)	(0.00609)		
Cult_prox									0.0515***	0.0308
									(0.0187)	(0.0194)
iGDP	-0.107***	-0.0709***	-0.0817***	-0.0607***	-0.103***	-0.0699***	-0.0851***	-0.0713***	-0.0937***	-0.0722***
	(0.0214)	(0.0183)	(0.0173)	(0.0163)	(0.0158)	(0.0139)	(0.0133)	(0.0115)	(0.0161)	(0.0168)
Lsc	0.0592	0.105	0.0494	0.0561	0.180*	0.154**	0.0895	0.140**	0.0627	0.0974
	(0.0733)	(0.0748)	(0.0990)	(0.0562)	(0.100)	(0.0735)	(0.0865)	(0.0631)	(0.0859)	(0.0812)
Life	0.156**	0.122**	0.149**	0.111*	0.156**	0.133***	0.0906	0.141***	0.141**	0.125**
	(0.0701)	(0.0526)	(0.0684)	(0.0656)	(0.0658)	(0.0440)	(0.158)	(0.0430)	(0.0698)	(0.0582)
Fertility	0.0261	0.0371	0.00905	-0.00215	0.0500	0.0415	0.0122	0.0323	0.0256	0.0367**
	(0.0244)	(0.0238)	(0.0231)	(0.0232)	(0.0332)	(0.0263)	(0.0257)	(0.0255)	(0.0219)	(0.0177)
Invest	0.270***	0.191**	0.223***	0.154*	0.286***	0.186***	0.269***	0.208***	0.228**	0.125
	(0.0804)	(0.0915)	(0.0734)	(0.0798)	(0.0966)	(0.0664)	(0.0840)	(0.0687)	(0.0975)	(0.105)
Gen_exp	-0.0444	-0.0995*	-0.0292	-0.0675	-0.0314	-0.0897*	0.110	0.101	0.00255	-0.0596
	(0.0768)	(0.0500)	(0.0572)	(0.0427)	(0.0538)	(0.0459)	(0.116)	(0.112)	(0.0690)	(0.0633)
Infl	0.0084***	0.00600	0.00559	-9.21e-05	0.00575	0.00241	-0.000153	0.00235	0.00762*	0.00344
	(0.00298)	(0.00532)	(0.00403)	(0.00689)	(0.00433)	(0.00677)	(0.0100)	(0.00786)	(0.00397)	(0.00647)
Trade	0.0010***	0.0012***	0.00093**	0.0011***	0.00096**	0.0011***	0.0012***	0.0012***	0.0011***	0.0012***
	(0.00044)	(0.000433)	(0.000359)	(0.000404)	(0.000371)	(0.000394)	(0.000358)	(0.000343)	(0.000394)	(0.000440)
Dbagdp	0.00476	-0.00172	0.00562	0.00787	-0.00785	-0.00628	0.0192	0.00634	0.0109	0.00244
	(0.0179)	(0.0116)	(0.0157)	(0.0129)	(0.0232)	(0.0138)	(0.0164)	(0.0147)	(0.0150)	(0.01000)
Dem	-0.0381	-0.00828	-0.0184	-0.00329	-0.0270	-0.00609	-0.0300	0.00140	-0.0190	-0.0134
	(0.0284)	(0.0209)	(0.0238)	(0.0184)	(0.0237)	(0.0176)	(0.0242)	(0.0217)	(0.0301)	(0.0230)
AR (1)	0.033	0.034	0.049	0.041	0.057	0.019	0.066	0.039	0.048	0.403
AR (2)	0.255	0.214	0.095	0.308	0.383	0.299	0.651	0.497	0.315	0.642
AR (3)	0.998	0.311	0.703	0.468	0.697	0.453	0.186	0.107	0.577	0.215
Hansen for over. Restr	0.242	0.152	0.328	0.351	0.201	0.414	0.435	0.383	0.304	0.146
Observations	224	227	224	227	224	227	205	208	224	227
Number of Contries	69	69	69	69	69	69	65	65	69	69

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*

Table 9 shows the results obtained running the AB model with and without orthogonal deviations using the second and the third lags of variables as instruments.

Unfortunately, the lagged dependent variable is not significant but the results can be useful to understand if globalization affect economic growth in a dynamic setting.

Among the Dreher's indices, *Oglob* and *Eglob* are positively related to growth. In the static analysis, the overall index is not significant. In the dynamic setting, economic growth is positively associated to changes in the globalization process, considering not only the economic sub-dimension but also the overall globalization index.

The *Economic Freedom index* confirms its strong and positive relationship with growth. The estimated coefficient is greater than in the static model. Finally, *Cultural proximity* affects positively economic growth, confirming what was said previously about the importance of the cultural factor in the globalization process.

The initial GDP is negative and strongly significant confirming the relative convergence theory. *Dbagdp* and *Dem* are not significant. I cannot confirm the impact of the financial development end institutional quality on economic growth.

Among the indices of financial integration (Table 10), only *Kaopen* is significant and positive. *Geqgdp* was positive and significant in the static model, but is not significant in the dynamic setting. Instead, Trade openness is an important component of the globalization process also in the dynamic setting. Its proxy, considering Exports and Imports, is strongly significant and indicating that more opened are the exchanges between countries, the higher is the GDP per capita growth rate. The estimates are larger than before.

Even in this model, I cannot confirm the importance of the financial markets (King and Levine, 1993) and the impact of political and institutional quality on economic growth (La Porta et al. 1998).

All the AR tests considered for the second and the third lag suggest that the instruments series are stationary. The Hansen tests do not reject the null hypothesis of exogeneity of the instruments, thus I can consider the lags of the variables good instruments for the variables themselves.

Table 10. Arellano – Bond regressions (2)

	(6)	(6a) Orthog	(7)	(7a) Orthog	(8)	(8a) Orthog	(9)	(9a) Orthog
VARIABLES	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**
L.GDP_grw	-0.0930	-0.0577	-0.0949	-0.0372	-0.108	-0.0957	-0.130	-0.0738
	(0.126)	(0.103)	(0.130)	(0.124)	(0.0877)	(0.130)	(0.102)	(0.114)
Ifigdp	0.000479	0.000156						
	(0.00209)	(0.00167)						
Geqgdp			0.00573	0.00153				
			(0.0173)	(0.0119)				
Kaopen					0.0128***	0.00963***		
					(0.00368)	(0.00301)		
Exp_imp							0.0824**	0.0540**
							(0.0369)	(0.0265)
iGDP	-0.0890***	-0.0631***	-0.0930***	-0.0681***	-0.0993***	-0.0661***	-0.0984***	-0.0734***
	(0.0139)	(0.0125)	(0.0126)	(0.00906)	(0.0121)	(0.0197)	(0.0149)	(0.0151)
Lsc	0.152**	0.148**	0.162**	0.181**	0.107	0.116**	0.168**	0.150**
	(0.0716)	(0.0645)	(0.0757)	(0.0712)	(0.0893)	(0.0469)	(0.0834)	(0.0671)
Life	0.106	0.106*	0.133**	0.108**	0.148*	0.108**	0.137**	0.129**
	(0.0650)	(0.0547)	(0.0643)	(0.0472)	(0.0845)	(0.0485)	(0.0566)	(0.0527)
Fertility	0.0523*	0.0527***	0.0497	0.0511*	0.00751	0.0186	0.0690**	0.0525***
	(0.0275)	(0.0158)	(0.0319)	(0.0261)	(0.0295)	(0.0222)	(0.0308)	(0.0198)
Invest	0.265***	0.209***	0.291***	0.202***	0.268***	0.189*	0.302***	0.170*
	(0.0684)	(0.0621)	(0.0834)	(0.0681)	(0.0587)	(0.106)	(0.0697)	(0.0854)
Gen_exp	0.0651	-0.0651	0.0357	-0.0714	0.0734	-0.0621	0.00101	-0.0503
	(0.0609)	(0.0492)	(0.0682)	(0.0595)	(0.0690)	(0.0520)	(0.0804)	(0.0745)
Infl	0.00601	0.00695*	0.00740***	0.00493	0.00407	0.00197	0.00524	0.00325
	(0.00388)	(0.00351)	(0.00202)	(0.00349)	(0.00357)	(0.00726)	(0.00326)	(0.00391)
Trade	0.00105***	0.00128***	0.00105***	0.00114***	0.00084***	0.000904**	0.000671**	0.000937**
	(0.000291)	(0.000339)	(0.000381)	(0.000411)	(0.000276)	(0.000414)	(0.000271)	(0.000383)
Dbagdp	0.00149	-0.000829	0.00330	0.00154	0.0110	0.00544	-0.0138	-0.0184
	(0.0144)	(0.00961)	(0.0143)	(0.0106)	(0.0123)	(0.0123)	(0.0204)	(0.0193)
Dem	-0.0162	-0.00286	-0.0254	-0.00906	-0.0385	-0.00768	-0.0313	-0.0111
	(0.0284)	(0.0174)	(0.0351)	(0.0183)	(0.0255)	(0.0163)	(0.0297)	(0.0214)
AR (1)	0.038	0.028	0.038	0.021	0.009	0.019	0.054	0.027
AR (2)	0.137	0.337	0.203	0.381	0,060	0.083	0.625	0.567
AR (3)	0.401	0.193	0.566	0.223	0.321	0.841	0.851	0.377
Hansen for over. restr	0.295	0.479	0.213	0.220	0.419	0.165	0.194	0.268
Observations	226	229	228	231	226	229	228	231
Number of ID	69	69	70	70	69	69	70	70

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*

Summarizing the results obtained from the dynamic approach, they confirm in general the previous ones obtained from the static approach. They suggest a positive relationship between globalization and growth. In particular, the complex indices, excepting for *Economic Freedom*, tend to be less significant than the simple indices representing a single sub-dimension of the phenomenon.

The second part of the analysis is focused on the hypothesis that the initial economic development may have a key role in the relationship between globalization and growth and to verify if entering in a globalized system may help developing countries to reach higher GDP growth rates. As stressed in the methodology section, firstly I replicate the previous analysis introducing an interaction between globalization indices and the initial level of GDP per capita.

Table 11. Fixed Effects regressions with interaction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**	**GDP_grw**
Oglob	-0.150							
	(0.116)							
Oglob*iGDP	0.0202*							
	(0.0118)							
Eglob		-0.150						
		(0.123)						
Eglob*iGDP		0.0202						
		(0.0126)						
Ec_fr			-0.0190					
			(0.0160)					
Ec_fr*iGDP			0.00312*					
			(0.00176)					
Cult_prox				-0.111				
				(0.0712)				
Cult_prox *iGDP				0.0130*				
				(0.00724)				
Ifigdp					0.0666			
					(0.0896)			
Ifigdp*iGDP					-0.00485			
					(0.00875)			
Geqgdp						0.0669		
						(0.0807)		
Geqgdp*iGDP						-0.00515		
						(0.00752)		
Kaopen							0.00841	
							(0.921861)	
Kaopen*iGDP							0.054832	
							(0.099818)	
Exp_imp								0.0447
								(0.0615)
Exp_imp*iGDP								-0.00269
								(0.00742)
iGDP	-0.0701***	-0.0699***	-0.0857***	-0.0631***	-0.0583***	-0.0631***	-0.0608***	-0.0579***
	(0.0155)	(0.0143)	(0.0202)	(0.0129)	(0.0117)	(0.0112)	(0.0129)	(0.0137)
Lsc	0.0406	0.0413	0.0622*	0.0421	0.0566	0.0565	0.0507	0.0569
	(0.0316)	(0.0329)	(0.0355)	(0.0318)	(0.0342)	(0.0355)	(0.0337)	(0.0349)
Life	0.0871***	0.0879***	0.0913*	0.0907***	0.0706*	0.0745**	0.0761**	0.0732**
	(0.0305)	(0.0301)	(0.0460)	(0.0308)	(0.0356)	(0.0364)	(0.0322)	(0.0337)
Fertility	-0.0128	-0.0149	-0.0209*	-0.0158	-0.00956	-0.0161	-0.0120	-0.00693
	(0.0130)	(0.0136)	(0.0123)	(0.0131)	(0.0130)	(0.0128)	(0.0131)	(0.0116)
Invest	0.142***	0.140***	0.183***	0.143***	0.142***	0.151***	0.153***	0.135***
	(0.0379)	(0.0360)	(0.0423)	(0.0381)	(0.0384)	(0.0402)	(0.0407)	(0.0379)
Gen_exp	-0.0289	-0.0303	-0.0203	-0.0299	-0.0200	-0.0206	-0.0310	-0.0230
	(0.0385)	(0.0382)	(0.0444)	(0.0388)	(0.0408)	(0.0425)	(0.0395)	(0.0402)
Infl	0.00151	0.00149	-0.000430	0.00174	0.00223	0.00435	5.84e-05	0.00244
	(0.00525)	(0.00552)	(0.00735)	(0.00489)	(0.00488)	(0.00350)	(0.00625)	(0.00466)
Trade	0.00122***	0.00121***	0.00142***	0.00122***	0.00136***	0.00137***	0.00125***	0.00126***
	(0.000338)	(0.000340)	(0.000351)	(0.000335)	(0.000324)	(0.000331)	(0.000313)	(0.000326)
Dbagdp	0.00585	0.00666	0.0125*	0.00646	0.0115	0.00936	0.0109	0.0108
	(0.00535)	(0.00532)	(0.00643)	(0.00546)	(0.00713)	(0.00734)	(0.00750)	(0.00731)
Dem	-0.0212	-0.0190	-0.0119	-0.0191	-0.0188	-0.0177	-0.0205	-0.0252
	(0.0165)	(0.0165)	(0.0163)	(0.0162)	(0.0158)	(0.0205)	(0.0150)	(0.0161)
Constant	0.218	0.217	0.295*	0.158	0.183	0.214	0.190	0.162
	(0.139)	(0.136)	(0.171)	(0.130)	(0.139)	(0.136)	(0.134)	(0.140)
Observations	357	356	311	357	356	344	357	357
R-squared	0.429	0.430	0.530	0.434	0.438	0.448	0.455	85
Number of countries	86	85	76	86	84	84	85	0.455
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*

Table 12. Fixed Effects regressions with interaction – Marginal effects

	dy/dx	Std. Err.	t	P>t	[95% Conf.	Interval]
Oglob	0.020426	0.041345	0.49	0.621	-0.06061	0.101461
Eglob	0.019964	0.032085	0.62	0.534	-0.04292	0.082849
Ec_fr	**0.007808**	0.002612	2.99	**0.003**	0.002689	0.012927
Cult_prox	-0.00082	0.01358	-0.06	0.952	-0.02744	0.025797
Ifigdp	0.025846	0.020271	1.27	0.202	-0.01389	0.065576
Geqgdp	0.023532	0.018203	1.29	0.196	-0.01214	0.059208
Kaopen	**0.004692**	0.001772	2.65	**0.008**	0.00122	0.008164
Exp_imp	**0.000221**	0.000136	1.63	**0.103**	-4.5E-05	0.000488

Marginal effects are calculated on the averages of the initial GDP.

The *Economic Freedom* index, *Kaopen* and Trade openness, *Exp_imp*, are positively related to growth. They highlight that fixing an average level of initial GDP, globalization affects positively GDP growth rates. Therefore, countries with higher level of economic development may catch more benefits from financial and trade openness with respect to the poorer countries.

Secondly, splitting the original sample based on the average initial GDP, I obtain two subsamples, developed and developing countries. The following analysis is different to the previous because the initial economic development may affect all the slope coefficients of the regression model. That is, different level of initial economic development may change the entire underline structure of the model.

I replicate the previous analyses except the dynamic specification. Since the previous analysis on the overall sample has shown that, in terms of results, the dynamic setting is in line with the static one, and considering the difficulty arising from the availability of the data, I only provide a static analysis for the subsamples. In particular, missing data does not allow using the AB model: the number of instruments is too high and it generates test results artificially high which make doubts about the exogeneity of the instruments themselves.

