

BANK CONCENTRATION AND ECONOMIC GROWTH:
EVIDENCE FROM EU

AYŞE KÖSE BAYRAK

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BANK CONCENTRATION AND ECONOMIC GROWTH:
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AYŞE KÖSE BAYRAK

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Prof. Dr. Cengiz EROL
Director

I certify that this thesis satisfies all the requirements as a thesis
for the degree of Master of Arts.

Assoc. Prof. Ayla OĞUŞ BİNATLI
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in
scope and quality, as a thesis for the degree of Master of Arts.

Assoc. Prof. Saadet KASMAN
Supervisor

Examining Committee Members
(Title and Name in alphabetical
order of last name)

Assoc. Prof. Hasan Fehmi BAKLACI

Assoc. Prof. Ayla OĞUŞ BİNATLI

Assoc. Prof. Saadet KASMAN

ABSTRACT

BANK CONCENTRATION AND ECONOMIC GROWTH

KÖSE BAYRAK, AYŞE

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This thesis analyzes the relationship between the banking sector concentration and economic growth in the twenty five member countries of the EU and two candidate countries over the period 1993-2006. Using panel data, panel unit-root test, panel cointegration and Granger-Sims causality test are performed for twenty seven sampled countries. The results of panel cointegration tests indicate that there is weak evidence of cointegration between the economic growth and banking sector concentration. According to the Granger-Sims causality results, the direction of causality cannot be determined.

Keywords: Bank Concentration, Economic Growth, Financial Development, Panel Unit-Root Test, Panel Cointegration, Granger-Sims Causality Test, European Union

ÖZET

BANKACILIK SEKTÖRÜ YOĞUNLAŞMASI VE EKONOMİK BÜYÜME: AVRUPA BİRLİĞİ ÖRNEĞİ

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Bu tez Avrupa Birliği'ne üye yirmi beş ülke ve aday iki ülkenin 1993-2006 yılları arasına ait verileri kullanılarak bankacılık sektöründeki yoğunlaşmanın ekonomik büyüme üzerindeki rolünü analiz eder. Örneklenen 27 ülke verileri panel data kullanılarak, panel birim-kök testi, panel koentegrasyon testi ve Granger-Sims nedensellik testleri uygulanmıştır. Panel koentegrasyon testleri ekonomik büyüme ile bankacılık sektör yoğunlaşması arasında zayıf bir koentegrasyon bulunduğunu göstermiştir. Granger-Sims nedensellik testi ise ekonomik büyüme ile bankacılık sektör yoğunlaşması arasındaki nedensellik ilişkisinin hangi yöne olduğu hakkında kanıt gösterememiştir.

Anahtar Kelimeler: Banka Konsantrasyonu, Ekonomik Büyüme, Finansal Gelişme, Panel Birim-Kök Testi, Panel Koentegrasyon Testi, Granger-Sims Nedensellik Testi, Avrupa Birliği

To My Parents,

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INTRODUCTION

Recently there has been an increasing trend among researchers to study the relationship between financial development and economic growth. These studies usually based on that higher financial development fosters economic growth.

This thesis focuses on searching the role of concentration in banking sector on economic growth. In fact, it is accepted that the banking concentration and macroeconomic performance are related. Although policy-makers and academics admit that the circumstances of competition among banks play an important role in constituting economic growth, the possibility of the causality which originates from banking concentration to economic growth has attracted less attention.

There are considerable contradictions in the value of economic indicators between European Union states, this study commits to evaluate if these discrepancies can be related to the level of banking concentration. Moreover, the thesis aims to assess if the mentioned discrepancies arise from or produce the process of consolidation of banks.

Thesis employs panel data and panel unit-root test, panel cointegration and Granger-Sims causality tests to investigate the role of banking sector concentration on economic growth for the twenty five member countries of European Union and two candidate countries.

The thesis is organized as follows. Chapter 1 reviews a brief history of European Union and financial market integration with banking industry activities in the European Union. Chapter 2 presents the relationship between financial markets and economic growth and shows empirical evidences on finance and growth nexus. Chapter 3 describes the data used in the empirical analysis and economic methodology and empirical findings based on unit root tests, Granger causality tests within a framework of panel cointegration model.

CHAPTER 1

BANKING INDUSTRY IN EUROPEAN UNION

1.1. BRIEF HISTORY of EUROPEAN UNION and FINANCIAL MARKET INTEGRATION

After frequent and bloody wars which were ended up with the Second World War, European countries became united with their neighbors in order to secure the peace between them. In 1952 they signed the Treaty of Paris and constitute a common market for coal and steel. France, the Federal Republic of Germany, Italy, The Netherlands, Belgium and Luxembourg, were “the Founding Six” countries of the “European Coal and Steel Community” (ECSC). Although each member of the community had different aims while being members, the main idea was to eliminate the national autonomy on the indispensable coal and steel resources in order to maintain perpetual peace.

