

**Financial liberalization, growth,  
productivity and capital accumulation:  
The case of European integration**

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### **Abstract**

In the present contribution, we concentrate on the process of financial liberalization in a specific context of European economic and monetary integration. We implement *de facto* and *de jure* measures of financial liberalization and find that formal aspects of financial openness generate a strongly positive impact on economic growth and its sources, productivity growth and capital accumulation. Moreover, there is evidence of a positive contribution to the process stemming from the EU membership, while no substantial effect comes from the euro adoption. Finally, we investigate the effects from financial integration on country groups within the EU.

**Keywords:** *Financial integration; economic growth; productivity; European integration*

**JEL F41, F36, F43**

## 1. Introduction

The process of financial liberalization of the last few decades dramatically changed the economic architecture worldwide.<sup>1</sup> In the investigation concerning the influence of the progressive financial opening, authors were mostly focusing on positive and negative growth effects. Most of the theoretical discussion on the growth effects coming from financial liberalization suggests that, through an improved allocation of capital, economic growth should be higher. In the standard neoclassical model, the liberalization of financial transactions leads to intensified flow of capital from capital-abundant towards capital-scarce regions. As an important consequence for the latter, the reduction of capital costs follows, thereby motivating higher investment and, finally, positively - even though temporary - influencing growth (Barro et al. 1995; Gourinchas and Jeanne 2006).

The results of the empirical studies in this field were rather inconclusive, with some authors finding strong support for the growth-enhancing hypothesis and some other contributions showing only weak or mixed evidence of positive growth.<sup>2</sup> In particular, negative influence of financial globalization has been found in enhanced financial instability (Bhagwati 1998; Rodrik 1998; Stiglitz 2004) and increased volatility of industrial production (Levchenko et al. 2009).<sup>3</sup> Moreover, due to increased volatility and riskiness, financial liberalization has been made responsible for having offered the main contribution to past financial and economic crisis (Kaminsky and Reinhard 1999; Stiglitz 2000; Joyce 2011).

In a more elaborated context, positive growth effects may be generated also indirectly, by improved factor productivity. In this sense, financial openness may produce a positive impact on productivity via better, more efficient allocation of resources (Mishkin 2006; Kose et al. 2009a), as well as easier access to investment opportunities (Giannetti et al. 2002). Moreover, financial

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<sup>1</sup> We follow this part (being a great majority) of economic community that clearly distinguishes between financial liberalization and financial development. In the present study, we adopt the concepts of financial liberalization, financial integration and financial openness as synonyms. They refer both to the global and the narrower European context. Nevertheless, when we use financial globalization, we refer exclusively to the international context.

<sup>2</sup> Bekaert et al. (2005), and Quinn and Toyoda (2008) document strong support for growth enhancing financial liberalization, while Rodrik (1998) and Edison et al. (2002) find only weak growth effect. Moreover, Prasad et al. (2007) in a study including a sample of developing countries between 1970 and 2004, show that countries running current account surpluses experienced a positive and not - as neoclassical model predicts - negative impact on growth. As an implication, countries relying on foreign financing experienced lower growth than countries financing their activity prevalently with domestic sources. In this same spirit, Gourinchas and Jeanne (2007) call this negative correlation between foreign capital flows and domestic growth in developing countries 'allocation puzzle'. Given the contradictory evidence of the past studies, Kose et al. (2009b) speak about mixed effects of financial openness on growth.

<sup>3</sup> For a comprehensive survey on the effects of financial liberalization on growth and volatility, see Kose et al. (2009b).

integration may result in a reduction or even complete elimination of capital constraints, permitting the economy to engage in more productive investment (Acemoglu and Zilibotti 1997; Acemoglu et al. 2006). Additionally, capital account release may spur financial development (Klein and Olivei 1999; Baltagi et al. 2009), as well as it contributes to more efficient business activities (Rajan and Zingales 2003). On the top of that, an expectation is that more freedom in financial transactions contributes to a better risk diversification, thus, enhancing foreign investors to shift at least a part of their investments from safe and low-yield to risky but more profitable locations (Obstfeld 1994; Sandri 2010). Moreover, a more efficient risk diversification could induce also domestic agents to undertake more risk in innovative activities (Saint-Paul 1992; Obstfeld 1994). In this context, it has been argued that the investigation of the effects of financial integration on productivity and investment proved to have important implications in terms of welfare analysis (Gourinchas and Jeanne 2006; Bonfiglioli 2008; Kose et al. 2009b).

Building on such a theoretical fundament, growing although still insufficient attention has been dedicated to the empirical investigation of the main channels through which financial integration influences economic development. Here, the results obtained by Bonfiglioli (2008), Kose et al. (2009a) - using country level data - and Bekaert, Harvey and Lundblad (2011) – in an industry-level investigation - seem to communicate an important message, namely, that it is mainly productivity growth that is positively influenced by intensified financial activities and contributes in that way to increased economic growth. However, Levchenko et al. (2009), in a study based on industry-level data, could not confirm any effect of the progressive financial openness on productivity and the growth effects appeared temporary.

Contributing to both strands of the literature, the present study aims to disentangle the effects of financial integration on growth in general, as well as on its direct (capital accumulation) and indirect (productivity improvements) sources. However, whereas the past studies build upon investigations in a generalized global framework<sup>4</sup>, there was only limited effort to single out the impact of financial liberalization specifically on the European economy. In this sense, the most important innovation of the paper is to concentrate on the process of financial integration and its effects observable in the specific context of the ongoing process of economic and monetary integration in Europe. In particular, an important question is whether the efforts to establish the common European market under the institutional design both of the European Union (EU) and later on of the

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<sup>4</sup> A great majority of past studies concentrate on samples including at the same time a number of developing and industrialized countries. Those studies aim at providing an overall evaluation on the effects of financial globalization on economic development. However, in doing that they sometimes exclude subgroups of countries, like for instance, Rodrik and Subramanian (2009) do not include European countries, while Gourinchas and Jeanne (2007) do not consider the group of Central and Eastern European (CEE) countries. Consequently, the exclusion of some country groups might lead to mixed and inconclusive results of apparently comparable analyses.

European Monetary Union (EMU) contributed in a significant way to the general process of financial globalization. Moreover, given that the members of the EU were and still are characterized by considerable structural divergences as well as by different degree of development of their financial markets, one could expect that the pattern of influence coming from the process was dissimilar in different country groups within the EU.

The literature measuring the growth effects of financial integration in the EU is essentially missing. The only rigorous analysis till now has been offered by Guiso et al. (2004) and by Masten et al. (2008). The first study is an empirical investigation trying to assess the 'growth dividend' in Europe coming as a result of more intensive financial integration. They implement the Rajan and Zingales (1998) methodology to international industry-level panel and find that financial development spurs industry growth. The second contribution implements both macro and industry-level data to detect the effects of financial development and international financial integration on economic growth in Europe. Their main finding predicts that the adoption of the euro by the new EU member states may lead to the establishment of a virtuous development circle mainly thanks to a positive dynamics in the domestic financial markets and further financial integration. Both studies investigate effects of financial integration on economic growth in general, disregarding the effects on its main sources, investment and productivity and treating the EU as a whole without distinguishing between different groupings within the EU.

From the theoretical point of view, the process of international financial liberalization is expected to be more intensive and to generate an additional impact on an area involved in a more intensive process of economic and monetary integration, like it is the case of the EU. In general, the institutional environment of the EU creates uniform rules for its members. But also candidate countries, already before their accession into the EU, are obliged to commit with the so called *acquis communautaire* that aim to adequate legislative and regulatory frameworks of the candidate countries with the EU standards. Due to the efforts put in the achievement of convergence and harmonization of general rules and, in particular, of financial market regulation within the integrating area, a competitive stimulus for the local financial markets can be achieved, with further positive effect in terms of allocative efficiency. The advance in the (financial) integration process internal to the area might also improve the conditions of access to foreign and domestic finance by less financially developed countries. Foreign financial resources can be more easily obtained both in the markets of the more developed partners and outside of the area (Guiso et al. 2004). Another factor expected to intensify the effects of the general process of financial liberalization in an integrating area is the establishment of the supranational monetary policy and the introduction of the common currency (Lane and Milesi-Ferretti 2008). Through the elimination of currency risk, financial transactions internal to the area are expected to be more intensive, due to the fact that now domestic and foreign securities are characterized by a higher degree of substitutability. But also financial transactions with the non-member countries are expected to increase, as the process of monetary integration spurs

financial depth and increases liquidity – effects that should induce foreign agents to intensify their financial activity in the area. Considering both kinds of effects, internal to the area and those going beyond it, although the bulk of evidence speaks in favor of bilateral financial transactions between the members of the Eurozone, the expectation is that the effects would spread outside of the euro area as well. Nevertheless, the difficulty stays in the separation of the resulting direct and indirect growth effects generated by internal as opposed to external financial integration. This notwithstanding, an attempt can be made to extrapolate the effect of the regional financial liberalization within the more general process of international financial integration.

