

**Uneven effects of financial liberalization:
Evidence from a dynamic panel investigation.**

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Abstract

The paper investigates the impact of the financial integration process on economic growth, and precisely, on its sources - investment and productivity. Based on a panel of sector-level (manufacturing and service) data from the EU KLEMS database, I estimate such effects in a dynamic panel setting. Moreover, I show that the effects of financial integration, although overall positive, are uneven and they differ between manufacturing and service sectors. The main results suggest that, manufacturing sectors could profit from the process of global financial integration more than services. Moreover, European monetary and economic integration did play a complementary role to the global financial liberalization.

Keywords: manufacturing and service sectors, financial liberalization, productivity growth

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Introduction

The speed and intensity of the financial integration process observed over the last few decades is an indisputable matter. Both *de facto* and *de jure* indicators, although measuring quite different aspects of the underlying process, suggest that financial liberalization played an important role in shaping economic development worldwide and, more precisely, in the EU (Fig. 1).

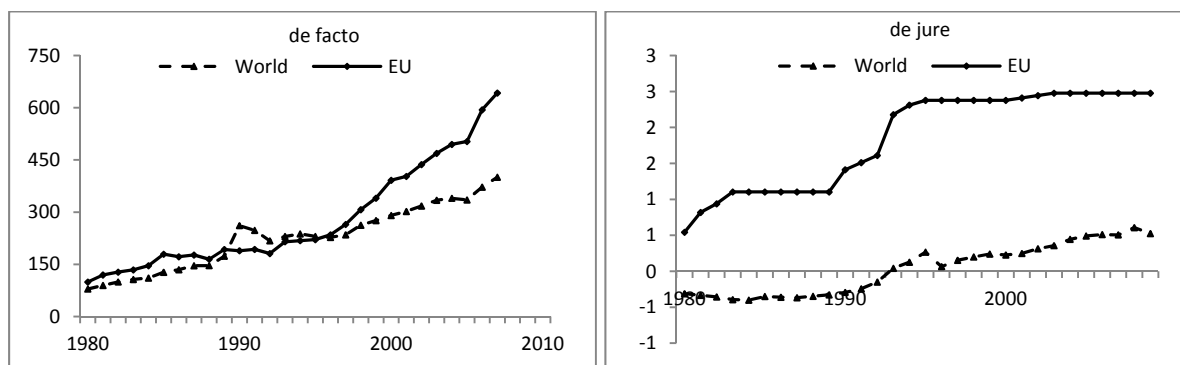


Figure 1 Dynamics of the financial integration process.

Note: *De facto* measures of financial integration (given by the sum of total assets and liabilities in percentage of GDP, based on updated data from Lane and Milesi-Feretti (2007)) on the left axis; *de jure* index of financial integration from an updated version of Chinn and Ito (2008) on the right axis. World refers to an average value for countries included in the database of the respective indexes. EU-8 comprises the eight EU members for which data in the revised version of EU KLEMS are available (Austria, Belgium, France, Germany, Italy, Netherlands, Spain, the UK).

At the same time, the manifold effects of financial integration, although intensively investigated in the past literature, are still unsure. Depending on the theoretical view that one coins, financial liberalization is deemed to have positive or negative effects on the growth process. In particular, the literature on liberalization and growth finds that financial liberalization on average stimulates growth. This is confirmed both when treating the growth process in general terms (Bekaert *et al.*, 2005) and when trying to disentangle the impact on its main sources, productivity and capital accumulation (Bonfiglioli, 2008; Gehringer, 2013). In contrast, the literature concerned more specifically with the economics of financial crises provides sound reasons to believe that financial globalization might be the main cause of increased frequency of crisis and of induced macroeconomic volatility (Demirguc-Kunt and Detragiache, 1998; Kaminsky and Reinhard, 1999; Stiglitz, 2000; Glick and Hutchinson, 2001). A third, quite recent, strand of the literature recognizes that such opposed views about financial integration do not need to exclude each other (Ranciere *et al.*, 2006).

All the aforementioned analyses took quite exclusively a global perspective, putting together a wide range of industrialized and developing economies. Moreover, macro data used in the empirical investigations were considered adequate to grasp an average effect of the phenomenon. Only a few studies recognized the need to make use of more disaggregated view: either by applying sector-level data (Levchenko, 2009; Becker *et al.*, 2011) or by more thoroughly investigating a particular group of

countries, like the EU being the case in Gehringer (2013). Yet there is still an unexploited part of the story. More precisely, given the intrinsic differences characterizing sectors within an economic system, it is reasonable to expect that the impact of financial globalization is sector-specific or at least varies between manufacturing and services. This recognition might be not a novelty, if one considers the already recalled studies using the sector-level data and possibly including time-invariant sectoral factors in the econometric specifications (Levchenko et al., 2009). The aim of doing that was to prevent that such sector-specific characteristics would enter the determination of the more general relationship between financial integration and economic growth. Though, such sector-specific characteristics make the impact of the financial globalization process uneven and there is the scope to investigate this in more detail. This constitutes the main motivation of the present investigation.

In disentangling the effects of financial integration, I analyse manufacturing and service sectors in separate settings. Moreover, I investigate the influence of financial globalization on the main aspects of the sectoral growth performance. In particular, I distinguish between two main sources of growth, investment and productivity (as measured by TFP). The resulting picture is a complex one, although some general conclusions can be drawn. In particular, the results confirm the positive influence of financial integration on productivity growth. Nevertheless, such a productivity-based positive economic growth was stronger for manufacturing than for services. This becomes even more evident, when distinguishing between alternative channels, through which *de facto* financial liberalization is taking place. Moreover, I investigate the complementarity between financial liberalization on the one hand and the euro adoption as well as trade openness on the other hand. Here, only mixed evidence, especially for services, could be found, making the effects of the process of financial integration rather uneven.

The paper is structured as follows. In the next section, I offer an overview of the relevant theoretical and empirical literature. Section 3 offers a short descriptive analysis of the sector-level economic performance. Section 4 is dedicated to the empirical investigation. This section is opened with an explanation of the empirical model and strategy undertaken. The data description and their short analysis follow. Finally, I close the section with the presentation and discussion the results. The last section concludes.

2. Financial integration and economic growth – macro versus meso perspective.

Capital account liberalization and growth has been a long discussed issue. The parallel observation of the dynamic financial openness and of the positive economic growth in the last decades encouraged the argumentations speaking in favour of a causal relationship going from increased capital mobility to economic progress.

This observation goes hand in hand with the recognition of the essential role played by (national and international) financial institutions in busting economic growth. In his path-breaking, micro-founded, contribution, Schumpeter (1911) emphasises the great role of bankers in financing

entrepreneurial ventures. The incorporation of the Schumpeter's hypothesis into a general equilibrium framework brought as the main conclusion that there would be a permanently positive influence of financial intermediation on productivity (King and Levine, 1993; Galetovic, 1996; Greenwood and Jovanovic, 1990). Although the original Schumpeterian argumentation more precisely describes the process of financial development rather than financial liberalization, the two phenomena seem to be linked to each other. Indeed, if financial integration brings about efficiency improvements in financial intermediation as it usually does, this would result in positive productivity dynamics. More precisely, such an enhancement in efficiency would result from an improved allocation of investment. In particular, with progressive financial integration, risk-sharing possibilities would be improved. As a consequence, higher and safer returns to individual project can be yielded. An efficiently made portfolio diversification may contribute to specialization and, finally, to productivity increase (Saint-Paul, 1992).

