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DISSERTATION

EXPLORING THE CONTRIBUTION OF FINANCIAL SECTOR FOR THE CONDITIONAL B-CONVERGENCE: AN ANALYSIS OF THE EUROZONE CASE

JOÃO PEDRO RODRIGUES FRAGOEIRO

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SUPERVISION:
JOSÉ RICARDO BORGES ALVES

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AMECO – Annual Macro-Economic Database of the European Commission's.

EEC – European Economic Community

EMU – European Monetary Union.

EU – European Union.

GDP – Gross Domestic Product.

GVA – Gross Value Added.

IMF – International Monetary Fund.

JEL – Journal of Economic Literature.

OLS – Ordinary Least Squares.

R&D – Research & Development

US – United States

WLS – Weighted Least Squares.

ABSTRACT, KEYWORDS AND JEL CODES

This dissertation explores the impact of financial sector development on the conditional convergence of Eurozone economies to their steady states. We analyse data from twenty Eurozone countries spanning from 1995 to 2019.

Using an innovative time-varying β-convergence approach, we find evidence of catch-up growth during the observed period. In the overall panel, the financial system dimensions positively contribute to the convergence process. However, results differ when considering regional convergence clubs and EMU integration dates, influenced by regional dynamics and initial variable levels.

Additionally, incorporating sectoral intensity alongside financial variables enhances the model's explanatory power. These variables exhibit statistical significance in explaining economic convergence, thereby bolstering the notion of the financial sector's facilitating role in promoting convergence within the Eurozone.

This study provides insights into Eurozone economic convergence, emphasizing the importance of financial sector. Our findings hold implications for policymakers and economists navigating European economic integration, highlighting the pivotal role of the financial system in advancing convergence objectives. Achieving greater economic integration and convergence remains a central goal within the European Union and EMU.

KEYWORDS: Financial Development; Economic Convergence; Eurozone; Financial System; Sectoral Structure.

JEL CODES: G10; G20; O16; O47; O52.

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EXPLORING THE CONTRIBUTION OF FINANCIAL SECTOR FOR THE CONDITIONAL B-CONVERGENCE: AN ANALYSIS OF THE EUROZONE CASE

By João Pedro Rodrigues Fragoeiro

THIS DISSERTATION EXAMINES THE IMPACT OF FINANCIAL SECTOR DEVELOPMENT ON CONDITIONAL CONVERGENCE IN THE EUROZONE FROM 1995 TO 2019. USING TIME-VARYING B-CONVERGENCE, CATCH-UP GROWTH IS OBSERVED. IN THE OVERALL PANEL, THE FINANCIAL SYSTEM POSITIVELY CONTRIBUTES TO CONVERGENCE, BUT RESULTS VARY IN REGIONAL CONVERGENCE CLUBS AND EMU INTEGRATION DATES DUE TO REGIONAL DYNAMICS. ADDITIONALLY, INCLUDING SECTORAL INTENSITY ALONGSIDE FINANCIAL VARIABLES STRENGTHENS THE MODEL'S EXPLANATORY POWER. THESE VARIABLES ARE STATISTICALLY SIGNIFICANT REINFORCING THE FINANCIAL SECTOR'S ROLE IN FOSTERING EUROZONE CONVERGENCE. THIS STUDY UNDERSCORES THE SECTOR'S IMPORTANCE FOR POLICYMAKERS NAVIGATING EUROPEAN ECONOMIC INTEGRATION, A CORE OBJECTIVE OF THE EU AND EMU.

1. INTRODUCTION

Neoclassical growth models, introduced by economists such as Ramsey (1928), Solow (1956), Cass (1965), and Koopmans (1963), offer valuable insights into the relationship between per capita growth rates and the initial level of output or income per person. In these models, there is typically an inverse relationship between the per capita growth rate and the initial level of output or income per person.

Furthermore, within the neoclassical framework, the concept of diminishing returns to capital plays a central role. It serves as a driving force that guides the model economy toward a steady state. The idea of diminishing returns to capital suggests that as an economy accumulates more capital, the additional output generated from each unit of capital becomes progressively smaller. Consequently, economies tend to gravitate toward an equilibrium point where growth rates stabilize.

These points lead growth theorists to pay close attention to the evolution of the convergence debate. This is because estimates of the speed of convergence across economies were believed to provide information on the share of capital in the production function (Sala-i-Martin, 1996).

Nowadays, based on the extensive body of literature available, we understand that economic growth is intricately conditional on a set of determinants, including capital accumulation, human capital, research and development (R&D) efforts, infrastructure investments, effective management and organization, as well as the allocation of resources across productive sectors (Stern, 1991). Furthermore, we have observed that

convergence phenomena can be conditional upon these factors. It follows logically that the steady state of an economy will be contingent upon the various levels of these determinants.

It is also crucial to acknowledge that certain catalysts can directly interact with these determinants, expediting their impact. Finance emerges as a notable facilitator in this regard. Financial institutions play an important role by efficiently channelling savings into productive investments (Schumpeter & Swedberg, 2021), expediting the growth of both physical and human capital. Capital markets inject vital funds into R&D initiatives, fostering innovation and technological advancement at an accelerated pace (Moshirian, et al., 2021). Additionally, access to financial resources accelerates infrastructure development (Kumari & Sharma, 2017), enhancing economic growth through swift improvements in logistics and connectivity. Moreover, through financial instruments and prudent risk management, finance not only safeguards accumulated capital but also magnifies its impact, further expediting overall development (Bencivenga & Smith, 1991).

Our dissertation seeks to explore the role of the financial sector in promoting convergence among nations and driving their economic growth. Does financial development genuinely encourage economic growth? If the financial domain offers diverse means to enhance the determinants of economic growth, including capital accumulation, R&D, human capital, and infrastructure development, can we investigate this relationship and arrive at conclusions that affirm this notion? Do the differing levels of financial development in various countries lead to trends of convergence among them?

To shed light on these questions, it is insightful to examine the reality of the European Union (EU). The EU presents a captivating case study, encompassing a group of developed countries that share several distinguishing characteristics. By being part of the EU, these nations benefit from a framework of common policies and regulations that aim to foster economic integration and convergence among member states. We should remember that the Treaty of Rome, signed in 1957, established the European Economic Community (EEC) with the goal of promoting economic integration and cooperation among its member states. One of the key objectives of the EEC, as established on the foundations of the Treaty, was to achieve economic convergence between its member countries.

In this dissertation, our focus will be directed towards the countries that make up the Eurozone, or those that have completed the process of joining the single currency area since 1995 and introduced the euro banknotes and coins into circulation. This choice is predicated on the premise that by concentrating our analysis on these nations, we can introduce an additional layer of financial integration, thus making it reasonable to anticipate a higher degree of economic convergence. The establishment of this currency union, within the broader framework of the European Union, has forged a unique environment where economic convergence is not only anticipated but also imperative for ensuring the stability and prosperity of the monetary union.

This study delves into the intricate relationship between financial development and economic dynamics within the countries of the European Monetary Union (EMU). Spanning the years from 1995 to 2019, a period marked by significant technological advancements and evolving priorities, this research employs an innovative time-varying approach to estimate β-convergence. Its primary aim is to investigate whether the level of financial development within each Eurozone member's economy played a consequential role in guiding these economies toward their respective steady states and, in turn, in mitigating disparities among nations. We will also explore whether financial development, in conjunction with the sectoral intensity of these countries, contributed to the convergence of their respective economies towards their steady states.

2. Literature review

β-convergence, introduced by Sala-i-Martin and Barro (1992) examines whether economies with lower initial levels of development tend to experience faster growth rates compared to more affluent ones. This convergence can take two forms: absolute and conditional. In the case of absolute convergence, the disparities in economic indicators between regions or countries diminish as time passes. This results in less developed regions progressively catching up with their more prosperous counterparts. Alternatively, conditional convergence acknowledges that the relationship between initial levels and growth rates can be influenced by various external factors. There is also σ-convergence, which entails whether the initial dispersion of economic indicators decreases or increases along development trajectories.

Conclusions regarding convergence among countries or regions will always rely on the specifications of the employed model and the constraints imposed within it to account for the effects of disparities observed across diverse economies. This phenomenon is exemplified by Sala-i-Martin (2016) in his study of a large cross-section of 110 countries. In absolute terms, he found that income inequality not only fails to diminish among these nations but rather tends to escalate over time. However, upon introducing proxy variables for the steady state of economies, conditional β-convergence was ultimately observed.

Numerous studies have challenged prevailing assumptions and introduced fresh conceptual and methodological specifications to models aiming to explore the existence of convergence. Quah (1993) revealed that commonly employed initial-level regressions do not contribute to the assumption that every country will eventually achieve similar prosperity and reduce disparities over time. Bernard and Jones (1996) put forth a theoretical framework allowing for technology variations among countries and found it significantly influences convergence. Boyle and McCarthy (1997) recommended using a rank concordance index (γ-convergence) alongside σ-convergence to test for β-convergence.

In our study, we will introduce an innovative approach (Ekkehart Schlicht, 2021) aimed at examining the potential relationship between β-convergence and the conceivable steady states of Eurozone members. This analysis will take into account financial and sectoral variables as conditioning factors.