After the success that they achieved about the ECSC, the same six countries then decided to integrate the other parts of their economies. By removing trade barriers, they institute a common economic community. On March 25, 1957 these six countries established the European Economic Community (EEC) and the European Atomic Energy Community

(Euratom) by signing the Treaty of Rome which came into force on January 1, 1958. The main purpose of the EEC was to establish a common market in order to increase the growth rate of the involved economies, and ultimately the well-being of their citizens. In other words, EEC was aimed to institute an integrated market which is identified by the free movement of goods, employees, capital, services and the freedom of establishment. The meaning of the integration in this community is to take joint decisions about the matters such as consumer relations, culture, competition, environment, energy, trade, transport and agriculture. Consequently, community members repealed the customs tariffs on the industrial products.

Common Assembly, then the European Parliament, proposed to extend the powers of the European Coal and Steel Community to cover the other sources of energy. The ECSC, combined the executive bodies of the Euratom and the EEC in order to constitute a single institutional structure and develop common policies. The Merger Treaty was signed in Brussels in 1965 and came into force on July 1, 1967. Over a transitional 12 years time, the common market was fulfilled by December 31, 1969.

The success of the project influenced other European countries. In 1973, the EEC broadened to nine members with the entry of Denmark, Ireland and the United Kingdom. After that, EEC's action field enlarged with the development of social, regional and environmental policies, with the foundation of the European Regional Development Fund (ERDF) in 1975. Because of the recession, in 1970s, in fact until the mid-1980s, there has been made limited progress.

In 1981 Greece joined to the communities. In Milan, at June 1985, the European government leaders came together and discussed "Completing the Internal Market", the title of the White Paper. In this meeting, they set the common market's completion date as December 31, 1992. ("Europe 1992").

In 1986, Spain and Portugal followed Greece. This enlargement gave rise to a greater role for regional policies, with greater budget allocations for structural funds, with the aim of reducing the disparities of economic development among twelve members. Same year the 12 Member Countries introduced the first Integrated Mediterranean Programs (IMP) which aims to reduce the economic development gap among the members. The Single European Act was signed in 1986 and by that the creation of a great single market was agreed. In the 1992 with signing of the Maastricht Treaty, the Community was renamed as European Union (EU). In 1993, EU was planning to establish the Monetary Union for 1999. Also EU was planning to actuate some institutional reforms and expanding the field of action with common policies on citizenship, the common security and foreign policy (CSFP) and arrangements about homeland security.

On January 1, 1995, three countries; Austria, Finland and Sweden joined to the EU, raising the total membership to 15. The Euro, the single currency of the union, was created on January 1, 1999. The twelve of the EU's 15 members joined the currency. United Kingdom, Denmark and Greece did not join on 1999. But Denmark and Greece joined the currency in 2001. The Euro entered into circulation in 2002. On May 1, 2004 by including ten Central and Eastern European Countries; Malta, Cyprus, Czech Republic, Slovakia, Hungary, Poland, Slovenia, Estonia, Latvia and Lithuania, the number of the members of the union became 25. The last enlargement was occurred with the entry of the Romania and Bulgaria into the European Union of 27 members. Croatia, Macedonia and Turkey are the official candidate countries to the EU. Albania, Bosnia and Herzegovina, Montenegro and Serbia are officially recognized as potential candidates. Because not all the members of the union recognized Kosovo as an independent country separate from Serbia, the European Commission does not list Kosovo as an independent country and as a potential candidate.

The minimization of the differences in the living standards among the members is the main objective of the EU. As an instrument of economic cooperation and a mechanism of economic integration, regional policy accomplish this through transferring funds from the richest regions to the poorest ones.

Although there are still barriers to full integration, especially in retail banking, European banking markets have become more and more integrated in recent times. The total number of operating banks in EU15 countries decreased from 12.315 to 7.300. France, Germany, Italy, Spain and the UK are the countries which as known the five largest EU15 by population or GDP. In these countries the rate of increase was 340% in nominal terms. For the big five, the ratio of banking industry assets to GDP stood at 283% in 2004, in 1985 a large increase figure of 175%. According to Dermine (2006) this growth represents the effectiveness of deregulations and the single market program give rise to the end of repressed banking system. Despite the fact that there was a large diminution in the number of bank branches in UK, the size of branch networks increased between 1985 and 2004. Concurrently, the banking sector employment in the EU15 countries expanded by around 15% and in 2004 the total number of employees in banking sector increased to 2.8 millions.