This chain of argumentation was particularly suggestive in the period of intensified industrialization process, experienced during the last century. Yet starting in the late 90s, a profound structural change associated to radical technological restructuring has been taking place especially in the advanced countries, with a deep re-organization of the economic systems towards the increasing importance of service sectors. Here the well-known distinction between growth and development is relevant. Both the structure and the technology of advanced economic systems have been changing in depth since the last decades of the XX century. The introduction of information and communication technologies and the rapid deindustrialization with the emergence of a new core of knowledge intensive business services have changed the organization of the economic activity of advanced economies. Indeed, little attention has been paid so far to explicitly consider service sectors and the impact that the progressive financial opening would have on them. The hypothesis that current technological change has a strong skill bias has important consequences for this analysis. The skill bias of new information and communication technologies (ICT) affects the traditional balance of factor intensities with the strong reduction of the fixed capital intensity. New knowledge intensive production activities based upon ICT are characterized by production processes that are at the same time capital-saving and blue-collar labor-saving. As a consequence, the demand for tangible capital of these activities is much lower and the expected benefits of better financial capital are also likely to be lower (Antonelli, 2013; Antonelli and Fassio, 2013).

Although both theoretical and empirical literature managed to incorporate these radical changes in some aspects of analysis¹, there still remain major loops that deserve attention (Rivera-Batiz and Rivera-Batiz, 1992). The only theoretically-based model to disentangle the impact of foreign direct investment flows in service and manufacturing sectors is due to Rivera-Batiz and Rivera-Batiz (1992). They show that FDI flows into services might generate positive *welfare* effects that an analogous investment in manufacturing may lack. After their contribution, no effort has been done to quantify the

¹ For a comprehensive literature review on trade and policy issues in services, see Francois and Hoekman (2010).

growth effects of FDI distinguishing between manufacturing and services. Such undermining of services comes as a surprise given their active involvement in the re-organization of the international division of labour.

This discussion might provide a crucial indication to understand why the net effect of financial liberalization on growth remains still a matter of concerns. Indeed, the empirical evidence on the matter is still inconclusive. On the one extreme, there are numerous contributions using both macro and micro data that confirm the direct and indirect growth-enhancing impact of financial globalization (Quinn and Toyoda, 2008; Bonfiglioli, 2008; Bekaert *et al.*, 2005 and 2011; Gehringer, 2013). On the other extreme, following the influential analysis by Rodrik (1998), authors were focusing on the financial instability effect and an increased probability of crises stemming from intensified capital market transactions (Bhagwati, 1998; Kaminsky and Reinhart, 1999; Stiglitz, 2004 and 2000; Neumann *et al.*, 2009, Joyce, 2011). Also contributions with mixed evidence are not missing (Kose *et al.*, 2009).

This inconclusiveness led Rancière *et al.* (2006) to rethink the conceptual underpinning and investigate the two contrasting views assigned to financial globalization in a unified framework. They put forward a two-step treatment effects model, in which they separate the direct effect of financial globalization on growth and an indirect one of higher crisis propensity. Their finding supports the hypothesis that although both effects play a role, the former outweighs the latter.

The same inconclusiveness suggests that the financial integration process is an uneven phenomenon and produces effects that differ both over time and in space, where the latter refers not so much to the geographic dimension, but rather to the dimension of economic activity that interest most in the present setting. Such recognition of intrinsic differences governing the structures and the dynamics of the development at the sector-level motivated the influential approach adopted by Rajan and Zingales (1998). Their main conjecture poses the question whether industrial sectors being more dependent on external financing find better growth opportunities in a more open financial environment. Based on the sector-level data regarding a large sample of countries in the period 1980-1990, they confirm this effect to be valid.

The methodology of Rajan and Zingales (1998) motivated the subsequent studies examining the role of finance for economic growth (Galindo, Micco and Ordenez, 2002; Vlachos and Waldenstrom, 2006; Prasad *et al.* 2007, Levchenko *et al.*, 2009). In particular, its application permits to overcome important shortcomings when using country-level data. First, given financial market imperfections within the country and the consequent differences in the risk sharing behaviours between agents, it seems a straightjacket to assume the entire economy to behave as a representative agent (Attanasio and Davis, 1996; Hayashi *et al.*, 1996; Levchenko *et al.*, 2009). Consequently, the use of macro data might result in biased estimations, deriving most importantly from omitting some crucial factors or from averaging out effects that present much of the sector-level variability. Levchenko *et al.* (2009)

demonstrate that, due to financial liberalization, sector-level volatility is much more affected than the aggregate one. They assign this effect to diversification across sectors.

The fact that (industrial) sectors differ in their reactions to financial co-movements stems directly from the analysis of Rajan and Zingales (1998). They associate these differences to the relative intensity of external finance in different sectors. But there are potentially more channels through which the magnitude of the reactions becomes rather sector-specific. Indeed, financial integration went hand in hand with trade liberalization, with changing sector-internal structures as well as with monetary integration impulses. Moreover, some of these developments were possible thanks to better access to international money. This suggests a complementarity relationship between financial aspects and other economic factors.

Regarding manufacturing sectors, although in a conceptual setting that - due to the focus on financial depth instead of financial integration - only limitedly fits mine, Neusser and Kugler (1998) investigate the impact on manufacturing productivity in a sample related to more than thirty OECD countries. Their choice of focusing on manufacturing is driven by the belief that it is the progress in accumulating technological knowledge in machinery and equipment to spur the overall productivity growth. Based on a time-series analysis, they find a strong cointegration relationship between value added of the financial sector and TFP in manufacturing sectors. Instead, no evidence could be confirmed when instead of TFP, GDP in manufacturing was considered.

Thus, the investigation by Rajan and Zingales (1998), by Neusser and Kugler (1998), as well as the subsequent efforts center on the manufacturing sectors, leaving the link between financial integration and services unexplored – most importantly because of the lack of data or, as in Neusser and Kugler (1998) due to the explicit recognition of a lesser importance of services. This might be a sub-optimal choice for two reasons. First, applying sector-level data only on manufacturing activities approaches the reality, but leaves the solution half-way, for the similar reason speaking against the use of aggregate data: manufacturing activities are only partly-representative for a national economy. Second, some service sectors are recognized to play a crucial role in providing stimulating business environment for the activity of the economic system as a whole. Such an influential role is often ascribed to the so called KIBS (knowledge intensive business services). This influence might be both direct - as the non-mediating drivers of (process) innovations - and indirect, through the crucial support for the rest of the economic activity. In this sense, they are sometimes argued to play a pivotal role as facilitators or even co-producers of economy-wide innovation (den Hertog, 2000).² In general, they often provide non-technological components crucial in the innovative process, such as innovative service concepts, logistic infrastructure and client interface facilities. But apart from KIBS, also other less-knowledge intensive services, like transport and storage or post and telecommunication, could be

² Interest in KIBS has been increasing especially in the last decade, since the recognition of their role played in the generation of the economy-wide value added. For examples of the literature, see contributions by Acs (2002), Muller and Zenker (2009), Tether and Tajar (2007) as well as Henrekson and Johansson (2010).

crucial due to the strong linkages and interactions with the rest of the economy. Without such efficiently functioning services, the activity of other sectors would be considerably jeopardized. Consequently, the influence of financial integration on services will be not neutral to the system. Depending on the sign and the strength of such influence, further indirect effects on the other sectors' economic performance would follow.

In that sense, still insufficient evidence concerns the effects of capital market liberalization on growth dynamics in services. If any, there is only very limited discussion, with scarce description of fragmented episodes regarding the influence of financial integration on the performance of services. To give an example, Harmann *et al.* (2003) observe that the dynamic process of global financial openness was accompanied by a progressive elimination of entry barriers in the banking industry. Such an increase in the competitive pressure from abroad might have resulted in dynamic efficiency improvements, occurring either through increased, purely-domestic, innovative efforts or through knowledge base transferred from abroad. Nevertheless, against this conjecture, Berger *et al.* (2003) and Hartmann *et al.* (2003) confirm the existence of significant regulatory barriers (eg. corporate taxation). This could prevent the sector from fully taking the advantage from the ongoing financial integration process.