The financial sector plays a crucial role in the economy by facilitating the allocation of funds from individuals with surplus capital to firms in need of additional funds for their investment projects. This dual role of financial development is pivotal. Firstly, it reduces the costs associated with saving and investing, thereby lowering the overall cost of capital in the economy. Secondly, it uses financial markets and institutions to address issues like moral hazard and adverse selection, ultimately reducing the costs of external financing compared to utilizing internal funds such as cash flows (Rajan & Zingales, 1996).

Evaluating the effectiveness of the financial system in achieving these objectives within a specific economy provides valuable insights into its level of financial development. While this assessment can be somewhat subjective, the aim is to establish proxies that characterize the dimensions of the financial system, aligning with its goals.

In this context, we adopt the conceptual framework introduced by Cihák et al. (2012), which defines four critical categories: depth, access, efficiency, and stability. These categories focus on the two primary channels through which the financial system operates: financial institutions and capital markets.

Financial Depth, as the name suggests, seeks to measure the extent and size of the financial system. To do so, metrics and indicators that assess the proportion of financial indicators relative to GDP are primarily utilized. A significant body of literature employs such metrics to establish a link with economic growth. King and Levine (1993) used variables like liquid liabilities of the financial system normalized by GDP and the ratio of bank credit to the sum of bank credit and central bank domestic assets for a cross-country analysis involving 80 nations. They found a robust and statistically significant association between measures of financial depth and economic growth. They also noted that the level of financial development in 1960 effectively predicted subsequent rates of economic growth over the next 30 years. However, Rousseau and Wachtel (2005), studying data from 1960 to 2003 across 84 countries, were unable to consistently establish a positive relationship between financial depth and economic growth for the final 15 years of the observed period.

Other metrics that fall under the category of depth measures, such as enterprise credit as a percentage of GDP in Sassi and Gasmi (2014), bank credit to the private sector as a share of GDP, market capitalization relative to GDP, and the value of trades relative to GDP, have all demonstrated positive impacts on economic growth (Levine & Zervos, 1998; Rousseau & Wachtel, 1998).

Moving on to the second dimension, Financial Accessibility - a significant aspect of financial development - pertains to the ease with which individuals and businesses can access and utilize a wide range of financial services and products offered by formal financial institutions and markets. Although the literature on this topic is relatively limited, likely due to data availability challenges (Arora, 2010), there are notable empirical insights.

Burgess and Pande (2005) highlight the positive impact of state-led initiatives to expand rural bank branches in India, effectively reducing poverty levels. Brune et al. (2011) provide findings from rural Malawi, demonstrating the benefits of enhanced financial access through commitment savings accounts for impoverished households.

These accounts served as a financial cushion during tough times. Allen et al. (2012) offer insights from Kenya, where commercial banks extended their services to underserved households, significantly improving financial access for the impoverished population.

Kim (2016), using cross-sectional data from forty countries between 2004 and 2011, investigated the impact of financial inclusion, measured in terms of financial accessibility, on income inequality and per capita GDP growth. Kim's research suggests that financial inclusion reduces income inequality and enhances the relationship between income inequality and economic growth.

Furthermore, to measure financial accessibility within the financial sector, several authors have proposed composite indexes (Arora, 2010; Cihák, 2012; Park & Mercado, 2018). These indexes have shown a positive and explanatory significance in economic growth, albeit with variations depending on the groups of countries considered and their specific characteristics.

Turning to the third dimension, Efficiency within the realm of stock markets is often assessed through metrics such as liquidity. Demirgüç-Kunt and Maksimovic (1998), as well as Levine and Zervos (1998), have conducted research indicating a positive correlation between market liquidity and GDP growth. At the financial institution level, Tarus, Chekol and Mutwol (2012) concluded that the lower the economic growth, the higher the net interest margins, which is commonly used as a benchmark for efficiency.

Lastly, it is also crucial to incorporate a variable representing financial sector instability in our study. The impact of financial instability on economic growth is multifaceted. While cyclical instability, including asset bubbles and excessive leverage, typically harms growth, volatility-driven instability may indicate increased risk-taking and improved information flow, potentially correlating positively with growth (Blejer, 2006). Dornbusch and Reynoso (1989) assert that financial factors significantly impact growth only when financial instability dominates the economy; otherwise, their impact on growth is minimal. Since the financial crisis, interest in financial stability has grown (Arcand et al., 2015; Cecchetti & Kharroubi, 2012; Beck, 2014), underscoring its relevance in economic research.

The role of finance in economic growth has been a longstanding subject of debate within the economics community. Lucas (1988) took a measured approach, suggesting that the influence of finance on growth might be overstated. In contrast, Miller (1988)

considered it self-evident that financial markets contribute significantly to economic growth. However, other scholars like Bagehot (1873) argued that dismissing the link between finance and growth would lead to an incomplete understanding of economic dynamics.

Regarding the convergence process among countries with different levels of development, Cavallaro and Villani's research in 2021, shed some light on this topic. They conducted an analysis of real income convergence within the EU28 countries from 1995 to 2017. Their conclusion emphasized that economic growth was inevitably restricted by the level of financial development, highlighting the critical role of financial integration in providing external financial resources and bolstering the growth of domestic financial markets and institutions.

In their 2022 study, Cavallaro and Villani expanded their research to examine a panel of 111 countries over the same period, 1995 to 2017. They uncovered a clustered pattern of growth and the existence of convergence clubs that were closely tied to the initial economic conditions of these economies. Their analysis also provided evidence that increasing financial development (or education) substantially raised the likelihood of a country belonging to higher-growth clubs, even when holding all other factors constant at their initial levels.

The other set of variables to be considered in our dissertation pertains to sectoral preferences. Existing literature suggests that these sectoral preferences do indeed influence economic growth and convergence among countries. As observed by Lewis (1954), the promotion of higher growth rates relies on encouraging savings, a feat accomplished through the expansion of an advanced sector capable of generating profits. These profits, in turn, contribute to increased savings, aligning with the principles of a classical savings function.

Furthermore, research by Sala-i-Martin and Barro (1992) demonstrated that the distribution of income across sectors significantly impacts the analysis of convergence, even among regions as observed in the case of US states. States with lower levels of prosperity often exhibited a particular sector composition, primarily agrarian, which translated into relatively modest growth. However, these patterns shifted during other periods, marked by changes in the distribution of income across sectors.

Additionally, countries with abundant natural resources, with a significant share of their GDP derived from the mining sector, have consistently shown a robust correlation with economic growth (Sala-i-Martin et al., 2004). It is evident that technological advancement primarily stems from sectors focused on generating innovative ideas to enhance productivity. The pivotal factor in this process lies in the efficient allocation of resources to these productive sectors, as emphasized by Stern (1991).

It is also essential to recognize the interconnectedness between financial variables and sectoral preferences. The development of financial systems can indeed influence sectoral preferences, as highlighted by Nove and Gerschenkron in 1962, who discussed its pivotal role in the industrialization process. Nevertheless, it's worth mentioning that according to Beck et al. (2014), the size of the financial sector, when adjusted for the level of intermediation within an economy, does not seem to have a substantial impact on long-term economic growth or stability.

3. Empirical Framework

3.1. Data

This research study relies on empirical analysis conducted using a dataset encompassing twenty Eurozone countries. Specifically, these countries are Austria, Belgium, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia, and Spain. The dataset comprises cross-sectional time series data spanning from the year 1995 to 2019. Figure 1 visually presents our sample, showcasing these countries on a map of Europe, along with a timeline showing their entry into the Eurozone.

TIMELINE – Joining the Euro Area

1999 - Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain

2001 – Greece

2002 – Coins and banknotes were launched

2007 – Slovenia

2008 – Cyprus and Malta

2009 – Slovakia

2011 – Estonia

2014 – Latvia

2015 – Lithuania

2023 - Croatia
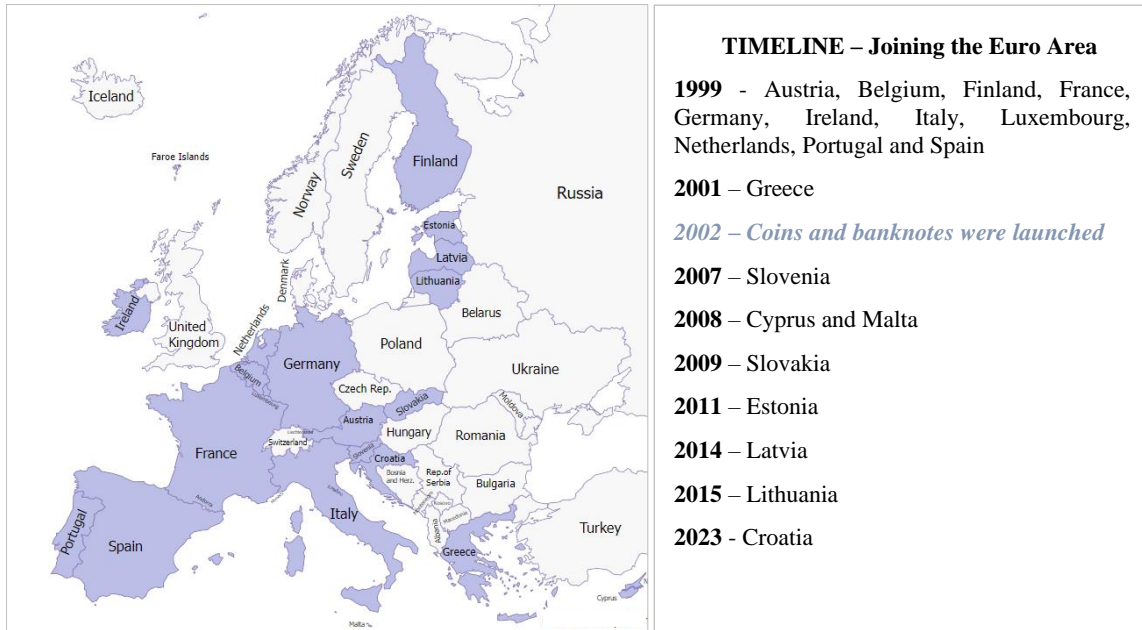
Figure 1 – Current Euro Area Member States (2023) and Historical Timeline of Euro Area Accession.