Refraining from the aforementioned net distinction between financial globalization and internal financial liberalization, it is worth to analyze the direct and indirect growth effects of financial liberalization on the EU. This is the crucial conceptual framework of the present analysis. In analyzing the process, we try to assess the impact that the EU membership, as well as the euro adoption could deliver to possibly strengthen the effects of financial globalization. Moreover, there exist country groups within the EU that are of particular interest in the actual public discussion, either because they are labeled as transition economies, new EU entrants, prospective euro adopters, or because they stay under a strong critique due to their economic difficulties made particularly explicit under the current crisis situation. The former group of countries refers to the Eastern European (that we call East) countries, including eight economies from the 2004 EU-enlargement, namely, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia, in addition to two countries (Bulgaria and Romania) that joined the EU in 2007. The other group of interest we call PIIGS (including Portugal, Ireland, Italy, Greece and Spain).

One common characteristic of the both East and PIIGS countries is that, at the time of their respective EU accession episodes, they were considered as catching up economies, having the potential to converge towards the core of the EU.<sup>5</sup> In particular, this potential could be translated in a more intensive process of financial liberalization with the consequent more considerable effects in terms of economic growth.

The crucial findings suggest that financial liberalization occurred in the EU influenced positively economic growth, and its main sources, i.e. total factor productivity (TFP) and capital accumulation. This result is confirmed especially when *de jure* measure was used, leaving the evidence of an impact coming from *de facto* aspects of the process rather weak. Interestingly, the effects of financial liberalization on the aforementioned variables seem to be unaffected by the euro adoption, while the EU membership produces a positive impact. Finally, the process of financial

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<sup>5</sup> Conventionally, I define “core EU” as the EMU member states that are recognized to form a stable part of the EMU also because they are not subject to major economic difficulties under the current (since 2008) economic and financial crises. Those countries include Austria, Belgium, Finland, France, Germany and Netherlands. Consequently, due to the fact that Denmark, Sweden and the UK did not adopt the common currency, they are not included in the core EU.

integration signed a particularly intensive impact both in the Eastern European countries and in PIIGS, with only marginal effect in the core EU.

The remainder of the paper is structured as follows. Section 2 shows some basic stylized facts about the financial integration and economic development in the EU in the last few decades. In Section 3, we present the data and the methodology implemented. Section 4 is dedicated to the empirical analysis. It describes the model, the estimating strategies and the results obtained. In Section 5, we conduct sensitivity analysis applying alternative measures of two out of three dependent variables. The last section concludes.

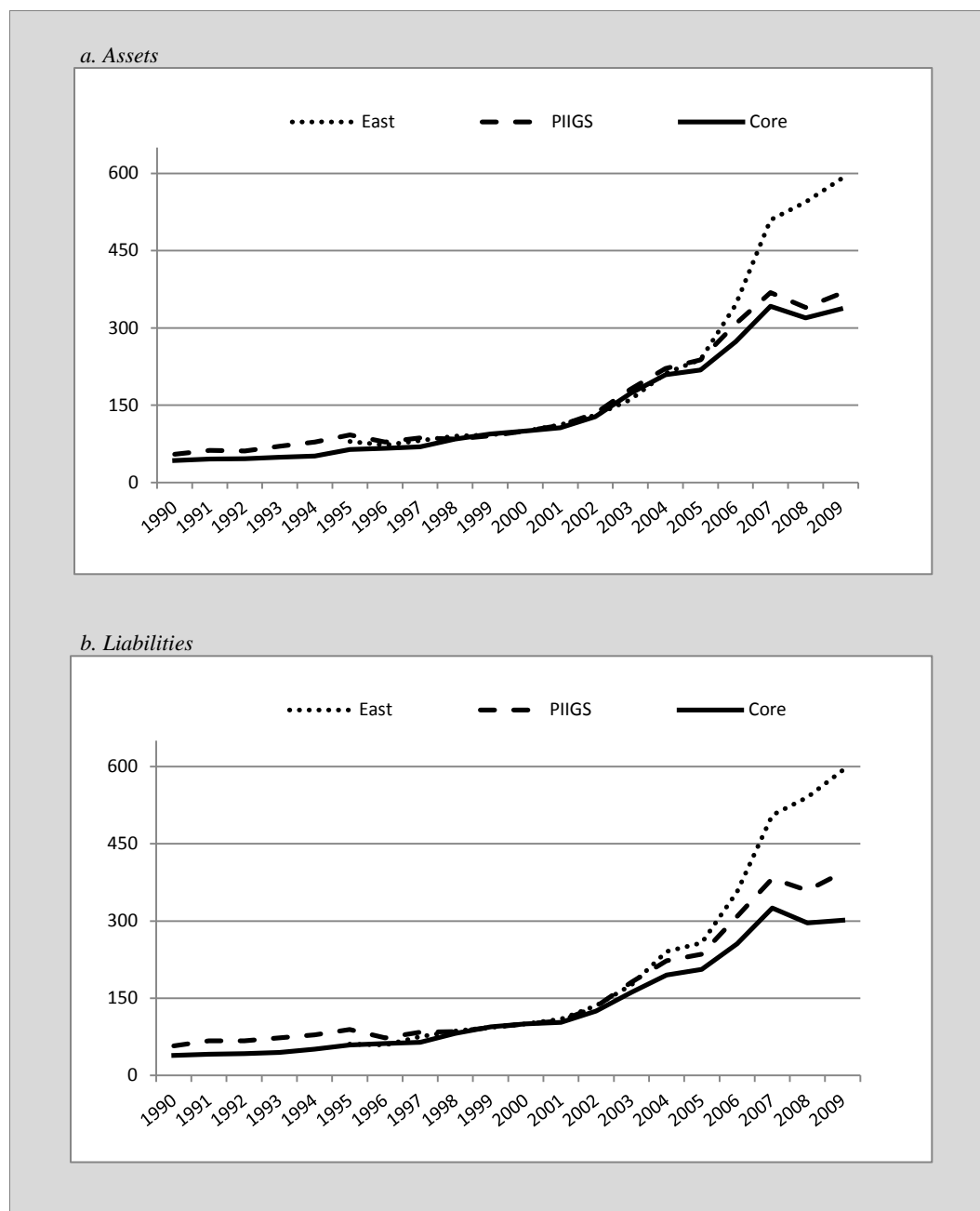
## **2. Financial and economic activity in the EU – some stylized facts**

Europe has been remarkably involved in the process of international financial integration over the last decades. The phenomenon was relevant to the extent that it eroded the so-called Feldstein-Horioka puzzle, implying that a missing link between domestic savings and investment could be explained with extensive opening of domestic economies to international financial markets (Blanchard and Giavazzi 2002).

As an expression of this intensified process of financial liberalization, financial flows - and consequently stocks - of assets and liabilities signed an increasing tendency in the EU as a whole, but also in its two subgroups, the group of East and in PIIGS. Figure 1 in panel (a) reports the development of the stock of liabilities, while in panel (b) - the stock of assets. Although not fully visible here due to missing data for the period 1990-1994, the path of development in the gross international investment position in Eastern European countries was particularly dynamic, especially considering the fact that they started the transition to market economies with completely closed financial markets. Depending on specific policy priorities and on initial economic conditions, each of those countries went through a successful process of integration into the global markets (Árvai 2005; von Hagen and Siedschlag 2008). For all three groups of countries, it is important to note that a particularly fast accumulation both of the stock of assets and of liabilities began after 2001, thus in the process of intensive pre-enlargement negotiations with the new EU member states. This process influenced significantly the accession economies that opened their markets especially towards the prospective partners from the EU-15 and managed to attract foreign resources in financing domestic activities. But also PIIGS and the core EU seem to have benefited from events around the 2004 wave of enlargement thanks to an eased and more homogenous with the EU standards access to the markets in the EU candidates. On the contrary, no such a strong and positive effect could be observed due to the euro adoption immediately after 1999.

At the same time, productivity, expressed in terms of TFP, showed an increasing tendency over the entire analyzed period, with a remarkably faster development in Eastern Europe than in the other country groups (Fig. 2). Moreover, it is worth to observe that, while TFP in the Eastern European countries grew at constantly high rates from the beginning of the observation period and at

least until 2007, in the other two groups, and especially for PIIGS, there was a break in 2001 that brought a slowing down of TFP growth for the rest of the period.



**Figure 1** Stock of assets (a) and of liabilities (b) in the EU.

Note: Being the values of stocks of assets and liabilities very different, especially between Eastern European countries and the other country groups, in order to permit comparability of the respective time series, we transformed the data into an index, where 2000=100.