The lack of investigation regarding the influence of financial integration services in particular as well as on manufacturing and service sectors in a unified framework provides sufficient motivation for the forthcoming analysis. First, I will provide some facts describing more in details the sector-level economic activity in the EU-8 countries. Subsequently, I will offer a more rigorous empirical exercise disentangling the uneven growth effects of financial integration.

3. Economic activity in manufacturing and service sectors and financial globalization in the core EU.

The domination of economic activities by services is a broadly recognized stylized fact. According to the recent estimates, the importance of services as measured in terms of GDP has passed from 55 percent to 70 percent worldwide and from 58 percent to 74 percent for high income OECD countries (Francois and Hoeckman, 2010). Against this picture, services are characterized by lower productivity dynamics than it is the case for manufacturing activities. In Figure 1, I calculate the EU-8 average index (2005=100) of the growth rates of TFP for manufacturing and service sectors over the observation period 1980-2009.³ The data confirm that manufacturing sectors were tending to improve their productivity performance, although such a development showed much variability over time. For services, instead, two phases - with 1992 as the break year - could be observed. This corresponds to the end date of the completion of the Single Market Programme that was aimed at removing the

³ EU-8 comprises the eight EU members for which data in the revised version of EU KLEMS are available (Austria, Belgium, France, Germany, Italy, Netherlands, Spain, the UK).

existing non-tariff barriers to the free movement of goods, services and production factors (Notaro, 2011).

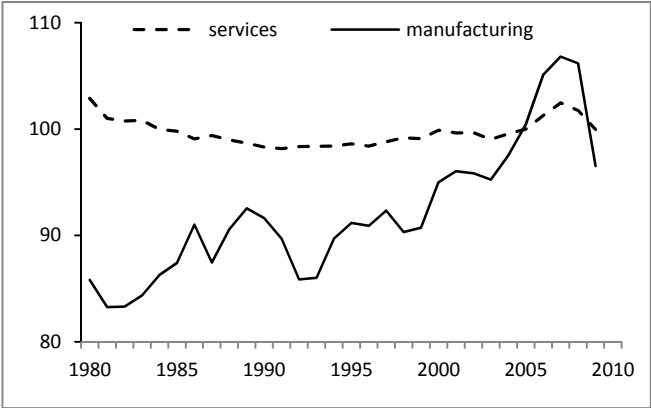


Figure 1 TFP growth development in the EU-8
 Source: own elaboration based on EU KLEMS rolling update database.

Such a productivity analysis provides some crucial insights with respect to the forthcoming empirical investigation, but still leaves unexploited the question regarding the direction and strength of the influence coming from capital market transactions liberalization. On the other hand, when looking at the data describing the involvement of services into international transactions, the missing interest regarding the influence of financial integration on services is even more surprising. Their relative shares of FDI (over total FDI) are much higher than for manufacturing activities (UNCTAD, 2004). Such a pattern was rather stable over time, both when considering in terms of stocks and in terms of flows, as illustrated in panels *a* and *b* of Table 1, respectively. An expectation could rise that through such intensive financial openness in terms of FDI flows and from here stemming international knowledge externalities, services would experience positive productivity impulses. This notwithstanding, services more than manufacture sectors are still subject to a number of regulatory requirements that might limit both their productivity dynamics and also the full exploitation of international advantages.

Table 1 FDI shares in manufacturing and service sectors, in percentage of total FDI.

<i>a) FDI stock</i>					
	1995-2009	1995	2000	2005	2009
	<i>incoming</i>				
<i>manufacturing</i>	17.8	32.0	18.1	13.7	18.2
<i>services</i>	72.5	58.6	76.9	75.9	63.6
	<i>outgoing</i>				
<i>manufacturing</i>	20.7	39.3	21.9	16.1	21.5
<i>services</i>	69.1	52.5	71.0	75.9	60.1
<i>b) FDI flows</i>					
	2002-2009	--	2002	2005	2009

			<i>incoming</i>		
manufacturing	14.3	--	11.6	10.2	33.9
services	72.3	--	77.8	56.1	60.0
			<i>outgoing</i>		
manufacturing	16.4	--	10.6	24.0	25.7
services	68.7	--	83.7	61.5	56.1

Note: For FDI flows, the data coverage starts in 2002.

Source: own calculations based on Eurostat.

4. Estimation strategy

The theoretical discussion related to the influence of financial integration on growth dynamics and, especially, productivity is suggestive on the aggregated effects, yet is inconclusive both on the direction and strength of a more specific impact. Also, when searching for possible relations between variables simply by eyeballing the data, one could recognize some tendencies, but no obvious links could be established. Therefore, I take advantage of the panel structure of my dataset and estimate the exact effects of *de jure* and *de facto* financial integration on sector-level economic performance. The strength of the panel estimations lies in the possibility to account for unobserved factors that do not vary over time, but that might exercise a significant influence on the phenomenon being analysed.

When analyzing forces determining productivity dynamics and growth in general, it is rather likely to find the assumptions underlying the standard fixed effects setting not to be valid. The main reason for this invalidity is serial correlation in the residuals. I therefore apply the less demanding first difference estimator, relying on the assumption that the first differences of the error terms are no more serially correlated. This would result in the following specification:

$$\Delta y_{ist} = \Delta \mathbf{F}I'_{it} \mathbf{B}_1 + \Delta \mathbf{X}'_{ist} \mathbf{B}_2 + \tau_t + \varepsilon_{ist} \quad (1)$$

with Δy_{ist} referring to one of the dependent variables, being productivity growth or investment in country i in sector s and at time t .⁴ Vector $\Delta \mathbf{X}'_{ist}$ comprises control variables measuring possible determinants of the growth dynamics suggested by the previous literature (Bonfiglioli, 2008; Gehringer, 2013). Those variables are measured at the country aggregate level (with the exception of investment). In particular, I include *trade openness* expressed as a percentage share to GDP of the sum of imports and exports. It is often argued that trade openness would sustain economic growth in general and productivity growth as well as investment in particular. Moreover, *government expenditure* in percentage of GDP should measure the contribution of the government involvement to direct and indirect economic growth. This influence might be positive, but it might be also negative, due to the crowding out effect found especially for private investment. I also consider the possible

⁴ In a separate set of estimations, I include sector-level value added growth as a dependent variable. The results regarding financial integration indicators, however, were insignificant, broadly confirming the past investigation (eg. Kose *et al.*, 2009).

influence coming from *ICT* and *non-ICT* capital services. In particular, there are contributions suggesting a great role played by information and communication technologies in sustaining general economic growth (Jorgenson, 2001; Colecchia and Schreyer, 2002; Oulton, 2002; Inklaar *et al.*, 2005). Regarding non-ICT capital, it can be argued that there might be a trade-off with ICT capital, as an additional investment in non-ICT services attracts away resources otherwise available for ICT capital. Finally, I include a sector's *size* variable in order to soak up some country-sector-specific characteristics that might be related to the relative dimension of the sector in an economic system (Maskus *et al.*, 2012; Friedrich *et al.*, 2012). The expected influence of this variable in my analysis is positive. Indeed, the industrial structure in the European economies is rather stable. Consequently, the interpretation given by Friedrich *et al.* (2012), when investigating a panel of emerging European economies, suggesting that young industries are supposed to grow faster is not valid anymore. Instead, in a mature economic system, sectors with relatively stronger position and, thus, better opportunities to take advantage from upstream and downstream knowledge externalities could be on a more dynamic growth path.

Vector $\Delta \mathbf{FI}'_{ist}$ includes the indicators of financial integration, a *de facto* indicator and an interaction term between the two. The latter should account for the fact that the estimations of the separate effects of *de facto* and *de jure* indicators might be unreliable. This is due to the fact that *de facto* measure includes in its debt component also sovereign debt and debt positions with official institutions, like IMF. Consequently, if a country has large debt positions it will be considered as *de facto* open, even if the private sector transactions were forbidden, implying a *de jure* closeness. Thus, the interaction term is included to capture the effects of *de facto* financial openness where the restrictions on capital account transactions are abandoned (Bonfiglioli, 2008, Gehringer, 2013). Factor τ_t refer to time specific effects. Finally, ε_{ist} is the idiosyncratic error term.