SOURCE: Elaborated by Author

It's worth noting that while data for certain variables is available up to the year 2023, we have chosen to exclude more recent years from our analysis. This decision is primarily driven by two factors: the unavailability of crucial data for other variables and the potential influence of the global Covid-19 pandemic on the data, which could introduce significant distortions or anomalies.

Our dependent variable is *β*-convergence, indicating the tendency of countries in our sample to approach their steady state economic conditions. Since we calculate this variable ourselves, we use real GDP per capita data extracted from the AMECO database.

Our independent variables can be broadly categorized into two main areas: financial and economic factors.

Regarding financial variables, we adhere to the conceptual framework outlined by Cihák et al. (2012), which benchmarks financial systems by categorizing them into four key dimensions – Depth, Access, Efficiency, and Stability. These dimensions relate to the two primary channels utilized by financial systems and the financial sector – financial institutions and financial markets.

Concerning the first three dimensions, Depth quantifies the extent to which Financial Institutions and Financial Markets are established and diversified, reflecting the maturity of a country's financial system. Access aims to evaluate individuals' ability to access and effectively utilize financial services. Lastly, Efficiency measures how efficiently financial institutions and markets operate, taking into consideration their capacity to allocate resources, manage risks, and provide services effectively.

To characterize Depth, Access and Efficiency, we rely on a set of financial indicators related to them. For this purpose, we make use of the indexes developed by Sahay et al. (2015) and Svirydzenka (2016), which similarly follow the conceptual approach of Cihák et al. (2012). Figure 2, presented below, schematically illustrates the indexes variables utilized and their corresponding financial indicators incorporated in their construction. Additionally, you can also find a detailed breakdown of these indicators in Table A1 within the appendix.

Note: Conceptual framework definided by Čihák and et al. (2012).
Financial Develoment indices developed in the context of Sahay et al. (2015) and Svirydzenka (2016).
Variable names are defined by the autor, with the prefix "fi" denoting Financial Institutions and "fm" denoting Financial Markets.

Figure 2 – Financial Development Indexes Variables and Corresponding Constituent Financial Sector Indicators

We also incorporate a variable related to the fourth dimension - stability of the financial system. It is worth noting that financial system stability encompasses a much broader concept than the other dimensions. For the purposes of this dissertation, we consider a stress index (CLIFS – Country-Level Financial Index) related to major financial markets, which characterizes events observed in these markets during periods of systemic stress over a 50-year period (1964 to 2014). This index was introduced by Duprey et al. (2017) and is substantiated by the correlation between stress observed in equity markets, bond markets, and foreign exchange markets.

To assess stress in these markets, two indicators per market are introduced: one focuses on measuring periods of volatility, and the other aims to quantify significant and lasting changes in these markets (through increases in bond market spreads, cumulative losses in equity markets, and significant cumulative changes in foreign exchange markets).

Finally, the economic variables we incorporate are designed to gauge the strength of economic sectors, which are classified according to the ISIC rev.4/NACE rev.2 classification system (Carré, 2008). We do this by comparing them in terms of their contribution to the Gross Value Added (GVA), expressed as a percentage of the cumulative GVA for all sectors. We extracted this information from the EUROSTAT database.

The summary of all the variables used in this dissertation can be found in Appendix Table A2.

3.2. Methodology

Our analysis is conducted in two steps. First, we estimate a time-varying conditional β-convergence, i.e., we estimate the convergence of each country towards its steady state. For that, we estimate equation (1):

$$GDPpcgr_{i,t,t-10} = \beta_0 + \beta_{i,t} GDPpc_{i,t-10} \ (1)$$

where $GDPpcgr_{t,t-10}$ represent the annual average growth rate between period *t* and *t-10* and $GDPpc_{t-10}$ is the initial per capita GDP. We consider that a 10-years interval is a sufficient time period to consider convergence phenomenon, which is considered a long-run growth process. Moreover, it is important to mention that per capita GDP is in natural logarithm. In order to estimate equation (1) we resort to Schlicht's (2021) approach. Therefore, we obtain a time-varying series of conditional β-convergence values for each

country. Additionally, and as we use data from 1995 to 2019, and, at the same time, we use a lag of 10-years, we then obtain a time-series for conditional convergence between 2005 and 2019.

Secondly, we use the previously obtained time-varying coefficients for the conditional convergence for each country ($\beta_{i,t}$) as the dependent variable and regress it on the abovementioned financial (and economic) sector variables of our interest:

$$\beta_{i,t} = \alpha_0 + \alpha_1 FIN_{j,i,t-10} + \varepsilon_{i,t} \; (2),$$

where $FIN_{j,i,t-10}$ represents the explanatory *j*-finance for country *i* at time *t-10* in order to assess the long-run contribution of the financial sector independent variable for the long-run steady state convergence. Moreover, as the dependent variable, $\beta_{i,t}$, is a pre-estimated variable, we resort to Weighted Least Squares (WLS) estimation technique in a panel data framework to account for the accuracy problem (as β is estimated, it is recognized that there more precise estimated coefficient than others). In line with this, we weighted our regression by the inverse of the standard error of the conditional β-convergence coefficients obtained in estimation of regression (1).

4. ANALYSIS AND DISCUSSION OF RESULTS

4.1. β-Convergence Hypothesis

As a starting point for our analysis, it is essential to examine whether our initial data for Eurozone countries demonstrate a convergence relationship between economic growth and the observed product over time. To do this, we have generated four graphs and plotted their respective trendlines (Figure 3 on the next page).

Based on these graphs, it appears that there is a convergence process in which economies with lower GDP per capita levels exhibit higher growth rates over time. Additionally, we have identified outliers, such as Ireland at various points and Greece, which was significantly impacted by the 2009 financial crisis.

Through this initial analysis, we observe that our data aligns with a pattern previously identified by multiple scholars. This pattern corresponds to the phenomenon of "catch-up growth," characterized by β-convergence, as articulated by Sala-i-Martin and Barro (1992).
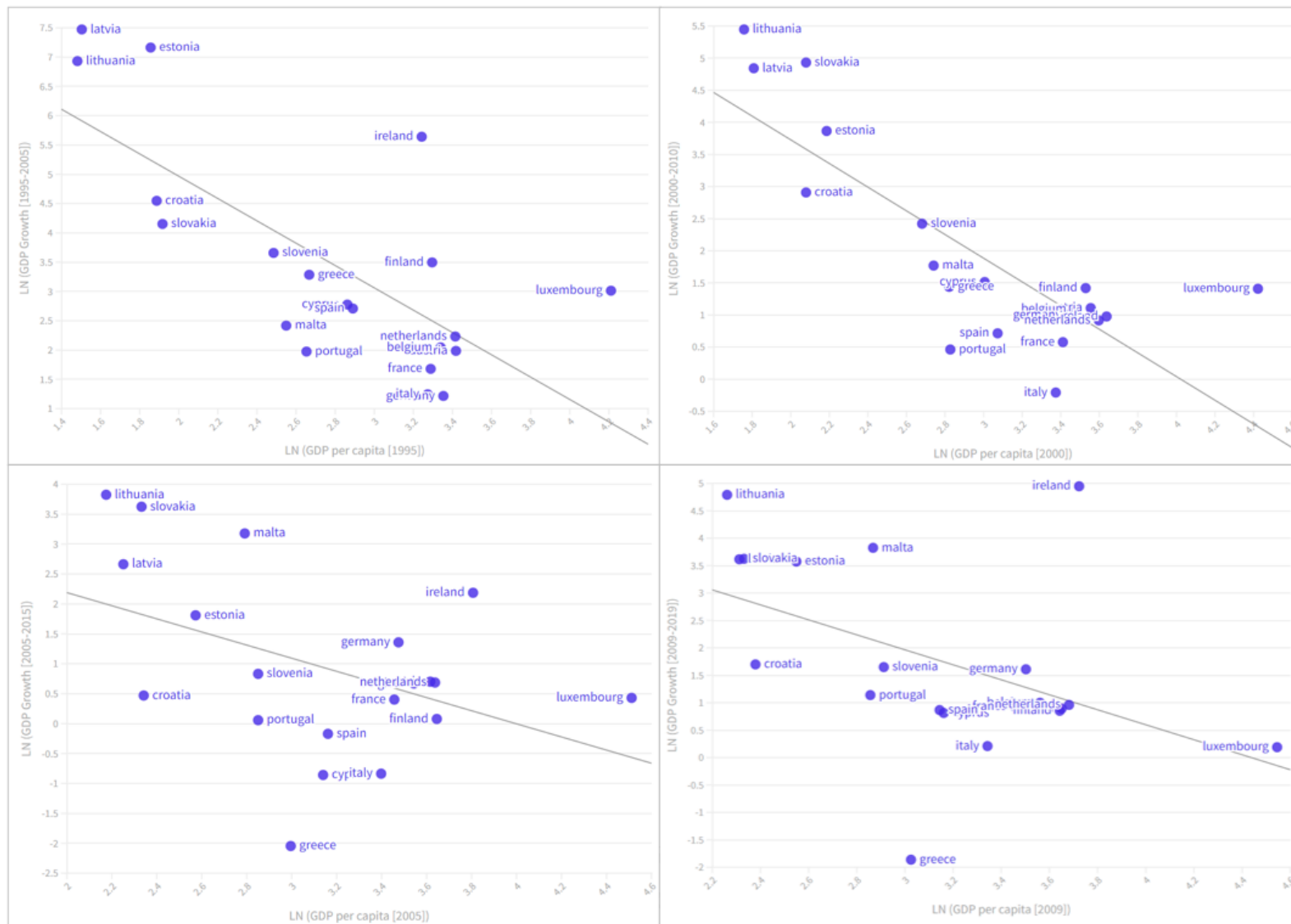
Figure 3 – Decade-long comparison of Initial GDP Per Capita vs Annual Growth Rate of four time periods (1995-2005, 2000-2010, 2005-2015, and 2009-2019)