1.2. BANKING INDUSTRY ACTIVITIES IN THE EU

Since the need to reconstruct a highly fragmented Europe into an integrated one, a certain number of steps have been taken concentrated at the deregulation and harmonization of the EU banking regulatory framework. The European Single Market establishment in 1993 made possible for financial institutions to open branches and present financial services in other EU member countries. Correspondingly, depending on the absence of exchange rate risk, the

European Monetary Union has made possible for savers to diversify their portfolio. Therefore corporate bond and equity markets have experienced significant structural changes. In addition to this important development, the approach of the financial institutions' management of credit risk has changed. Because the policies which set by European Central Bank, may occasionally not sufficient to all EU members, financial institutions may need to consider international diversification of their loan portfolio. Also some prudential rules are suggested to be considered. With reference to this necessity, The Financial Services Action Plan was accepted by European Commission in order to establish legislative and non-legislative frameworks essential to establish an optimal single financial market. Subsequently, at 2004 Basel II Accord was set out. Basel II Accord, aimed to minimize the regulatory capital requirements for banks in an undertaking to diminish potential risks encountered by financial system in the process of economic turmoil. So Basel II Accord fosters international convergence of capital measurement and capital standards. Consequently, encouraging the strengthening of banks' capital adequacy leads these requirements to promote mergers between banks. According to these developments, the EU banking industry has been experienced an aggravated stage of consolidation, especially since the early 1990s. Although there have been some exceptions for Scandinavian and Benelux countries, the cross-border mergers are still limited. Domestic mergers generally between large universal banks have played an essential role in the banking industry. In a rapidly changing environment, financial institutions are considering about mergers and acquisitions to provide the survival or growth of their businesses. Fundamentally, the consolidation should be motivated from the desire to augment the shareholder value. But mostly, the consolidation efforts bring about some disagreements between shareholders and managers.

Figueira and Nellis (2009) investigated merger and acquisition (M&A) activity in the EU banking system with using the data for the period of 1998-2004. The results of Figueira and Nellis (2009) provide evidence that banks have generally increased efficiency over time.

Because banks are being more market aware, more concentrated on customer demands, more struggling about product diversifying, they obtain higher non-interest-based revenues. In the last few years there have been political, social and economic changes which have been very essential, in the environment of the EU. These are the changes that very significant for supporting the integration of the European banking system. The European Single Market completion, the enlargement of the EU to 27 member countries, the Euro establishment and constitution of the Financial Services Act Plan are some of these changes that underpinned the integration process. Additionally there have been other changes based on the Basel Accords, also taken place in the global regulatory frameworks which have been substantial in conclusions corresponding to bank consolidation in and across states. Figueira and Nellis (2009) suggest that, it is not to say that M&As are not a high risk route of development. In fact, as Schoenberg (2006) put forward that almost half of all cross-border acquisitions fail to meet their initial aims. Consolidation generally offer banks access to more customers but does not consistently leads to profitable growth or an improvement in the quality of the loan portfolio. Sometimes it devastates shareholder value.

CHAPTER 2

ANALYZING RELATIONSHIP BETWEEN FINANCIAL MARKETS AND ECONOMIC GROWTH

2.1. FINANCIAL MARKETS and ECONOMIC GROWTH

Economists have different aspects about the relationship between financial development and economic growth. Credit markets are discussed in terms of its impact on economic growth since the beginning of the 20th century. In his initial work Schumpeter (1911) asserted that entrepreneurs demand credit to adopt new production techniques. Banks, as a key agent of financial systems, facilitate financial activities and economic growth. Therefore well-developed financial systems guide financial resources to be used effectively.

However, Robinson (1952) contend that financial development cannot promote economic growth, in fact he postulates that because the higher demand for financial services, financial development reacts economic growth in a passive level. Schumpeter's work put forth the important role of credit markets in the process of economic development for consideration. A good number of researchers traced his work.

Gurley & Shaw (1955), Goldsmith (1956) and Hicks (1969) followed Schumpeter. They argue that financial system development is excessively important in order to foster economic growth. Underdeveloped financial systems cannot promote economic growth. Around this main idea they formed "financial structuralist view". According to this view, financial systems should be expanded in order to stimulate economic growth. The more financial services are provided

and financial products are supplied, the more positive impact on economic growth should be achieved.

In the 1970s, in contrast to the Keynesian model, McKinnon (1973) and Shaw (1973) assume that investments mainly self-financed in the developing countries. According to 'McKinnon model', adequate amount of saving must be accumulated in the form of bank deposit for the realization of investments. The role between saving and investment, the role between money and physical capital is known as 'complementarity hypothesis'. Furthermore Shaw (1973) suggested 'debt-intermediation' view that financial intermediaries foster investment by borrowing and lending. Hence output growth increases. These assertions denote that development in financial intermediation induces output growth to increase.

According to McKinnon (1973) and Shaw (1973) theories, restrictions in the financial systems, reduce savings and capital accumulation, and correspondingly retard efficient resource allocation. Entrepreneurs would have incentive when they have the opportunities to invest high-yield investment projects. Without restrictions on financial activities, in other words in the environment of 'financial liberalization', higher economic growth should be expected. This is 'financial liberalization' view.