Still, given that the country and sector specific trends enter the residuals, the assumption of no serial correlation in the error terms in Equation (1) does not necessarily hold, even after first-differencing. As a solution, I apply to measures. First, I use feasible generalized least squares (FGLS) procedure, allowing for country-sector specific serial correlation in the error term. Moreover, I include the lagged dependent variable, thereby explicitly allowing for the dynamics that is responsible for the existence of serial correlation. This brings me to estimate as my main specification the following model:

$$\Delta y_{ist} = \Delta y_{ist-1} + \Delta \mathbf{FI}'_{it} \mathbf{B}_1 + \Delta \mathbf{X}'_{ist} \mathbf{B}_2 + \tau_t + \varepsilon_{ist} \quad (2)$$

where Δy_{ist-1} is a one period lagged dependent variable and the other variables remain unchanged from Equation (1). It can be argued, nevertheless, that the inclusion of the lagged dependent variable provokes a downward bias in the estimates. A solution to this dynamic model problem is to apply the Anderson-Hsiao (AH) instrumental variable estimator. It is based on a first-differenced specification, similar to Equation (2), where the lagged dependent variable is instrumented with its lags. Moreover,

the lagged dependent variable is instrumented with the second lag of the dependent variable. The main problem of such a specification is that it significantly increases mean square error. Nevertheless, the comparison of the results from the IV method with the FGLS estimations brought very comparable results.⁵

Regarding the time dimension, annual data have been often found to be quite noisy when analyzing a medium- to long-term phenomenon, like the one at hand. This is supposed to be even more problematic in a first-differenced setting. Therefore, I apply 5-year non overlapping averages. Another advantage of using such multi-year averages consists in overcoming the possible cyclicity problems underlying annual data.

Finally, given that many of my explanatory variables are not sector- but country-specific, it is less probable that I run into endogeneity problems. Indeed, in such a setting, it is plausible to accept that the sector level productivity developments wouldn't have significant influence on the country' overall economic performance.

5. Data description

I use the 2012 EU KLEMS revision to obtain the sector-level data. This version of the database is in the NACE revision 2 classification and is published on a rolling, country by country, basis. With respect to the revision 1.1, the newer revision provides useful information especially regarding some specific services. In particular, the revision 2 classifies as separate categories *information and communication services*, and *professional, scientific, technical, administrative and support service activities*, which - for the reasons explained in the previous section - might be interesting to account for separately. I use the data for the maximum number of manufacturing and service sectors observed at the two-digit level. This amounts for eleven manufacturing and for thirteen service sectors.

Moreover, the 2012 version of EU KLEMS extends the time dimension that now reaches 2009. Consequently, I take into my analysis the longest time span possible, i.e. 1980-2009. The disadvantage of this database with respect to the previous one is that the country coverage is very limited. I use the data related to all available countries that constitute EU-8 sample composed by Austria, Belgium, France, Germany, Italy, Netherlands, Spain and the UK.

From EU KLEMS I obtained the data to derive my dependent variables, namely, capital accumulation and productivity growth. Regarding productivity, I use TFP growth rates directly provided by EU KLEMS as an index, with 2005=100.

From the same source, I use the information on sector-level intensity of ICT and non-ICT capital services, expressed in terms of a volume index (2005=100). Finally, the same source is used to calculate the sector-specific size variable, expressed as a percentage share of sectoral VA over the overall VA.

⁵ The results of estimations run according to FGLS are available on request.

In order to construct my measures of financial deepening, I use two sources of data. My *de facto* measure of financial integration comes from an updated version of Lane and Milesi-Feretti (2007). They provide data on the stock of assets and liabilities, as well as on their main components, portfolio investment, FDI and debt titles. As the main measure of *de facto* financial integration, I will adopt the percentage share of GDP of the sum between total assets and liabilities. In the subsequent analysis, I will investigate in more details alternative measures of de facto integration (stock of assets to GDP and stock of liabilities to GDP) as well as single channels of financial liberalization (portfolio and FDI liabilities versus debt liabilities). All are taken from Lane and Milesi-Feretti (2007). Additionally, for the reasons explained before, I apply an interaction term between de facto and de jure financial liberalization, where as a measure of the latter I use an indicator developed by Chinn and Ito (2008) and based on an estimation procedure applying a principal components model. The authors use the data from the IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). 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.

6. Results

In Table 2, I present the main results of the estimations on the effects of financial integration on the sources of economic growth. I consider here two main sources of growth, TFP growth (columns 1-3) and capital accumulation (columns 4-6). For each of the dependent variable I estimate three specifications. First, I pooled manufacturing and service sectors together (columns 1 and 4). Second, I run the analogous estimations only manufacturing sectors (columns 2 and 5). Accordingly, these estimations are important with respect to the past contributions using sector-level data. Finally, I consider services in a separate set of regressions (columns 3 and 6). These last regressions are important to determine whether the process of financial integration had some impact on services as well.

Regarding the pooled regressions, the positive effect of financial integration can be broadly confirmed in the case of the TFP growth and in all three samples. Instead, capital accumulation remained unaffected. The results are important in so far as they provide insights on the linkages between finance and growth. More precisely, not only they confirm that financial liberalization might be growth-enhancing across the economic sectors, but they put into evidence that such positive effects arrive through productivity improvements. This overall outcome is very much in line with the evidence obtained by Bonfiglioli (2008) and Beakert *et al.* (2011), when analyzing a mixed sample of 70 developing and developed countries. Nevertheless, the focus here should be put on the evidence regarding services. Indeed, although on average services experienced much lower productivity dynamics in the recent past, these sectors benefited from the progressive opening of financial market transactions. This influence though seems to be weaker than for manufacturing. Nevertheless, this fact

shouldn't be very surprising, given, again, a significant productivity gap between manufacturing and service sectors illustrated in the previous section.

Table 2 Effects of financial integration on the sources of growth.

	<i>dependent variable:</i>					
	<i>TFP growth</i>			<i>capital accumulation</i>		
	<i>all</i>	<i>manufacturing</i>	<i>services</i>	<i>all</i>	<i>manufacturing</i>	<i>services</i>
<i>lagged dep var</i>	-0.606 (0.154)***	-0.665 (0.168)***	-0.434 (0.046)***	-0.417 (0.131)***	-0.328 (0.159)**	-0.583 (0.181)***
<i>L-MF de facto</i>	0.059 (0.019)**	0.092 (0.028)***	0.027 (0.012)**	0.095 (0.080)	0.123 (0.76)	0.092 (0.079)
<i>Ch-I*L-MF</i>	0.004 (0.005)	-0.004 (0.007)	-0.006 (0.004)	0.0003 (0.026)	0.033 (0.038)	0.013 (0.019)
<i>trade openness</i>	0.348 (0.295)	1.122 (0.372)**	-0.146 (0.166)	1.308 (1.349)	0.328 (1.251)	0.917 (1.749)
<i>investment</i>	0.016 (0.010)	-0.013 (0.009)	0.019 (0.008)**			
<i>gov expend</i>	1.670 (1.563)	4.584 (1.935)**	0.643 (1.283)	10.72 (13.60)	-11.45 (19.87)	8.084 (13.28)
<i>ICT services</i>	-0.066 (0.039)	0.076 (0.093)	-0.073 (0.032)**	0.740 (0.311)**	1.352 (0.608)**	0.163 (0.324)
<i>nn-ICT services</i>	-0.029 (0.090)	0.151 (0.174)	-0.116 (0.043)**	0.411 (0.462)	0.572 (0.683)	0.805 (0.420)*
<i>sector size</i>	2.360 (1.268)*	2.653 (3.278)	2.563 (0.877)**	9.944 (5.787)*	11.02 (10.46)	4.477 (6.231)
<i>N. obs.</i>	445	284	315	418	269	293
<i>R sq.</i>	0.503	0.562	0.567	0.348	0.381	0.404

Note: Period analysed spans from 1980 to 2009. The dependent and explanatory variables are constructed as 5-year non-overlapping averages. Ch-I is a *de jure* indicator of financial liberalization taken from Chinn and Ito (2008). L-MF expresses *de facto* financial integration indicator, given by the percentage share of the total assets and liabilities to GDP – calculated based on data provided by the updated version of Lane and Milesi-Feretti (2007). Regressions are run according to IV methodology, accounting for serial correlation and heteroskedasticity in error terms. I instrument the lagged dependent variable with its second lag. In all estimations, time specific effects are included. Robust standard are reported in parenthesis. ***, ** and * report significance level of 1, 5 and 10 %, respectively.