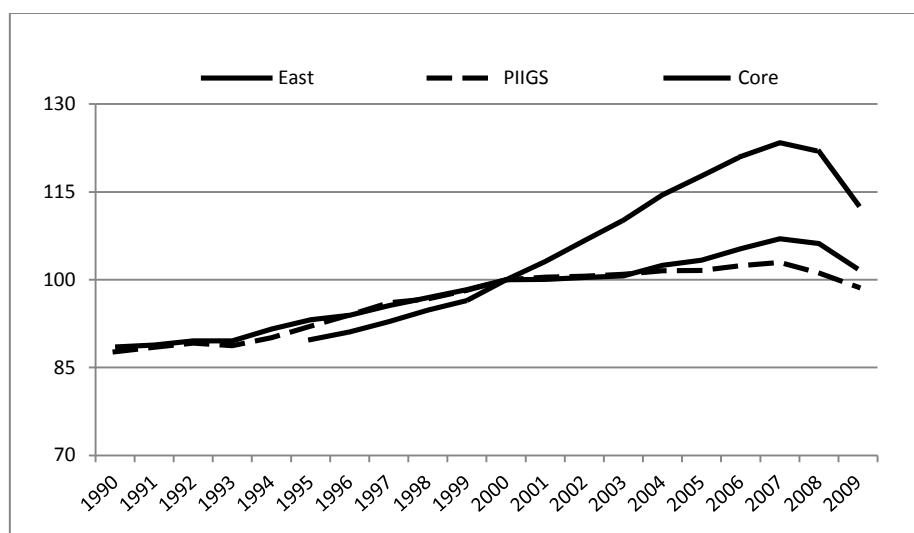
Source: Own calculations based on IMF Balance of Payments Statistics, International Investment Position.

A comparable conclusion could be drawn for the levels of real GDP. As Figure 3 shows, after a short period of transitional shock characterized by negative growth of real GDP, starting in 1993 real GDP in Eastern Europe began to grow and maintained this positive tendency until the breakup of the



crisis in 2008. In PIIGS and in the core EU, although positive growth rates of real GDP could be observed in the entire period 1990-2008, a slowing down of the growth dynamics was registered and persisted since 2001.

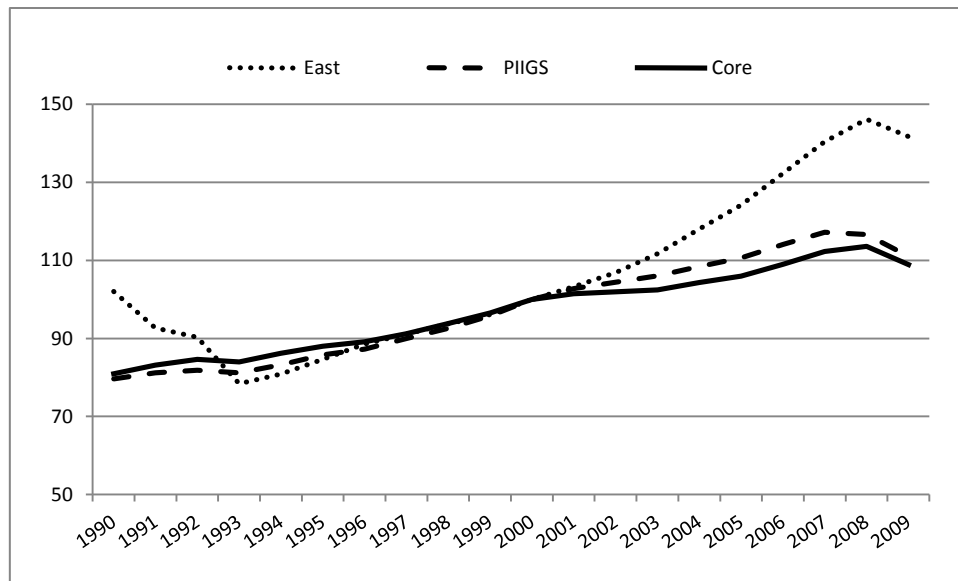
To sum up, this short overview of the data regarding the European economy provides an expectation of a positive relationship between financial liberalization, productivity growth and, in more general terms, between economic growth, although some considerable differences between country groups could be observed. However, the direction of causality at this stage of analysis is still an open question. As argued before, there are well-established theoretical explanations suggesting a positive impact coming from the process of progressive financial openness. Nevertheless, in principle, the opposite direction of influence could be also assumed: more dynamic economies, with high expectations of profitable investment activities could attract more (domestic as well as foreign) financial flows (Guiso et al. 2004). I take into account this possible reversal causality and try to deal with that question by applying an appropriate methodology in my empirical investigation.



**Figure 2** Development of TFP in the EU.

Note: TFP for total economy, 2000=100.

Source: AMECO annual macro-economic database.



**Figure 3** Development of real GDP in the EU.

Note: To improve comparability of the time series, we transformed the data relative to real GDP into an index, where 2000=100.

Source: Own calculations based on the Penn World Tables 6.3.

### 3. Methodology and data

The database is an unbalanced panel, based on annual observations in the time span 1990-2007. We include all the actual EU members, except Luxembourg.<sup>6</sup> In particular, the country coverage include: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom. We transform the annual observations into 3-year non-overlapping averages, on which we base the panel estimations.<sup>7</sup> In that way, we have six observations available for each country. This transformation is undertaken to face cyclicity problems of the annual data.<sup>8</sup> In what follows, we describe the methodology implemented in the construction of the variables included in the analysis and their statistical sources.

<sup>6</sup> Luxembourg has been excluded from the sample due to its outlier position in terms of the volume and intensity of financial activity.

<sup>7</sup> We transformed the data also into 18-year averages that we implemented in a cross-section OLS estimation. The results, not reported here, were unsatisfactory, as no evidence of an impact coming from financial liberalization on any dependent variable could be detected. The lack of any evidence shouldn't come as a major surprise, if one considers a very dynamic nature of the process of financial integration. Putting such a process in a static framework doesn't permit to exploit this dynamics of changes.

<sup>8</sup> The transformation of the data into non-overlapping averages is a common practice of studies in this field. Regarding the cyclicity concerns, a preferred transformation would consist in averaging the yearly data over a longer (usually, 4 or 5-year) time span. This procedure, however, would considerably reduce the number of already limited observations available for our estimations. For that reason, and in order to exploit all yearly

In the main empirical analysis conducted in the next section, we will consider three distinct dependent variables: a general measure of economic growth, expressed in terms of logarithmic growth rate of real GDP, a measure of TFP growth and a measure of capital accumulation. In the sensitivity analysis of Section V, we implement one alternative measure of TFP growth and one for capital accumulation, both derived in a procedure described below.

In particular, as a main measure of TFP, we implement the time series from AMECO annual macro-economic database, available for all 26 countries. However, for the most of Eastern European countries there are missing data between 1990 and 1994, so that for many of them the two first observations in the transformed panel are not available. Nevertheless, whenever there were some observations available between 1990 and 1994, we use them to calculate the corresponding averages. From the time series of TFP in levels, we obtain its logarithmic annual growth rates.

The main measure of capital accumulation is derived as a logarithmic growth rate of capital stock. The time series of capital stock are obtained from AMECO annual macro-economic database and express net capital stock at constant prices. This indicator is calculated according to the following formula:

$$K_{it} = K_{it-1} + KF_{it} - \frac{CK_{it}}{def_{it}} 100, \quad (1)$$

where  $K_{it}$  is the capital stock in country  $i$  at time  $t$ ,  $KF_{it}$  expresses gross fixed capital formation at constant prices,  $CK_{it}$  corresponds to consumption of fixed capital at current prices and  $def_{it}$  is the price deflator of gross fixed capital formation.

In a great part of the past contributions in this field of research, authors based their estimation on a measure of TFP obtained in a procedure applying the perpetual inventory method.<sup>9</sup> As a robustness check and following the common practice of these past studies, we calculate a comparable measure of TFP - and of capital accumulation - that we use as alternatives in the robustness check.

First, we use the standard perpetual inventory method to construct the capital stock time series (Hall and Jones 1999; Bonfiglioli 2008; Kose et al. 2009a; Levchenko et al. 2009). Accordingly, the stock of capital each year  $t$  in country  $i$  is given by

$$K_{it} = (1 - \delta) K_{it-1} + I_{it}, \quad (2)$$

where  $I_{it}$  measures investment and  $\delta$  is a depreciation rate assumed constant and equal to 0.06. Moreover, the initial level of capital is computed as

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observations in our database, in the main analysis, we apply 3-year averages. Nevertheless, in a separate exercise not reported here, we transform the sample including also 2008 and 2009 into 5-year non-overlapping averages and run the analogous specifications as in Section IV. The results obtained confirm the evidence, though weaker, found in the procedure described in the next section. The weaker evidence might be due to the fact that by transforming the data into 5-year averages, the number of observations available shrinks by about 1/3, which is significant in an already limited sample.