Both McKinnon (1973) and Shaw (1973) developed financial liberalization models. The principal difference between two models is the way of funding. McKinnon's outside money model emphasizes the relationship between deposit interest rate and investment and funding is raised internally. Shaw's model is known as inside money model, on the other hand funding is raised externally and he highlights the significance of borrowing and lending activities.

In the 1980s McKinnon-Shaw theories are analyzed by neo-structural economists. Wijnbergen(1982, 1983), Taylor(1983) and Buffie(1984) introduced various suggestions. They argue that in the presence of efficient curb markets, financial liberalization cannot spur economic

growth. According to their model, households prefer to invest in three types of assets, such as bank deposit, gold and curb market loans. In the event of an increase of bank deposit rates, households motivate to shift their investments to curb market loans. Then the supply of loanable funds reduce, investments and economic growth decelerates.

However, following analysis of Fry (1988) and Owen and Solis-Fallas(1989) conceived that curb markets are not necessary more than commercial banks. They put forward that neo-structuralists' theories are not sensible because unorganized markets could not provide perfect efficient intermediations.

In early 1990s more complex growth models developed by Greenwood and Jovanovic (1990), Bencivenga and Smith(1991, 1993), Saint-Paul (1992), King & Levine (1993b), Pagano(1993), Bencivenga et al., (1995), Greenwood & Smith (1997), Blackburn & Hung (1998) emerged. They supported the idea that financial development reduces information asymmetries and develops resource allocation efficiency. Additionally, elimination of government restrictions stimulates economic growth in the developing countries.

In the financial development process, the McKinnon-Shaw model states the significance of the financial liberalization providing increment in saving and therefore in investments. However endogenous financial development and economic growth models concentrate on the effect of financial intermediation in improving efficiency from the aspect of quality in the investments rather than quantity. Unlike the McKinnon-Shaw model, endogenous models indicate two-sided actions between financial development and economic growth. High level of economic development motivates entrepreneurs to demand more financial services which in turn cause competition and efficiency whereby provide financial development. On the other side in the financially developed markets, financial institutions provide provisions of timely and valuable information which promotes entrepreneurs to market their projects efficiently and thus improve capital accumulation and economic development.

2.1.1. THE RELATIONSHIP BETWEEN FINANCIAL DEVELOPMENT and ECONOMIC GROWTH

Financial development is an essential condition for economic growth, since well-functioning markets and financial institutions may reduce the transaction costs and asymmetric information problems. Concurrently, financial institutions play a crucial role identifying investment opportunities, choosing the most profitable projects, mobilizing savings, facilitating trading and the diversification of risk, as well as developing corporate governance systems.

There has been an increasing process of empirical studies at the aggregate level for the last twenty years, especially from the studies of King and Levine (1993). The empirical studies are used to elucidate output variables with financial ratios and variables such as bank loans to private sector, stock market capitalization or liquid liabilities that may be representants of financial systems and institutions.

Considering data from 49 countries for the period 1976 to 1990, Levine and Zervos (1998) deduce that there is a robust correlation between the rates of real per-capita output growth and stock market liquidity. Allen and Gale (2000) searched financial systems of different countries and regions, presented that there is internal inefficiency within monopolistic banks. While comparative nature of markets likely to promote innovation and growth enhancing activities, the monopolistic power of banks may embrace an extremely conservative approach. Leahy et al. (2001) use data for 19 OECD countries for the period 1970 to 1997 and investigate the effect of financial variables on real per-capita output growth. They use the particular financial variables such as the liquid liabilities and the private credit from deposit banks. In one such study, Bassanini et al. (2001) examine data for 24 OECD countries in the period 1971 to 1998, and used similar variables in their study such as liquid liabilities, private credit from

deposit banks and stock market capitalization in relation to GDP. Through this study they acquire more appropriate results for stock markets than for bank variables. Inquiring data of 9 OECD countries Shan et al. (2001) determine real per-capita GDP by bank credit to GDP and deduce that causality diversifies between countries.

Beck et al. (2004) studied with a panel of 52 countries in the period 1960 to 1999. They investigated the depth and breadth of the financial intermediation. In order to measure this they used the ratio of the value of credit from financial intermediaries to the private sector divided by GDP. Their results present that financial development is both pro-growth and pro-poor, mean that in the countries with better developed financial intermediation, income inequality decreases expeditiously.

To sum up all these research and studies, the results that represent that while the general effects of financial development on the outputs are positive, the size of these effects differentiate with the distinctive variables considered, with indicators of financial development and with the estimation method, data frequency or the defined functional form of the relationship. (Ferreira, 2008)

2.1.2. MARKET-BASED and BANK-BASED FINANCIAL SYSTEMS

In the years late 1990s and early 2000s many researchers; Allen & Gale (1999, 2000), Beck & Levine (2002), Ergungor (2004), Levine (2005), underline the merits of a bank-based financial system (German – Japanese) and a market-based financial system (Anglo-Sakson) in fostering economic development and growth. Banks have an important role in financial markets, allocating resources to expand economic development and growth. Financial markets are

observed with reference to their structural features and the effects of them on economic development.