Finally, regarding the other control variables, only mixed evidence can be reported. Accordingly, there is a strongly positive effect of trade openness for manufacturing sectors and no effect on services. This result seems to reflect the relatively stronger involvement of manufacturing activities in international trade relations that contributed to positive productivity-driven growth impulses. In the case of services, negative impact came from ICT and non-ICT capital services. Especially for ICT services this might come as a surprise, given that ICT adoption opened up a variety of innovation potentials also in sectors *outside* the ICT producing industries. This notwithstanding, the past empirical investigation on the productivity impacts of ICT services concentrated on manufacturing. Moreover, analyses on manufacturing sectors have failed to quantitatively detect innovational spillovers coming from ICT (Stiroh, 2002; Van der Wiel, 2001). By contrast, the evidence regarding services is extremely scarce and limited to business-related services for which Hempell *et al.* (2004) find positive effect. Accordingly, such a positive effect could be confirmed also in my investigation (the results are shown in Appendix). But this doesn't preclude that ICT capital services could have negative effect on services on average. More precisely, the negative effect could derive from a kind of replacement effect. More precisely, given that services are relatively more labour intensive and, additionally, given that the skill-biased technological change might be the main source of technology improvements in services, the adoption of ICT (and non-ICT capital) drives labour - and with them the skills - away from the services. Nevertheless, such a negative effect seems to be only temporary, until the newly adopted ICT technologies are assimilated by the labour force.⁶

In Table 2, I considered one of the possible measures of actual financial integration. The past literature considers different alternative measures as well (Kose *et al.*, 2009). Although both flows and stock measures have been used, there are reasons to prefer the latter (Gehring, 2013). In Table 3, I include two alternative measures of de facto financial integration, one given by the total stock of assets and the other the total stock of liabilities, both in percentage to GDP. The results, confirm the previous evidence in many aspects. Financial liberalization exercised a clearly positive impact on productivity growth, with a much stronger effect observed for manufacturing than for services.

⁶ See Appendix for the regression results concerning the discussed argumentation.

Table 3 Effects of financial integration on the sources of growth – alternative measures of *de facto* financial integration.

	<i>dependent variable: TFP growth</i>					
	<i>all</i>		<i>manufacturing</i>		<i>services</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>lagged dep var</i>	-0.604 (0.153)***	-0.603 (0.153)***	-0.665 (0.168)***	-0.662 (0.166)***	-0.433 (0.046)***	-0.434 (0.046)***
<i>total assets (% GDP)</i>	0.115 (0.036)***		0.185 (0.058)***		0.054 (0.023)**	
<i>total liabilities (% GDP)</i>		0.094 (0.037)**		0.162 (0.051)**		0.036 (0.022)
<i>trade openness</i>	0.236 (0.297)	0.526 (0.294)*	0.920 (0.353)**	1.378 (0.400)***	-0.208 (0.177)	-0.055 (0.161)
<i>investment</i>	0.016 (0.010)	0.016 (0.010)	-0.014 (0.009)	-0.012 (0.009)	0.019 (0.008)**	0.019 (0.008)**
<i>gov expend</i>	1.232 (1.593)	2.425 (1.566)	3.604 (1.824)**	5.658 (2.098)**	0.480 (1.302)	1.075 (1.310)
<i>ICT services</i>	-0.066 (0.040)	-0.066 (0.039)	0.084 (0.096)	0.075 (0.093)	-0.079 (0.033)**	-0.076 (0.033)**
<i>nn-ICT services</i>	-0.025 (0.091)	-0.034 (0.089)	0.161 (0.175)	0.141 (0.172)	-0.115 (0.044)**	-0.121 (0.045)**
<i>sector size</i>	2.291 (1.277)*	2.317 (1.270)*	2.414 (3.282)	3.046 (3.197)	2.448 (0.877)**	2.415 (0.880)**
<i>N. obs.</i>	445	445	284	284	315	315
<i>R sq.</i>	0.504	0.501	0.562	0.558	0.565	0.561

Note: Period analysed spans from 1980 to 2009. The dependent and explanatory variables are constructed as 5-year non-overlapping averages. The alternative measures of financial liberalization are *de facto* indicators, given by the percentage share of total assets and total liabilities to GDP, respectively. Both are obtained from the updated version of Lane and Milesi-Feretti (2007). Regressions are run according to IV methodology, accounting for serial correlation and heteroskedasticity in error terms. I instrument the lagged dependent variable with its second lag. In all estimations, time specific effects are included. Robust standard are reported in parenthesis. ***, ** and * report significance level of 1, 5 and 10 %, respectively.

As a final point, I take the advantage of the extensive data availability regarding the composition of financial stocks. My aim is to analyse whether different types of financial transactions could have a differentiated impact on TFP dynamics. This follows the argument and the evidence reported by Kose *et al.* (2009) that there might be much of the difference between FDI and portfolio investment, on the one hand, and debt investment, on the other hand. They argue that whereas FDI and equity flows could be expected to generate positive spillovers in the domestic firms, debt flows, on the contrary, would have some undesirable features, as for instance they may result in inefficient capital allocation by under-informed domestic banks.

I apply a similar strategy to my sample. In doing that, I estimate analogous regressions seen in Table 2, by replacing my financial integration variables with the three separate components of the overall stock of liabilities, namely, portfolio equity, FDI and debt liabilities, again all in percentage of GDP.

I summarize the results of the regressions in Table 4, where I keep the distinction between the full-sector sample, manufacturing and service sectors. The main outcome is that manufacturing could profit from positive productivity impulses from all three sources of investment, with the strongest impact coming from FDI. On the contrary, for services no significant evidence could be reported. But interestingly enough, the influence coming from debt liabilities in the case of manufacturing was clearly positive, contrasting the previous results by Kose *et al.* (2009). This contrast is, nevertheless, weaker if one considers different country samples taken into the respective analyses. Whereas Kose *et al.* (2009) study a large sample of both developing and industrialized countries, the focus here is on a very specific country group. Consequently, given economic advance of the EU-8 countries, their institutional framework is already well-developed, permitting the debt investment to be efficiently allocated and to provide positive productivity impulses.

Table 4 Effects of financial integration on the sources of growth – equity, FDI and debt liabilities.