Table 13. Over-identification tests

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Oglob	**Eglob, Pglob, Sglob**	**Eglob**	**Ec_Fr**	**Cult_Prox**	**Ifigdp**	**Geqgdp**	**Kaopen**	**Exp_Imp**
P-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
	FE	**FE**	**FE**	**FE**	**FE**	**FE**	**FE**	**FE**	**FE**

Over-identification tests – Developed sample

For both sub-samples, the POLS regressions are shown in Tables 20 and 21, Appendix A. Secondly, I run both FE and RE model and the over-identification test to compare them. Starting from the developed sample in Table 13, the results from the tests indicate the presence of FE.

Table 14. FE regressions – Developed sample

VARIABLES	(1) GDP_grw	(2) GDP_grw	(3) GDP_grw	(4) GDP_grw	(5) GDP_grw	(6) GDP_grw	(7) GDP_grw	(8) GDP_grw	(9) GDP_grw
Oglob	0.0391								
	(0.0417)								
Eglob		0.0319	0.0494						
		(0.0338)	(0.0321)						
Pglob		-0.0445**							
		(0.0216)							
Sglob		0.0373*							
		(0.0220)							
Ec_fr				0.00881***					
				(0.00289)					
Cult_prox					0.0226**				
					(0.00847)				
Ifigdp						0.0278*			
						(0.0159)			
Geqgdp							0.0130**		
							(0.00620)		
Kaopen								0.00356*	
								(0.00199)	
Exp_imp									0.0156
									(0.0164)
iGDP	-0.0564***	-0.0544***	-0.0551***	-0.0622***	-0.0569***	-0.0506***	-0.0570***	-0.0551***	-0.0538***
	(0.0152)	(0.0147)	(0.0145)	(0.0142)	(0.0149)	(0.0138)	(0.0136)	(0.0149)	(0.0152)
Lsc	0.0322	0.0478	0.0436	0.0380	0.0287	0.0305	0.0336	0.0366	0.0346
	(0.0318)	(0.0372)	(0.0354)	(0.0338)	(0.0310)	(0.0335)	(0.0342)	(0.0342)	(0.0336)
Life	-0.0268	-0.00845	-0.0228	-0.0433	-0.0122	-0.0397	-0.0324	-0.0250	-0.0419
	(0.0626)	(0.0670)	(0.0640)	(0.0691)	(0.0626)	(0.0560)	(0.0538)	(0.0581)	(0.0627)
Fertility	-0.0187	-0.0251*	-0.0208*	-0.0260***	-0.0208	-0.0267**	-0.0282**	-0.0206*	-0.0198
	(0.0124)	(0.0128)	(0.0124)	(0.00957)	(0.0126)	(0.0126)	(0.0134)	(0.0119)	(0.0126)
Invest	0.149***	0.150***	0.143***	0.180***	0.153***	0.140***	0.157***	0.160***	0.141***
	(0.0502)	(0.0512)	(0.0486)	(0.0449)	(0.0510)	(0.0506)	(0.0568)	(0.0510)	(0.0523)
Gen_exp	-0.0100	-0.0152	-0.0119	-0.0446	-0.0113	-0.00807	0.000210	-0.0188	-0.00510
	(0.0378)	(0.0375)	(0.0363)	(0.0420)	(0.0380)	(0.0403)	(0.0422)	(0.0373)	(0.0418)
Infl	-0.00558	-0.00831	-0.00721	-0.0141**	-0.00594	-0.00271	0.00140	-0.00862*	-0.00309
	(0.00532)	(0.00498)	(0.00521)	(0.00568)	(0.00504)	(0.00457)	(0.00659)	(0.00483)	(0.00468)
Trade	0.00167***	0.00163***	0.00165***	0.00158***	0.00165***	0.00176***	0.00176***	0.00169***	0.00171***
	(0.000302)	(0.000302)	(0.000300)	(0.000280)	(0.000296)	(0.000274)	(0.000292)	(0.000285)	(0.000302)
Dbagdp	0.00722	0.00749	0.00807	0.00999*	0.00629	0.00822	0.00743	0.00888	0.00905
	(0.00590)	(0.00610)	(0.00586)	(0.00509)	(0.00613)	(0.00555)	(0.00563)	(0.00583)	(0.00578)
Dem	-0.0200	-0.0148	-0.0172	-0.0155	-0.0190	-0.0165	-0.0121	-0.0194	-0.0195
	(0.0164)	(0.0162)	(0.0162)	(0.0167)	(0.0163)	(0.0163)	(0.0213)	(0.0156)	(0.0159)
Constant	0.610*	0.535	0.578*	0.696**	0.570*	0.635**	0.658**	0.608**	0.660**
	(0.310)	(0.338)	(0.309)	(0.311)	(0.315)	(0.277)	(0.284)	(0.296)	(0.324)
Observations	228	228	228	218	228	226	219	226	229
R-squared	0.575	0.594	0.580	0.647	0.586	0.619	0.629	0.618	0.611
Number of countries	51	51	51	50	51	49	50	51	51
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*

In general, the results are in line with those obtained using the overall sample. Globalization seems to promote growth. The general index, *Oglob,* introduced by Dreher is not significant, while *Cult_Prox* is positively related to growth. *Ec_fr* is significant and positive, confirming the positive relationship with growth verified for the overall sample.

The financial integration indices, *Ifigdp, Geqgdp* and *Kaopen*, are significant and positive highlighting the importance for developed countries to have an integrated financial system.

In Table 16, I show the results for the developing sub-sample.

Table 15 Over-identification tests

	(1) Oglob	(2) Eglob, Pglob, Sglob	(3) Eglob	(4) Ec_Fr	(5) Cult_Prox	(6) Ifigdp	(7) Geqgdp	(8) Kaopen	(9) Exp_Imp
P-value	0.0854	0.0298	0.0269	0.0000	0.2702	0.0111	0.0111	0.4369	0.0150
	RE	**FE**	**FE**	**FE**	**RE**	**FE**	**FE**	**RE**	**FE**

Over-identification tests – Developing sample

Table 16. FE regressions – Developing sample

VARIABLES	(1) GDP_grw	(2) GDP_grw	(3) GDP_grw	(4) GDP_grw	(5) GDP_grw	(6) GDP_grw	(7) GDP_grw	(8) GDP_grw	(9) GDP_grw
Oglob	0.122								
	(0.0745)								
Eglob		0.0406	0.0265						
		(0.112)	(0.0948)						
Pglob		-0.0125							
		(0.0527)							
Sglob		-0.0600							
		(0.135)							
Ec_fr				0.00697					
				(0.00524)					
Cult_prox					-0.0246				
					(0.0230)				
Ifigdp						0.0170			
						(0.0545)			
Geqgdp							0.0196		
							(0.0527)		
Kaopen								0.00645**	
								(0.00271)	
Exp_imp									0.0512**
									(0.0238)
iGDP	-0.0380***	-0.0881***	-0.0915***	-0.147***	-0.0270**	-0.0963***	-0.0976***	-0.0309***	-0.0986***
	(0.0130)	(0.0303)	(0.0303)	(0.0458)	(0.0112)	(0.0317)	(0.0319)	(0.0105)	(0.0294)
Lsc	-0.0555	0.215	0.203	0.256	-0.0485	0.237**	0.220**	-0.0370	0.231**
	(0.0684)	(0.131)	(0.129)	(0.154)	(0.0693)	(0.0974)	(0.106)	(0.0591)	(0.0993)
Life	0.122***	0.133**	0.133**	0.158**	0.125***	0.127**	0.131**	0.122***	0.142***
	(0.0313)	(0.0523)	(0.0519)	(0.0733)	(0.0334)	(0.0518)	(0.0528)	(0.0347)	(0.0486)
Fertility	-0.00187	-0.0495	-0.0452	-0.0504	-0.00911	-0.0452	-0.0546	-0.00481	-0.0397
	(0.0191)	(0.0482)	(0.0433)	(0.0581)	(0.0219)	(0.0461)	(0.0543)	(0.0185)	(0.0424)
Invest	0.0633**	0.113	0.116	0.237**	0.0583*	0.125*	0.127*	0.0688**	0.105*
	(0.0303)	(0.0717)	(0.0689)	(0.109)	(0.0314)	(0.0692)	(0.0718)	(0.0288)	(0.0583)
Gen_exp	-0.0389	-0.0734	-0.0706	-0.0669	-0.0422	-0.0621	-0.0653	-0.0238	-0.0760
	(0.0504)	(0.0676)	(0.0711)	(0.109)	(0.0502)	(0.0672)	(0.0683)	(0.0547)	(0.0612)
Infl	0.0147***	0.00762	0.00856**	0.00765	0.0127***	0.00782*	0.00818*	0.0114***	0.00822**
	(0.00420)	(0.00472)	(0.00386)	(0.00506)	(0.00392)	(0.00390)	(0.00403)	(0.00347)	(0.00353)
Trade	0.000716	0.000786	0.000778	0.00105	0.000768	0.000871	0.000866	0.000572	0.000761
	(0.000596)	(0.000545)	(0.000541)	(0.000835)	(0.000593)	(0.000552)	(0.000546)	(0.000592)	(0.000511)
Dbagdp	-0.0207	-0.0322	-0.0320	-0.0408	-0.0170	-0.0314	-0.0315	-0.0312	-0.0388
	(0.0202)	(0.0292)	(0.0298)	(0.0638)	(0.0179)	(0.0299)	(0.0302)	(0.0213)	(0.0296)
Dem	-0.0508*	-0.0713	-0.0761	-0.0731	-0.0300	-0.0694	-0.0705	-0.0282	-0.104**
	(0.0295)	(0.0594)	(0.0611)	(0.0603)	(0.0267)	(0.0533)	(0.0547)	(0.0255)	(0.0480)
Constant	0.123	0.122	0.127	0.116	0.122	0.152	0.144	0.160	0.136
	(0.140)	(0.140)	(0.136)	(0.160)	(0.141)	(0.138)	(0.138)	(0.140)	(0.136)
Observations	129	128	128	93	129	130	125	131	132
R-squared		0.411	0.409	0.550		0.402	0.410		0.431
Number of countries	35	34	34	26	35	35	34	34	34
Fixed Effects	NO	YES	YES	YES	NO	YES	YES	NO	YES

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*

As before, I run the POLS model (Table 21, Appendix A) and then both FE and RE model, performing an Over-identification test in order to choose between them. Unlike before, Table 15 shows the presence of RE in some cases (Regressions 1,5 and 8) .

From such a sample, I obtain more limited results. *Kaopen* is significant and positively associated with growth, highlighting the importance that capital openness may have for developing countries in term of growth. *Exp_imp* is also positive related with growth underlining that trade openness may help developing countries to obtain greater growth rate. The magnitude effect is less than developed countries. The complex indices are not significant at all. In general, in the developing sample I do not detect a significant relationship with most of the variables representing globalization. The results do not allow to reach any strong conclusion. The developed sample is more in line with the general results with respect to developing one. In particular, financial integration seems to improve economic growth. This result may support the hypothesis that economic development has an impact in the relationship between globalization and growth. The more developed countries seem to be able to capture more benefits in terms of growth from the globalization process.

Comparing the two different approaches used to verify whether the initial economic development is important to the countries to be able to reach benefits in terms of economic growth from the globalization process. It seems that the first one is more persuasive and it allows to reach stronger conclusions. The first approach is based on the hypothesis that the underline relationship on the model is the same for all countries but the initial economic development is an important key to reach higher growth rates through the globalization process. The finding is that the initial economic development is important in the relationship between globalization and growth. As highlighted by the results, developed countries are able to capture benefits from the globalized system more than the developing ones. As the economic development increases, as the chance that a country benefits from the integration increases. The doubts of some scholars related to the fact that globalization is not able to speed up the growth rates for developing countries (Edison et al. 2002, Rodrik, 1998) are confirmed. Globalization seems to have a key role for those countries that have an economic, financial, politic and social environment sufficiently developed. Instead, for developing countries entering in a globalized system produces risks and may have negative effects deriving from the shifts of the international markets.

6 Conclusions

Globalization is a complex phenomenon. From this complexity derives the main challenge related to the analysis of the relationship between globalization and growth: the difficulty to find a proxy to measure it. In this work, I consider a wide set of globalization measures to show how the growth rate of GDP may be related to alternative globalization measures. I provide a comparative analysis of the relationship between globalization and growth specifying how specific dimensions of globalization may influence economic growth. Additionally, I discuss and use complex globalization measures obtained using a large number of sub-indices. I use several approaches, POLS FE, IV and AB, in order to compare them and verify how the relationship between globalization and economic growth develops in different settings.

The main findings of this analysis can be summarized as follows. First, the most complex measures, excluding *Economic Freedom,* fail to capture the relationship between globalization and growth. A significant positive result is obtained using the *Cultural proximity index* that describes integration and homogenization in terms of consumption. The second remarkable result is that the simple indices, focused on specific sub-dimensions of the globalization phenomenon, are positively related to growth. Specifically, measures of financial integration and trade openness are significant, highlighting how specific sub-dimensions are able to capture the relation between globalization and growth. Among the index of financial openness, *Kaopen* is strongly significant and affects positively growth. The liberalization of the cross-borders capitals improves the financial openness highlighting the importance of the financial integration to promote growth in a global scenario. Even *Trade openness* is positively related to growth. This result shows that growth is affected by the improvement that trade has undergone. Eliminating barriers and tariffs has increased the volume of transactions of goods and services and that has a positive effect on economic growth. The third result is related to the separate analysis on the subsamples of developed and developing countries to take into account the possibility that the initial stage of development may change the relationship between globalization and economic growth. Although it is not possible to conduct a dynamic analysis on both sub-samples, the evidence seems to suggest that the initial level of economic development is important to capture the benefits deriving from the globalization process in terms of growth. To verify the assumption that the higher the

initial economic development, the greater are the benefits deriving from the globalization process, I split the overall sample in two sub-sample of develop and developing countries. For the developed countries, I find results in line with those obtained in the overall sample: financial integration and economic freedom are positively associated with growth. For the developing sample, the results are generally not significant, so it impossible to say anything clear on of the relationship between globalization and growth. One possible explanation is that developed countries can beneficiate more in terms of growth having economic, financial and political structure able to capture the benefits deriving from the globalized markets. Thus, following this intuition, the level of economic development is important to capture the advantages provided by globalization: more developed is a country more globalization improves economic growth.