SOURCE – Elaborated by Author

4.2. Financial Sector Analysis – Overall Pannel

TABLE I

WLS RESULTS, FINANCIAL SECTOR OVERALL PANEL

VARIABLES		(1) VII	(2) VII	(3) VII	(4) VII	(5) VII	(6) VII	(7) VII	(8) VII
	clif_**stress** (t-10)	0.006 (0.029)							0.034 (0.032)
Financial Institutions	fi_**depth** (t-10)		0.031*** (0.007)						-0.047*** (0.017)
	fi_**access** (t-10)			0.069*** (0.006)					0.036*** (0.009)
	fi_**efficiency** (t-10)				0.066*** (0.018)				0.004 (0.030)
Financial Markets	fm_**depth** (t-10)					0.048*** (0.005)			0.022* (0.012)
	fm_**access** (t-10)						0.028*** (0.006)		0.025*** (0.007)
	fm_**efficiency** (t-10)							0.019*** (0.005)	0.024*** (0.006)
	Constant	9.577*** (0.872)	7.043*** (0.820)	4.347*** (0.747)	4.910*** (1.068)	7.407*** (0.727)	7.464*** (0.748)	8.094*** (0.867)	6.397*** (2.165)
	Observations	262	300	300	300	300	300	255	238
	R-squared	0.016	0.050	0.208	0.033	0.148	0.069	0.050	0.209

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Our analysis begins with an examination of financial development variables. The financial stress index, whether considered in isolation or alongside other financial variables, does not demonstrate statistical significance. This outcome is unsurprising, as the impact of this variable is inherently uncertain, as it relies heavily on the volatility of major financial markets. As noted by Blejer (2006), this volatility can have a dual effect – negative for growth when linked to market inefficiencies like bubbles, mispricing, and excessive leverage, but also positive when associated with increased risk-taking.

The unpredictability of this variable's influence is due to its sensitivity to rapidly changing market dynamics influenced by various factors. Therefore, its reliability as a predictor or indicator for broader economic trends remains uncertain and should be approached cautiously in economic analysis.

In contrast, the remaining financial variables show statistical significance at the individual level, contributing positively to the model. However, it is important to note that these variables have limited explanatory power, indicated by the low R-squared values in individual variable analyses.

When collectively analysing the financial development variables, our results differ considerably when comparing the two primary channels through which the financial system operates.

In the realm of financial institutions, we observe that efficiency (measured by the *fi_efficiency* index) loses its statistical significance. Furthermore, financial institutional depth (*fi_depth* index) starts to exhibit a negative influence on the model. On the other hand, greater access (*fi_access* index) to these institutions has a positive impact on the model.

Regarding financial markets, we find that the impact is statistically significant and positive for economic convergence across all observed dimensions.

These findings correspond with some of the literature we reviewed. The influence of financial depth on economic growth and convergence remains a topic of discussion, especially in recent years when the positive effect is not readily apparent, particularly in wealthier countries where this relationship is absent, as highlighted by Rousseau and Wachtel (2005). In this scenario, we obtained mixed results, as the effect of greater depth is negative in the case of financial institutions but positive in the case of financial markets.

Enhanced access to financial markets and institutions positively impacts the model, consistent with research findings from Allen et al. (2014) and Kim (2016), emphasizing the positive effects of improved financial inclusion.

Lastly, concerning efficiency, our findings in the realm of financial markets align with Demirgüç-Kunt and Maksimovic (1998) and Levine and Zervos (1998), underscoring the importance of increased liquidity in markets for GDP growth.

The R-squared value in the regression that attempts to explain β-convergence significantly increases to 0.21 when these various variables are considered together. However, it is important to acknowledge that the regression model remains limited in its explanatory and predictive capabilities. This is expected, given that the convergence of countries is a complex process influenced by numerous factors.

4.3. Financial Sector Analysis – European Region

When conducting a regional analysis, we generate results based on four regions defined by their geographical location in the European continent (please refer to Figure 4 for their identification).
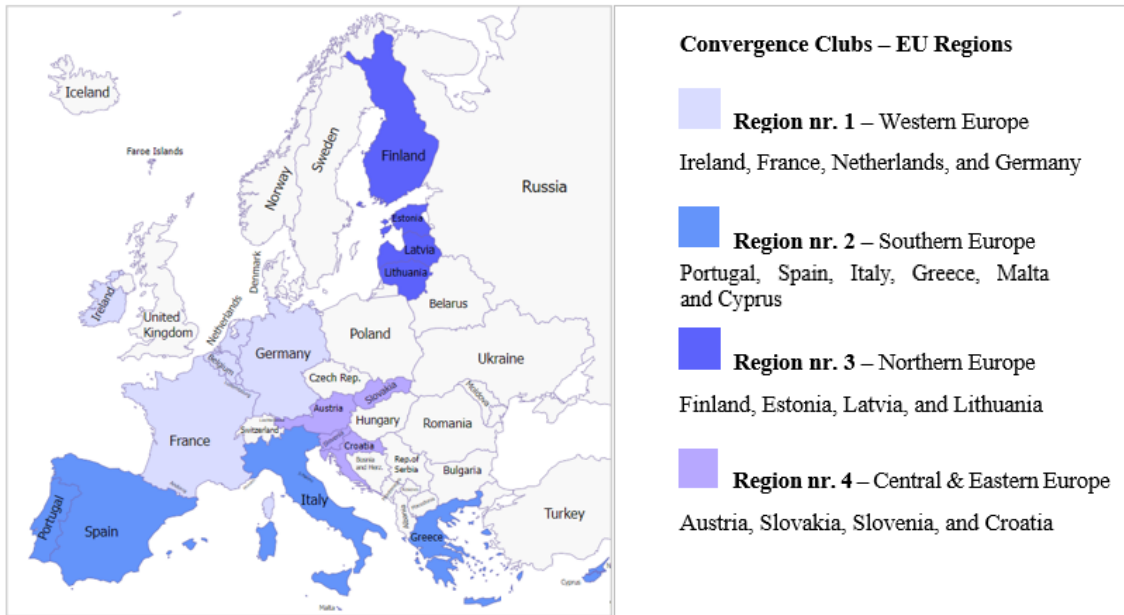
Figure 4 – Convergence Clubs in Eurozone: Breakdown by European Regions.

Source: Elaborated by Author

In Table II, which is presented below, we can ascertain the results obtained for the Eurozone regions.