<sup>9</sup> See, for instance, Bonfiglioli (2008), Kose et al. (2009a).

$$K_{i0} = I_{i0} g + \delta, \quad (3)$$

where  $g$  is a geometric average of the growth rate of investment over the whole observed period, 1990-2007, and  $I_{i0}$  is investment made at time  $t=0$  that in our case is 1990. We use the time series of capital stock obtained from equation (2) in order to obtain our alternative measure of capital accumulation for the analysis of Section 6, calculated as logarithmic growth rates of capital stock.

Moreover, we implement the same data on capital stock, calculated according to equation (2), in addition to the data on total national output and labor force and, following Jorgenson and Stiroh (2000), we obtain a measure of TFP. In logarithmic terms, TFP at time  $t$  is equal to

$$\ln TFP_{it} = \ln Y_{it} - (1-\alpha) \ln L_{it} - \alpha \ln K_{it}, \quad (4)$$

where  $Y_{it}$  is total output,  $L_{it}$  labor force and the parameter  $\alpha$  is the share of capital in total national income. In this kind of analysis, authors were usually assuming a constant  $\alpha = \frac{1}{3}$ .<sup>10</sup> This measure of TFP we use in our robustness check.

The data on  $Y$ ,  $L$  and  $I$  come from the Penn World Tables 7.0. In particular,  $Y$  has been obtained as a product between the time series of real GDP per capita (*rdgpch*) and population (*pop*),  $L$  expresses the total number of workers and has been calculated as a ratio between real GDP ( $Y$ ) and real GDP per worker (*rdgpwok*). Finally, the time series of investment has been obtained as a ratio between investment share of real GDP (*ki*) and real GDP ( $Y$ ).

Considering manifold aspect of the ongoing process of financial globalization and trying to capture differences in the influence coming from formal-political (*de jure*) and actual (*de facto*) financial liberalization, we employ two distinct measures. We use Chinn and Ito (2008) *de jure* indicator, obtained in an estimation procedure, based on a principal components model. The authors use the data from the IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).<sup>11</sup> In the construction of the index, information is used on the presence (or absence) of multiple exchange rates, on restrictions on current account and capital account transactions and on the requirement of the surrender of export proceeds. This index covers all the countries and years included in our sample. As a measure of *de facto* financial integration, we implement the ratio of stock of total liabilities to GDP. To calculate this indicator, we retrieve the data from IMF International Investment Position included in the Balance of Payments Statistics. As Kose et al. (2009a) argue, this measure of *de facto* financial liberalization is the most reliable expression of financial inflows potentially

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<sup>10</sup> See, for instance, Kose et al. (2009a).

<sup>11</sup> Detailed information on the construction method of the index has been described in Chinn and Ito (2008). There exist numerous measures of financial liberalization. For a comprehensive discussion, see Kose et al. (2009b). In particular, there are different *de jure* measures of financial integration (for example, Quinn index of capital account liberalization), but they cover only limitedly the time span and/or countries applied in my analysis. Analogously, Lane and Milesi-Ferretti (2007) develop a broadly used measure of *de facto* financial liberalization that, however, ends in 2004 and thus doesn't cover several years in my observation sample.

generating positive technological spillovers on the receiving economy. Moreover, stock measures as opposed to flow indicators are preferable, mainly due to the higher degree of stability over time and lower risk of measurement error (Prasad et al. 2003; Kose et al. 2006; Masten et al. 2008).

The distinction between *de jure* and *de facto* measures of financial integration has become a common practice in the most recent contributions in this field of research. Nevertheless, as pointed out by Kose et al. (2006) and Kose et al. (2009b), the distinction between *de jure* and *de facto* measures of financial openness is by no means a trivial one, with potentially important consequences on the estimation procedures and on the way of interpretation of results. Indeed, both measures cover different and often diverging aspects of the financial globalization process. Whereas *de jure* indicators consider the presence (or absence) of legal restrictions on capital transactions, on the contrary, *de facto* measures quantify flows or stocks of foreign assets and/or liabilities. Consequently, not necessarily a formally opened economy will be also practically so and vice versa.

What we are interested in are the effects on economic dynamics coming from capital movements actually happening. For that reason, it would be preferable to consider principally – if not exclusively – *de facto* measures of financial integration. However, all those measures might be highly imperfect. This is the case both of price-based measures (for instance, price differentials on asset markets) and of measures based on quantities (like flows or stocks of foreign assets and liabilities). One of the drawbacks connected with *de facto* measures is that the choice in favor of one of them leaves the information contained in all the others *de facto* measures aside. Thus, whatever measure of actual financial integration is chosen, it risks containing incomplete and thus distorting information on the process. On the other hand, the *de jure* indicators, even though in a majority of cases they are based on summary information revealed in the IMF's AREAER reports, should in principle contain more complete information on the formal – and potentially also on actual – financial liberalization than *de facto* measures do. Consequently, especially in the case of more developed economies, to the extent to which *de jure* financial openness leads also to *de facto* liberalization episodes, the former could be to a certain degree treated as a proxy for the latter. This last statement could be still less valid for emerging countries, as most of the examples of divergence between formal and actual financial integration refer to economies still involved in a dynamic process of integration into global markets.

Given the focus of the present contribution laying in investigating effects coming from the process of European economic and monetary integration, we add two dummy variables - one for the EU membership and one for the euro adoption - both interacted with the respective *de jure* and *de facto* indicators of financial openness in the way to measure the simultaneous effects of the general process of financial integration driven by the respective institutional arrangements. The expectation is that, thanks to political efforts made in liberalizing capital account transactions in Europe, the operating of positive effects of financial globalization could be strengthened. Finally, considering the intrinsic heterogeneity between the EU member states, we include further dummy variables corresponding to three country groups: East, PIIGS and the core EU, with countries belonging to each

group as explained before. Analogously as in the case of the EU and euro variables, we interact these three dummies with the respective *de jure* and *de facto* measures of financial liberalization in order to measure the impact of financial integration deriving from the fact of belonging to one of the three country groups. In particular, given a dynamic development in terms of productivity growth as well as general economic growth accompanied by a fast and growing financial involvement observed on average in countries of Eastern Europe, it is to expect a positive impact on their economies coming from financial integration. But also the other groups, PIIGS and the core EU, could be expected to have experienced positive, though minor, influence from the process of financial globalization.

Among control variables, we include trade openness defined as a ratio of aggregate trade flows (the sum of imports and exports of goods and services) to GDP taken from Penn World Tables 7.0 (variable *openk*). We control also for financial depth, using the ratio of private sector credit to GDP coming from the World Bank. Given that financial integration may contribute to a faster technological development of the financial sector, the inclusion of this variable permits to separate the direct effect of financial liberalization from the effect mediated by financial depth.<sup>12</sup> The aforementioned measure of financial depth has been argued to express better the effects of financial development than it is the case of alternative measures, like for instance measures of monetary aggregates such as M1, M2, or M3 (De Gregorio and Guidotti 1995; Calderón and Liu 2003). Most importantly, it has the merit of concentrating exclusively on credits received by the private sector from financial intermediaries, excluding thus credits issued to the public sector and also credits stemming from the central banks. Following Bonfiglioli (2008), we consider government expenditure over GDP to detect the possible crowding-out effect on investment (*kg* from Penn World Tables 7.0). However, we include this control variable in all the remaining regressions as well: in the regressions for TFP, as the government spending may indirectly produce some negative impact on productivity growth as well, and in the growth regression, as excessive public spending may negatively influence economic development. More precisely, independently of the fact, whether public expenditures provoke shrinking private investment or not, unsustainably and inefficiently used public expenditures, for instance to finance excessive consumption, may produce negative results in terms of long-term economic growth. Nevertheless, government spending might be used also in a productive way, contributing to a positive evolution in investment, TFP growth and, consequently, implying positive overall economic development.

#### 4. Regression analysis

The forthcoming analysis investigates the influence of international financial integration on economic growth and on its most important sources, TFP growth and investment, in the European context between 1990 and 2007. We do not include observations for 2008 and 2009, aiming at

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<sup>12</sup> Trade openness and financial depth are the standard controls in this kind of empirical analysis (see, Bonfiglioli [2008] and Kose et al. [2009a]).

eliminating the influence from the turmoil of the current economic and financial crises, observable already in the descriptive part of Section 2.<sup>13</sup>

The research hypothesis is based on the influence on economic development coming from financial integration. Putting such a relationship in a static regression framework suffers from an important drawback referring principally to endogeneity issues. Indeed, in principal, one can imagine a reverse causality going from, for example, TFP growth or positive capital accumulation to intensified financial transactions. Moreover, individual country effects are necessarily correlated with lagged dependent variables with the consequence that OLS as well as other static panel techniques are inconsistent (Baltagi, 2001).