Because firms are mostly financed by banks rather than financial markets, in a bank-based financial system, financial markets relatively less developed. This condition provides an opportunity to banks to execute a monitoring role. Usually a small number of shareholders own firms with large share stakes. A bank-based financial system should foster long-term economic growth as long as banks provide long-term loans.

In contrast to a bank-based financial system, a market-based financial system mainly featured with advanced and various financial markets. Because firms raise long-term funds through active, liquid and efficient financial markets, banks are less necessary for resource allocation and fund ownership. Generally firms are owned by a large number of stakeholders with small share stakes. Merger and acquisitions may be observed occasionally. In a market-based financial system firms are primarily concerned about their recent performances and financial markets have short term effects.

Demirguc-Kunt and Levine (1996), Levine (2002), and Beck and Levine (2002) studied with panel and cross-section methods to find whether a bank-based or market-based financial structure is irrelevant to economic growth.

2.1.3. SIGNIFICANCE of FINANCIAL SYSTEMS

Some of the researchers are not convinced about the significance of the financial systems. The notable early work of Modigliani and Miller (1958) put forth a model which suggests that real economic decisions are independent from financial structure. In this model it is

assumed a perfect market without any information asymmetries or transaction cost in the economic activities. Similarly Fama (1980) indicated that in a competitive banking sector, if any individual bank changes a lending decision, under a general equilibrium setting, this will not effect on price of real activity. In this model Fama suggests that entrepreneurs can always refinance their loans and there is equal access to capital markets. Lucas (1988) stated that the financial factors in the process of economic development are magnified.

2.1.4. THE CONTRIBUTION of STOCK MARKET DEVELOPMENT TO ECONOMIC GROWTH

Another topic for researchers is that the debate on stock markets contribution to the economic development. As a result of their nature stock markets provide speculative activities that generate negative consequences and instability for an economy. Stock market development causes bank loans less preferred against stocks. Because bank loans generate capital accumulation and additional resources to economic development, stock markets development may have detrimental effects on an economy. In a fragile banking system, crises waits for only one crack on confidence level. For example, unreasonable speculations provoke asset price bubbles. In a weak banking system they will burst and produce economic crises. Kindleberger (1978) and Singh (1997) supported this argument. Singh (1997) argue that in developing countries stock market improvement reduces long-term economic growth and unlikely to fuel the economic growth.

On the other hand, substantial numbers of economists have counterviews about the benefits of financial liberalization. One of them, Stiglitz (1994, 2000), put forward that instability and even crisis are highly connected with financial liberalization. Government

interventions can reduce market failures and promotes the whole economic performance. For instance, keeping interest rates low is a way to upgrade borrowers' quality and credit constraint enforcements may induce to channel more equity to funding business developments. Thus, cost of capital reduces. Likewise Mankiw (1986) suggest that government interventions can promote credit allocation efficiency.

2.1.5. CONCENTRATION THEORY

Among the studies assessing the effect of the banking market structure on growth, Pagano (1993) stated that imperfect competition in credit markets introduces inefficiencies that could limit firms' access to credit, and then hinder growth. Conversely, other studies showed that, in the circumstance of monopoly power, banks are better stimulated to provide lending relationships with firms, thus promoting the access to credit lines.

Specifically, Petersen and Rajan (1995) found that firms are less credit constrained in more concentrated banking markets, and younger firms are charged lower loan rates, while analyzing credit availability for a cross-section of U.S. small businesses located in markets where different degrees of bank concentration exist.

Shaffer (1998) presented a contrasting result, using cross-sectional U.S. data. Shaffer (1998) found evidence that household income grows faster in markets with a higher number of banks. Black and Strahan (2002) stated a negative relationship between banking concentration and the number of new firms in the U.S.

Bonaccorsi di Patti and Dell'Ariccia (2004), using cross-industry and cross-provinces Italian data, showed that firms operating in informationally opaque sectors grow more when

banking markets are more concentrated. Cetorelli and Gambera (2001) used an extended Rajan and Zingales data set, with both cross-industry and cross-country characteristics, and investigated whether, for a given size, the market structure of the banking sector has empirical relevance for economic growth. They found that the concentration in the banking sector states a general deadweight loss which depresses growth, impacting all sectors and all firms indiscriminately.

Bolbol, Fatheldin, and Omran, (2005) studied Egypt's financial structure and its connection to total factor productivity. They found that the banking system has a positive influence on growth only when accompanied with higher per-capita GDP.

2.2. EMPIRICAL EVIDENCE ON FINANCE and GROWTH

Since Schumpeter (1911), many researchers have been investigated the relationship between financial development and economic growth over data derived from different countries and periods. Most of the empirical studies indicate a positive relationship between financial development and economic growth.