TABLE II

WLS RESULTS, FINANCIAL SECTOR BY EU REGIONS

VARIABLES		Eurozone Region			
		Western	Southern	Northern	Central & Eastern
	clif_**stress** (t-10)	-0.006	-0.071	-0.004	0.016
		(0.018)	(0.070)	(0.004)	(0.024)
	fi_**depth** (t-10)	0.036**	-0.282***	0.006	-0.022*
		(0.014)	(0.032)	(0.004)	(0.012)
Financial Institutions	fi_**access** (t-10)	-0.010	0.087*	-0.009	0.003
		(0.021)	(0.046)	(0.006)	(0.016)
	fi_**efficiency** (t-10)	-0.068***	-0.329***	0.002	0.079***
		(0.023)	(0.120)	(0.004)	(0.019)
	fm_**depth** (t-10)	0.032**	0.072	-0.012***	-0.017
		(0.012)	(0.045)	(0.003)	(0.018)
Financial Markets	fm_**access** (t-10)	0.004	-0.058**	0.001	0.067***
		(0.008)	(0.024)	(0.006)	(0.010)
	fm_**efficiency** (t-10)	-0.032***	0.009	0.002	0.014
		(0.007)	(0.020)	(0.002)	(0.009)
	Constant	11.517***	33.184***	8.674***	0.142
		(2.307)	(7.114)	(0.372)	(1.231)
	Observations	90	85	15	48
	R-squared	0.560	0.562	0.617	0.962

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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Our findings are intriguing and more multifaceted when compared to the overall panel results. In the Western European region, the depth of financial institutions and financial markets has a positive influence on the model, while their efficiency has a negative effect. It is crucial to note that Western European countries had higher levels of these variables in 1995 compared to the other regions under consideration. Figure 5, presented below, provides a graphical illustration for better understanding.
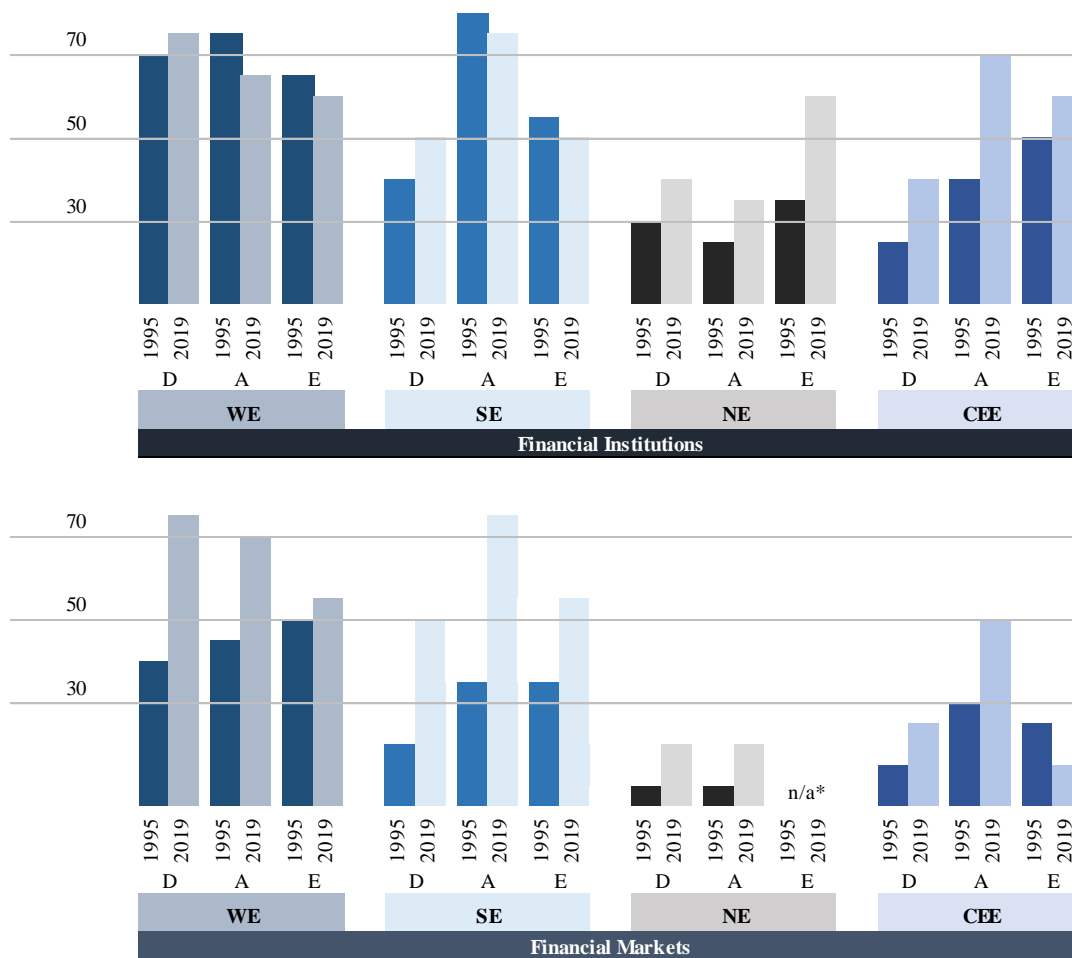
* Number of observations not reasonable for graphic presentation

Note: Y axis: Level of D/A/E Development (Scale between 1-100. Higher the Better).

X axis: D: Depth, A: Access; E: Efficiency

Figure 5 – Depth, Access, and Efficiency Levels by Eurozone region: Comparison between 1995 (start of our sample timespan) and 2019 (ending observation).

SOURCE: Elaborated by Author

This prompts the question of the extent to which greater financial development, above a hypothetical threshold, is crucial for regional convergence toward their potential output levels. In terms of economic growth, it is noteworthy that while the GDP of these economies (comprising the WE group) increased significantly over the observed timespan (the average real GDP was approximately 35 thousand euros in 1995 compared to 53 thousand euros in 2019), the evolution of these variables did not exhibit uniform trends.

Regarding financial institutions, the average values observed in 1995 (the beginning of our sample) compared to those in 2019 (the end of our sample) have remained relatively stable, with a decline in both access and efficiency of these institutions.

In the domain of financial markets, there has been some growth, particularly in terms of their depth and access dimensions. However, as mentioned earlier, only depth holds statistically significant importance in our model and contributes positively to it.

Finally, mirroring the findings in the overall panel, our financial stress variable lacks statistical significance. As mentioned earlier, the impact of periods of high financial stress on economic growth is ambiguous, with some events indeed leading to uncertain short to medium-term recovery, while others do not have such a negative systemic effect on growth (Barro, 2001).

In Southern Europe, we observed that the analysed variables experienced growth from 1995 until the onset of the 2009 financial crisis. From 2009 onwards, some variables gradually declined while others stabilized (Figure 6 allows us to observe the change in the growth trend seen until the financial crisis, identified by the red dashed line in the Figure). Notably, this observation finds some support in the findings of Cavani and Villani, who had previously identified that the growth convergence process of the early 2000s lost its initial momentum due to the global financial crisis. Furthermore, the unique legacies of individual countries played a significant role in the emergence and solidification of these economic asymmetries. Additionally, Cabral and Castellanos-Sousa (2019) also found evidence that the average output per capita and rate of convergence in European Union fell sharply during the financial crisis.
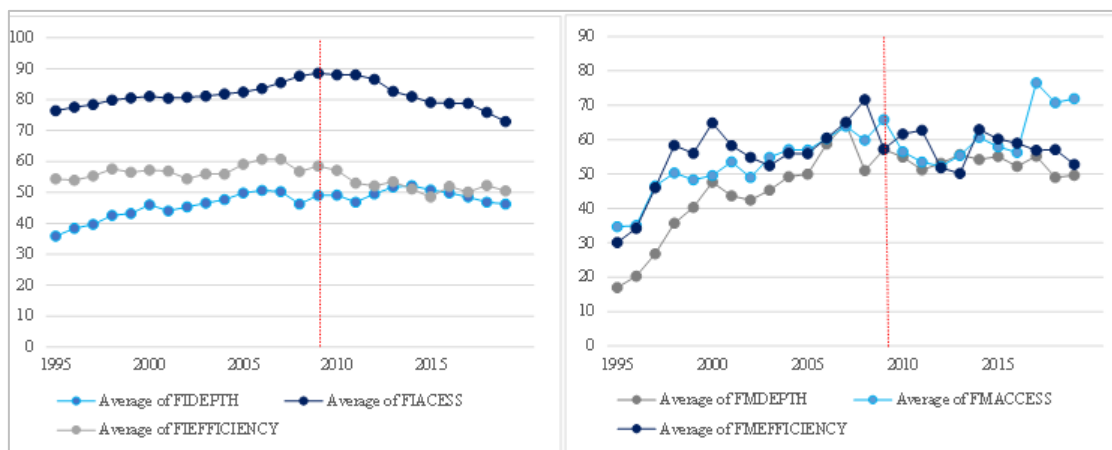
Note: Red line Indicates financial crisis of 2009 starting point.

Figure 6 – Progression of Financial Institutions (left side graph) and Financial Markets Variables (right side graph) from 1995 to 2019.

SOURCE: Elaborated by Author

An intriguing aspect of the progression of variables in this group is the resilience exhibited by access to financial markets in the face of the negative or stagnant trend triggered by the financial crisis. Access to financial markets began to rebound between 2016 and 2019 (as indicated by the light blue line on the right side of Figure 6). This notable recovery coincided with a period of substantial growth in financial markets, primarily attributable to the expansionary monetary policy implemented by the European Central Bank. The ECB's initiatives such as the effort to reduce borrowing costs and stabilize the most vulnerable economies may have played a pivotal role in facilitating and enhancing the accessibility of financial markets for numerous stakeholders.