To cope with the aforementioned problems, we apply the difference GMM model suggested by Arellano and Bond (1991). Their methodology is to take the difference of the equation in levels and in that way get rid of country specific and time-invariant effects that could be correlated with the present and past verifications of the explanatory variables. This results in the following dynamic expression:

$$\Delta g_{iD} = \beta_1 + \gamma - 1 g_{i,D-1} + \beta_2' \Delta Z_{iD} + \beta_3' \Delta F_{iD} + \Delta \eta_D + \Delta \varepsilon_{iD}, \quad (5)$$

where variables with  $\Delta$  operator express the first differences,  $D$  is the time index of the 3-year averages,  $g_{iD}$  refers to one of the three dependent variables (real GDP growth, TFP growth or capital accumulation) and  $g_{i,D-1}$  is the one period lag of  $g_{iD}$ . The vector  $Z_{iD}$  contains the control variables and  $F_{iD}$  is the vector of indicators measuring financial integration. In each equation, a constant is included. Finally,  $\eta_D$  are unobservable time specific effects, while  $\varepsilon_{iD}$  is the error term. There are no country specific effects, given that they have been eliminated by first-differencing the equation in levels. We consider the Sargan test of over-identifying restrictions and Arellano-Bond test of second order serial correlation of residuals to check the overall validity of the model.

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<sup>13</sup>In a separate empirical analysis, we consider a full time span where the last observation is given by the average over 2008 and 2009. The results, that for the reason of space we don't report here, confirm the positive linkage between financial integration and all three dependent variables. Also the strong positive effect on East and PIIGS could be observed both for general economic growth and for TFP growth. The major differences in the results regarded the influence of the euro: in addition to the positive effect of the EU membership, the membership in the Eurozone interacted with *de jure* financial integration had some relevant positive influence on growth in general and also on capital accumulation. This result might be driven by two factors. First, it could be catalyzed by the euro adoption in the first new EU member states (Cyprus, Malta, Slovenia). Second, despite the crisis, formal financial integration didn't decrease, and by adding to positive, yet still insignificant, evidence from the sample 1990-2007, it could arrive in 2008 and 2009 at the critical mass of significance. Given, however, that the crisis is still on course, it is difficult at present to offer some conclusive interpretation about its influence on economic performance channeled through financial integration. This is the main reason why we decided to consider the restricted time span.

The results from this dynamic panel estimation are reported in Tables 1, 2 and 3. The variables are described in Table A1 of the Appendix.

**Table 1** Financial Integration and GDP Growth in the EU: Dynamic GMM Panel Regressions.

| Dependent variable: $y$ |                     |                     |                     |                    |                     |                     |
|-------------------------|---------------------|---------------------|---------------------|--------------------|---------------------|---------------------|
|                         | (1)                 | (2)                 | (3)                 | (4)                | (5)                 | (6)                 |
| $y_{itD-1}$             | -0.128<br>(0.051)   | 0.021<br>(0.057)    | 0.003<br>(0.048)    | -0.103<br>(0.062)  | -0.073**<br>(0.027) | -0.067<br>(0.052)   |
| <i>Openness</i>         | 0.062***<br>(0.015) | 0.017<br>(0.017)    | 0.066***<br>(0.008) | 0.027*<br>(0.014)  | 0.053***<br>(0.014) | 0.048**<br>(0.018)  |
| <i>Expendit</i>         | -0.004<br>(0.027)   | -0.071**<br>(0.026) | 0.035<br>(0.023)    | -0.076*<br>(0.030) | -0.048<br>(0.026)   | 0.009<br>(0.038)    |
| <i>Fin. depth</i>       | -0.002<br>(0.006)   | -0.002<br>(0.003)   | -0.015**<br>(0.004) | -0.005<br>(0.004)  | -0.007<br>(0.005)   | -0.004<br>(0.005)   |
| <i>Ch-I (de jure)</i>   | 0.058***<br>(0.015) | 0.122***<br>(0.020) |                     |                    |                     |                     |
| <i>IMF (de facto)</i>   |                     | 0.008<br>(0.007)    |                     |                    |                     |                     |
| <i>Ch-I*IMF</i>         |                     | -0.040**<br>(0.012) |                     |                    |                     |                     |
| <i>Euro*Ch-I</i>        |                     |                     | 0.022<br>(0.016)    |                    |                     |                     |
| <i>EU*Ch-I</i>          |                     |                     | 0.119***<br>(0.024) |                    |                     |                     |
| <i>Euro*IMF</i>         |                     |                     |                     | -0.001<br>(0.002)  |                     |                     |
| <i>EU*IMF</i>           |                     |                     |                     | 0.008<br>(0.003)   |                     |                     |
| <i>East*Ch-I</i>        |                     |                     |                     |                    | 0.032**<br>(0.011)  |                     |
| <i>PIIGS*Ch-I</i>       |                     |                     |                     |                    | 0.176**<br>(0.059)  |                     |
| <i>Core*Ch-I</i>        |                     |                     |                     |                    | 0.061<br>(0.127)    |                     |
| <i>East*IMF</i>         |                     |                     |                     |                    |                     | 0.084***<br>(0.022) |
| <i>PIIGS*IMF</i>        |                     |                     |                     |                    |                     | 0.012<br>(0.003)    |
| <i>Core*IMF</i>         |                     |                     |                     |                    |                     | 0.006<br>(0.007)    |
| <i>Sargan (p-value)</i> | 0.146               | 0.313               | 0.094               | 0.271              | 0.251               | 0.248               |
| <i>A-B m2 (p-value)</i> | 0.149               | 0.169               | 0.415               | 0.070              | 0.123               | 0.181               |
| Obs                     | 98                  | 89                  | 98                  | 91                 | 99                  | 96                  |

Note: The dependent variable,  $y$ , is the average growth rate of real GDP over 3-year non-overlapping averages, 1990-1992, 1993-1995, 1996-1998, 1999-2001, 2002-2004, 2005-2007. Results refer to difference GMM Arellano-Bond estimation. Standard errors are reported in brackets. Time dummies are included in all regressions. The symbols \*\*\*, \*\* and \* indicate significance levels of 1, 5 and 10%, respectively. The p-values from the second step estimation of the Sargan test of over-identifying restrictions and of the Arellano-Bond test for autocovariance in residuals of order 2 are included.

Generally, the results suggest the occurrence of positive growth effects mediated by the process of financial globalization, with an important, as possibly long-lasting, influence played by the productivity growth. As it is clear from the first and the second column in Table 1, 2 and 3, financial liberalization – but only when measured in terms of *de jure* indicator - contributed to positive economic growth, channeled both through increasing investment and through TFP growth. This is a



rather general result that, on the one side, documents the active involvement of the European economy in the ongoing process of financial globalization and, on the other side, confirms the evidence from the past studies of a more significant role played by formal, as opposed to actual, aspects of the process (Bonfiglioli 2008; Kose et al. 2009a). In this respect, it seems important to note that, even though we do not report any factual influence from financial liberalization, we cannot exclude that such an effect occurred in practice. This is mainly due to the fact of incompleteness of *de facto* measures discussed in Section 3.