Appendix A

Table 17. Pooled regressions

VARIABLES	(1) GDP_grw	(2) GDP_grw	(3) GDP_grw	(4) GDP_grw	(5) GDP_grw	(6) GDP_grw	(7) GDP_grw	(8) GDP_grw	(9) GDP_grw
Oglob	0.0263								
	(0.0169)								
Eglob		0.0247*	0.0287**						
		(0.0143)	(0.0124)						
Pglob		-0.00507							
		(0.00781)							
Sglob		0.00723							
		(0.0134)							
Ec_fr				0.00372**					
				(0.00162)					
Cult_prox					0.00435				
					(0.00543)				
Ifigdp						0.00103			
						(0.00151)			
Geqgdp							0.00627		
							(0.00410)		
Kaopen								0.00219**	
								(0.000972)	
Exp_imp									0.00815*
									(0.00426)
iGDP	-0.0138***	-0.0138***	-0.0135***	-0.0128***	-0.0123***	-0.0116***	-0.0121***	-0.0123***	-0.0113***
	(0.00328)	(0.00328)	(0.00297)	(0.00271)	(0.00293)	(0.00254)	(0.00260)	(0.00252)	(0.00253)
Lsc	0.00178	0.00316	0.00541	-0.000851	0.00117	0.00195	0.00115	-0.00365	0.000932
	(0.0129)	(0.0126)	(0.0125)	(0.0115)	(0.0133)	(0.0116)	(0.0117)	(0.0122)	(0.0118)
Life	0.0697**	0.0712**	0.0699**	0.0637	0.0712**	0.0677**	0.0702**	0.0692**	0.0665**
	(0.0309)	(0.0307)	(0.0309)	(0.0477)	(0.0316)	(0.0315)	(0.0314)	(0.0318)	(0.0313)
Fertility	-0.0124	-0.0123	-0.0117	-0.0142	-0.0136	-0.0135	-0.0140*	-0.0137	-0.0133
	(0.00894)	(0.00907)	(0.00878)	(0.00951)	(0.00876)	(0.00851)	(0.00840)	(0.00849)	(0.00859)
Invest	0.0705***	0.0640***	0.0628***	0.0716***	0.0682***	0.0675***	0.0648***	0.0663***	0.0608***
	(0.0190)	(0.0181)	(0.0175)	(0.0221)	(0.0188)	(0.0185)	(0.0182)	(0.0187)	(0.0188)
Gen_exp	0.0228	0.0118	0.0120	0.0472*	0.0316	0.0277	0.0279	0.0301	0.0143
	(0.0240)	(0.0247)	(0.0246)	(0.0278)	(0.0236)	(0.0245)	(0.0236)	(0.0241)	(0.0238)
Infl	0.00157	0.00136	0.000872	0.00281	0.00174	0.00170	0.00198	0.000844	0.00267
	(0.00398)	(0.00357)	(0.00369)	(0.00336)	(0.00410)	(0.00389)	(0.00387)	(0.00412)	(0.00347)
Trade	0.0016***	0.0016***	0.0016***	0.0018***	0.0016***	0.0016***	0.0016***	0.0016***	0.0016***
	(0.000276)	(0.000278)	(0.000274)	(0.000261)	(0.000276)	(0.000259)	(0.000259)	(0.000266)	(0.000259)
Dbagdp	0.000448	0.00164	0.00151	0.000732	-9.97e-05	0.000273	0.000321	-3.81e-05	0.00150
	(0.00348)	(0.00345)	(0.00348)	(0.00267)	(0.00337)	(0.00311)	(0.00314)	(0.00319)	(0.00305)
Dem	0.00404	0.00541	0.00543	0.00372	0.00517	0.00571	0.00506	0.00477	0.00672
	(0.00798)	(0.00806)	(0.00787)	(0.00829)	(0.00802)	(0.00804)	(0.00794)	(0.00809)	(0.00798)
Constant	-0.170	-0.173	-0.173	-0.163	-0.178	-0.169	-0.174	-0.166	-0.167
	(0.128)	(0.129)	(0.128)	(0.199)	(0.131)	(0.132)	(0.131)	(0.133)	(0.131)
Observations	357	356	356	311	357	361	362	357	361
R-squared	0.372	0.387	0.386	0.447	0.368	0.375	0.378	0.374	0.383

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*

Table 18. Pooled and Fixed Effects regressions. Dynamic model (1)

VARIABLES	(1) GDP_grw	(1a) FE GDP_grw	(2) GDP_grw	(2a) FE GDP_grw	(3) GDP_grw	(3a) FE GDP_grw	(4) GDP_grw	(4a) FE GDP_grw	(5) GDP_grw	(5a) FE GDP_grw
L.GDP_grw	0.133	-0.114	0.120	-0.117	0.120	-0.116	0.0917	-0.183	0.135	-0.114
	(0.0860)	(0.121)	(0.0858)	(0.121)	(0.0849)	(0.121)	(0.0934)	(0.139)	(0.0858)	(0.121)
Oglob	0.0224	0.0299								
	(0.0176)	(0.0447)								
Eglob			0.0181	0.0149	0.0241*	0.0292				
			(0.0145)	(0.0342)	(0.0132)	(0.0321)				
Pglob			-0.00554	-0.0282						
			(0.00868)	(0.0238)						
Sglob			0.0122	0.0295						
			(0.0140)	(0.0286)						
Ec_fr							0.00294*	0.0095***		
							(0.00152)	(0.00265)		
Cult_prox									0.00438	0.0193*
									(0.00563)	(0.0110)
iGDP	-0.0146***	-0.0606***	-0.0151***	-0.0600***	-0.0143***	-0.0594***	-0.0138***	-0.0656***	-0.0135***	-0.0618***
	(0.00357)	(0.0120)	(0.00363)	(0.0116)	(0.00331)	(0.0108)	(0.00300)	(0.0111)	(0.00321)	(0.0110)
Lsc	0.00524	0.0380	0.00502	0.0325	0.00832	0.0410	0.00182	0.0343	0.00444	0.0282
	(0.0125)	(0.0311)	(0.0127)	(0.0326)	(0.0123)	(0.0324)	(0.0115)	(0.0364)	(0.0128)	(0.0303)
Life	0.0539	0.111**	0.0554	0.110**	0.0541	0.111**	0.0558	0.132**	0.0557	0.112**
	(0.0427)	(0.0517)	(0.0423)	(0.0520)	(0.0425)	(0.0516)	(0.0503)	(0.0538)	(0.0434)	(0.0510)
Fertility	-0.0156	-0.00687	-0.0157	-0.0124	-0.0149	-0.00823	-0.0169*	-0.00732	-0.0166*	-0.00963
	(0.00976)	(0.0130)	(0.0100)	(0.0137)	(0.00966)	(0.0134)	(0.00970)	(0.0132)	(0.00964)	(0.0135)
Invest	0.0555**	0.156***	0.0537**	0.156***	0.0505**	0.154***	0.0666***	0.196***	0.0532**	0.157***
	(0.0234)	(0.0461)	(0.0231)	(0.0456)	(0.0222)	(0.0450)	(0.0238)	(0.0461)	(0.0232)	(0.0458)
Gen_exp	0.0289	-0.0174	0.0196	-0.0175	0.0198	-0.0180	0.0561*	0.0363	0.0384	-0.0164
	(0.0270)	(0.0424)	(0.0275)	(0.0420)	(0.0272)	(0.0423)	(0.0318)	(0.0545)	(0.0264)	(0.0428)
Infl	0.00204	0.00544*	0.00226	0.00455	0.00149	0.00490	0.00312	0.00152	0.00232	0.00560*
	(0.00392)	(0.00289)	(0.00335)	(0.00351)	(0.00363)	(0.00321)	(0.00344)	(0.00540)	(0.00397)	(0.00310)
Trade	0.0015***	0.0011***	0.0015***	0.0011***	0.0015***	0.0011***	0.0017***	0.0011***	0.0015***	0.0011***
	(0.000324)	(0.000352)	(0.000332)	(0.000355)	(0.000324)	(0.000357)	(0.000312)	(0.000377)	(0.000323)	(0.000350)
Dbagdp	0.00294	0.00835	0.00439	0.00780	0.00413	0.00803	0.00109	0.0103	0.00273	0.00848
	(0.00412)	(0.00912)	(0.00406)	(0.00955)	(0.00406)	(0.00963)	(0.00390)	(0.00943)	(0.00414)	(0.00905)
Dem	0.00880	-0.0113	0.00989	-0.00912	0.00997	-0.0104	0.00950	-0.00502	0.00965	-0.0113
	(0.00835)	(0.0160)	(0.00842)	(0.0157)	(0.00825)	(0.0158)	(0.00874)	(0.0186)	(0.00843)	(0.0156)
Constant	-0.0997	0.0294	-0.0991	0.0493	-0.102	0.0241	-0.124	-0.0657	-0.107	0.0535
	(0.176)	(0.238)	(0.176)	(0.243)	(0.175)	(0.236)	(0.207)	(0.237)	(0.179)	(0.237)
Observations	308	308	307	307	307	307	282	282	308	308
R-squared	0.374	0.457	0.386	0.463	0.384	0.458	0.428	0.529	0.371	0.462
Number of countries		81		80		80		74		81

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*

Table 19. Pooled and Fixed Effects regressions. Dynamic model (2)

VARIABLES	(5) GDP_grw	(5a) FE GDP_grw	(6) GDP_grw	(6a) FE GDP_grw	(8) GDP_grw	(8a) FE GDP_grw	(9) GDP_grw	(9a) FE GDP_grw
L.GDP_grw	0.138	-0.108	0.138	-0.110	0.127	-0.145	0.128	-0.114
	(0.0850)	(0.122)	(0.0852)	(0.122)	(0.0849)	(0.118)	(0.0861)	(0.120)
Ifigdp	0.00152	0.00129						
	(0.00159)	(0.00151)						
Geqgdp			0.0101***	0.0163**				
			(0.00368)	(0.00665)				
Kaopen					0.00176*	0.00601***		
					(0.00104)	(0.00187)		
Exp_imp							0.00638	0.0257*
							(0.00441)	(0.0130)
iGDP	-0.0127***	-0.0578***	-0.0136***	-0.0576***	-0.0132***	-0.0588***	-0.0123***	-0.0586***
	(0.00281)	(0.01000)	(0.00288)	(0.00942)	(0.00282)	(0.0105)	(0.00283)	(0.0106)
Lsc	0.00409	0.0449	0.00326	0.0463	-0.000230	0.0296	0.00307	0.0465
	(0.0114)	(0.0310)	(0.0115)	(0.0306)	(0.0119)	(0.0341)	(0.0117)	(0.0318)
Life	0.0522	0.109**	0.0551	0.109**	0.0550	0.114**	0.0520	0.114**
	(0.0434)	(0.0538)	(0.0430)	(0.0529)	(0.0430)	(0.0504)	(0.0432)	(0.0520)
Fertility	-0.0169*	-0.00929	-0.0180*	-0.0160	-0.0168*	-0.0137	-0.0165*	-0.00712
	(0.00956)	(0.0132)	(0.00941)	(0.0141)	(0.00943)	(0.0136)	(0.00963)	(0.0127)
Invest	0.0513**	0.156***	0.0475**	0.150***	0.0521**	0.166***	0.0453*	0.140***
	(0.0229)	(0.0457)	(0.0224)	(0.0449)	(0.0227)	(0.0448)	(0.0233)	(0.0437)
Gen_exp	0.0330	-0.0208	0.0306	-0.0241	0.0375	-0.0149	0.0237	-0.0159
	(0.0271)	(0.0422)	(0.0263)	(0.0407)	(0.0267)	(0.0432)	(0.0266)	(0.0429)
Infl	0.00220	0.00537*	0.00247	0.00538*	0.00140	0.00343	0.00282	0.00524*
	(0.00380)	(0.00289)	(0.00376)	(0.00287)	(0.00407)	(0.00392)	(0.00355)	(0.00277)
Trade	0.00152***	0.00114***	0.00148***	0.00111***	0.00149***	0.00103***	0.00150***	0.00108***
	(0.000317)	(0.000348)	(0.000317)	(0.000345)	(0.000319)	(0.000341)	(0.000319)	(0.000351)
Dbagdp	0.00195	0.00670	0.00125	0.00240	0.00152	0.00737	0.00312	0.00295
	(0.00417)	(0.00930)	(0.00416)	(0.00868)	(0.00427)	(0.00904)	(0.00407)	(0.00930)
Dem	0.0105	-0.0122	0.00941	-0.0106	0.00982	-0.00822	0.0112	-0.0171
	(0.00841)	(0.0166)	(0.00827)	(0.0165)	(0.00848)	(0.0147)	(0.00832)	(0.0175)
Constant	-0.0985	0.0309	-0.1000	0.0403	-0.104	0.0243	-0.102	0.00388
	(0.181)	(0.246)	(0.178)	(0.241)	(0.178)	(0.227)	(0.180)	(0.237)
Observations	312	312	312	312	310	310	312	312
R-squared	0.375	0.453	0.381	0.461	0.377	0.482	0.376	0.462
Number of countries		81		81		81		81

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*

Table 20. POLS model – Developed sample

VARIABLES	(1) GDP_grw	(2) GDP_grw	(3) GDP_grw	(4) GDP_grw	(5) GDP_grw	(6) GDP_grw	(7) GDP_grw	(8) GDP_grw	(9) GDP_grw
Oglob	0.0113								
	(0.0177)								
Eglob		0.0276**	0.0210*						
		(0.0124)	(0.0111)						
Pglob		-0.00400							
		(0.0127)							
Sglob		-0.0187							
		(0.0139)							
Ec_fr				0.00141					
				(0.00147)					
Cult_prox					-0.00866				
					(0.00565)				
Ifigdp						0.00289**			
						(0.00128)			
Geqgdp							0.00471		
							(0.00390)		
Kaopen								0.000141	
								(0.00123)	
Exp_imp									0.0103**
									(0.00429)
iGDP	-0.0161**	-0.0128**	-0.0167***	-0.0152***	-0.0105*	-0.0158***	-0.0151***	-0.0139**	-0.0150***
	(0.00632)	(0.00580)	(0.00551)	(0.00569)	(0.00542)	(0.00559)	(0.00554)	(0.00589)	(0.00535)
Lsc	-0.0100	-0.00230	-0.00639	-0.0126	-0.00621	-0.00571	-0.0101	-0.0108	-0.00445
	(0.00860)	(0.00877)	(0.00846)	(0.00852)	(0.00857)	(0.00886)	(0.00850)	(0.00963)	(0.00883)
Life	0.242***	0.214***	0.236***	0.234***	0.220***	0.225***	0.231***	0.232***	0.224***
	(0.0461)	(0.0488)	(0.0394)	(0.0480)	(0.0391)	(0.0373)	(0.0395)	(0.0436)	(0.0370)
Fertility	0.00862	0.00838	0.00987	0.00690	0.00470	0.00604	0.00530	0.00645	0.00625
	(0.00689)	(0.00827)	(0.00611)	(0.00586)	(0.00554)	(0.00561)	(0.00577)	(0.00616)	(0.00543)
Invest	0.103***	0.0890***	0.100***	0.100***	0.0969***	0.0974***	0.0948***	0.0986***	0.0890***
	(0.0308)	(0.0313)	(0.0276)	(0.0299)	(0.0289)	(0.0259)	(0.0267)	(0.0300)	(0.0272)
Gen_exp	0.0179	0.00920	0.00682	0.0276	0.0318	0.0249	0.0265	0.0234	0.00486
	(0.0243)	(0.0244)	(0.0247)	(0.0233)	(0.0210)	(0.0241)	(0.0235)	(0.0242)	(0.0238)
Infl	-0.300*	-0.347**	-0.302**	-0.302*	-0.351**	-0.199	-0.261*	-0.306*	-0.303**
	(0.154)	(0.173)	(0.143)	(0.156)	(0.144)	(0.156)	(0.151)	(0.154)	(0.140)
Trade	0.00145***	0.00151***	0.00146***	0.00147***	0.00148***	0.00142***	0.00139***	0.00147***	0.00144***
	(0.000357)	(0.000322)	(0.000330)	(0.000341)	(0.000371)	(0.000318)	(0.000326)	(0.000366)	(0.000367)
Dbagdp	-0.00579	-0.00474	-0.00402	-0.00672*	-0.00727*	-0.00599*	-0.00599*	-0.00658*	-0.00503
	(0.00354)	(0.00329)	(0.00317)	(0.00348)	(0.00367)	(0.00311)	(0.00317)	(0.00366)	(0.00313)
Dem	0.00370	0.00851	0.00416	0.00443	0.00786	0.00697	0.00328	0.00490	0.00914
	(0.0114)	(0.0117)	(0.0102)	(0.0112)	(0.0118)	(0.0112)	(0.0110)	(0.0118)	(0.0119)
Constant	-0.895***	-0.801***	-0.868***	-0.871***	-0.848***	-0.821***	-0.846***	-0.865***	-0.824***
	(0.186)	(0.199)	(0.162)	(0.200)	(0.166)	(0.160)	(0.166)	(0.181)	(0.157)
Observations	114	114	114	113	114	114	114	112	114
R-squared	0.634	0.656	0.647	0.625	0.641	0.660	0.643	0.627	0.655