However, when it comes to determining whether these aspects of financial development ultimately account for the economic convergence of these economies towards their potential steady states, our findings do not support this hypothesis. Concerning financial institutions, both the depth and efficiency dimensions negatively impact the model, apart from access, which enters positively, albeit with a 90% confidence level. Regarding financial markets, access, on the other hand, has a negative impact, while the remaining dimensions do not exhibit statistical significance.

Given these results, it would be valuable to isolate specific time periods to account for the impact of the financial crisis, which appears to be a clear adverse event that may be influencing our model.

The Northern Europe region is the one among the four regions that exhibits comparatively lower levels of financial development. This region, somewhat akin to the Central and Eastern Europe region, consists of a variety of countries with highly distinct characteristics. Take, for example, Finland, which demonstrates financial development levels more in line with Western Europe than with its counterparts within its group, such as Estonia or Lithuania.

In a way, one might expect that the changes in the financial variables considered over our timespan would result in statistically significant positive coefficients in our model. However, what we have observed is that the generated model itself is not very explanatory. Only the depth of financial markets is statistically significant, entering the model in a negative manner.

Now, if we are to draw any conclusions, it raises the question of whether this group may be heterogeneous enough to hinder the convergence effect among its members, or if our dataset is not comprehensive enough to provide a conclusive view on the hypothesis initially proposed.

So far, the observed results have been somewhat ambiguous, with some variables having a negative impact on the model. However, now we turn our attention to the central and eastern zone of the countries within the euro area. It is worth noting that this region, unlike Western Europe or Southern Europe, is characterized by lower initial levels of these variables and more significant increases over time (except for the efficiency of financial markets). Therefore, it is reasonable to anticipate certain benefits arising from increased financial development in this context, as it is plausible that additional financial development from such initial low levels might yield a more substantial impact.

Upon examination, we find that the efficiency of financial institutions and increased access to financial markets have a positive impact on our model. Interestingly, greater access to financial institutions (along with their inherent services) does not have explanatory significance, and the depth of these same institutions ends up entering the model negatively. Nevertheless, the results are clearly positive when analysing this region.

4.4. Financial Sector Analysis – EMU Integration

Another perspective deserving attention pertains to the timing of countries' integration into the Eurozone. Article 140 of the Treaty on the Functioning of the European Union

(TFEU) outlines the membership criteria for Economic and Monetary Union and the adoption of the euro. In accordance with this article, member states are required to achieve a substantial and enduring level of economic convergence before they can join the euro area. This convergence is evaluated based on factors such as inflation, fiscal balances, public debt, exchange rates, long-term interest rates, and the strength of their institutional frameworks. The emphasis on sustainability is crucial, indicating that countries must consistently meet these criteria over time. This is not only a prerequisite for adopting the euro but also a vital component in preserving the stability and functionality of the currency union established within the EU.

Given this presumed higher level of convergence among participating countries, which is clearly dependent on our financial development variables, it is interesting to assess their contribution considering our analysis. In this manner, we have established two convergence groups: the early adopters of the euro (countries that joined the euro since the introduction of euro banknotes and coins in 2002) and late adopters (countries that joined on the following years until 2019). In this instance, we have opted to exclude Croatia from our analysis, given that its integration process into the Eurozone was finalized in 2023. Consequently, it would not be prudent to incorporate it into the analysis groups, especially considering that our variable observations only extend up to 2019. The implications for convergence, within the scope of the assumptions of this exercise, would require a more careful examination.
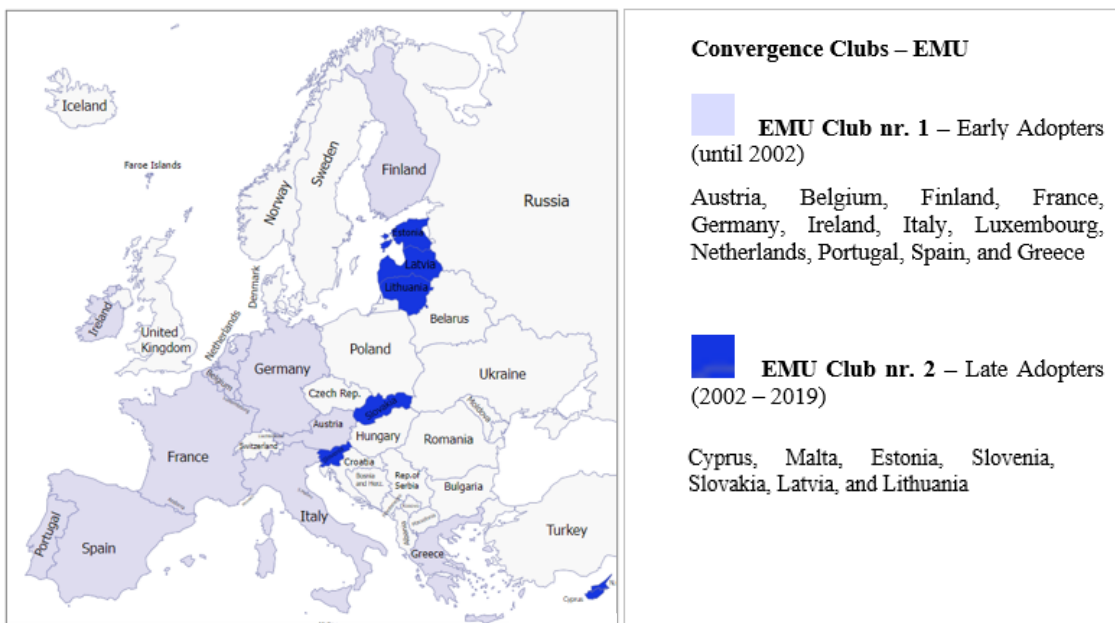
Figure 7 – Convergence Clubs in Eurozone: Grouped by EMU Integration Date

Source: Elaborated by Author

TABLE III

WLS RESULTS, FINANCIAL SECTOR BY EMU CLUBS

VARIABLES		EMU Early Adopters	EMU Late Adopters
	clif_**stress** (t-10)	**0.016**	**-0.007**
		-0.022	-0.043
Financial Institutions	fi_**depth** (t-10)	**-0.090*****	**-0.038**
		-0.01	-0.023
	fi_**access** (t-10)	**0.002**	**0.169*****
		-0.006	-0.021
	fi_**efficiency** (t-10)	**0.039***	**-0.061**
		-0.022	-0.051
Financial Markets	fm_**depth** (t-10)	**-0.001**	**-0.056**
		-0.008	-0.049
	fm_**access** (t-10)	**0.014****	**-0.045*****
		-0.007	-0.012
	fm_**efficiency** (t-10)	**-0.012****	**0.411*****
		-0.005	-0.044
	Constant	**11.948*****	**-0.284**
		-1.681	-2.872
	Observations	**180**	**47**
	R-squared	**0.491**	**0.957**

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The results obtained from this analysis are somewhat inconclusive. In the case of countries that adopted the euro at its inception, they demonstrate an added benefit from increased access to financial markets and financial institutions efficiency, in contrast to the negative influence of financial institutions' depth and financial market efficiency.

Conversely, for countries that adopted the euro in the following decade, they seem to gain advantages from enhanced access to financial institutions and improved financial market efficiency. However, it is noteworthy that in the latter group, access to financial markets appears to have a negative impact in this model. This could be attributed to these countries relying less on this channel or possibly due to the limitations of our sample size and the number of observations, which reduce the model's explanatory power, as evidenced by the high R-squared value it produces.

4.5. The role of sectors and financial sector variables

While the literature offers various references regarding the impact that one or more sectors can have on economic growth, as exemplified by the works of Lewis (1954), Sala-i-Martin and Barro (1992), Sala-i-Martin et al. (2004), among others, it is crucial to bear in mind that these analyses control for a set of explanatory variables (technological development, human capital, and other growth determinants) which, when considered collectively, provide a different perspective than what this dissertation aims to explore.

A more compelling approach, in line with our study objectives aimed at assessing the impact of financial development, involves conducting an analysis by economic sector in conjunction with a set of financial development variables. The purpose of this analysis is to determine whether the evolution of GVA within the sector over time contributes to explaining convergence towards the economies' steady states. Simultaneously, it seeks to investigate whether the changes in financial variables also hold importance within the considered model.

Now, if both the sector coefficient and our financial variables are statistically significant, it suggests the presence of a mutually reinforcing and complementary relationship between the financial system and economic activity.

The results are indeed intriguing. Sectors such as Agriculture, Forestry, and Fishing (NACE classification A), Construction (NACE classification F), Wholesale and Retail Trade, Transport, Accommodation, and Food Service Activities (NACE classification G, H, and I), Real Estate Activities (NACE classification L), and Public Administration, Defense, Education, Human Health, and Social Work Activities (NACE classification O, P, and Q), when analysed along with financial variables as the sole explanatory variables, enter the model positively and with statistical significance, contributing to the explanation of the convergence of Eurozone economies toward their steady states.

In contrast, the Industry sector (NACE Classification B, C, D, and E) and Professional, Scientific, and Technical Activities; Administrative and Support Service Activities (NACE Classification M and N) have a negative impact on explaining convergence.