Empirical studies can be constitute in terms of the nature of data over three different types of analysis; such as cross-country, time series and panel analysis.

2.2.1. CROSS – COUNTRY ANALYSIS

The relationship between financial development and economic growth is studied empirically after 1990s. On their foremost work, King and Levine (1993a) studied with 80 countries data over the period 1960-1989. They controlled factors that affect long-run growth.

They reached to the results that indicating the introductory level of financial development is a good predictor of the consequential economic growth rates. King and Levine's (1993a) banking variables to proxy the level of financial development have been extensively used by researchers. In the study, they show that several financial development indicators are cogently associated with real per capital GDP growth, the rate of physical capital accumulation and Total Factor Productivity (TFP) growth. Besides, their empirical results supported that finance matters for growth (Schumpeterian view). While King and Levine (1993a) use banking variables as the substitutes for the level of financial development, some researchers try to determine the contribution of stock markets in developing economic growth. Atje and Jovanovic (1993) stated that in their study of analyzing 94 countries' annual data for the period 1960-1985 using Ordinary Least Squares (OLS) method, stock markets have positive impacts on the activities promoting economic growth. After them, Harris (1997) found contrary results in a study of 39 countries over the period of 1980-1988 by using two stage least squares (2SLS). After re-examined Atje and Jovanovic results, Harris (1997) find that there is only a weak impact on growth in per capita output from stock market activity. He presents that while stock market activity has weak affect in less developed countries, in developed countries stock market activity has some affect on economic growth. Apart from that, in the same study Harris(1997) argues that while lagged investment is not highly correlated with current investment, the use of lagged investment as an instrument in Atje and Jovanovic's work, is not convenient to deal with the endogeneity issues.

Demirguc-Kunt & Maksimovic (1998) and Levine & Zervos (1998) approved this statement with their researches. Additionally Demirguc-Kunt & Maksimovic (1998) showed that legal and efficient system is motivating firms to use long-term external funds.

Ram (1999) searched 95 countries data and found that financial development and economic growth have negatively correlated. Their results were very different from the findings of the general literature.

Demirguc-Kunt and Maksimovic (2002) inquired 40 countries with their firm-level data. They found that overall financial development encourages the growth of firms. They also showed that there is no evidence of distinction for firms to grow faster in either a market-based or a bank-based financial system.

Deidda and Fattouh (2002) demonstrate a simple OLG model over the King and Levine's (1993) data set. They apply a threshold regression model which establishes a non-linear and possibly a non-monotonic relationship between financial development and economic growth. Their model with risk averse agents and costly financial transactions such that differently from the existing literature, the growth effect of financial development is indefinite at low levels of development, while as development advances it becomes positive. They find that in low income countries there is no considerable relationship between financial development and growth whereas in high income countries they find the relationship is strongly significant and positive. Despite the results are consistent with their model, they are not completely convenient with model which predicts that financial development is related with higher growth rates at all levels of economic development.

Demirguc-Kunt and Maksimovic (2002) researched the impact of the stock market and banking sector development on firms' growth and find that these are closely related to the development of the country's legal environment. They study with firm level data for the largest publicly manufacturing firms in 40 countries over the period 1989-1996 using 2SLS method. According to their analysis, there is no evidence that development of market based or bank based financial system per se affects firms' access to financing.

Levine (2002) study on the bank-based and market-based financial systems views. He analyzes annual data of 48 countries over the period 1980-1995 using OLS and instrumental variables (IV). While the results present no support for either bank-based or market-based view, the overall level of financial development helps explain cross-country growth rate differences. Additionally the legal system is an important factor influencing financial development which in turns influences long-run economic growth.

Many empirical analyses have been widely contribute the empirical research on the finance-growth nexus, especially after World Bank developed new data sets of large sample of countries. There is an important handicap against the practicability of the results of comprehensive comparative studies which is the deficiency of high quality data with adequate degree of comparability across countries.

The extensive comparative analyses which are handled with the aggregate level data, are not capable to seize the completeness of the financial environment and past experiences of the countries respectively. Because the finance – growth nexus is generally analyzed within the financial environment and the operations of the financial institutions, countries perform their analyses inclusive of their own.

The cross-country analyses cannot hold a profound understanding of stored financial experiences and countries financial environments individually. Because cross-country evidences produce a limited guidance to the researchers, some other researchers work with time series country specific studies.

2.2.2. TIME SERIES STUDIES

The direction of the finance-growth nexus is studied by researchers with time series analysis using the methods such as, Vector Auto Regressive models (VARs), Vector Error-Correction Model (VECM), Engle- Granger cointegration, Johansen cointegration and Granger causality methods.

Depending on the constraints of the data, the estimation period is usually short in the time series studies. It is generally reported that in the developing countries data are rare. However in the time series analysis, it is essential to have long series of data in order to make comprehensible analysis.