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*

Table 21. POLS model – Developing sample

VARIABLES	(1) GDP_grw	(2) GDP_grw	(3) GDP_grw	(4) GDP_grw	(5) GDP_grw	(6) GDP_grw	(7) GDP_grw	(8) GDP_grw	(9) GDP_grw
Oglob	0.0232								
	(0.0294)								
Eglob		0.0336	0.0357**						
		(0.0229)	(0.0179)						
Pglob		-0.0125							
		(0.0126)							
Sglob		-0.00567							
		(0.0280)							
Ec_fr				0.00401*					
				(0.00232)					
Cult_prox					-0.00374				
					(0.0120)				
Ifigdp						-0.000425			
						(0.00234)			
Geqgdp							0.00395		
							(0.0137)		
Kaopen								0.00229*	
								(0.00135)	
Exp_imp									0.00969
									(0.00597)
iGDP	-0.0182***	-0.0182***	-0.0188***	-0.0171***	-0.0168***	-0.0163***	-0.0165***	-0.0166***	-0.0160***
	(0.00421)	(0.00411)	(0.00393)	(0.00368)	(0.00376)	(0.00330)	(0.00334)	(0.00329)	(0.00326)
Lsc	-0.00517	-0.00585	-0.00375	-0.000544	-0.00481	-0.00915	-0.00897	-0.0113	-0.0193
	(0.0296)	(0.0294)	(0.0294)	(0.0241)	(0.0292)	(0.0250)	(0.0242)	(0.0249)	(0.0263)
Life	0.0800**	0.0884**	0.0822**	0.0690	0.0842**	0.0796**	0.0801**	0.0770**	0.0779**
	(0.0349)	(0.0359)	(0.0346)	(0.0545)	(0.0356)	(0.0354)	(0.0353)	(0.0359)	(0.0349)
Fertility	-0.0154	-0.0146	-0.0149	-0.0168	-0.0152	-0.0143	-0.0145	-0.0149	-0.0151
	(0.0114)	(0.0110)	(0.0112)	(0.0130)	(0.0114)	(0.0109)	(0.0108)	(0.0109)	(0.0109)
Invest	0.0826***	0.0681***	0.0711***	0.0818***	0.0812***	0.0851***	0.0819***	0.0823***	0.0793***
	(0.0237)	(0.0235)	(0.0225)	(0.0290)	(0.0238)	(0.0237)	(0.0240)	(0.0244)	(0.0241)
Gen_exp	0.00650	-0.0195	-0.0119	0.0254	0.00806	0.00886	0.00627	0.00761	-0.0131
	(0.0315)	(0.0360)	(0.0334)	(0.0437)	(0.0324)	(0.0340)	(0.0324)	(0.0320)	(0.0327)
Infl	0.00346	0.00269	0.00240	0.00431	0.00375	0.00417	0.00417	0.00288	0.00580*
	(0.00391)	(0.00358)	(0.00368)	(0.00332)	(0.00385)	(0.00381)	(0.00376)	(0.00408)	(0.00343)
Trade	0.00157***	0.00156***	0.00157***	0.00183***	0.00159***	0.00160***	0.00161***	0.00153***	0.00155***
	(0.000324)	(0.000327)	(0.000325)	(0.000313)	(0.000323)	(0.000309)	(0.000313)	(0.000323)	(0.000310)
Dbagdp	-0.00396	-0.00237	-0.00375	-0.000916	-0.00270	-0.000261	-0.000131	-0.000364	-0.000165
	(0.00771)	(0.00750)	(0.00735)	(0.00576)	(0.00739)	(0.00594)	(0.00611)	(0.00636)	(0.00611)
Dem	-0.00796	-0.00748	-0.00825	-0.00422	-0.00603	-0.00738	-0.00700	-0.00665	-0.00684
	(0.00938)	(0.00922)	(0.00895)	(0.00963)	(0.00942)	(0.00897)	(0.00893)	(0.00904)	(0.00893)
Constant	-0.168	-0.195	-0.173	-0.143	-0.188	-0.178	-0.178	-0.160	-0.170
	(0.145)	(0.149)	(0.142)	(0.224)	(0.148)	(0.147)	(0.146)	(0.149)	(0.145)
Observations	243	242	242	198	243	247	248	245	247
R-squared	0.371	0.388	0.385	0.456	0.369	0.376	0.378	0.375	0.387

*Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the growth rate of GDP.*

Appendix B

Table 1. Data sources

Name	Data source
GDP Growth rate	World Bank, WDI
Economic globalization index	Dreher
Social globalization index	Dreher
Political globalization index	Dreher
Overall index of globalization	Dreher
Cultural Proximity index	Dreher
Ifigdp	Lane and Milesi-Ferretti
Geqgep	Lane and Milesi-Ferretti
Economic Freedom Index	Gwartney and Lawson
Kaopen	Chinn and Ito
Trade openness	World Bank, WDI
Initial GDP per capita	World Bank, WDI
Schooling	Barro and Lee
Life expectancy	World Bank, WDI
Fertility rate	World Bank, WDI
Investments	World Bank, WDI
General government final consumption expenditures	World Bank, WDI
Inflation	World Bank, WDI
Growth rate of trade	World Bank, WDI
Rural Population	World Bank, WDI
Deposit money bank assets to GDP	Financial Development and Structure Dataset (2013)
Liberal Democracy index	Quality of Government dataset (2017)
Legal Structure and Security of Property Rights	Quality of Government dataset (2017)

Data sources

Table 2. Data description

Variable	Name	Definition	Construction
GDP_grw_{it}	GDP Growth rate	It is the growth rate of GDP per capita, the gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars	Logarithmic transformation of the GDP per capita ($ln\, x_t - ln\, x_{t-1}$)
EG_{it}	Economic globalization index	It is an index of economic integration that involves data that represent trade openness and restrictions and financial integration	The principal component analysis gives the following weights: • Actual Flows (50%): Trade (in percentage of GDP) (21%), Foreign direct investment (in percentage of GDP) (28%), Portfolio investment (in percentage of GDP) (24%), Income payments to foreign nationals (in percentage of GDP) (27%). • Restrictions (50%): Hidden import barriers (22%), Mean tariff rate (28%), Taxes on international trade (in percentage of current revenue) (26%), Capital account restrictions (24%).
SG_{it}	Social globalization index	It is an index of social integration that involves data about the flows of information and people and the cultural globalization expressed like the expanding of the American culture	The principal component analysis gives the following weights: • Data on personal contact (33%): Telephone traffic (25%), Transfers (in percentage of GDP) (2%), International tourism (26%), Foreign population (in percentage of total population) (21%), International letters (per capita) (25%) • Data on information flows (36%): Internet users (per 1000 people) (37%), Television (per 1000 people) (39%), Trade in newspapers (percentage of GDP) (25%) • Data on cultural proximity (32%): Number of McDonald's restaurants (per capita) (47%), Numbers of Ikea (per capita) (47%), Trade in books (percentage of GDP) (6%)
PG_{it}	Political globalization index	It is an index of political integration that considers the diplomatic relationship between countries	The principal component analysis gives the following weights: • Embassies in country (25%), Membership in international organizations (27%), Participation in UN Security Council missions (22%), International Treaties (26%)
OG_{it}	Overall index of globalization	It is a unique index of globalization that includes all the globalization's aspects explained above	It is obtained from a principal component analysis of the Economic, Social and Political globalization indices. The PCA gives the following weights: • economic globalization index (36%), • social globalization index (37%), • political globalization index(27%)
$Cult\_Prox_{it}$	Cultural Proximity index	It indicates the globalization at cultural level	Is obtained as PCA of the following indices: • Number of McDonald's restaurants (per capita) (47%), • Numbers of Ikea (per capita) (47%), • Trade in books (percentage of GDP) (6%)

$Ifigdp_{it}$	Ifigdp	It is an indicator of financial integration that considers the stock of foreign direct investments	It is obtained by the following ratio $Ifigdp_{it} = \frac{(FA_{it} + FL_{it})}{GDP_{it}}$ in which FA_{it} are the total external assets and FL_{it} the total external liabilities.
$Geqgdp_{it}$	Geqgdp	It is an indicator of financial integration that considers the stock of foreign direct investments and the equity market	It is obtained by the following ratio $Geqgdp_{it} = \frac{(PEQA_{it} + FDIA_{it} + PEQL_{it} + FDIL_{it})}{GDP_{it}}$ where $PEQA_{it}$ is the stock of portfolio equity assets, $PEQL_{it}$ is the stock of portfolio equity liabilities, $FDIA_{it}$ is the stock of foreign direct investment asset and finally $FDIL_{it}$ is the stock of foreign direct investment liabilities
Ec_fr_{it}	Economic Freedom Index	It is an indicator of how much economic freedom is developed.	It is obtained through PCA that combines variables that refer to personal choice, voluntary exchange, freedom to trade, access to sound money, persons and property right protection, regulation of credit and business.
$Kaopen_{it}$	Kaopen	It is an indicator of capital openness	They start from binary dummies described in the AREAER representing restrictions on foreign financial transactions; in particular, the above-mentioned variables indicate • the existence of multiple exchange rates; • restrictions on current and capital account transactions; • the obligation of the submission of export profits; These variables are combined using a PCA
Exp_imp_{it}	Trade openness	It is an indicator of trade openness.	It is obtained from the sum of Exports and Imports as a share of GDP
$IGDP_{it}$	Initial GDP per capita	It is the initial GDP per capita at beginning of each period (explanation above)	It is calculated by a logarithmic transformation of the GDP at the beginning of each period
Lsc_{it}	Schooling	It is an indicator of the rate of schooling	It is the percentage of completed secondary schooling attained in the population of each country.
$Life_{it}$	Life expectancy	It indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life	It is the average number of years a newborn is expected to live if mortality patterns at the time of its birth remain constant in the future. It reflects the overall mortality level of a population, and summarizes the mortality pattern that prevails across all age groups in a given year. It is calculated in a period life table which reflects a snapshot of a mortality pattern of a population at a given time. It therefore does not reflect actual mortality patterns that a person actually goes through during his/her life, which can be calculated in a cohort life table.

$Fertility_{it}$	Fertility rate	It represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year	Total fertility rates are based on data on registered live births from vital registration systems or, in the absence of such systems, from censuses or sample surveys. The estimated rates are generally considered reliable measures of fertility in the recent past. Where no empirical information on age-specific fertility rates is available, a model is used to estimate the share of births to adolescents. For countries without vital registration systems fertility rates are generally based on extrapolations from trends observed in censuses or surveys from earlier years.
$Invest_{it}$	Investments	It is the gross domestic savings in percentage of GDP	It is calculated as GDP less final consumption expenditure (total consumption)
GE_{it}	General government final consumption expenditures	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation. Data are in constant 2010 U.S. dollars.	Gross domestic product (GDP) from the expenditure side is made up of household final consumption expenditure, general government final consumption expenditure, gross capital formation (private and public investment in fixed assets, changes in inventories, and net acquisitions of valuables), and net exports (exports minus imports) of goods and services. Such expenditures are recorded in purchaser prices and include net taxes on products
I_{it}	Inflation	It is measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole	It is the ratio of GDP in current local currency to GDP in constant local currency.
$Trade_{it}$	Growth rate of trade	Annual growth rate of imports of goods and services based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.	
Rur_Pop_{it}	Rural Population	Rural population refers to people living in rural areas as defined by national statistical offices.	It is calculated as the logarithm of the difference between total population and urban population.
$Dbagdp_{it}$	Deposit money bank assets to GDP	Claims on domestic real nonfinancial sector by deposit money banks as a share of GDP	It is calculated using the following deflation method: $\{(0.5) * [F_t/P_{e_t} + F_{t-1}/P_{e_{t-1}}]\}/[GDP_t/P\_a_t$ F_t is deposit money bank claims, P_{e_t} is end-of period CPI, and P_a_t is average annual CPI..
Dem_{it}	Liberal Democracy index	The liberal principle of democracy emphasizes the importance of protecting individual and minority rights against the tyranny of the state and the tyranny of the majority. The liberal model takes a "negative" view of political power insofar as it judges the quality of democracy by the limits placed on government. This is achieved by constitutionally protected civil liberties, strong rule of law, an independent judiciary, and effective checks and balances that, together, limit the exercise of executive power. To make this a measure of liberal democracy, the index also takes the level of electoral democracy into account	The index is aggregated using this formula: $v2x_{libidem} = 0.25 * v2x_{poliarchy}{}^{1.6} + 0.25 * v2x_{liberal} + 0.5 * v2x_{poliarchy}{}^{1.6} * v2x_{liberal}$ Where $v2x_{liberal}$ is an index that represents the liberal principle of democracy emphasizing the importance of protecting individual and minority rights against the tyranny of the state and the tyranny of the majority and $v2x_{poliarchy}$ is an index that measures how extent is electoral democracy

$Legprop_{it}$	Legal Structure and Security of Property Rights	The index consists of the following indicators: Judicial independence: The judiciary is independent and not subject to interference by the government or parties in dispute, Impartial courts: A trusted legal framework exists for private businesses to challenge the legality of government actions or regulations, Protection of intellectual property, Military interference in rule of law and the political process, Integrity of the legal system.	The index ranges from 0-10 where 0 corresponds to ”no judicial independence”, ”no trusted legal framework exists”, ”no protection of intellectual property”, ”military interference in rule of law”, and ”no integrity of the legal system” and 10 corresponds to ”high judicial independence”, ”trusted legal framework exists”, ”protection of intellectual property”, ”no military interference in rule of law”, and ”integrity of the legal system”

Data description

Chapter 3 - *Macroeconomic Volatility and Globalization*

1 Introduction

Looking at the history of industrial development, the expansion of markets is characterized by a succession of periods of strong growth in production and income followed by phases of falling profits and investments. This nonlinear development, the observation of accelerating and slowing development phases, leads economists to look for the reasons behind such volatility and prompts them to elaborate the concept economic cycle (Lucas, 1980). A growth phase of production, investment, consumption and volume of trade always reaches a culminating moment followed by an inversion of the trend. A crisis is characterized by a fall in economic performances, and after stagnation or depression a new phase of growth producing a cyclical trend. In other words, phases cause each other: stagnation periods have in itself the conditions for the new phase of development, and growth has the conditions to induce a new depression phase. The aim of the business cycle theory is to understand how the economy can reach a general equilibrium considering the fluctuations deriving from internal and external shocks (Romer, 2012).

The development of international markets, the liberalization of capitals and trade, and monetary policies have become crucial in the cycle theory (Denizer et al.2000, Easterly et al. 2000). All these changes lead, time after time, to a more linked and globalized market. The debate about the costs and benefits in terms of cycle volatility deriving from globalization divides the economists. On the one hand, trade openness allow countries to specialize their production in goods and services that provide some comparative advantage while importing the rest from abroad. This causes a better allocation of capital but, on the other hand, it may make the country more vulnerable to specific sector shocks (Buch, 2002, Buch et al., 2002, Razin and Rose, 1992).

This chapter provides an empirical analysis of the relationship between macroeconomic cycle volatility and globalization focusing on financial integration. I will discuss in the next sections the theoretical and empirical literature about the relationship between financial integration and macroeconomic volatility. Some scholars consider the relationship between globalization and volatility not clear from a theoretical point of view (Buch. 2002). Thus, the empirical analysis becomes crucial to verify how financial integration may affect macroeconomic volatility. However, in most cases, also the empirical evidence does not allow to detect a clear relationship between globalization and macroeconomic volatility (Buch et al., 2002, Razin and Rose, 1992). A series of issues have been pointed out to explain the lack of significant results. They are widely discussed in the next sections. In the empirical analysis of the relationship between globalization and volatility, I try to address the sources of disturbance highlighted by the previous economic literature.

The analysis is concentrated on a panel of 41 European countries from 1970 to 2014, that is the period in which the Monetary Union has been formed. The empirical analysis is structured as follows. Firstly, I focus on a sample of European countries and use financial integration indices to study the relationship between macroeconomic volatility and globalization. Secondly, introducing some control groups, I compare countries that are part of the Euro zone with those that are not. That is, in my setting, the financial integration is represented by the fact of being part of the Euro zone. I aim to verify if being part of the Euro zone may affect the macroeconomic cycle volatility.