	<i>all</i>			<i>manufacturing</i>			<i>services</i>		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>lagged dep var</i>	-0.602 (0.153)***	-0.602 (0.153)***	-0.601 (0.152)***	-0.657 (0.167)***	-0.659 (0.168)***	-0.658 (0.165)***	-0.434 (0.047)***	-0.434 (0.047)***	-0.433 (0.046)***
<i>portf. liab. (% GDP)</i>	0.185 (0.117)**			0.298 (0.162)*			0.029 (0.046)		
<i>FDI liab. (% GDP)</i>		0.222 (0.136)**			0.399 (0.193)**			0.031 (0.054)	
<i>debt liab. (% GDP)</i>			0.076 (0.040)*			0.157 (0.048)***			0.047 (0.029)
<i>trade openness</i>	0.478 (0.263)*	0.524 (0.272)*	0.640 (0.308)**	1.226 (0.346)***	1.300 (0.364)***	1.554 (0.428)***	-0.014 (0.156)	-0.004 (0.157)	-0.019 (0.160)
<i>investment</i>	0.017 (0.010)*	0.018 (0.010)*	0.017 (0.010)	-0.007 (0.009)	-0.007 (0.009)	-0.013 (0.009)	0.019 (0.008)**	0.019 (0.008)**	0.019 (0.008)**
<i>gov expend</i>	3.951 (2.013)**	2.403 (1.568)	1.805 (1.664)	7.529 (3.114)**	5.258 (2.123)**	3.980 (1.918)**	1.447 (1.396)	1.199 (1.321)	0.718 (1.302)
<i>ICT services</i>	-0.061 (0.041)	-0.060 (0.041)	-0.066 (0.039)	0.066 (0.092)	0.067 (0.092)	0.073 (0.093)	-0.072 (0.032)**	-0.072 (0.032)**	-0.077 (0.033)**
<i>nn-ICT services</i>	-0.034 (0.091)	-0.036 (0.090)	-0.036 (0.089)	0.094 (0.161)	0.111 (0.166)	0.145 (0.168)	-0.119 (0.046)**	-0.120 (0.046)**	-0.122 (0.045)**
<i>sector size</i>	2.364 (1.282)*	2.266 (1.305)*	2.414 (1.257)*	3.728 (2.628)	3.324 (2.822)	2.173 (3.412)	2.413 (0.890)**	2.414 (0.887)**	2.496 (0.883)**
<i>N. obs.</i>	445	445	445	284	284	284	315	315	315
<i>R sq.</i>	0.502	0.501	0.497	0.557	0.560	0.550	0.558	0.558	0.561

Note: Period analysed spans from 1980 to 2009. The dependent and explanatory variables are constructed as 5-year non-overlapping averages. The alternative measures of financial liberalization are *de facto* indicators, given by the percentage share of total assets and total liabilities to GDP, respectively. Both are obtained from the updated version of Lane and Milesi-Feretti (2007). Regressions are run according to IV methodology, accounting for serial correlation and heteroskedasticity in error terms. I instrument the lagged dependent variable with its second lag. In all estimations, time specific effects are included. Robust standard are reported in parenthesis. ***, ** and * report significance level of 1, 5 and 10 %, respectively.

It emerges, thus, that both the channels through which financial globalization works and the outcomes it produces are clearly positive both for manufacturing and services. Nevertheless, the intensity of the respective influence differs, being stronger for more productive manufacturing sectors and weaker for services. At this point, is it possible to understand the more precise channels driving the results for manufacturing and services? I will face this question in the following sub-section, by trying to disentangle some of the possible factors that might have sustained the operating of financial integration effects. More precisely, given interconnectedness between financial, monetary and real aspects of any integration process, it is reasonable to expect that the growth impulses might have been generated not only by the opening of financial market transactions, but by contemporaneous interaction between financial, monetary and real integration channels.

Economic, monetary and financial integration

The investigation by Rajan and Zingales (1998) was based on the presumption that there are some forces that make the effects of financial depth sector-specific rather than common at the aggregate level. Their focus was on the external dependence. The evidence shows that the more the sectors are externally dependent the better growth perspectives they have in countries where financial development is faster. In order to test such a hypothesis, they interact external dependence with the indicator of financial development.

I follow a similar strategy, though not to exploit sector-specific effects. I rather search for factors connected with the process of economic integration in Europe that at the same time might have sustained growth-generating forces of the financial opening process. In particular, among the control variables used in the previous investigation, I more precisely investigate the *trade openness* channel, given its strong and positive effect observed on manufacturing sectors. It should be stressed, however, that such a variable doesn't measure the effects of economic integration that might pertain exclusively to the dynamics of the European single market. Indeed, trade openness embraces the progressive global trade liberalization as well. Nevertheless, given strong trade relations within the EU, a great part of the evidence can be assigned to European integration dynamics. In particular, if financial integration spurs efficient allocation of resources, the better is the availability of finance the more intensive could be productivity impulses possible through trade. To refer more precisely to the European case, I take a closer look at the process of monetary integration in Europe (*euro*). The variable is a dummy, being one in the years after 1999 and null otherwise.⁷ The presumption – also confirmed in the past literature - is that the process of monetary integration contributed to the easier financing conditions. If such beneficial circumstances were used to more efficiently allocate the scarce resources, positive productivity dynamics would follow.

With respect to those two phenomena, trade openness and the euro adoption, my strategy, thus, consist in interacting each of the two variables with the respective indicators of financial integration. I

⁷ Given my 5-year averaged data structure, the euro dummy assumes the value 1 in period 5 and 6 and null in the periods before. Also, for the UK, the euro dummy is always null.

then estimate three separate equations where I replace the financial integration as well as one of the three variables of interest with the three interaction terms.

Table 5 Effects of European monetary and financial integration on TFP growth.

	<i>Euro</i>			<i>trade openness</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>lagged dep var</i>	-0.606 (0.155)***	-0.659 (0.170)***	-0.435 (0.046)***	-0.606 (0.158)***	-0.668 (0.180)***	-0.434 (0.046)***
<i>euro* de facto</i>	0.037 (0.014)**	0.047 (0.023)**	0.026 (0.010)**			
<i>euro*de facto*de jure</i>	-0.018 (0.006)**	-0.023 (0.011)**	-0.011 (0.006)**			
<i>trade*de facto</i>				0.0005 (0.0001)***	0.001 (0.0002)***	0.0002 (0.0001)**
<i>trade*de facto* de jure</i>				-0.0001 (0.0001)*	-0.0001 (0.0001)	-0.0001 (0.0003)**
<i>ICT* de facto</i>						
<i>ICT*de facto*de jure</i>						
<i>trade openness</i>	0.564 (0.304)	1.422 (0.412)***	-0.058 (0.160)			
<i>investment</i>	0.018 (0.010)	-0.010 (0.010)	0.020 (0.008)**	0.019 (0.010)*	-0.007 (0.009)	0.019 (0.008)**
<i>gov expend</i>	1.571 (1.919)	4.198 (2.125)**	0.435 (1.433)	1.386 (1.373)	4.831 (2.133)**	1.044 (1.270)
<i>ICT services</i>	-0.059 (0.040)	0.072 (0.096)	0.068 (0.030)**	-0.071 (0.010)*	0.085 (0.095)	0.071 (0.030)**
<i>non-ICT services</i>	-0.042 (0.090)	0.101 (0.169)	-0.113 (0.046)**	-0.036 (0.088)	0.147 (0.178)	-0.101 (0.044)**
<i>size</i>	2.630 (1.254)**	1.868 (3.393)	2.494 (0.893)***	2.344 (1.314)*	4.203 (3.039)	2.590 (0.887)**
<i>N. obs.</i>	445	284	315	445	284	315
<i>R sq.</i>	0.502	0.556	0.569	0.501	0.540	0.573

Note: Period analysed spans from 1980 to 2009. The dependent and explanatory variable is constructed as 5-year non-overlapping averages. Ch-I is a *de jure* indicator of financial liberalization taken from Chinn and Ito (2008). L-MF expresses *de facto* financial integration indicator, given by the percentage share of the total assets and liabilities to GDP – calculated based on data provided by the updated version of Lane and Milesi-Feretti (2007). In columns 1, 4 and 7 are the results for the entire sample (manufacturing + services), in columns 2, 5, 8 – for manufacturing and in 3, 6 and 9 – for services. Regressions are run according to IV methodology, accounting for serial correlation and heteroskedasticity in error terms. I instrument the lagged dependent variable with its second lag. Robust standard errors are reported in parenthesis. ***, ** and * report significance level of 1, 5 and 10 %, respectively.