TABLE IV

WLS RESULTS, SECTORAL PRODUCT AND FINANCIAL SYSTEM VARIABLES

		NACE Classification									
		A	**B, C, D and E**	**F**	**G, H and I**	**J**	**K**	**L**	**M and N**	**O, P and Q**	**R, S, T and U**
VARIABLES		Agriculture, Forestry and Fishing	Manufacturing, mining and quarrying and other industry	Construction	Wholesale and retail trade, transportation and storage, accomodation and food service activities	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific, technical, administration and support service activities	Public administration, defence, education, human health and social work activities	Other services
Sector		**1.432*** **	**-0.275*** **	**0.491*** **	**0.230*** **	**0.006**	**0.066**	**0.532*** **	**-0.573*** **	**0.251*** **	**-0.331**
		(0.123)	(0.041)	(0.108)	(0.080)	(0.154)	(0.056)	(0.149)	(0.088)	(0.087)	(0.257)
	clif_**stress** (t-10)	**0.055** **	**0.055***	**0.047**	**0.044**	**0.033**	**0.033**	**0.025**	**0.025**	**0.036**	**0.029**
		(0.023)	(0.028)	(0.031)	(0.031)	(0.033)	(0.033)	(0.031)	(0.030)	(0.032)	(0.033)
	fi_**depth** (t-10)	**-0.004**	**-0.011**	**-0.042*** **	**-0.023***	**-0.047*** **	**-0.047*** **	**-0.022**	**-0.027** **	**-0.051*** **	**-0.052*** **
		(0.012)	(0.015)	(0.016)	(0.014)	(0.017)	(0.017)	(0.015)	(0.014)	(0.017)	(0.017)
Financial Institutions	fi_**access** (t-10)	**0.027*** **	**0.017** **	**0.021** **	**0.025** **	**0.036*** **	**0.034*** **	**0.054*** **	**0.032*** **	**0.036*** **	**0.036*** **
		(0.008)	(0.009)	(0.009)	(0.011)	(0.009)	(0.008)	(0.010)	(0.009)	(0.009)	(0.009)
	fi_**efficiency** (t-10)	**-0.072*** **	**-0.021**	**-0.014**	**-0.019**	**0.004**	**0.005**	**0.051**	**-0.005**	**-0.002**	**0.003**
		(0.025)	(0.026)	(0.028)	(0.028)	(0.030)	(0.030)	(0.032)	(0.028)	(0.029)	(0.030)
	fm_**depth** (t-10)	**0.052*** **	**-0.019**	**0.033*** **	**0.030** **	**0.022***	**0.013**	**-0.005**	**0.050*** **	**0.023***	**0.018**
		(0.011)	(0.015)	(0.012)	(0.013)	(0.013)	(0.017)	(0.014)	(0.014)	(0.012)	(0.012)
Financial Markets	fm_**access** (t-10)	**0.025*** **	**0.027*** **	**0.018** **	**0.024*** **	**0.025*** **	**0.022*** **	**0.032*** **	**0.011**	**0.034*** **	**0.029*** **
		(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)	(0.006)	(0.008)	(0.008)	(0.007)
	fm_**efficiency** (t-10)	**0.010** **	**0.038*** **	**0.023*** **	**0.023*** **	**0.024*** **	**0.030*** **	**0.019*** **	**0.020*** **	**0.023*** **	**0.029*** **
		(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.009)	(0.006)	(0.005)	(0.006)	(0.007)
	Constant	**3.111** **	**13.538*** **	**5.012** **	**2.365**	**6.378*** **	**6.113*** **	**-2.640**	**10.293*** **	**2.251**	**7.536*** **
		(1.555)	(2.208)	(2.153)	(2.412)	(2.260)	(2.238)	(3.093)	(2.135)	(2.853)	(2.390)
	Observations	**238**	**238**	**238**	**238**	**238**	**238**	**238**	**238**	**238**	**238**
	R-squared	**0.519**	**0.369**	**0.274**	**0.253**	**0.209**	**0.213**	**0.267**	**0.317**	**0.230**	**0.217**

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

While this macro-level analysis provides valuable insights, explaining the exact reasons behind these sector-specific outcomes is challenging. Notably, sectors with negative impacts are often linked to research and innovation. There is a disparity across Europe, with innovation leaders primarily in Western and Northern Europe, while Southern European countries have been adversely affected by economic recessions impacting their research and innovation systems. Central-Eastern European countries have experienced varying effects, with some effectively using EU funds as counter-cyclical measures, while others struggle due to economic downturns, hampering their ability to leverage research and innovation funding (Izsak & Radosevic, 2017).

Another interesting result pertains to the relationship between the evolution of GVA in the financial sector itself and the financial variables. In this instance, this sector is not statistically significant, which aligns with economic intuition, as we are attempting to explain the effect of the sector itself through proxy variables that mimic it.

Additionally, several noteworthy points emerge from our analysis. Firstly, financial institutions' depth consistently exhibits a statistically significant negative relationship in most of the estimated regressions, aligning with the trends observed in the overall panel data. Conversely, greater access to both financial channels - institutions and financial markets - emerges as a positive variable in the models, mirroring what we observe for financial market efficiency and depth. However, the efficiency of financial institutions does not attain statistical significance.

In this reading and analysis, these results underscore the pivotal role played by financial markets in the convergence process of respective economies towards their steady states, particularly when considering the economic sectors composing them. These outcomes may be somewhat connected to the fact that over the timeline considered in our analysis, substantial advancements in access, efficiency, and depth of financial markets occurred, surpassing the magnitude of changes observed in the same variables for financial institutions (Figure 8 graphically illustrates this variation).
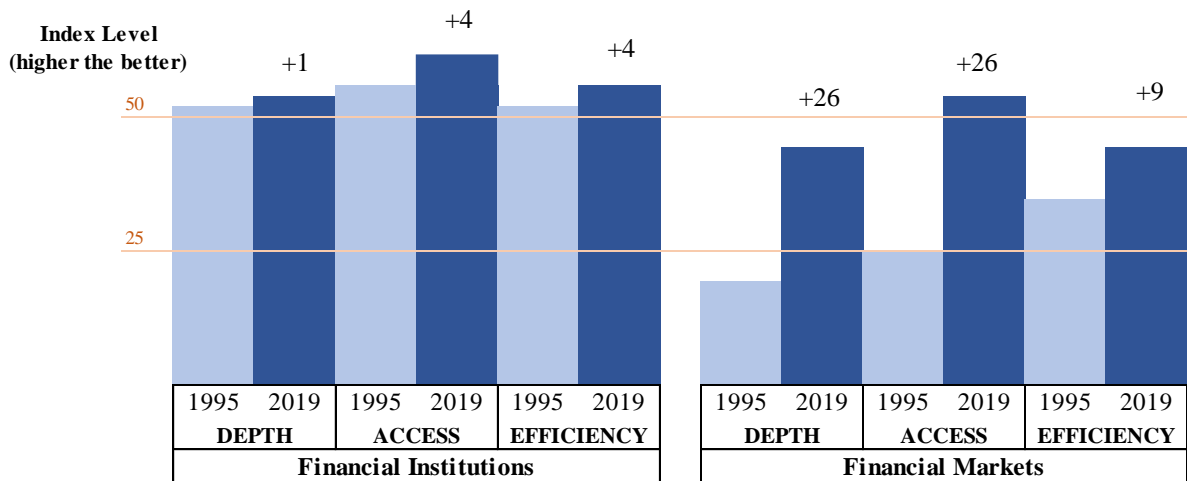
Figure 8 – Comparative evolution of financial sector variables

SOURCE: Elaborated by Author

Finally, these results may lend some support to the empirical evidence (Orlowski, 2020) for a move towards deeper integration of financial markets within the EU context, to foster economic growth.

5. CONCLUSION

It would be challenging to envision a world without the intervention of a financial sector, given the roles it performs and facilitates in the current dynamics that define our societies. Consequently, it would be difficult to argue against the notion that its intervention and development do not contribute positively to the growth of regions lacking in resources and investment.

With that said, our dissertation sought to contribute by addressing the question of whether, with some level of development already present in this financial system, its further enhancement (as evidenced by the increase in selected variables that characterize it) brings additional benefit to a process of economic convergence from an economy to its potential output level. In this case, the answer is not straightforward, and as observed in the extensive existing literature, multiple outcomes could be possible.

For this purpose, we utilized a sample that is inherently biased toward the existence of convergence. The Eurozone, in addition to the set of policies governing the European Union, imposes several preliminary convergence requirements for a country to participate. Right away, we observe that this catch-up growth process (β-convergence) occurred during the period under analysis, spanning from 1995 to 2019.

Regarding the relationship between convergence and the development of the financial sector, our findings are intriguing. When analysing the group of countries as a whole, the effects of greater financial development are unequivocal, especially at the level of financial markets. It is noteworthy that during our analysed timespan, we witnessed the most significant increases in depth, access, and efficiency in financial markets. On the other hand, for the majority of our analyses, greater depth of financial institutions is synonymous with a negative contribution to convergence.