To proxy cyclical volatility, I use measures widely employed in the literature. Namely, the standard deviation of growth rates of the variables and the Hodrick-Prescott filter (HP filter), used to capture the cycle and the trend of the macroeconomic variables. Once the two components are identified, the standard deviation of the cycle is employed to proxy macroeconomic volatility and capture the short-term shocks. In particular, I analyze output volatility to proxy the macroeconomic volatility following the approach proposed by Kose et al. (2003). Additionally, I perform a double robustness check. Firstly, I use consumption volatility since the output is made up to 70% of consumption, thus the two series have similar growth paths. Secondly, I reduce the original sample using countries that are part of the European Union (EU). This is an attempt to focus on

countries with similar features. The expectation is that both checks confirm the previous results.

2 Literature review

In recent years, financial crises have affected the entire economic environment. Economic crises follow financial crises and in developing countries they rise in effects and frequency. These crises lead to more fluctuations in the economic variables and make countries more vulnerable.

Due to the absence of a theoretical model that explains the relationship between globalization and volatility, the empirical literature plays an important role. The neo-classical growth model and the more recent development by Mundell (1963) and Fleming (1962) have been used and adapted for the empirical analysis (Buch, 2002). Both models explain how macroeconomic variables react when some shock occurs. The neo-classical model focuses on productivity shocks, the second one on policy shocks like monetary and fiscal shocks.

Following the neo-classical theory, households smooth consumption over time using their savings. In this context, in the absence of frictions, the increase of financial integration through the growth of capital flows should have an impact on macroeconomic volatility: consumption volatility should decline with respect the output volatility, meanwhile investment volatility should increase (Buch, 2002).

In the Mundell and Fleming setting, the exchange regime and the degree of capital mobility are important for macroeconomic volatility. Consumption and volatility have the same trend over time when some policy shock occurs.

The regressions performed in the empirical analysis start from a neo-classical setting. I follow the approach used by Kose et al. (2003).

The empirical literature, starting from the mentioned theoretical models, has described the relationship among macroeconomic cycle volatility and globalization highlighting both benefits and costs. Despite the importance of the empirical literature on this topic, in most cases, the results are contradictory and do not suggest a clear

relationship between globalization and macroeconomic volatility. (Buch et al., 2002, Razin and Rose, 1992).

One advantage of the globalization phenomenon is related to the possibility to invest in a wide range of opportunities diversifying the risks linked to investments. This benefit could be more important for those countries, like the emerging ones, with a higher volatility due to a less diversified structure of the investments. Considering output volatility, financial integration helps emerging countries to access new capital opportunities and to increase product diversification; these capitals may encourage countries to specialize their production looking for a comparative advantage. On the other hand, this production specialization may have a cost, it makes the economies more exposed to industry-specific crises (Razin and Rose, 1992). Therefore, the effect of globalization on growth volatility can be ambiguous (Prasad et al. 2003). With respect to the consumption volatility, globalization should have a positive effect, reducing fluctuations. Entering in a globalized system allows sharing macroeconomic risks and smooth consumption (Prasad et al. 2003).

Razin and Rose (1992) study the effect of trade and financial integration on volatility. As macroeconomic measures they consider output, consumption and investment volatility. They find that restrictions on goods affect investment and consumption volatility; restrictions on capitals reduce investment and diversification opportunities. Thus, capital openness should increase investment volatility and make easier consumption smoothing. Restrictions also limit the possibility of a country to specialize its production taking into account the competitive advantages deriving from it. The advantages concern the possibility to produce specialized goods at lower costs, creating a concentration of specialized industries and exploiting the external economies to export them. However, this industry specialization can make countries vulnerable to specific shocks increasing output volatility. Thus, trade openness may increase output volatility. If these shocks are persistent, the consumption volatility can also be affected. Nevertheless, the empirical evidence does not clarify the relationship between globalization and volatility. Many shocks are related across countries, but it is difficult to find a link between globalization and volatility.

Easterly, Islam and Stiglitz (2000) analyze output volatility trying to find which variables may affect it. They find that private capital flows and the real wage volatility are not associated with growth volatility. More in general, financial openness does not affect macroeconomic volatility. However, they highlight the key role of the financial sector for macroeconomic volatility. Financial development affects negatively growth. An increase in depth of the financial sector generates greater stability and the possibility to smooth consumption and production and, thus, leads to lower volatility. However, the relationship is not linear; there is a cutoff point beyond which the negative effect becomes positive. That is, a very big financial sector tends to amplify the macroeconomic shocks.

Kose et al. (2003) analyze several aspects of the macroeconomic volatility: output, consumption, income, total consumption (the sum of the public and private consumption) and the ratio of total consumption and income. They find a decline in output volatility in the 1990s with respect to the previous decades. Economic models suggest that, ceteris paribus, financial integration should reduce consumption volatility, but, with respect the several volatility measures used, Kose et al. (2003) detect an empirical association between financial integration and macroeconomic volatility only considering as dependent variable the the ratio of total consumption and income. Trade openness is positively associated with the ratio of total consumption volatility to income volatility; this result contradicts the theoretical assumption that risk-sharing opportunities increase when globalization increases. Financial and trade openness do not affect the other macroeconomic volatility measures. Kose et al. (2003) find, as Easterly, Islam and Stiglitz (2000) do, that financial development is negatively related to macroeconomic volatility measured even this time as the ratio of total consumption and income volatility. Denizier et al. 2000 find that greater financial development is related to lower output and consumption.

The empirical literature discussed shows that it is difficult to detect a clear relationship between globalization and macroeconomic volatility (Buch, 2002). Many issues have been raised in the literature to explain the difficulty to empirically detect a relationship between globalization and cycle volatility. First, the instability of the volatility phenomenon. Using data spanning several decades, may weaken the relationship between financial and trade openness and volatility. The fluctuation of volatility and the instability of the macroeconomic measures involved across the decades

may affect the relationship with globalization inducing biased results (Buch et al., 2002). Second, the nature and the duration of the shocks, temporary or permanent, may affect the relationship between globalization and volatility (Razin and Rose, 1992, Buch et al., 2002). To identify the correct nature of the shock is important in order to capture the relationship. Third, the presence of asymmetric shocks in countries that are part of the same sample may affect the empirical results. The synchronization of the cycles affects the manner of propagation of the shocks in such a way that the countries of the same area are affected in the same way (Buch et al., 2002).

Starting from the existent empirical literature and the problems related to the analysis of the link between globalization and cycle volatility, I try to understand how macroeconomic volatility in European countries is related to financial openness. In 1999 the Economic and Monetary Union, EMU was born to reach a deeper level of mutual economic and political involvement (Kim et al., 2006). The economic and financial integration becomes deeper after the agreements about a new European monetary unit, the Euro, which becomes the currency that is actually circulating in all the countries of the Euro zone since 2002.

The aim of this chapter is to analyze the link between financial integration and macroeconomic volatility in Europe taking into account the empirical issues highlighted in the literature. With respect to the first issue, I provide a descriptive analysis of both output and consumption volatility across time to verify the presence of fluctuations that may generate disturbances in capturing the real relationship between globalization and growth. I show that in my sample macroeconomic volatility is substantially fluctuating over time. Thus, I acknowledge that the relationship between volatility and globalization may be unstable and that this instability may affect the estimates. Regarding the second and third issues, I propose an approach that tries to address them. To tackle the second issue (that is to consider the different impact on volatility of shocks of different nature) I use a filter to separate the long-run shocks captured by the trend component from the short-run shocks captured by the cycle fluctuations. I focus on the standard deviation of the cycle component to capture the effect on volatility of short run shocks, leaving out the long run shocks that may interfere in the relationship between volatility and growth. Finally, to try to deal with the third issue (that is to consider that countries that are part of the same sample may be affected in a different way by external shocks) I focus on

European countries. If countries are part of a macro-region, there is the possibility that they are affected by the same cycle features, that is a certain level of regionalism may develop. Selecting European countries, I concentrate the attention on countries with similar cycle features and I reduce the possibility that asymmetric external shocks may affect differently the cycle characteristics and the related macroeconomic volatility. I also take into account that into the European macro-region may be sub-regions, like the countries that are part of the Euro zone, that may be more homogeneous. I consider different control groups to try to address the asymmetric shocks issue.

3 Methodology

I measure macroeconomic volatility as the GDP growth rate volatility[9]. Output volatility is a measure commonly used in the literature to proxy macroeconomic volatility. I also consider consumption volatility as a robustness check.

As mentioned before, I aim to verify empirically if a link between financial integration and cycle volatility exists trying to address some issues raised by the literature.

I specify a regression model that relates the different measures of macroeconomic volatility to the different indices of financial integration. As stressed in literature section, due to the absence of a theoretical model that relates globalization and macroeconomic volatility, the neoclassical growth model is used and adapted for this analysis (Razin and Rose, 1992). Starting from the regression model by Kose et al. (2003), I add a set of different financial integration indices. I construct a 5-years panel database in which all the explanatory variables, except for the initial level of GDP (that is the level at the beginning of each period), are averages over 5-years. The dataset contains data from 1970 to 2014 for 41 European countries. Taking 5-years averages, I obtain nine observations for each variable and each country. This panel structure allows catching the cycle effect. Shorter time intervals would not allow capturing the effect of the economic cycle. The model is the following,

[9] Output is proxied by the GDP per capita in constant 2010 US$

$$\sigma_{it} = \alpha_0 + \alpha_1 G_{it} + \alpha_2 X_{it} + \eta_i + \theta_t + \varepsilon_{it} \qquad (1)$$

where *i* represents the individual unit, countries, and *t* represent the time unit, 5-years period. The model aims to estimate the relationship between cycle volatility and globalization, assuming that the error term is not correlated with the explanatory variables. The dependent variable, σ_{it}, is a measure of output volatility over the 5-year time period. Many attempts of measuring the volatility phenomenon have been done in the literature. As I mentioned before, the different nature of the shocks, permanent or temporary, may affect output volatility in a different way. Razin and Rose (1992) argue that failing to consider the different nature of the shocks may lead to false conclusions. To address this issue, I use two different measures of volatility. The first is the standard deviation over the 5-years of the growth rate of the variable. This classical measure of volatility has been criticized since it is based on the hypothesis that variables are stationary in first difference without proving it. The second measure is obtained applying the HP filter (Cariolle, 2012). The filter separates the non-stationary trend component, ${y^T}_t$, (long term variation) from the cycle component, ${y^C}_t$, (short term variation),

$$y_t = {y^T}_t + {y^C}_t$$

As a measure of volatility, I use the standard deviation of the cycle for each 5-years. Distinguishing between temporary and permanent shocks may be useful to capture the link between globalization and cycle volatility. In particular, using a filter allows focusing on the temporary shocks that affect the cycle component, and therefore this approach is an attempt to take into consideration the different nature of the shocks (Cariolle, 2012).

The regressors G_{it} are the globalization variables used one by one in order to capture the contribution of each specific financial integration measure on volatility. The controls included in X_{it} are: the initial level of GDP per capita, *iGDP,* that allows controlling for the initial economic development; *Trade,* the annual growth rate of imports of goods and services; *Broad money,* the sum of currency outside banks; Consumer price index*, Infl,*

describing the inflation; *General Government Final Consumption Expenditures, Gen_exp*, including all government current expenditures.

In model (1) θ_t, fixed temporal effects, and η_i, time invariant country effects, are included. To obtain unbiased results, having more countries than time periods, I introduce a full set of dummies for each period and cluster standard errors by countries. If the temporal effects are fixed, using a dummy for each period helps to completely remove the correlation between observations in the same period by countries. If the temporal effects are not fixed, using time dummies will not remove the correlation even using the standard errors clustered by country (Petersen, 2009).

Firstly, I run a Pooled OLS (POLS). Then, to take into account the panel structure of the dataset, there are two possible estimation options, depending on whether the vector η_i, denoting the country fixed effects, is correlated with one or more of the regressors. Consider first the case in which $cov(G_{it}, \eta_i) \neq 0$, then it is optimal to use the Fixed Effects (FE) estimator which is consistent and efficient. On the other hand, if $cov(G_{it}, \eta_i) = 0$, the FE estimator is consistent, but inefficient. The consistent and efficient estimator is the Random Effects (RE) estimator. To take into account these two options, I run an over-identification test, a version of the Hausman test, considering robust standard errors.

Secondly, I introduce in the previous model a dummy identifying the countries that are Euro members, to verify if the regionalism phenomenon affects the dynamics between globalization and growth volatility. The aim is to estimate the change in cycle macroeconomic volatility caused by globalization in the Euro zone. As the economic literature highlights, the presence of asymmetric shocks in the sample can make difficult to detect empirically a relationship between globalization and growth volatility. Focusing on European countries is a first attempt to reduce this problem since European countries can be considered a macro-region and thus should be affected by similar cycle fluctuations. However, in the analyzed sample there may be smaller and more homogeneous macro-regions in terms of cycle conditions and reactions to external shocks. For example, the countries from the old communist block have common features different from the other European countries. The Mediterranean countries have similar characteristics and economies based on similar activities and thus may be affected in the

same way by economic fluctuations. The Northern European countries represent also a different block in Europe. The list of the macro-regions in Europe can be extended and the mentioned examples are just some of them.

To further control the regionalism phenomenon, I decide to consider one big macro-region: the countries that are in the Euro zone. The Euro dummy controls if a country is part of the Euro zone, that is, it is equal to one if a country is in the Euro zone and zero otherwise. The Euro zone represent a macro-region where financial integration has increased substantially. Using the same currency helps the cross-border financial flows, and the circulation of goods and people. The previous model is modified as follows

$$\sigma_{it} = \beta_0 + \beta_1 EURO_i + \beta_2 G_{it} + \beta_3 EURO_i * G_{it} + \beta_4 X_{it} + \gamma_i + \delta_t + \varepsilon_{it} \qquad (2)$$

where i represents the individual unit, countries, and t represent the time unit, 5-years period. In model (2) the dummy EURO takes the value one if the country enters in the EURO zone and zero otherwise. The coefficient β_3 is the estimate capturing the effect of the interaction between the Euro dummy and the financial integration indices. The slope coefficient β_2 is the marginal effect of globalization on volatility when the dummy is zero. If the euro dummy is equal to one, that is, if a country is part of the Euro zone, the marginal effect is given by $\beta_2 + \beta_3$.

I follow the same scheme as before running firstly the POLS model and then, after the Over-identification test, I run the FE or the RE model.

Finally, I consider that being part of the Euro zone generates a financial integration process in which a single country is involved. Each country that enters in the Euro zone develops a financially integrated system of relationships. This is another attempt to capture the synchronization of the cycle in the European countries and to avoid using an heterogeneous sample. The aim is to estimate the change in cycle macroeconomic volatility caused by the entry in the Euro zone. Since countries entry in the Euro in different years, this variation gives the possibility to employ a Difference-in-Difference (DD) method. Considering an entry in the Euro as the treatment, to apply the DD method I need to assume that, in the absence of an entry in the Euro, volatility would have had a

parallel path in treated and not treated countries. That is, they would have experienced the same macroeconomic volatility. In different years, each set of treatment countries served as a control for the other ones. The DD model employed in the analysis can be formalized as follows

$$\sigma_{it} = \zeta_0 + \zeta_1 EURO_i + \zeta_2 After_{it} + \zeta_3 EURO_i * After_{it} + \zeta_4 X_{it} + \kappa_i + \lambda_t + \varepsilon_{it} \quad (3)$$

where *i* represents the individual unit, countries, and *t* represent the time unit, 5-years period (Roberts and Whited, 2012). With respect to the previous model in which I use G_{it} as proxies of the globalization phenomenon, in this case the dummy $EURO_i$ is the variable representing the integration. It takes value one if country *i* entered in the Euro zone and zero otherwise. $After_{it}$ is a dummy that takes value one if country *i* entered in the Euro zone in the year *t* and zero otherwise. The coefficient ζ_3 is the estimate the captures the effect of the interaction of the dummies. It shows how macroeconomic cycle volatility changes when countries are members of the Euro with respect to those that are not. Using this setting, firstly I run the POLS model and secondly, after the Over-identification test, I run the FE or the RE estimation.