In order to protect the degrees of freedom, performing only one lag in the empirical model specification usually deforms the reliability of the results of the model. It is essential to exercise with proper lags in the modeling the short run dynamics and to accomplish the serial correlation problems. The choice of the lag length and the included trend terms should affect the results. Moreover in order to make conclusions on the long-run results, an adequately long time period is desired and employing quarterly data in order to increase the size of the sample is not a sufficient solution to eliminate the problem.

The time series studies are imposed upon the omitted variable problems. In the time series model, whether a single or simultaneous equations, improved from the data of developing countries, usually be formed with four variables. This contains, a real income variable (Y_t), a financial development indicator (F_t), and some control variables (Z_{it}), such like real interest rate, inflation, investment, etc.

The first time series survey is conducted by Gupta (1984) in which he used quarterly industrial output data from 1961Q1 to 1980Q4 in order to measure the level of economic development. He searched the finance-growth nexus with the data of 14 developing countries. He used VARs and Granger causality methods. He reached the results showing that causality arises from financial development to economic growth. Because the industrial output only presents a limited part of total output in the most of the developing countries, it is not a convincing measure for economic development. Gupta uses the industrial output as a measure of economic development by reason of the deficiency of better ones.

Using VARs and Granger causality methods, Jung (1986) studied with annual data of 37 less developed countries and 19 developed countries. His results contribute to the Patrick's supply leading hypothesis which denotes that financial development generates economic development in less developed countries and in developed countries an opposite causality is established.

Arestis and Demetriades (1996) present some of different explanations for the variation of causality tests from country to country. First different countries have different financial systems and institutional structures. Some of institutional structures may be more beneficial to economic growth. Secondly, financial sector policies play a substantial role in finding out whether financial development encouraging economic growth. Thirdly, two countries with indistinguishable financial systems and financial sector policies may alter depending on their utility of those institutions that create and execute the policies.

Additionally Demetriades and Hussein (1996) worked with 27 observations of the annual data of 16 countries. Their study presents limited support for the supply leading hypothesis. Their results show that financial development and economic growth are determined together.

Demetriades and Luintel (1996) worked on the annual observations of India for the period from 1961 to 1991. They found that controls on banking sector have negative effects on the financial development process. Moreover as Demetriades and Hussein (1996) explained before, they found from the exogeneity tests, financial development and economic growth are determined together.

Demetriades and Hussein (1996), and Arestis and Demetriades (1997) searched the finance- growth relationship in developing and developed economies, respectively. They have shown that even the same variables and estimation methods are used, the results show considerable discrepancies across countries. Their studies demonstrated that the cross-country studies handle different economies as a uniform entity.

The direction of causality is enquired by Arestis and Demetriades (1997) using quarterly data for Germany and the USA for the period 1979Q1 to 1994Q4. They worked with Johansen cointegration, VECM and weak exogeneity tests. According to the results, causality runs from financial development to real GDP in Germany while for the USA, an opposite causality is pointed out.

Neusser and Kugler (1998) investigate the finance-growth nexus with using two proxies for financial development and economic growth which are financial sector GDP and manufacturing GDP. Their causality tests results are consistent with the supply-leading hypothesis which tells that finance play an important role in economic development. Some other researchers obtained similar results such as, Choe and Moosa (1999), Luintel and Khan (1999), Xu (2000), Bell and Rousseau (2001), and Rousseau and Vuthipadadorn (2005).

The causality tests have been performed on the basis of different countries. Choe and Moosa (1999) inquired with annual data for the Korea for the period 1970-1992. They used VARs and Granger causality methods. For the case of Korea, the causality tests show that

financial development leads to higher economic growth. In this relationship, financial intermediaries are considerably important than capital markets.

In 1999 Luintel and Khan worked with 36-41 observations of annual data for 10 developing countries (Costa Rica, Colombia, Greece, India, Korea, Malaysia, The Philippines, Sri Lanka, South Africa and Thailand) and found that in the long-run, finance and output are positively related.

Xu (2000) studied on the annual data for 41 countries, over the period 1960-1993 and used VARs and Impulse Response Analyses (IRA) methods. As stated in the study, 41 countries examined. Depending on the results, 27 of these countries, financial development has positive effects on both the investment growth and the economic growth. These results produce evidence that financial development fosters growth by investment channel mostly.

In the same context, Rousseau and Vuthipadadorn (2005) searched whether the intensification of financial intermediation promoted investment and growth in 10 Asian countries over the period 1950-2000. Research was performed with time series analysis approach. They did the analysis by VARs models and Vector Error Correction models (VECMs) in order to criticize the character of relationship between financial and real sector activities measurements. Although their results demonstrate that finance is a driving force behind the investment, same results present little support to the role for financial factors in output.