Now, when delving into a cluster analysis, the results obtained are much more varied. At the regional level, we observe that Central and Eastern Europe benefit the most from increased financial development. In contrast, Western and Southern Europe experience negative effects of a larger financial sector on convergence towards a higher output level. These effects can be justified by the higher levels of financial development in Western Europe at the initial stage of our analysis period. In the case of Southern Europe, the effects of the financial crisis are undeniable, given that this crisis originated in the financial sector itself and may thus account for the negative impact.

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When it comes to providing a definitive answer regarding the benefits associated with a longer duration of integration into the Eurozone is a challenging task. What our model has demonstrated is that the dimensions of financial development that significantly contribute to convergence vary depending on the group of countries under analysis.

On one hand, those countries that adopted the single currency earlier seemed to benefit more from increased access to financial markets and improved efficiency of financial institutions in their convergence process. On the other hand, countries that adopted the single currency at a later stage placed greater emphasis on similar dimensions but through different channels, such as increased access to financial institutions and enhanced efficiency of financial markets.

It's worth noting that the concept of convergence within the Eurozone has been questioned by some scholars (Cabral & Castellanos-Sosa, 2019), although their analysis differs substantially from the one presented here.

Finally, we observe that the intensity of sectors, coupled with the dimensions of the financial system, jointly contribute to explaining the convergence process towards the steady states of their respective economies. A definitive conclusion may not be drawn from this macro-analysis alone, but it serves as an encouraging indication that indeed the financial system acts as an amplifier of activity in other sectors, thereby augmenting their contribution to an economic convergence process.

In conclusion, the question of whether financial development effectively contributes to the convergence of economies toward their potential output remains unresolved. We understand that this development is a necessary factor, and indeed, some of its dimensions are highly relevant. The when and why of its impact could be subject of future research. Expanding this analysis by incorporating variables typically associated with economic growth determinants, such as human capital, infrastructure development, capital accumulation, R&D efforts, management & organization, and the allocation of output towards more productive sectors (Stern, 1991), would be intriguing.

Furthermore, it would be highly interesting to correlate the obtained results with the geopolitical and economic events of the past three decades, both globally and within the European Union.

One undeniable fact is that the financial system is far too significant to be disregarded.

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APPENDICES

Table A1

FINANCIAL VARIABLES DIMENSIONS - DESCRIPTION OF INDICATORS

Dimension: **DEPTH**
Financial Markets | measured by *fm_depth*
Total debt securities of Financial and Non-Financial Corporations to GDP: This metric provides a comprehensive perspective on the issuance of debt securities by both financial and non-financial corporations in relation to the country's GDP, offering insights into the corporate debt landscape.
International debt securities of government to GDP: This indicator measures the volume of international debt securities issued by the government relative to the GDP, shedding light on external financial obligations.
Stocks traded to GDP: This indicator reflects the value of stock market transactions as a percentage of the GDP, indicating the level of trading activity in these markets.
Stock market capitalization to GDP: This metric quantifies the total value of publicly traded stocks in comparison to the country's GDP, providing an assessment of the stock market's overall size."
Financial Institutions | measured by *fi_depth*
Private sector credit to GDP: This metric provides the ratio of deposit money bank credit issued to the private sector over GDP
Pension fund assets to GDP: Financial metric that assesses the size of pension funds relative to the overall economic output of a country or region, typically expressed as a percentage. It measures the total value of pension fund assets as a proportion of the Gross Domestic Product (GDP).
Mutual fund assets to GDP: Financial metric that evaluates the size of mutual fund investments within a country or region relative to its Gross Domestic Product (GDP). It is expressed as a percentage and provides insights into the significance of mutual funds in the investment landscape and their relationship to the overall economy.
Insurance premiums (life + non-life) to GDP: Financial metric that measures the total value of insurance premiums (including both life and non-life insurance) relative to the Gross Domestic Product (GDP) of a country or region. It is typically expressed as a percentage and provides insights into the size and significance of the insurance industry in relation to the overall economy.
Dimension: **ACCESS**
Financial Markets | measured by *fm_access*
Percent of market capitalization outside of top 10 largest companies
Total number of issuers of debt (domestic and external, financial and non-financial corporations) per 100,000 adults: Financial metric that measures the number of organizations, including both financial and non-financial corporations, within a given population that issue debt securities. This ratio is expressed per 100,000 adults and provides insights into the diversity and accessibility of debt markets within a specific region or economy.
Financial Institutions | measured by *fi_access*
Bank branches per 100,000 adults: Measures the density or availability of physical bank branches within a given population of adults. This indicator helps assess the accessibility of traditional banking services to the adult population.
ATMs per 100,000 adults: Measures the density or availability of Automated Teller Machines (ATMs) within a given population of adults. This indicator assesses the accessibility of ATM services
Dimension: **EFFICIENCY**

Financial Markets | measured by *fm_efficiency*	
Stock market turnover ratio (value traded/stock market capitalization): Financial metric that assesses the level of trading activity and liquidity in a stock market. It measures the proportion of the total stocks traded relative to the total market capitalization of the stocks listed on the exchange.	
Financial Institutions | measured by *fi_efficiency*	
Net interest margin: Financial metric used to evaluate the profitability and efficiency of a financial institution, such as a bank or credit union. It represents the difference between the interest income a financial institution earns from its interest-earning assets (like loans and investments) and the interest expenses it incurs on its interest-bearing liabilities (such as deposits and borrowings).	
Lending-deposits spread: Indicator which refers to the difference between the interest rate at which a financial institution lends money (e.g., through loans and credit products) and the interest rate it pays on deposits (e.g., savings accounts or certificates of deposit). Metric used to assess a bank's profitability and its ability to generate income from its core banking activities.	
Non-interest income to total income: Financial ratio that measures the proportion of a financial institution's total income that is derived from sources other than interest-related activities. It assesses the diversity of revenue streams for the institution and its reliance on non-interest income sources.	
Overhead costs to total assets: Financial ratio that evaluates the efficiency and cost management of a business or financial institution. Measures the proportion of a company's total operating expenses (often referred to as overhead costs) relative to its total assets.	
Return on assets: Profitability metric that measures the ability to generate earnings from its total assets.	
Return on equity: Profitability metric that measures the ability to generate earnings from its shareholders' Equity.	

SOURCE: ELABORATED BY AUTHOR

Table A2

VARIABLES AND INDICATORS - DESCRIPTION AND SOURCES

Variables and Indicators	Description	Source
fi_depth	Financial Institution Depth Sub-index *(view table A1 for detailed description)*	IMF
fi_efficiency	Financial Institution Efficiency Sub-index *(view table A1 for detailed description)*	IMF
fi_access	Financial Institution Access Sub-index *(view table A1 for detailed description)*	IMF
fm_depth	Financial Institution Depth Sub-index *(view table A1 for detailed description)*	IMF
fm_effiency	Financial Institution Efficiency Sub-index *(view table A1 for detailed description)*	IMF
fm_access	Financial Institution Acess Sub-index *(view table A1 for detailed description)*	IMF
clif_stress	Country-level Index of Financial Stress	ECB

gvanace_a	National accounts aggregates by industry - Gross Value Added (GVA) - Agriculture forestry and fishing (% of total)	EUROSTAT
gvanace_be	National accounts aggregates by industry - Gross Value Added (GVA) - Industry (except construction) (% of total)	EUROSTAT
gvanace_f	National accounts aggregates by industry - Gross Value Added (GVA) - Construction (% of total)	EUROSTAT
gvanace_gi	National accounts aggregates by industry - Gross Value Added (GVA) - Wholesale and retail trade, transport, accommodation and food service activities (% of total)	EUROSTAT
gvanace_j	National accounts aggregates by industry - Gross Value Added (GVA) - Information and communication (% of total)	EUROSTAT
gvanace_k	National accounts aggregates by industry - Gross Value Added (GVA) - Financial and insurance activities (% of total)	EUROSTAT
gvanace_l	National accounts aggregates by industry - Gross Value Added (GVA) - Real estate activities (% of total)	EUROSTAT
gvanace_mn	National accounts aggregates by industry - Gross Value Added (GVA) - Professional, scientific and technical activities; administrative and support service activities (% of total)	EUROSTAT
gvanace_oq	National accounts aggregates by industry - Gross Value Added (GVA) - Public administration, defence, education, human health and social work activities (% of total)	EUROSTAT
gvanace_ru	National accounts aggregates by industry - Gross Value Added (GVA) - Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies (% of total)	EUROSTAT

SOURCE: ELABORATED BY AUTHOR

	ISIC Rev. 4/ NACE Rev. 2 sections	Description
1	A	Agriculture, forestry and fishing
2	B, C, D and E	Manufacturing, mining and quarrying and other industry
2a	C	*Of which: manufacturing*
3	F	Construction
4	G, H and I	Wholesale and retail trade, transportation and storage, accommodation and food service activities
5	J	Information and communication
6	K	Financial and insurance activities
7	L	Real estate activities*
8	M and N	Professional, scientific, technical, administration and support service activities
9	O, P and Q	Public administration, defence, education, human health and social work activities
10	R, S, T and U	Other services

*   which includes imputed rents of owner-occupied dwellings

Figure A1 – High-level SNA/ISIC aggregation (Carré, 2008)