In order to provide a strong DD estimator, robustness checks should be performed. First, I reduce the sample considering only the countries that are in the EU. In this case, the parallel path assumption should be more probably justified since the regionalism phenomenon is more pronounced. EU countries have common features and very similar growth paths. As before, within the EU, I identify the Euro countries as the treated group and perform the DD model. An alternative approach can be the Difference-in-Difference-in-Difference model, DDD. A second control group could be added to perform the DDD. However, this kind of control may cause problems in the estimates because it tends to produce higher standard errors in the treated group (Roberts and Whited, 2012). I prefer the first approach that use a reduced sample in order to catch the regionalism that may affect the relationship between financial integration and growth.

Second, I replicate all the previous analysis, POLS, FE and DD, considering private consumption volatility as the dependent variable. Output and Consumption tend to follow

the same path over the years. Private consumption is the market value of all goods and services, including durable products bought by households [10]. The household final consumption expenditures constitute on average the 60% of the GDP in the world. Considering the European countries, the percentage decreases to 55%. Thus, it is reasonable to expect that the consumption volatility may provide a robustness check to the output volatility confirming the results obtained.

A detailed list of the countries involved in the analysis is presented in Appendix B.

4 Data

The data cover the period 1970-2014 and they extend to the European countries. The full list is available in Appendix B. Since the availability of the data, the dataset is unbalanced and the number of observations depends on the considered variables.

The dependent variable is macroeconomic volatility. In particular, I focus on output and consumption volatility. The output volatility is obtained using the per-capita Gross Domestic Product divided by midyear population. The measure of consumption is constructed using the Household Final Consumption Expenditure per capita in constant 2010 US$. It is the private consumption per capita and it is calculated using private consumption in constant 2010 prices and World Bank population estimates. It is the market value of all goods and services, including durable products, purchased by households. It excludes purchases of dwellings, but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses. Both measures are obtained from the WDI World Bank databank.

The regressors are the financial openness measures showed in the previous chapters. *Ifigdp* and *Geqgdp* by Lane and Milesi-Ferretti (2006) representing the financial integration. *Kaopen* by Chinn and Ito (2008) that is a capital openness index taking into account the restrictions on capital account openness.

The controls are introduced to reduce the endogeneity problem. The level of the *Initial GDP per capita* (*iGDP*) measures the initial economic development. It is the

[10] The definition of private consumption follows the WDI by World Bank

logarithm of GDP at the beginning of each period. *Trade* is a proxy to highlight the commercial activity of a country. It is the annual growth rate of imports of goods and services aggregated on constant 2010 U.S. dollars. The standard deviation of *Trade* is used. *Broadmoney* is the sum of currency outside banks: demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper. Therefore, intuitively, this ratio measures the proportion of transactions facilitated by quasi-money as a medium of payment. I consider both the mean and the standard deviation of the *Broadmoney* over 5-year. *Consumer price index (Infl)* reflects changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. *General Government Final Consumption Expenditures (Gen_exp)* includes all government current expenditures for purchases of goods and services (including compensation of employees). The standard deviation of the variable is used.

5 Empirical Results

5.1 Descriptive and preliminary analysis

Firstly, I conduct a preliminary analysis of the European countries analyzing the variation of the cycle volatility over the years and the correlations.

Table 1 shows the volatility of output and consumption over time highlighting how both volatility series go hand in hand. There are two peaks in 1990 and 2005, after that the trend seems downward. In general, the measures of volatility are fluctuating. As stressed in the literature section, the observed temporal pattern may be unstable. The fluctuations of volatility over time make difficult to find a strong association between globalization and growth volatility.

Table 1. Output and Consumption means over the periods (st. dev. of the growth rate)

Variables	1970	1975	1980	1985	1990	1995	2000	2005	2010
Output	0.0228505	0.0279921	0.0192689	0.0215564	0.0481381	0.0347571	0.0174449	0.0496776	0.019442
Consumption	0.0216937	0.0226339	0.0182054	0.0175237	0.0454931	0.0392595	0.0241154	0.0491241	0.0245327

Means comparing results – Standard deviation of the growth rates are considered

Table 2 shows a similar pattern of the alternative volatility measures obtained as the standard deviation of the cycle components. As before there are two peaks in 1990 and 2005, but in this case, the consumption series fluctuates less than in the previous case where volatility is measured in terms of standard deviation of the growth rate.

Table 2. Output and Consumption means over the periods (st. dev. of the cycle)

Variables	1970	1975	1980	1985	1990	1995	2000	2005	2010
Output	489.9754	440.0196	557.9578	622.1762	772.5406	480.2255	369.3311	991.1442	580.3858
Consumption	298.6139	311.5524	352.234	389.0814	421.4829	279.0388	220.1194	417.1204	351.7148

Means comparing results – Standard deviation of the cycle components are considered

Figure 1 and 2 may help to visualize the fluctuations over time of the volatility measures. Figure 3 shows that the financial integration measures follow the same pattern as the described in Chapter 2 where the considered sample includes 180 countries from 1970 to 2014 highlighting how the world average pattern of financial integration is increasing over time. The above descriptive analysis seems to support the concern raised by the empirical literature related to the temporal fluctuation of volatility and the possibility to detect empirically a relationship between globalization and volatility.

Figure 1. Output and Consumption means over the periods (st. dev. of the growth rate)

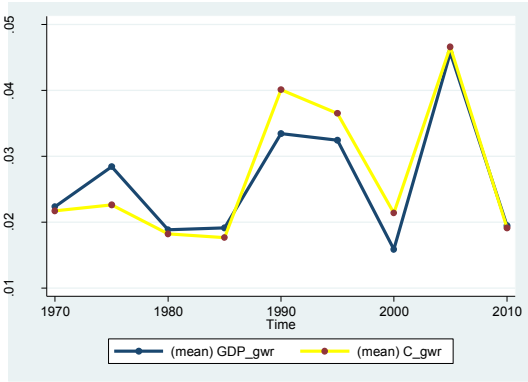


Figure 2. Output and Consumption means over the periods (st. dev. of the cycle)

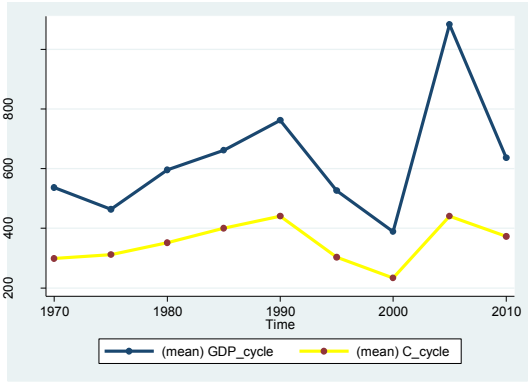


Figure 3. Financial integration measures

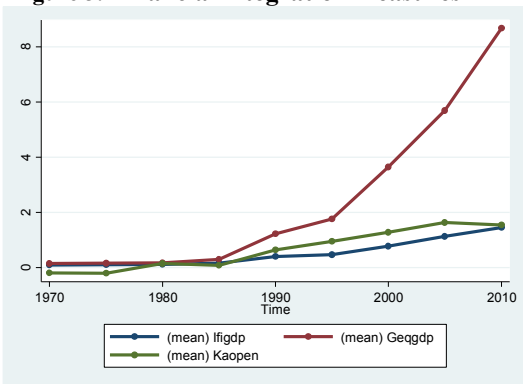


Table 3 reports the correlation matrix among the variables used in the analyses. The two types of dependent variables show opposite behaviour. While the output and the consumption growth volatility are negatively related to the financial integration measures, the volatility measures obtained computing the standard deviation of the cycle are positively associated with the financial integration measures.

Table 3. Correlation - European countries

	GDP_grw	C_grw	GDP_cycle	C_cycle	Ifigdp	Geqgdp	Kaopen
GDP_grw	1						
C_grw	0.6883	1					
GDP_cycle	0.1626	-0.0099	1				
C_cycle	0.167	0.2065	0.6897	1			
Ifigdp	-0.251	-0.3773	0.4305	0.2031	1		
Geqgdp	-0.0425	-0.1282	0.2717	0.073	0.8165	1	
Kaopen	-0.0255	-0.1337	0.4232	0.1682	0.4321	0.409	1

Correlation matrix

5.2 Results

I start estimating model (1). Using output volatility as the dependent variable, I run Pooled OLS regressions to verify the relationship between globalization and volatility without taking into account the panel structure of the sample. The results are in Tables 4. None of the financial integration indices is significant.

Table 4. Pooled model - Output volatility

VARIABLES	(1) GDP_grw	(2) GDP_grw	(3) GDP_grw	(4) GDP_cycle	(5) GDP_cycle	(6) GDP_cycle
Ifigdp	-0.00458			-73.22		
	(0.00700)			(206.4)		
Geqgdp		-0.000660			-10.19	
		(0.00183)			(43.92)	
Kaopen			0.000909			-44.63
			(0.00178)			(34.66)
iGDP	-0.000439	-0.000751	-0.000379	361.5***	356.3***	407.8***
	(0.00328)	(0.00324)	(0.00306)	(58.85)	(56.26)	(57.08)
Trade_sd	0.00151***	0.00151***	0.00209***	4.136	4.078	6.074
	(0.000306)	(0.000306)	(0.000605)	(5.106)	(5.090)	(8.030)
Broadmoney	-0.000997	-0.00100	-0.000768	-16.28	-16.42	-30.65*
	(0.00113)	(0.00111)	(0.00141)	(13.50)	(13.58)	(17.23)
Broadmoney sd	0.000377	0.000365	0.00130	-73.64	-73.92	-6.305
	(0.00644)	(0.00648)	(0.00757)	(95.56)	(96.50)	(100.5)
Inflation	0.00232	0.00238	0.00393	-32.65	-31.64	-12.06
	(0.00273)	(0.00274)	(0.00356)	(50.17)	(50.01)	(49.47)
Gov_exp_sd	0.00217	0.00205	0.00310	64.67*	62.80*	76.82**
	(0.00249)	(0.00244)	(0.00278)	(35.67)	(34.56)	(31.87)
Constant	0.0295	0.0327	0.0143	-2,866***	-2,812***	-3,075***
	(0.0296)	(0.0293)	(0.0284)	(670.2)	(669.1)	(612.0)
Observations	102	102	95	102	102	95
R-squared	0.638	0.637	0.610	0.649	0.649	0.672
Year dummies	YES	YES	YES	YES	YES	YES

*Pooled regressions. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is the standard deviation of the growth rate of output for regressions 1-3, is the standard deviation of the cycle of output for regressions 4-6.*

After, I run both the FE and the RE specifications and I compare the two performing an over-identification test, considering as measures of volatility both the standard deviation of the growth rate and the standard deviation of the cycle. Table 5 shows the presence of FE in regressions 1 and 2. In the other cases the test shows that there is no variance in the panel-specific intercepts, i.e. sigma_u=0. Since the panel-specific intercepts are all the same, the regressions reduce to simple POLS.

Table 5. Over-identification tests – Output volatility

		(1) Ifigdp	(2) Geqgdp	(3) Kaopen
P-value	**GDP_grw**	0.0000	0.0000	-
Fixed Effects		**YES**	**YES**	**NO**
		(4)	**(5)**	**(6)**
P-value	**GDP_cycle**	-	-	-
Fixed Effects		**NO**	**NO**	**NO**

Over-identification tests

Table 6. FE models - Output volatility

VARIABLES	(1) GDP_grw	(2) GDP_gwr
Ifigdp	0.00784	
	(0.0123)	
Geqgdp		0.00453
		(0.00268)
iGDP_2010	0.0138	0.0168
	(0.0293)	(0.0264)
Trade_sd	0.00132***	0.00129***
	(0.000266)	(0.000252)
Broadmoney	0.00407	0.00479
	(0.00594)	(0.00537)
Broadmoney sd	-0.00864	-0.00943
	(0.0110)	(0.0105)
Inflation	-0.00246	-0.00270
	(0.00615)	(0.00545)
Gov_exp_sd	0.00566	0.00564
	(0.00428)	(0.00435)
Constant	-0.202	-0.243
	(0.166)	(0.152)
Observations	102	102
R-squared	0.646	0.652
Number of countries	20	20
Year dummies	YES	YES
Fixed Effects	YES	YES

*FE regressions. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the standard deviation of the GDP growth rate in regressions (1), (2) and (3), the standard deviation of the detrended cycle of the GDP in regressions (4), (5) and (6)*

Following the results of the over-identification test, I report in Table 6 the estimations obtained including country fixed effects and using as dependent variable growth output volatility. As before, the variables representing financial integration are not significant.

For robustness check, I replicate the previous analysis using as dependent variable consumption volatility. Table 7 in Appendix A reports the estimations obtained using POLS. Again, the variables representing financial integration are not significant. Then, I

run an over-identification test to detect the presence of FE. Given the results of Table 8, I re-estimate the model using consumption volatility as dependent variable introducing country fixed effects.

Table 8. Over-identification tests – Consumption volatility

		(1) **Ifigdp**	(2) **Geqgdp**	(3) **Kaopen**
P-value	**C_grw**	0.0000	0.0006	0.0000
Fixed Effects		**YES**	**YES**	**YES**
		(4)	(5)	(6)
P-value	**C_cycle**	0.000	0.0000	0.0000
Fixed Effects		**YES**	**YES**	**YES**

Over-identification tests

As Table 9 shows, again the variables representing financial integration are not significant. These findings highlight the difficulty to detect empirically a relationship between globalization and macroeconomic volatility. The choice to focus on the European countries, hoping that this subsample could represent a sufficiently homogeneous sample affected by symmetric shocks, fails to improve the empirical analysis. As shown in the descriptive analysis, the volatility in the European countries is fluctuating over the periods. As underlined by the previous literature, the temporal fluctuation of volatility may explain why I do not find significant results.

Table 9. FE models - Consumption volatility

VARIABLES	(1) C_grw	(2) C_grw	(3) C_grw	(4) C_cycle	(5) C_cycle	(6) C_cycle
Ifigdp	0.000634			68.45		
	(0.0156)			(142.7)		
Geqgdp		-0.000675			-18.99	
		(0.00478)			(61.81)	
Kaopen			0.000502			25.53
			(0.00491)			(46.30)
iGDP_2010	0.00758	0.00618	0.0152	420.1**	355.2	419.0*
	(0.0423)	(0.0388)	(0.0620)	(192.1)	(207.7)	(205.4)
Trade_sd	0.00333***	0.00334***	0.00331***	13.65**	14.06**	21.49*
	(0.000650)	(0.000658)	(0.000848)	(5.475)	(5.506)	(11.12)
Broadmoney	0.0241*	0.0241*	0.0225	104.8**	108.6**	97.27**
	(0.0132)	(0.0128)	(0.0134)	(43.98)	(44.03)	(42.09)
Broadmoney sd	0.0118	0.0120	0.0170	77.42	86.72	187.1
	(0.0133)	(0.0128)	(0.0186)	(84.51)	(83.33)	(145.7)
Inflation	-0.00843	-0.00863	-0.0110	19.33	8.179	18.96
	(0.0126)	(0.0116)	(0.00950)	(58.37)	(60.78)	(73.30)
Gov_exp_sd	0.0144***	0.0145***	0.0143***	36.25	39.32	31.66
	(0.00376)	(0.00361)	(0.00377)	(24.94)	(25.23)	(22.62)
Constant	-0.632**	-0.620*	-0.657	-6,344***	-5,841***	-6,261***
	(0.299)	(0.302)	(0.425)	(1,806)	(2,031)	(1,960)
Observations	98	98	91	98	98	91
R-squared	0.727	0.727	0.673	0.453	0.453	0.464
Number of id	20	20	19	20	20	19
Year dummies	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES

*FE regressions. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is the standard deviation of the growth rate of private consumption in regressions (1), (2) and (3) and standard deviation of detrended consumption cycle in regressions (4), (5) and (6)*

In model (2), I add a dummy for the Euro zone and I introduce an interaction with the financial integration variables. The introduction of the Euro has increased financial integration among the countries that adopted it.