**Table 2** Financial Integration and TFP Growth in the EU: Dynamic GMM Panel Regressions.

| Dependent variable: $d(TFP)$ |                     |                    |                      |                    |                      |                    |
|------------------------------|---------------------|--------------------|----------------------|--------------------|----------------------|--------------------|
|                              | (1)                 | (2)                | (3)                  | (4)                | (5)                  | (6)                |
| $d(TFP)_{it-1}$              | -0.158**<br>(0.048) | -0.029<br>(0.030)  | -0.131***<br>(0.037) | -0.075*<br>(0.036) | -0.106***<br>(0.024) | -0.057*<br>(0.026) |
| <i>Openness</i>              | 0.070**<br>(0.021)  | 0.034**<br>(0.026) | 0.069***<br>(0.015)  | 0.047*<br>(0.022)  | 0.058**<br>(0.021)   | 0.070**<br>(0.021) |
| <i>Expendit</i>              | 0.040<br>(0.022)    | 0.004<br>(0.015)   | 0.059**<br>(0.021)   | -0.005<br>(0.021)  | 0.030<br>(0.020)     | 0.057*<br>(0.027)  |
| <i>Fin. depth</i>            | -0.009<br>(0.005)   | -0.007*<br>(0.003) | -0.008<br>(0.006)    | 0.005<br>(0.007)   | -0.011<br>(0.006)    | -0.008<br>(0.006)  |
| <i>Ch-I (de jure)</i>        | 0.043***<br>(0.012) | 0.106**<br>(0.037) |                      |                    |                      |                    |
| <i>IMF (de facto)</i>        |                     | 0.005<br>(0.010)   |                      |                    |                      |                    |
| <i>Ch-I*IMF</i>              |                     | -0.061*<br>(0.028) |                      |                    |                      |                    |
| <i>Euro*Ch-I</i>             |                     |                    | -0.001<br>(0.020)    |                    |                      |                    |
| <i>EU*Ch-I</i>               |                     |                    | 0.101***<br>(0.018)  |                    |                      |                    |
| <i>Euro*IMF</i>              |                     |                    |                      | -0.001<br>(0.002)  |                      |                    |
| <i>EU*IMF</i>                |                     |                    |                      | 0.003<br>(0.002)   |                      |                    |
| <i>East*Ch-I</i>             |                     |                    |                      |                    | 0.038*<br>(0.015)    |                    |
| <i>PIIGS*Ch-I</i>            |                     |                    |                      |                    | 0.108**<br>(0.030)   |                    |
| <i>Core*Ch-I</i>             |                     |                    |                      |                    | 0.064<br>(0.183)     |                    |
| <i>East*IMF</i>              |                     |                    |                      |                    |                      | 0.029<br>(0.021)   |
| <i>PIIGS*IMF</i>             |                     |                    |                      |                    |                      | 0.004<br>(0.008)   |
| <i>Core*IMF</i>              |                     |                    |                      |                    |                      | 0.001<br>(0.008)   |
| <i>Sargan (p-value)</i>      | 0.168               | 0.245              | 0.151                | 0.221              | 0.198                | 0.339              |
| <i>A-B m2 (p-value)</i>      | 0.248               | 0.306              | 0.384                | 0.323              | 0.260                | 0.596              |
| Obs                          | 98                  | 89                 | 98                   | 92                 | 100                  | 97                 |

Note: The dependent variable,  $d(TFP)$ , is the average growth rate of TFP over 3-year non-overlapping averages, 1990-1992, 1993-1995, 1996-1998, 1999-2001, 2002-2004, 2005-2007. Results refer to difference GMM Arellano-Bond estimation. Standard errors are reported in brackets. Time dummies are included in all regressions. The symbols \*\*\*, \*\* and \* indicate significance levels of 1, 5 and 10%, respectively. The p-values from the second step estimation of the Sargan test of over-identifying restrictions and of the Arellano-Bond test for autocovariance in residuals of order 2 are included.

**Table 3** Financial Integration and investment in the EU: Dynamic GMM Panel Regressions.

| Dependent variable: $k$ |                     |                     |                    |                     |                     |                     |
|-------------------------|---------------------|---------------------|--------------------|---------------------|---------------------|---------------------|
|                         | (1)                 | (2)                 | (3)                | (4)                 | (5)                 | (6)                 |
| $k_{iD-1}$              | 0.278<br>(0.147)    | 0.214<br>(0.195)    | 0.465*<br>(0.273)  | 0.745***<br>(0.141) | 0.567***<br>(0.158) | 0.602**<br>(0.203)  |
| <i>Openness</i>         | 0.011<br>(0.012)    | -0.013<br>(0.012)   | 0.002<br>(0.021)   | 0.006<br>(0.017)    | 0.002<br>(0.010)    | 0.007<br>(0.008)    |
| <i>Expendit</i>         | -0.005<br>(0.015)   | -0.062**<br>(0.020) | -0.043*<br>(0.021) | 0.022<br>(0.016)    | -0.003<br>(0.015)   | 0.006<br>(0.015)    |
| <i>Fin. depth</i>       | 0.001<br>(0.004)    | -0.003<br>(0.004)   | -0.003<br>(0.004)  | -0.011<br>(0.005)   | -0.004<br>(0.006)   | -0.004<br>(0.004)   |
| <i>Ch-I (de jure)</i>   | 0.086***<br>(0.009) | 0.088***<br>(0.025) |                    |                     |                     |                     |
| <i>IMF (de facto)</i>   |                     | 0.010<br>(0.008)    |                    |                     |                     |                     |
| <i>Ch-I*IMF</i>         |                     | -0.013<br>(0.018)   |                    |                     |                     |                     |
| <i>Euro*Ch-I</i>        |                     |                     | 0.001<br>(0.002)   |                     |                     |                     |
| <i>EU*Ch-I</i>          |                     |                     | 0.003<br>(0.004)   |                     |                     |                     |
| <i>Euro*IMF</i>         |                     |                     |                    | 0.015<br>(0.011)    |                     |                     |
| <i>EU*IMF</i>           |                     |                     |                    | 0.029<br>(0.021)    |                     |                     |
| <i>East*Ch-I</i>        |                     |                     |                    |                     | 0.047*<br>(0.023)   |                     |
| <i>PIIGS*Ch-I</i>       |                     |                     |                    |                     | 0.113*<br>(0.056)   |                     |
| <i>Core*Ch-I</i>        |                     |                     |                    |                     | 0.029<br>(0.049)    |                     |
| <i>East*IMF</i>         |                     |                     |                    |                     |                     | 0.061***<br>(0.008) |
| <i>PIIGS*IMF</i>        |                     |                     |                    |                     |                     | 0.004<br>(0.005)    |
| <i>Core*IMF</i>         |                     |                     |                    |                     |                     | 0.011<br>(0.007)    |
| <i>Sargan (p-value)</i> | 0.303               | 0.065               | 0.050              | 0.120               | 0.104               | 0.076               |
| <i>A-B m2 (p-value)</i> | 0.758               | 0.347               | 0.944              | 0.766               | 0.846               | 0.771               |
| Obs                     | 98                  | 89                  | 98                 | 92                  | 100                 | 97                  |

Note: The dependent variable,  $k$ , is the average growth rate of capital stock over 3-year non-overlapping averages, 1990-1992, 1993-1995, 1996-1998, 1999-2001, 2002-2004, 2005-2007. Results refer to difference GMM Arellano-Bond estimation. Standard errors are reported in brackets. Time dummies are included in all regressions. The symbols \*\*\*, \*\* and \* indicate significance levels of 1, 5 and 10%, respectively. The p-values from the second step estimation of the Sargan test of over-identifying restrictions and of the Arellano-Bond test for autocovariance in residuals of order 2 are included.

Considering a particular institutional design adopted in Europe, it is interesting to observe that, in terms of financial globalization, the years of economic integration in Europe played a role in generating a positive influence on economic growth in general and on TFP growth in particular. Indeed, in column 3 of Table 1 and 2, the coefficients corresponding to the interaction terms between the EU dummy and *de jure* indicator of financial integration resulted to be significantly positive. This confirms that the efforts put to complete the common European market through formal measures liberalizing transactions of financial capital produced a desired effects in terms of growth, and most importantly, in terms of productivity growth. On the contrary, there is no evidence in this context of a

positive impact coming from actual process of progressive financial openness. Interestingly, the analogous coefficients measuring the contribution of the euro adoption remained insignificant, suggesting that the introduction of the common currency didn't operate as catalyst to the process of financial globalization in Europe. This last result could come as a major surprise, as in the extensive political and economic discussion anticipating the introduction of the common European currency, the benefits from more intensified financial integration have been indicated among the major positive outcomes of the European monetary integration. The lack of any "additional" impact coming from the euro could be explained with the fact that, although since 1999 the exchange rate risk is absent, different national-level regulations and institutions persisted from the past and went on contributing to at least *de jure* financial market segmentation (Guiso et al. 2004). This would provide an explanation why the formal process of financial liberalization under the euro adoption remained insignificant. Regarding, instead, the missing positive effect from the creation of the euro area when accounting for the actual process of financial globalization, this confirms the stylized fact from Section 2, namely, that a more intensified increase in the stock of financial assets and liabilities started after 2001, thus with a lag with respect to the introduction of the common currency. A final attempt to explain the lacking influence coming from the euro adoption regards the fact that, in the present contribution, we concentrate not on any kind of effects, yet on benefits in terms of economic growth. This implies that effects of the introduction of the euro measured in terms of more convenient refinancing conditions for some member states that before the common currency were charged with relatively high interest rates are disregarded here. This effect could clearly be translated in further positive influence on economic development. But it also created conditions that potentially contributed to excessive consumption, with a rather detrimental effect on growth.