In my discussion, I concentrate exclusively on TFP growth, leaving apart the evidence regarding investment that appeared to be unaffected in the previous investigation. The results, shown in Table 5, show mixed evidence. Whereas the result regarding the interaction between the euro dummy and *de facto* financial integration reports positive influence on TFP growth, the opposite effect is reflected in the second interaction term. Such an outcome again can be confirmed for the entire sample and also when considering manufacturing and services apart. But again here, the relatively stronger intensity of the impact on manufacturing could be observed. This reaffirms that more evident positive influence from the financial integration process goes hand in hand with more intensive innovative dynamics. But still the negative sign of the coefficients obtained for the second interaction term deserves a comment. Recalling first the meaning of the “pure” financial integration variable (*de facto*de jure*), this should measure *de jure* financial integration episodes that at the same time led to actual financial openness.

Consequently, one could interpret the negative sign on *euro*de facto*de jure* as the evidence for negative productivity impulses that accompanied the financial liberalization in the years of the euro. More precisely, the adoption of the euro went together with the formal efforts to complete financial market integration within the Community. This notwithstanding, such efforts seem to have contributed to negative productivity impulses.

The results regarding trade openness confirm that for manufacturing trade openness complemented through more intensive financial market integration produced positive TFP growth effects. Instead, both for the entire sample and for services, there seems to be at best mixed evidence, with positive effects when looking at impulses coming from *de facto* financial liberalization and negative ones for the other interaction term.

To sum up, there seems to be evidence that financial integration process doesn't happen on its own. In particular, the European case demonstrate that its influence on the economic activity goes through channels related to trade as well as common currency. Those channels, nevertheless, are stronger for manufacturing than for service sectors, making the overall effects of the financial integration process somehow mixed.

Structural break in services

From the descriptive part of the analysis, it emerged that around 1992 there was a reversal in the TFP growth dynamics for services. This structural break might have been determined by the completion of the Single Market Programme and the consequent removal of the residual barriers that prevented the free movement of goods, services, capital and labour.

I investigate more closely the hypothesis and, in particular, whether the financial markets integration had different impact in the two sub-periods.

Table 6 Structural break in services and financial integration.

	<i>pre 1990</i>	<i>post 1990</i>
<i>lagged dep var</i>	-0.303 (0.062)***	-0.546 (0.040)***
<i>L-MF de facto</i>	-0.174 (0.065)**	0.022 (0.013)**
<i>Ch-I*L-MF</i>	0.002 (0.012)	-0.016 (0.004)
<i>trade openness</i>	0.589 (0.461)	-0.094 (0.183)
<i>investment</i>	-0.011 (0.019)	0.024 (0.007)***
<i>gov expend</i>	4.209 (2.676)	0.621 (1.422)
<i>ICT services</i>	0.065 (0.053)	-0.039 (0.031)
<i>nm-ICT services</i>	-0.418 (0.113)***	-0.114 (0.043)**
<i>sector size</i>	2.321 (1.925)	2.117 (0.838)**

<i>N. obs.</i>	66	249
<i>R sq.</i>	0.656	0.655

Note: Period analysed spans from 1980 to 2009. The dependent and explanatory variable is constructed as 5-year non-overlapping averages. Ch-I is a *de jure* indicator of financial liberalization taken from Chinn and Ito (2008). L-MF expresses *de facto* financial integration indicator, given by the percentage share of the total assets and liabilities to GDP – calculated based on data provided by the updated version of Lane and Milesi-Feretti (2007). Regressions are run according to IV methodology, accounting for serial correlation and heteroskedasticity in error terms. I instrument the lagged dependent variable with its second lag. Robust standard errors are reported in parenthesis. ***, ** and * report significance level of 1, 5 and 10 %, respectively.

The results seem to confirm that there might have been negative productivity impact on services coming from the financial liberalization. In particular, the many regulatory barriers were substantially limiting economic activities especially in services and much less the manufacturing sectors. Consequently, the investment decisions driven by dynamic efficiency reasons were better allocated in the latter, diverging away financial resources from the former.

5. Conclusions

Many efforts have been made to assess the growth-related effects deriving from the dynamics of the global financial integration process. Both theoretical and empirical investigations were looking at the phenomenon from numerous perspectives and were providing often inconclusive statements on the final outcome.

This contribution broadens the discussion by looking at the issue from a more detailed sectoral perspective. I apply the distinction between manufacturing and service sectors and provide the evidence that TFP growth in both branches was enhanced by financial integration. On the contrary, the other indirect source of growth, capital accumulation, remained unaffected. This finding reaffirms the validity of the long-run growth channel, identified in the recent investigations. Additionally, however, the results show that the influence on manufacturing was much stronger than in services, which is inherent in the relatively lower capital intensity of service activities.

Financial integration, thus, exercises an uneven effect within economic activities. Putting this result together with the increasing importance of service activities in the modern economic systems provides a crucial insight to the broader investigation on economic growth. Indeed, this finding seems to be coherent with the evidence of the slowing down of the growth dynamics observed in the last decades, especially in Europe, but also elsewhere. This shouldn't lead, however, to any particular policy implication trying to modify the direction or intensity of the financial integration process. Rather, considering the new skill-intensive direction of technological change, with profound re-organization of the structure of modern economic systems, the focus on continuously increasing financial liberalization fades out. On the contrary, new insights could be achieved from the more dedicated analysis of the implications that the new direction of technological change might have on productivity dynamics of both manufacturing and service sectors.

References

- Aharoni, Y. and Nachum, L. (2000). *Globalization of Services: Some Implications for Theory and Practice*, Routledge, London.
- Antonelli, C. (2013). The slow growth of the knowledge economy: globalization and induced technological change, mimeo.
- Antonelli, C., Fassio, C. (2013) The economics of the light economy. Globalization, skill biased technological change and slow growth, mimeo.
- Arellano, M., Bond, S. (1991). Some test of specification of panel data: Monte-Carlo evidence and application to employment equations. *Review of Economic Studies*, 58, 2, 277-297.
- Arellano, M., Bover, O. (1995). Another look at the instrumental variable estimation of error-component model. *Journal of Econometrics*, 68, 29-52.
- Attanasio, O. and Steven, D. (1996). Relative wage movements and the distribution of consumption. *Journal of Political Economy*, 104, 6, 1227-1262.
- Bekaert, G., Harvey, C.R., & Lundblad, Ch. (2005). Does financial liberalization spur growth? *Journal of Financial Economics*, 77, 1, 3-56.
- Bekaert, G., Harvey, C.R., & Lundblad, Ch. (2011). Financial openness and productivity. *World Development*, 39, 1-19.
- Berger, A. Dai, Q., Ongena, S., Smith, D. (2003). To what extent will the banking industry be globalized? A study of bank nationality and reach in 20 European nations. *Journal of Banking and Finance*, 27, 383-415.
- Bonfiglioli, A. (2008). Financial integration, productivity and capital accumulation. *Journal of International Economics*, 76, 337-355.
- Chinn, M., & Ito, H. (2008). A new measure of financial openness. *Journal of Comparative Policy Analysis*, 10, 309-322.
- Colecchia, A., Schreyer, P. (2002). ICT Investment and Economic Growth in the 1990s: Is the United States a Unique Case?: A Comparative Study of Nine OECD Countries. *Review of Economic Dynamics*, 5, 2, 408-442.
- Demirguc-Kunt, A., Detragiache, E., (1998). Financial liberalization and financial fragility. IMF Working Paper 98/83.