Table 10 reports the estimates of the model (2) under the POLS specification for both output volatility measures.

Even inserting a dummy to capture the effect of the synchronization of the cycle for the Euro zone, the variables measuring financial integration are not significantly related to output volatility. In Table 10 there are some significant results, but since there is an interaction term, I need to check the significance of the marginal effect $\beta_2 + \beta_3$. Table 11 reports the marginal effects of the variables measuring financial integration. As we can see, only *Ifigdp* is significant and positively related to output volatility.

Table 10. POLS models - Output volatility

VARIABLES	(1) GDP_grw	(2) GDP_grw	(3) GDP_grw	(4) GDP_cycle	(5) GDP_cycle	(6) GDP_cycle
Ifigdp	-0.000101			-34.55		
	(0.00646)			(218.2)		
Ifigdp*EURO	0.261***			2,617**		
	(0.0589)			(1,021)		
Geqgdp		-0.000605			-7.779	
		(0.00179)			(45.14)	
Geqgdp*EURO		0.0322**			466.0***	
		(0.0124)			(153.2)	
Kaopen			-0.00240			-73.38
			(0.00178)			(45.88)
Kaopen*EURO			0.0615			742.7
			(0.0535)			(575.3)
EURO	-0.0141	0.00961	-0.108	-233.2	-73.71	-1,420
	(0.0118)	(0.0115)	(0.123)	(184.3)	(136.8)	(1,302)
iGDP_2010	-0.00296	-0.00250	-0.000302	341.8***	340.8***	407.9***
	(0.00288)	(0.00296)	(0.00307)	(60.88)	(57.61)	(60.71)
Trade_sd	0.00130***	0.00134***	0.00160***	2.518	2.775	1.667
	(0.000225)	(0.000235)	(0.000525)	(4.936)	(4.912)	(7.822)
Broadmoney	0.000793	0.00104	0.00194	-7.109	-7.453	-7.863
	(0.000936)	(0.00101)	(0.00129)	(20.04)	(20.76)	(22.94)
Broadmoney sd	-0.00431	-0.00537	-0.00612	-111.9	-137.4	-80.33
	(0.00902)	(0.00903)	(0.0104)	(93.35)	(102.5)	(110.9)
Inflation	-0.00101	-0.00151	-0.000541	-53.00	-56.89	-51.46
	(0.00267)	(0.00276)	(0.00272)	(53.46)	(53.86)	(46.41)
Gov_exp_sd	0.00257	0.00292	0.00432	63.17*	61.47*	86.76***
	(0.00226)	(0.00228)	(0.00261)	(34.98)	(34.83)	(32.59)
Constant	0.0206	0.0105	-0.0380	-2,827***	-2,799***	-3,500***
	(0.0283)	(0.0314)	(0.0265)	(733.4)	(756.4)	(763.2)
Observations	102	102	95	102	102	95
R-squared	0.733	0.711	0.679	0.663	0.662	0.684
Year dummies	YES	YES	YES	YES	YES	YES

*POLS models. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the standard deviation of the GDP growth rate in regressions (1), (2) and (3), the standard deviation of the detrended cycle of the GDP in regressions (4), (5) and (6)*

Table 11. Marginal effects – Output volatility

Regressions	Variables	Dy/dx	Std. Err.	z	P>z	[95% Conf.	Interval]
(1)	**Ifigdp**	**0.0229147**	0.0098412	2.33	**0.022**	0.0033443	0.042485
(2)	**Geqgdp**	0.0022389	0.0024248	0.92	0.358	-0.002583	0.0070608
(3)	**Kaopen**	0.0034227	0.0057319	0.6	0.552	-0.007991	0.0148364
(4)	**Ifigdp**	196.3794	250.2495	0.78	0.435	-301.2692	694.0279
(5)	**Geqgdp**	33.34276	48.68351	0.68	0.495	-63.46974	130.1553
(6)	**Kaopen**	-3.021735	73.3582	-0.04	0.967	-149.0966	143.0531

Marginal effects

Then, in order to overcome the POLS analysis, I run the over-identification tests to verify the presence of fixed or random effects (Table 12).

Table 12. Over-identification tests – Output volatility

		(1) Ifigdp	(2) Geqgdp	(3) Kaopen
P-value	**GDP_grw**	0.0000	0.0000	-
Fixed Effects		**YES**	**YES**	**NO**
		(4)	**(5)**	**(6)**
P-value	**GDP_cycle**	-	-	-
Fixed Effects		**NO**	**NO**	**NO**

Over-identification tests

From the previous table, in regressions 1 and 2, the test suggests the presence of FE. In the other cases there is no evidence of country fixed effects and the simple linear regression estimated by POLS is correct. Thus, for regressions 3-6, I consider the POLS analyses reported in Table 10 as correctly specified, for regressions 1 ad 2 the POLS estimates from Table 10 and its marginal effects from Table 11 are not valid anymore. Table 13 and 14 show respectively the results obtained estimating (1) and (2) adding country fixed effects, and the marginal effects of the financial integration variables.

Table 13. FE models – Output volatility

VARIABLES	(1) GDP_grw	(2) GDP_grw
Ifigdp	0.0174*	
	(0.00922)	
Ifigdp*EURO	0.466***	
	(0.126)	
Geqgdp		0.00383
		(0.00257)
Geqgdp*EURO		0.0686*
		(0.0383)
EURO	-	-
iGDP_2010	0.00780	0.0162
	(0.0250)	(0.0254)
Trade_sd	0.00131***	0.00139***
	(0.000206)	(0.000231)
Broadmoney	-0.00813*	-0.00486
	(0.00404)	(0.00564)
Broadmoney sd	-0.00860	-0.0105
	(0.0120)	(0.0113)
Inflation	0.00933**	0.00661
	(0.00372)	(0.00588)
Gov_exp_sd	0.00262	0.00406
	(0.00395)	(0.00434)
Constant	0.106	-0.0375
	(0.164)	(0.149)
Observations	102	102
R-squared	0.720	0.679
Number of countries	20	20
Year dummies	YES	YES
Fixed effects	YES	YES

*FE effects models. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is always the standard deviation of the GDP growth rate.*

Table 14. Marginal effects – Output volatility

Regressions	Variables	Dy/dx	Std. Err.	z	P>z	[95% Conf.	Interval]
(1)	**Ifigdp**	**0.0584888**	0.0149035	3.92	**0.0000**	0.0292785	0.0876991
(2)	**Geqgdp**	**0.0098825**	0.0038178	2.59	**0.0100**	0.0023998	0.0173651

Marginal effects

Table 14 shows that both the financial integration variables (*Ifigdp* and *Geqgdp*) are positively related to growth volatility. Thus, introducing country fixed effect, I find that financial integration increases output volatility and countries that are part of the Euro zone experience more volatility than the other ones.

For robustness check, I replicate the previous analysis considering consumption volatility. Tables 12 and 15 in Appendix A show the results. The POLS model confirms the previous findings. In particular, *Ifigdp* is positively related to consumption volatility. This result contradicts the economic theory that argues that financial integration helps consumption smoothing and thus it may reduce consumption volatility. The other indices are not significant.

Finally, I eliminate the financial integration variables and the dummy Euro represents itself financial integration. A DD estimation is performed. Firstly, I run a POLS model, and secondly a FE model if the over-identification test detects the presence of FE.

Table 17 reports the results from the POLS model. Table 18 reports the results of the over-identification tests

Table 17. DD model – Output volatility

VARIABLES	(1) GDP_grw	(2) GDP_cycle
EURO	0.0116	-0.0332*
	(0.00889)	(0.0197)
AFTER	0.00282	-0.00927
	(0.00868)	(0.0106)
EURO*AFTER	0.0250*	0.0620***
	(0.0133)	(0.0218)
iGDP_2010	-0.00193	-0.00368
	(0.00230)	(0.00352)
Trade_sd	0.00136***	0.00310***
	(0.000231)	(0.000808)
Broadmoney	0.00148	0.000327
	(0.00107)	(0.00175)
Broadmoney sd	-0.00491	4.04e-05
	(0.00853)	(0.0141)
Inflation	-0.00223	0.00728
	(0.00265)	(0.00564)
Gov_exp_sd	0.00386	0.0100***
	(0.00239)	(0.00278)
Constant	-0.00554	-0.00102
	(0.0244)	(0.0423)
Observations	107	103
R-squared	0.696	0.728
Year dummies	YES	YES

*DD - POLS. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable in regression (1) is the standard deviation of the growth rate of output. The dependent variable in regression (2) is the standard deviation of the cycle of GDP.*

Table 18. Over-identification tests for DD model

	(1) GDP_grw	(2) GDP_cycle
P-value	0.0000	0.0007
Fixed Effects	**YES**	**YES**

Over-identification tests

Table 18 shows the presence of FE for both regressions so a FE estimation is performed. The results of FE model are the following,

Table 19. DD model – Output volatility

VARIABLES	(1) GDP_gwr	(2) GDP_cycle
EURO	-	-
AFTER	-	-
EURO*AFTER	0.0242**	252.5*
	(0.0105)	(141.0)
iGDP_2010	0.00436	536.7**
	(0.0253)	(232.9)
Trade_sd	0.00141***	5.446
	(0.000236)	(4.216)
Broadmoney	0.00201	-55.73
	(0.00440)	(100.1)
Broadmoney sd	-0.0106	-175.6*
	(0.0109)	(97.65)
Inflation	-0.00103	37.03
	(0.00509)	(104.7)
Gov_exp_sd	0.00564	56.43
	(0.00411)	(37.37)
Constant	-0.0757	-3,674
	(0.149)	(2,290)
Observations	107	107
R-squared	0.656	21
Number of id	21	0.500
Year dummies	YES	YES
Fixed Effects	YES	YES

*DD - FE. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable in regression (1) is the standard deviation of the growth rate of output, the dependent variable in regression (2) is the standard deviation of the cycle of GDP.*

Tables 19 shows that the effect of the Euro dummy on output volatility is strongly positive. That is, entering in the Euro zone affects positively output volatility with respect to the countries that are not in the Euro zone. This positive result is in line with literature that argues that entering in a globalized system may cause an increasing in output volatility (Razin end Rose, 1992). The robustness analysis using consumption volatility provides similar results. Tables 20 and 22 in Appendix A, show that financial integration is positive related to consumption volatility. The results about consumption volatility are in contrast with the economic theory that points out that globalization may help to smooth consumption and reduce the consumption volatility (Kose et al. 2010).

The final robustness check is developed on a reduced sample, the countries that are part of the EU, in which the parallel path assumption can be more strongly supported. The aim is to provide an analysis on a sub-sample of countries that have the same features in order to avoid the possibility that within the panel there are countries affected by asymmetric external shocks affecting macroeconomic volatility. Table 23 in Appendix A reports the POLS estimations showing that globalization affects positively output and

consumption volatility. An over-identification test is performed and the results show that there is no variance in the panel-specific intercepts and all the intercepts can be considered equal. Thus, the POLS estimations are correct. These results are in line with the previous DD regressions obtained using the extended sample of European countries confirming that entering in a globalized system, proxied in this case by the Euro zone, increases macroeconomic volatility.

6 Conclusions

Empirical works fail to provide clear-cut results on the relationship between financial integration and macroeconomic volatility. Output volatility should increase when the circulation of goods increases. Consumption volatility should decline when financial integration among countries increases since the increase in capital flows allows to smooth consumption over time. On the one hand, financial integration helps accessing to new capital opportunities and diversifying products. On the other hand, these capitals may encourage countries to specialize their production looking for a comparative advantage and making their economies more exposed to industry-specific crises that make the output more volatile.

The lack of significant evidence highlighted by the literature may depend on a series of issues. Firstly, the temporal fluctuation of volatility may be a problem for the empirical analysis. Second, the nature in terms of duration of the shocks, temporary or permanent, has to take into account since this characteristic may affect the relationship between globalization and volatility. Failing to consider that difference may lead to wrong conclusions. Thirdly, the presence of asymmetric shocks in countries that are part of the same sample may affect the empirical results. The synchronization of the cycles within a region affects the manner of propagation of the shocks in such a way that the countries of the same area are affected in the same way. If European countries are affected by asymmetric shocks, the relationship between globalization and macroeconomic volatility may also be affected.

I verified empirically the first issue on my sample. Volatility fluctuations are present for both output and consumption volatility, suggesting that the relationship

between globalization and volatility may not be the same across periods and countries. This may explain the weakness of the first empirical results. Regarding the other two issues, I specify settings that may help to account for them.

To address the problem of regionalism, I build a sample of European countries and control for the sub-group of the countries that are members of the Euro zone. Firstly, I use a dummy to control for the Euro zone, and, secondly, I run a DD model. The first analysis remarks that financial integration indices are positively, but weakly, related to both output and consumption volatility. Including the consumption volatility is another attempt to provide strong empirical results. Output is made up to 70% by consumption, thus the results coming from the model that use consumption volatility should confirm the results of output volatility. The positive relationship between financial integration and consumption volatility contradicts the existing theoretical literature. It points out that entering in a globalized system, capital openness should increase investment volatility and make easier consumption smoothing. The DD approach strongly remarks that financial integration affects positively output and consumption volatility. The counterintuitive positive relationship detected between financial integration and consumption volatility may depend on the setting of my analyses. In particular, to address the problem of the different nature of the shocks, I filter the cycle component to focus on short-term shocks. This choice may affect the results since consumption smoothing is a long-term position. Thus, it is not possible to highlight a reduction of consumption volatility in terms of smoothing consumption due to financial integration.

This empirical analysis is an attempt to overcome the critical points highlighted by the literature to capture a link between financial integration and cycle volatility in Europe. While the first general model fails to find significant results, the settings obtained refining the sample of countries to look more carefully at the countries of the Euro zone provide some interesting findings.