The results of the estimations exploiting the heterogeneity of the country groups inside the EU (columns 5 and 6) communicate an important outcome as well, namely, that the process of international financial integration produced positive direct and indirect growth effects in all three country groups considered but to a different extent and in a slightly different manner. In particular, Eastern European countries documented a significant influence coming from formally driven financial liberalization in the case of all three dependent variables. Additionally, there has been some positive effect from *de facto* financial integration on general economic growth and on investment. Those results are in line with the expectations over the general effects deriving from their EU accession. In particular, they confirm a positive and significant impact coming both through the adoption of the EU standards regarding specifically capital flows and through factual financial market liberalization that accompanied their way from highly closed post-communist economies towards the EU membership. Concerning PIIGS, they have been also positively influenced by formal measures of financial integration. Instead, the impact of financial liberalization on the core EU was basically absent. This last outcome might be driven by the fact that those countries, contrary to Eastern European and to a certain extent to PIIGS, since a longer time are characterized by a high degree of integration into

European as well as global financial markets, with the consequence of no significantly measureable effects on their economic development. Indeed, at least *de jure* indicators of financial integration achieved the maximum scores for all those countries at least since the introduction of the euro but in many cases also before, meaning that there would be no room for increasing the formal side of financial openness. Remaining those indicators at the same level since many years, there is no positive effect of a more financial integration on economic growth.

Among the control variables, trade openness confirmed the expectation of a positive influence on general economic growth (Tab. 1) as well as on its indirect source, i.e. TFP growth (Tab. 2). On the contrary, trade openness resulted to be insignificant on capital accumulation. Regarding the influence of the government expenditure, there is some, even if weak, evidence of a negative influence on economic growth and of the crowding-out effect on investment. Finally, no particular conclusion can be drawn on the influence coming from financial development. Indeed, the coefficients expressing financial depth in the majority of specifications were insignificant.

## 5. Robustness

In many past studies, authors were applying perpetual inventory method to arrive at the time series of capital stock, necessary to derive some measure of TFP.<sup>14</sup> This method, extensively used in the context of growth models, is based on rather strong assumptions regarding parameters. In particular, the depreciation rate of capital stock is usually assumed constant and conventionally equal to 0.06. Such an assumption may be stringent, especially when considering a longer time span and technical conditions varying between countries and industries. Moreover, when calculating levels of TFP over time, it is a common practice to assume a constant share of capital over output,  $\alpha=1/3$ .<sup>15</sup>

Given that in our case the time series of capital stock and of TFP are directly available from AMECO, we adopted them as the primary data sources in the estimation analysis described in the previous section. However, as a robustness check, we calculate the data on capital stock and on TFP, according to the method described in Section 3. In particular, we use as dependent variables in equation (5) one alternative measure of TFP growth, as well as an alternative measure of capital accumulation, derived with the standard perpetual inventory method.

Tables 4 and 5 present the results from the estimations applying, as before, difference GMM method.

In general, the results obtained using the alternative measure of TFP growth document some relevant differences with respect to the results from the main estimation exercise, although some outcomes were confirmed. In particular, the positive and significant impact of the EU in the general

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<sup>14</sup> One example of a recent application of the method is the study by Bekaert et al. (2011).

<sup>15</sup> This is another assumption that can be problematic for the same reasons as mentioned before regarding the depreciation rate, mainly that the actual share of capital in output may vary over time, or depending on technological characteristics of a country or of an industry.

process of financial globalization has been confirmed, with the difference that now also actual process of financial integration played a role. Again, no influence could be observed from the euro adoption. Regarding the effects on the three country groups, there is evidence of a beneficial outcome on PIIGS coming from *de jure* financial liberalization, while *de facto* indicator was significant in the case of East and the core EU.

**Table 4** Sensitivity analysis on the measure of TFP growth

| Dependent variable: $d(\text{TFP})$ obtained from the perpetual inventory method |                     |                    |                     |                      |                    |                      |
|--|---------------------|--------------------|---------------------|----------------------|--------------------|----------------------|
|  | (1)                 | (2)                | (3)                 | (4)                  | (5)                | (6)                  |
| $d(\text{TFP})_{it-1}$   | -0.035<br>(0.039)   | 0.027<br>(0.038)   | -0.036<br>(0.035)   | -0.041<br>(0.031)    | -0.086*<br>(0.033) | 0.028<br>(0.022)     |
| <i>Openness</i>  | 0.008*<br>(0.004)   | 0.007<br>(0.004)   | 0.008**<br>(0.004)  | 0.010***<br>(0.003)  | 0.010*<br>(0.004)  | 0.009**<br>(0.003)   |
| <i>Expendit</i>  | 0.006<br>(0.004)    | -0.0007<br>(0.003) | 0.009*<br>(0.004)   | 0.003<br>(0.003)     | 0.007<br>(0.004)   | 0.012***<br>(0.003)  |
| <i>Fin. depth</i>  | -0.0004<br>(0.0007) | -0.0003<br>(0.001) | -0.0004<br>(0.0008) | -0.0004<br>(0.001)   | 0.0008<br>(0.0006) | 0.0002<br>(0.0008)   |
| <i>Ch-I (de jure)</i>  | 0.006**<br>(0.002)  | 0.009<br>(0.007)   |                     |                      |                    |                      |
| <i>IMF (de facto)</i>  |                     | 0.003<br>(0.002)   |                     |                      |                    |                      |
| <i>Ch-I*IMF</i>  |                     | -0.005<br>(0.005)  |                     |                      |                    |                      |
| <i>Euro*Ch-I</i>   |                     |                    | 0.002<br>(0.002)    |                      |                    |                      |
| <i>EU*Ch-I</i>   |                     |                    | 0.015**<br>(0.004)  |                      |                    |                      |
| <i>Euro*IMF</i>  |                     |                    |                     | 0.0002<br>(0.0003)   |                    |                      |
| <i>EU*IMF</i>  |                     |                    |                     | 0.002***<br>(0.0005) |                    |                      |
| <i>East*Ch-I</i>   |                     |                    |                     |                      | 0.002<br>(0.003)   |                      |
| <i>PIIGS*Ch-I</i>  |                     |                    |                     |                      | 0.017**<br>(0.006) |                      |
| <i>Core*Ch-I</i>   |                     |                    |                     |                      | -0.020<br>(0.026)  |                      |
| <i>East*IMF</i>  |                     |                    |                     |                      |                    | 0.008***<br>(0.001)  |
| <i>PIIGS*IMF</i>   |                     |                    |                     |                      |                    | 0.001<br>(0.001)     |
| <i>Core*IMF</i>  |                     |                    |                     |                      |                    | 0.004***<br>(0.0008) |
| <i>Sargan (p-value)</i>  | 0.109               | 0.178              | 0.115               | 0.198                | 0.070              | 0.251                |
| <i>A-B m2 (p-value)</i>  | 0.068               | 0.198              | 0.079               | 0.462                | 0.117              | 0.445                |
| Obs  | 98                  | 89                 | 98                  | 92                   | 100                | 97                   |

Note: The dependent variable,  $d(\text{TFP})$ , is the average growth rate of TFP over 3-year non-overlapping averages, 1990-1992, 1993-1995, 1996-1998, 1999-2001, 2002-2004, 2005-2007. Results refer to difference GMM Arellano-Bond estimation. Standard errors are reported in brackets. Time dummies are included in all regressions. The symbols \*\*\*, \*\* and \* indicate significance levels of 1, 5 and 10%, respectively. The p-values from the second step estimation of the Sargan test of over-identifying restrictions and of the Arellano-Bond test for autocovariance in residuals of order 2 are included.

Turning to the alternative measure of capital accumulation, here not only *de jure* but also *de facto* measures of financial liberalization played a positive and significant role. There is some evidence

that the EU helped in generating benefits from the actual process of financial integration. Finally, capital accumulation grew thanks to more intensive financial transactions in all three country groups, and thus additionally some positive effect on the core EU in the course of actual process of financial liberalization could be observed.