- Francois, J., Koekman, B. (2010). Services Trade and Policy. *Journal of Economic Literature* 48, 642-692.
- Friedrich, Ch., Schnabel, I., Zettelmeyer, J. (2012). Financial integration and growth – Why is Emerging Europe different? *Journal of International Economics*, doi: 10.1016/j.inteco.2012.07.003.
- Galindo, Arturo, Alejandro Micco and Guillermo Ordoñez (2002), “Financial Liberalization: Does it Pay to Join the Party?” *Economia* 3, 231-261.
- Gehring, A. (2013), Growth, productivity and capital accumulation: The effects of financial liberalization in the case of European integration, *International Review of Economics and Finance*, 25, 291-309.
- Glick, R. Hutchinson, M. (2001). Banking crises and currency crises: How common are the twins. In: Glick, R., Moreno, R., Spiegel, M. (eds.), *Financial Crises in Emerging Markets*. Cambridge University Press, New York.
- Hahn, J., Hausman, J., Kuersteiner, G., 2001. Bias corrected instrumental variables estimation for dynamic panel models with fixed effects. MIT Working Paper.
- Hayashi, F., Altonji, J. and Kotlikoff, L. (1996). Risk-sharing between and within families. *Economica*, 64, 2, 261-294.
- Hempell, T., Van Leeuwen, G., Van der Weil, H. (2004). ICT, Innovation and Business Performance in Services: Evidence for Germany and the Netherlands, ZEW Discussion Paper No. 04-06.
- Hirsch, A. 1989, ‘Services and Service Intensity in International Trade’, *Review of World Economy* (formerly, *Weltwirtschaftliches Archiv*), 125, pp. 45-60.
- Inklaar, R., O’Mahony, M., Timmer, M. (2005). ICT and Europe’s productivity performance: Industry-level growth account comparisons with the United States. *The Review of Income and Wealth*, 51, 4, 505-536.
- Jorgenson, D.W. (2001). Information Technology and the U.S. Economy. *American Economic Review*, 91, 1–31
- Kaminsky, G., Reinhart, C. (1999). The twin crises: the causes of banking and balance of payments problems. *The American Economic Review*, 89, 3, 473-500.
- King, R.G. and Levine, R. (1993). Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics*, 108, 717-737.

- Kruiniger, H., 2000. GMM estimation of dynamic panel data models with persistent data. Mimeo, Queen Mary, University of London.
- Lane, P.R., & Milesi-Ferretti, G.M. (2007). The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970-2004. *Journal of International Economics*, 73, 223-250.
- Levchenko, A.A., Rancière, R., & Thoenig, M. (2009). Growth and risk at the industry level: The real effects of financial liberalization. *Journal of Development Economics*, 89, 210-222.
- Maskus, K.E., Neumann, R., Seidel, T. (2012). How national and international financial development affect industrial R&D. *European Economic Review*, 56, 72-83.
- Neusser, K. and Kugler, M. (1998). Manufacturing growth and financial development: Evidence from OECD countries. *Review of Economics and Statistics*, 80, 4, 638-646.
- Notaro, G. (2011). European integration and productivity: Exploring the early effects of completing the internal market, *Journal of Common Market Studies*, 49, 4, 845-869.
- Oulton, N. (2002). ICT and Productivity Growth in the United Kingdom. *Oxford Review of Economic Policy*, 18, 3, 363-379.
- Prasad, Eswar, Raghuram Rajan and Luigi Zingales (2007), "Foreign Capital and Economic Growth," NBER Working Paper no.13619 (November).
- Rajan, Raghuram and Luigi Zingales (1998), "Financial Dependence and Growth," *American Economic Review* 88, p.559-586.
- Ranciere, R., Tornell, A., Westermann, F. (2006). Decomposing the effects of financial liberalization: crises vs. growth. *Journal of Banking & Finance*, 30, 3331-3348.
- Rivera-batiz, F.L., Rivera-Batiz, L.A. (1992). Europe 1992, and the liberalization of direct investment flows: Service versus manufacturing. *International Economic Journal*, 6, 1, 45-57.
- Roodman, D. (2009). A Note on the Theme of Too Many Instruments. *Oxford Bulletin of Economics and Statistics*, 71, 1, 135-158.
- Saint-Paul, G. (1992). Technological choice, financial markets and economic growth. *European Economic Review*, 36, 763-781.
- Schumpeter, J. (1911). *Theorie der Wirtschaftlichen Entwicklung*. Leipzig: Dunker & Humblot.
- Stiglitz, J.E. (2000), Capital Market Liberalization, Economic Growth, and Instability, *World Development*, 28, 6, 1075-1086.

Stiroh, K.J., (2002), Are ICT spillovers driving the New Economy, *Review of Income and Wealth*, Series 48, Number 1, March 2002.

UNCTAD, (2004). *World investment report: The shift towards services*, United Nations, New York and Geneva, available on: http://unctad.org/en/Docs/wir2004_en.pdf.

Van der Wiel, H.P. (2001), Does ICT boost Dutch productivity growth?, CPB-document no 16.

Vlachos, Jonas and Daniel Waldenstrom (2005), “International Financial Liberalization and Industry Growth,” *International Journal of Finance and Economics* 10, pp.263-284.

Appendix

The main results of the estimation report negative influence of ICT capital services on TFP growth in service sectors. Previously, I provided a hypothetical explanation to this result. Here, I confirm this intuition with the estimations with the results summarized in Table A.1. In particular, I estimated the basic specification for knowledge intensive business services (KIBS), for which I could confirm the evidence found in Hempell *et al.* (2004) on the positive contribution of ICT capital services to TFP growth of the sector. Additionally, regarding the entire group of service sectors, I show that although the immediate effect of the more intensive ICT use seems to be negative, this effect is insignificant with the first lag of ICT variable and turns to be positive (although still insignificant) with the second lag. This suggest that a certain learning process is required in order to adjust to the structural replacement occurred through ICT investment (Hempell *et al.*, 2004).

Table A.1 ICT capital services.

	KIBS	services (1)	services (2)	services (3)
<i>lagged dep var</i>	0.244 (0.107)**	-0.434 (0.046)***	-0.436 (0.051)***	-0.525 (0.043)***
<i>L-MF de facto</i>	0.031 (0.015)**	0.027 (0.012)**	0.029 (0.012)**	0.019 (0.013)
<i>Ch-I*L-MF</i>	0.041 (0.025)*	-0.006 (0.004)	-0.010 (0.003)	-0.014 (0.004)
<i>trade openness</i>	-0.765 (0.266)**	-0.146 (0.166)	-0.019 (0.165)	0.035 (0.182)
<i>investment</i>	-0.039 (0.023)	0.019 (0.008)**	0.015 (0.009)	0.023 (0.007)**
<i>gov expend</i>	-5.323 (2.186)**	0.643 (1.283)	0.790 (1.303)	0.652 (1.474)
<i>ICT services</i>	0.733 (0.145)***	-0.073 (0.032)**		
<i>l. ICT services</i>			-0.032 (0.036)	
<i>l2.ICT services</i>				0.065 (0.046)
<i>nm-ICT services</i>	-1.168 (0.136)***	-0.116 (0.043)**		
<i>l.nm-ICT services</i>			-0.006	

			(0.057)	
<i>ln-ICT services</i>				0.059 (0.066)
<i>sector size</i>	3.026 (2.320)	2.563 (0.877)**	2.631 (0.958)**	2.527 (0.934)**
<i>N. obs.</i>	23	315	302	236
<i>R sq.</i>	0.946	0.567	0.575	0.673

Note: Period analysed spans from 1980 to 2009. The dependent and explanatory variables are constructed as 5-year non-overlapping averages. Ch-I is a *de jure* indicator of financial liberalization taken from Chinn and Ito (2008). L-MF expresses *de facto* financial integration indicator, given by the percentage share of the total assets and liabilities to GDP – calculated based on data provided by the updated version of Lane and Milesi-Feretti (2007). Regressions are run according to IV methodology, accounting for serial correlation and heteroskedasticity in error terms. I instrument the lagged dependent variable with its second lag. In all estimations, time specific effects are included. Robust standard errors are reported in parenthesis. ***, ** and * report significance level of 1, 5 and 10 %, respectively.