APPENDIX A

Table 7. Pooled model. Consumption volatility (st. dev. of growth rate)

VARIABLES	(1) C_grw	(2) C_grw	(3) C_grw	(4) C_cycle	(5) C_cycle	(6) C_cycle
Ifigdp	-0.00443			113.8		
	(0.00998)			(292.2)		
Geqgdp		-0.00326			-65.76*	
		(0.00254)			(38.56)	
Kaopen			0.000269			-33.40
			(0.00285)			(44.10)
iGDP_2010	-0.00242	-0.00116	-0.00381	139.6***	196.2***	210.1***
	(0.00459)	(0.00464)	(0.00459)	(35.88)	(42.92)	(77.59)
Trade_sd	0.00304***	0.00304***	0.00408***	14.12*	14.20*	29.54*
	(0.000830)	(0.000830)	(0.000977)	(7.651)	(7.842)	(14.83)
Broadmoney	-9.40e-06	0.000177	0.00213	-3.697	2.355	3.053
	(0.00203)	(0.00202)	(0.00230)	(11.86)	(12.43)	(17.71)
Broadmoney sd	0.00496	0.00549	0.00622	71.41	87.50	159.4
	(0.0114)	(0.0114)	(0.0136)	(96.73)	(103.0)	(155.4)
Inflation	0.00764	0.00730	0.00589	86.05*	70.62	132.1
	(0.00623)	(0.00623)	(0.00609)	(50.70)	(46.72)	(85.59)
Gov_exp_sd	0.00979***	0.0101***	0.00822***	7.350	23.16	12.07
	(0.00287)	(0.00282)	(0.00226)	(21.40)	(18.93)	(18.67)
Constant	-0.00655	-0.0234	-0.0494	-1,494***	-2,189***	-2,648**
	(0.0521)	(0.0547)	(0.0384)	(473.4)	(710.4)	(1,275)
Observations	98	98	91	98	98	91
R-squared	0.680	0.683	0.675	0.382	0.396	0.434
Year dummies	YES	YES	YES	YES	YES	YES

*Pooled regressions. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is the standard deviation of the growth rate of private consumption for regressions 1-3, the standard deviation of the cycle of private consumption for regressions 4-6.*

Table 12. Pooled model - Consumption volatility

VARIABLES	(1) C_grw	(2) C_gwr	(3) C_gwr	(4) C_cycle	(5) C_cycle	(6) C_cycle
Ifigdp	0.000139			-34.55		
	(0.00990)			(218.2)		
Ifigdp*EURO	0.389**			2,617**		
	(0.159)			(1,021)		
Geqgdp		-0.00305			-7.779	
		(0.00253)			(45.14)	
Geqgdp*EURO		0.0367			466.0***	
		(0.0253)			(153.2)	
Kaopen			-0.00161			-73.38
			(0.00303)			(45.88)
Kaopen*EURO			0.0577			742.7
			(0.0893)			(575.3)
EURO	-0.0519*	-0.00998	-0.114	-233.2	-73.71	-1,420
	(0.0286)	(0.0229)	(0.205)	(184.3)	(136.8)	(1,302)
iGDP_2010	-0.00430	-0.00219	-0.00380	341.8***	340.8***	407.9***
	(0.00467)	(0.00474)	(0.00479)	(60.88)	(57.61)	(60.71)
Trade_sd	0.00285***	0.00292***	0.00368***	2.518	2.775	1.667
	(0.000869)	(0.000867)	(0.000919)	(4.936)	(4.912)	(7.822)
Broadmoney	-0.000346	0.000418	0.00341	-7.109	-7.453	-7.863
	(0.00180)	(0.00182)	(0.00214)	(20.04)	(20.76)	(22.94)
Broadmoney sd	-4.00e-05	-7.05e-05	0.000244	-111.9	-137.4	-80.33
	(0.0142)	(0.0137)	(0.0172)	(93.35)	(102.5)	(110.9)
Inflation	0.00635	0.00522	0.00195	-53.00	-56.89	-51.46
	(0.00697)	(0.00683)	(0.00578)	(53.46)	(53.86)	(46.41)
Gov_exp_sd	0.00848***	0.00968***	0.00871***	63.17*	61.47*	86.76***
	(0.00266)	(0.00261)	(0.00238)	(34.98)	(34.83)	(32.59)
Constant	0.0281	-0.0108	-0.0656	-2,827***	-2,799***	-3,500***
	(0.0506)	(0.0540)	(0.0423)	(733.4)	(756.4)	(763.2)
Observations	98	98	91	102	102	95
R-squared	0.716	0.694	0.686	0.663	0.662	0.684
Year dummies	YES	YES	YES	YES	YES	YES

*Pooled regressions. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is the standard deviation of the growth rate of private consumption for regressions 1-3, the standard deviation of the cycle of private consumption for regressions 4-6.*

Table 13. Marginal Effects

Regressions	Variables	Dy/dx	Std. Err.	z	P>z	[95% Conf.	Interval]
(1)	**Ifigdp**	**0.0359007**	0.0192544	1.86	**0.066**	-0.0024169	0.0742182
(2)	**Geqgdp**	0.0003265	0.0036758	0.09	0.929	-0.0069885	0.0076415
(3)	**Kaopen**	0.0040941	0.0104227	0.39	0.696	-0.0166784	0.0248665
(4)	**Ifigdp**	196.3794	250.2495	0.78	0.435	-301.2692	694.0279
(5)	**Geqgdp**	33.34276	48.68351	0.68	0.495	-63.46974	130.1553
(6)	**Kaopen**	-3.021735	73.3582	-0.04	0.967	-149.0966	143.0531

Marginal effects

Table 14. Over-identification test – Consumption volatility

		(1) **Ifigdp**	(2) **Geqgdp**	(3) **Kaopen**
P-value	**C_grw**	0.0000	0.0000	0.0000
Fixed Effects		**YES**	**YES**	**NO**
		(4)	(5)	(6)
P-value	**C_cycle**	-	-	-
Fixed Effects		**NO**	**NO**	**NO**

Over-identification tests

Table 15. FE model - Consumption volatility

VARIABLES	(1) C_grw	(2) C_grw	(3) C_grw
Ifigdp	0.00383		
	(0.0162)		
Ifigdp*EURO	0.295		
	(0.315)		
Geqgdp		-0.000457	
		(0.00493)	
Geqgdp*EURO		-0.0149	
		(0.0791)	
Kaopen			0.000502
			(0.00489)
Kaopen*EURO			-0.000417
			(0.185)
EURO	-	-	-
iGDP_2010	0.00175	0.00656	0.0152
	(0.0406)	(0.0388)	(0.0654)
Trade_sd	0.00325***	0.00334***	0.00331***
	(0.000736)	(0.000644)	(0.000806)
Broadmoney	0.0154	0.0265*	0.0225
	(0.0142)	(0.0133)	(0.0138)
Broadmoney sd	0.0103	0.0127	0.0170
	(0.0142)	(0.0125)	(0.0199)
Inflation	-0.00177	-0.0105	-0.0110
	(0.0134)	(0.0118)	(0.0105)
Gov_exp_sd	0.0123***	0.0149***	0.0143***
	(0.00307)	(0.00308)	(0.00388)
Constant	-0.392	-0.676**	-0.657
	(0.281)	(0.253)	(0.477)
Observations	98	98	91
R-squared	0.738	0.728	0.673
Number of id	20	20	19
Year dummies	YES	YES	YES
Fixed effect	YES	YES	YES

*FE regressions. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable is the standard deviation of the growth rate of private consumption for regressions 1-3, the standard deviation of the cycle of private consumption for regressions 4-6.*

Table 16. Marginal Effects

Regressions	Variables	Dy/dx	Std. Err.	z	P>z	[95% Conf.	Interval]
(1)	**Ifigdp**	0.0309195	0.0342523	0.90	0.367	-0.0362138	0.0980528
(2)	**Geqgdp**	-0.001825	0.0075732	-0.24	0.810	-0.0166681	0.0130181
(3)	**Kaopen**	0.000461	0.0201128	0.02	0.982	-0.0389593	0.0398814

Marginal effects

Table 20. DD model – Consumption volatility - Robustness check

VARIABLES	(1) C_grw	(2) C_cycle
EURO	25.36	-38.78
	(122.8)	(113.1)
AFTER	279.5*	40.05
	(157.4)	(86.27)
EURO*AFTER	231.2*	267.6**
	(129.7)	(132.9)
iGDP_2010	342.9***	153.8***
	(44.67)	(43.62)
Trade_sd	3.659	12.44
	(4.768)	(7.828)
Broadmoney	-2.343	7.888
	(20.17)	(13.48)
Broadmoney sd	-110.7	20.17
	(96.04)	(116.6)
Inflation	-54.20	43.11
	(49.98)	(45.05)
Gov_exp_sd	69.92**	19.69
	(30.61)	(17.30)
Constant	-2,967***	-1,791**
	(573.4)	(704.8)
Observations	107	103
R-squared	0.667	0.402
Year dummies	YES	YES

*DD - POLS. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable in regression (1) is the standard deviation of the growth rate of consumption. The dependent variable in regression (2) is the standard deviation of the cycle of consumption.*

Table 21. Over-identification tests for DD model

	(1) C_grw	(2) C_cycle
P-value	0.0000	-
Fixed Effects	**YES**	**YES**

Over-identification tests

Table 22. DD model – Consumption volatility – Robustness check

VARIABLES	(1) C_cycle
EURO	-
AFTER	-
EURO*AFTER	131.7
	(86.75)
iGDP_2010	305.7*
	(155.1)
Trade_sd	12.63**
	(5.216)
Broadmoney	97.67*
	(49.41)
Broadmoney sd	49.28
	(79.28)
Inflation	0.778
	(52.49)
Gov_exp_sd	33.86*
	(18.89)
Constant	-5,074***
	(1,737)
Observations	103
R-squared	0.442
Number of countries	21
Year dummies	YES
Fixed Effects	YES

*DD - FE. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable in regression (1) is the standard deviation of the growth rate of consumption. The dependent variable in regression (2) is the standard deviation of the cycle of consumption.*

Table 23. DD model – Output and Consumption volatility – Robustness check

VARIABLES	(1) GDP_grw	(2) GDP_cycle	(3) C_grw	(4) C_cycle
EURO	-0.00259	-0.0451*	-15.79	-52.38
	(0.00629)	(0.0252)	(194.4)	(117.8)
AFTER	-0.00933	-0.00140	-2.321	-31.23
	(0.00989)	(0.0117)	(197.6)	(60.63)
EURO*AFTER	0.0289***	0.0787***	179.8	287.6**
	(0.00964)	(0.0234)	(176.3)	(116.9)
iGDP_2010	-0.000310	0.000342	398.5***	144.7***
	(0.00295)	(0.00469)	(90.98)	(38.85)
Trade_sd	0.00221***	0.00408***	19.77***	13.74***
	(0.000370)	(0.00117)	(7.189)	(4.773)
Broadmoney	0.000109	0.000226	-7.903	-1.395
	(0.000716)	(0.00222)	(29.05)	(18.11)
Broadmoney sd	-0.0166***	-0.0202**	-10.51	-58.19
	(0.00493)	(0.00889)	(98.11)	(57.52)
Inflation	0.00963***	0.00535	122.8*	53.93
	(0.00194)	(0.00762)	(63.58)	(35.82)
Gov_exp_sd	0.0145***	0.0155**	157.2**	56.08
	(0.00308)	(0.00637)	(62.42)	(33.73)
Constant	-0.0369	-0.0426	-4,118***	-1,457***
	(0.0363)	(0.0704)	(1,017)	(436.7)
Observations	56	56	56	56
R-squared	0.886	0.818	0.710	0.682
Year dummies	YES	YES	YES	YES

*DD - POLS. Robust standard errors clustered by state, in brackets. * significance at 10%, ** at 5% and *** at 1%. Dummies per year are included. The dependent variable in regression (1) is the standard deviation of the growth rate of GDP. The dependent variable in regression (2) is the standard deviation of the cycle of GDP. The dependent variable in regression (3) is the standard deviation of the growth rate of consumption. The dependent variable in regression (4) is the standard deviation of the cycle of consumption.*

Table 24. Over-identification tests for DD model

	(1) **GDP_grw**	(2) **GDP_cycle**
P-value	-	-
Fixed Effects	**NO**	**NO**
	C_grw	**C_cycle**
P-value	-	-
Fixed Effects	**NO**	**NO**

Over-identification tests

APPENDIX B

Table 1. List of countries – European countries

Albania	Lithuania*
Austria*	Luxembourg*
Belarus	Macedonia, FYR
Belgium*	Malta*
Bosnia and Herzegovina	Moldova
Bulgaria*	Monaco
Croatia*	Montenegro
Cyprus*	Netherlands*
Czech Republic*	Norway
Denmark*	Poland*
Estonia*	Portugal*
Finland*	San Marino
France*	Serbia
Germany*	Slovak Republic*
Greece*	Slovenia*
Hungary*	Spain*
Iceland	Sweden*
Ireland*	Switzerland
Italy*	Ukraine
Latvia*	United Kingdom*
Liechtenstein	

The list is retrieved from https://europa.eu. It includes all the states belonging exclusively to the European geographic region.
**Countries that are part of the EU.They are used in the last part of the analysis as homogeneous sample.*

APPENDIX C

Table 1. List of variables

Name	Data source
GDP (st. dev. of the growth rate)	World Bank, WDI
GDP (st. dev. of the filtered cycle)	World Bank, WDI
Consumption (st. dev. of the growth rate)	World Bank, WDI
Consumption (st. dev. of the filtered cycle)	World Bank, WDI
Ifigdp	Lane and Milesi-Ferretti
Geqgep	Lane and Milesi-Ferretti
Kaopen	Chinn and Ito
Initial GDP per capita	World Bank, WDI
Trade	World Bank, WDI
Broad money	World Bank, WDI
Inflation	World Bank, WDI
General Government Final Consumption Expenditures	World Bank, WDI
Euro (dummy)	https://europa.eu.
After (dummy)	https://europa.eu.

List of variables used in the analysis

Table 2. Variables description

Variable	Name	Definition	Construction
GDP_grw_{it}	GDP (st. dev. of the growth rate)	It is st. dev of the growth rate of GDP per capita, the gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars	St. dev. of the logarithmic transformation of the GDP per capita ($ln\, x_t - ln\, x_{t-1}$)
GDP_cycle_{it}	GDP (st. dev. of the filtered cycle)	It is st. dev of the filtered cycle of the GDP per capita, the gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars	St. dev. of the filtered cycle of the GDP per capita. It is obtained applying the HP filter.
C_grw_{it}	Consumption (st. dev. of the growth rate)	It is the standard deviation of the household final consumption expenditure per capita (private consumption per capita). It is calculated using private consumption in constant 2010 prices and World Bank population estimates. Household final consumption expenditure is the market value of all goods and services, including durable products (such as cars, washing machines, and home computers), purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses. Here, household consumption expenditure includes the expenditures of nonprofit institutions serving households, even when reported separately by the country. Data are in constant 2010 U.S. dollars.	St. dev. of the logarithmic transformation of the Private Consumption per capita ($ln\, x_t - ln\, x_{t-1}$)
C_cycle_{it}	Consumption (st. dev. of the filtered cycle)	It is st. dev of the filtered cycle of the household final consumption expenditure per capita (private consumption per capita). It is calculated using private consumption in constant 2010 prices and World Bank population estimates. Household final consumption expenditure is the market value of all goods and services, including durable products (such as cars, washing machines, and home computers), purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses. Here, household consumption expenditure includes the expenditures of nonprofit institutions serving households, even when reported separately by the country. Data are in constant 2010 U.S. dollars.	St. dev. of the filtered cycle of the Private Consumption per capita. It is obtained applying the HP filter.
$Ifigdp_{it}$	Ifigdp	It is an indicator of financial integration that considers the stock of foreign direct investments	It is obtained by the following ratio $Ifigdp_{it} = \frac{(FA_{it} + FL_{it})}{GDP_{it}}$

			in which FA_{it} are the total external assets and FL_{it} the total external liabilities.
$Geqgdp_{it}$	Geqgdp	It is an indicator of financial integration that considers the stock of foreign direct investments and the equity market	It is obtained by the following ratio $Geqgdp_{it} = \frac{(PEQA_{it} + FDIA_{it} + PEQL_{it} + FDIL_{it})}{GDP_{it}}$ where $PEQA_{it}$ is the stock of portfolio equity assets, $PEQL_{it}$ is the stock of portfolio equity liabilities, $FDIA_{it}$ is the stock of foreign direct investment asset and finally $FDIL_{it}$ is the stock of foreign direct investment liabilities
$Kaopen_{it}$	Kaopen	It is an indicator of capital openness	They start from binary dummies described in the AREAER representing restrictions on foreign financial transactions; in particular, the above-mentioned variables indicate • the existence of multiple exchange rates; • restrictions on current and capital account transactions; • the obligation of the submission of export profits; These variables are combined using a PCA
$IGDP_{it}$	Initial GDP per capita	It is the initial GDP per capita at beginning of each period (explanation above)	It is calculated by a logarithmic transformation of the GDP at the beginning of each period
$Trade_{it}$	Growth rate of trade	Annual growth rate of imports of goods and services based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.	It is obtained as st.dev. of the Growth rate of Trade
$Broadmoney_{it}$	Broad money	It is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.	It is obtained by a logarithmic transformation. It is used in level and also applying the st.dev.
$Inflation_{it}$	Inflation	Consumer price index reflects changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	The Laspeyres formula is used.

Gen_exp_{it}	General government final consumption expenditures	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation. Data are in constant 2010 U.S. dollars.	Gross domestic product (GDP) from the expenditure side is made up of household final consumption expenditure, general government final consumption expenditure, gross capital formation (private and public investment in fixed assets, changes in inventories, and net acquisitions of valuables), and net exports (exports minus imports) of goods and services. Such expenditures are recorded in purchaser prices and include net taxes on products

Description of the variables used in the analysis

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