**Table 5** Sensitivity analysis on capital accumulation

| Dependent variable: $k$ obtained with perpetual inventory method |                      |                        |                       |                       |                        |                       |
|--|----------------------|------------------------|-----------------------|-----------------------|------------------------|-----------------------|
|  | (1)                  | (2)                    | (3)                   | (4)                   | (5)                    | (6)                   |
| $k_{iD-1}$   | 0.444***<br>(0.091)  | 0.603***<br>(0.088)    | 0.398*<br>(0.162)     | 0.729***<br>(0.149)   | 0.555***<br>(0.094)    | 0.735***<br>(0.149)   |
| <i>Openness</i>  | 0.0005<br>(0.0004)   | 0.0002<br>(0.006)      | 0.0004<br>(0.0005)    | 0.0002<br>(0.0006)    | 0.0003<br>(0.0006)     | 0.0003<br>(0.0004)    |
| <i>Expendit</i>  | -0.001**<br>(0.0003) | -0.002**<br>(0.005)    | -0.002***<br>(0.0004) | -0.002*<br>(0.007)    | -0.002***<br>(0.0004)  | -0.001**<br>(0.0004)  |
| <i>Fin. depth</i>  | -0.0003*<br>(0.0001) | -0.0007***<br>(0.0001) | -0.0004**<br>(0.0002) | -0.0005**<br>(0.0001) | -0.0005***<br>(0.0001) | -0.0005*<br>(0.0001)  |
| <i>Ch-I (de jure)</i>  | 0.002**<br>(0.001)   | 0.003*<br>(0.001)      |                       |                       |                        |                       |
| <i>IMF (de facto)</i>  |                      | 0.001***<br>(0.0002)   |                       |                       |                        |                       |
| <i>Ch-I*IMF</i>  |                      | -0.001<br>(0.009)      |                       |                       |                        |                       |
| <i>Euro*Ch-I</i>   |                      |                        | -0.0007<br>(0.0003)   |                       |                        |                       |
| <i>EU*Ch-I</i>   |                      |                        | -0.0009<br>(0.0006)   |                       |                        |                       |
| <i>Euro*IMF</i>  |                      |                        |                       | -0.0001<br>(0.0001)   |                        |                       |
| <i>EU*IMF</i>  |                      |                        |                       | 0.0004**<br>(0.0001)  |                        |                       |
| <i>East*Ch-I</i>   |                      |                        |                       |                       | 0.0004<br>(0.0009)     |                       |
| <i>PIIGS*Ch-I</i>  |                      |                        |                       |                       | 0.004**<br>(0.002)     |                       |
| <i>Core*Ch-I</i>   |                      |                        |                       |                       | -0.0004<br>(0.002)     |                       |
| <i>East*IMF</i>  |                      |                        |                       |                       |                        | 0.001**<br>(0.0004)   |
| <i>PIIGS*IMF</i>   |                      |                        |                       |                       |                        | 0.0002<br>(0.0001)    |
| <i>Core*IMF</i>  |                      |                        |                       |                       |                        | 0.0007***<br>(0.0001) |
| <i>Sargan (p-value)</i>  | 0.023                | 0.067                  | 0.047                 | 0.098                 | 0.059                  | 0.058                 |
| <i>A-B m2 (p-value)</i>  | 0.657                | 0.914                  | 0.554                 | 0.587                 | 0.974                  | 0.719                 |
| Obs  | 98                   | 89                     | 98                    | 92                    | 100                    | 97                    |

Note: The dependent variable,  $k$ , is the average growth rate of capital stock over 3-year non-overlapping averages, 1990-1992, 1993-1995, 1996-1998, 1999-2001, 2002-2004, 2005-2007. Results refer to difference GMM Arellano-Bond estimation. Standard errors are reported in brackets. Time dummies are included in all regressions. The symbols \*\*\*, \*\* and \* indicate significance levels of 1, 5 and 10%, respectively. The p-values from the second step estimation of the Sargan test of over-identifying restrictions and of the Arellano-Bond test for autocovariance in residuals of order 2 are included.

## 6. Conclusions

In the past theoretical and empirical investigations authors were focusing on the effects of financial liberalization on different aspects of economic activity. There is a wide range of

contributions dedicated to the analysis of the impact of international financial integration on economic growth. Limited, but increasing attention has been offered to the question of the influence of financial integration on the crucial sources of growth, namely, productivity growth and investment.

A common characteristic of the great majority of those studies is that they consider long time spans in a global context, including extensive samples of both developing and industrialized countries. Although there has been some attention offered to the overall growth effect of financial integration on the EU, there has been no contribution concentrating on the process in a more detailed perspective, distinguishing between direct and indirect growth effects. Moreover, there has been no attempt to assess the contribution to the process of financial globalization coming from the financial liberalization efforts made under the EU and under the euro adoption, respectively.

The present contribution aims at filling this gap and asks the aforementioned question over the influence of financial integration on growth, productivity growth and investment in a specific context of the European integration. To the extent to which it is possible to explore the comparability of the outcomes of the present contribution with the past studies, the results that we obtained seem to confirm the past investigations, pointing to a significant and positive impact of financial liberalization on all the dependent variables. This positive impact could be observed especially when *de jure* (or formal) financial integration has been considered, with only marginal evidence coming from *de facto* indicator. These results are in line with the past contribution. However, when interpreting them some caution is needed. Most importantly, the respective measures of financial integration refer to essentially different aspects of the process. Moreover, whereas it would be in principle preferable to assess the impact coming from the liberalization episodes actually occurring, the fact of choosing only one *de facto* indicator and disregarding the others implies leaving apart important piece of information. The development of better, more complete measures of actual aspects of financial liberalization could constitute an important extension in the future investigation.

Turning to the central results of the present study, they concern the impact of financial globalization process operating through the specific institutional framework in Europe, as well as the impact that the process exercised on different country groups within the EU. As it comes to the latter, financial liberalization appeared to be beneficial – although to a different degree - in all three groups of countries. In particular, Eastern European countries experienced the clearest and the strongest positive impact on the direct and indirect growth channels. This result confirms a crucial role played already by the pre-accession policies extensively removing controls on capital flows (von Hagen and Siedschlag 2008). Moreover, the institutional anchor provided by the European Union contributed to the further elimination of disruptive risks from the newly accessing members and permitted to run persistent current account deficits that, however, thanks to the growth potential of those economies, were considered sustainable in the long-run. But also PIIGS were addressed with a significantly positive effect on their economic development, with the difference that here only formal aspects of the

process were relevant. Finally, for the core of the euro area no significantly positive effect could be found.

Regarding the effects of European integration, we controlled for a possible “additional” impact of financial integration coming from European economic (EU) and monetary integration (euro). As the results show, the process of economic integration taking place under the institutional framework of the European Union contributed significantly to positive growth effects generated by the ongoing process of international financial integration, whereas the euro adoption didn’t have any significant impact.

All the results here illustrated might change their dimension and even the direction under the impact of the current economic and financial crises. The expectation might be that through the financial difficulties created principally as a consequence of unsustainable sovereign debts, the positive growth effects would be no more evident. On the other hand, it is plausible to expect, that the reduction at least in financial activity, visible in shrinking capital flows, might go hand in hand with slowed-down growth, preserving the positive relationship between financial integration and economic performance. In this respect, the assessment of the precise effects under the crisis should motivate research effort in the future.



## Appendix

Table A1 Variables used in the estimations

|                        | Description   | Data source                        |
|------------------------|---|------------------------------------|
| Dependent variables:   |   |                                    |
| $y$                    | growth rate of real GDP   | Penn World Tables 7.0              |
| $d(\text{TFP})$        | growth rate of TFP  | AMECO                              |
| $k$                    | growth rate of capital stock  | Penn World Tables 7.0              |
| Independent variables: |   |                                    |
| <i>Openness</i>        | Trade openness  | Penn World Tables 7.0              |
| <i>Expendit</i>        | Government expenditure to GDP   | Penn World Tables 7.0              |
| <i>Fin. depth</i>      | Credit to private sector to GDP   | World Bank data                    |
| <i>Ch-I (de jure)</i>  | Chinn and Ito <i>de jure</i> indicator of financial liberalization                                    | Chinn and Ito (2009)               |
| <i>IMF (de facto)</i>  | <i>De facto</i> measure of financial liberalization: stock of liabilities to GDP                      | IMF Balance of Payments Statistics |
| <i>Ch-I*IMF</i>        | Interaction term between <i>de jure</i> and <i>de facto</i> measures of financial liberalization      |                                    |
| <i>Euro*Ch-I</i>       | Interaction term between <i>de jure</i> measure of financial liberalization and euro dummy            |                                    |
| <i>EU*Ch-I</i>         | Interaction term between <i>de jure</i> measure of financial liberalization and EU dummy              |                                    |
| <i>Euro*IMF</i>        | Interaction term between <i>de facto</i> measure of financial liberalization and euro dummy           |                                    |
| <i>EU*IMF</i>          | Interaction term between <i>de facto</i> measure of financial liberalization and EU dummy             |                                    |
| <i>East*Ch-I</i>       | Interaction term between <i>de jure</i> measure of financial liberalization and Eastern Europe dummy  |                                    |
| <i>PIIGS*Ch-I</i>      | Interaction term between <i>de jure</i> measure of financial liberalization and PIIGS dummy           |                                    |
| <i>Core*Ch-I</i>       | Interaction term between <i>de jure</i> measure of financial liberalization and core Europe dummy     |                                    |
| <i>East*IMF</i>        | Interaction term between <i>de facto</i> measure of financial liberalization and Eastern Europe dummy |                                    |
| <i>PIIGS*IMF</i>       | Interaction term between <i>de facto</i> measure of financial liberalization and PIIGS dummy          |                                    |
| <i>Core*IMF</i>        | Interaction term between <i>de facto</i> measure of financial liberalization and core Europe dummy    |                                    |

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