Ang and Mckibbin (2007) perform multivariate cointegration and particular causality tests to investigate finance-growth relationship in small open economy of Malaysia with using time series data from 1960 to 2001. They design the use of principal component analysis to develop a financial development index using relevant financial development indicators in order to accomplish the multicollinearity and over-parameterization problems. Because the Malaysian financial system is a bank-based financial system, they used only banking variables in

developing the index. They studied with VECM, Johansen cointegration, Granger causality and PCA methods. Instead of the traditional results, the findings strongly support the consideration that output growth generates financial development in the long-run. According to the same results, there is no evidence to support the hypothesis that a bank-based financial system promotes long-term growth in the real sector.

Ang (2008) continued the analysis for Malaysia and used annual data from 1965 to 2004. He used same methods with the earlier work he did with McKibbin. In this study, he investigated the causality between Foreign Direct Investments (FDI) and economic growth in Malaysia with controlling financial development level. The level of the financial development is measured by an index which summarizes the four financial development indicators. The results reveal that FDI and economic growth are positively related to output in the long-run and financial development enhances the impact of FDI on output.

Although particular country case studies sustain an important knowledge, the results of these case studies are not sufficient to approve or refuse the current thoughts about the relationship between finance and growth. The findings acquired from an individual country cannot be used to make inferences to other countries in order to make generalizations. Besides using single country time series analysis may not be able to policy formulation for the country under observation.

In the time series analysis context, there have been efforts to determine the relative significance of banks and stock markets promoting economic growth. Arestis et al. (2001) obtain the results supporting that banks are more powerful to promote economic growth. They denote that in the cross-country studies, the stock markets contribution to the economic growth has been magnified. According to their results, 40 percent of the developed economies which are examined show that stock markets incline to have negative effects on economic growth. Conversely, Thangavelu and Ang (2004) acquire different results suggesting that the banking

sector is responsive to the demand made by economic development, in other words, economic growth promoting banking development in the Granger sense. Moreover, the findings of using financial market indicators are compatible with Schumpeter's (1911) view that stock market development is fundamental for raising economic growth.

In their study, Caporale et al. (2005) investigate the causal impact of stock market developments on economic growth and they find strong evidence that in Malaysia stock market development increases economic growth rates through increasing investment efficiency, which in turn at the aggregate level raises the productivity of the economy.

2.2.3. PANEL STUDIES

Recently, researchers have been trying to enhance the effectiveness of the cross-sectional studies by using the dynamic panel estimation technique which is taking the time dimension into account. The empirical findings of the researchers (Levine (1999), Beck et al. (2000), Levine et al. (2000), Rousseau and Wachtel (2000), Beck and Levine (2004) and Rioja and Valev (2004)) coherently indicate that financial development has a positive effect on economic growth.

In order to determine the relationship between financial development and economic growth at the macro level, some attempts had been made by employing firm- or industry- level data. The primary and influential study of Rajan and Zingales (1998) has fuelled the research interest in the use of micro level data rather than country level data in order to have more information about the relationship between financial development and economic growth. They studied with 41 countries industry-level data for the period 1980-1990, using OLS and panel

data fixed effects. They suggest that market frictions may reduce under the terms of better developed financial intermediaries and financial markets. Lower external finance costs promote firms to expand and encourage the creation of new firms. Rajan and Zingales (1998) use a very large sample based on industry-level data. They present that the industries which are more depend on the external finance may flourish in countries with better developed financial intermediaries and financial markets.

Beck et al. (2000) employed annual data for 77 countries for the period of 1960-1995 with using Generalized Method of Moments (GMM) and found that financial sector development is robustly and positively correlated with both real per capita GDP growth and TFP growth. Although the links are found to be statistically weak, the results also presented some support for the positive role of financial development on both capital accumulation and private savings rate.

Benhabib and Spiegel (2000) worked with annual observations for four countries (Argentina, Chile, Indonesia and Korea) and used GMM. Their results present that financial development effects both total factor- productivity growth and investment rates. Nevertheless, the findings are influenced by the inclusion of country fixed effects and other financial development indicators.

Henry (2000) worked with the annual data of 11 developing countries; Argentina, Brazil, Chile, Colombia, India, Korea, Malaysia, Mexico, The Philippines, Thailand, and Venezuela, spanning the 1970s to 1990s. He used panel data techniques and the findings indicate that the stock market liberalization provokes private investment to increase. The empirical evidence show that in the three years of liberalization, the average rate of private investment was 22 percent points higher than the sample mean.

Levine et al. (2000) using both IV and dynamic panel techniques on the annual data for 74 countries for period of 1960 to 1995, found the results show that the financial intermediary development is positively correlated to economic growth. Additionally empirical evidence show that the data cross-country differences in legal and accounting systems helps to understand the differences in financial development. According to these results legal and accounting reforms which strengthen creditor rights, contract enforcement, and accounting practices fuel financial development and foster economic growth.

Beck and Levine (2002) searched whether bank-based or market-based financial system is better at financing the expansion of industries that depend heavily on external finance. They used annual data for 42 countries and 36 manufacturing industries for the period 1980-1995. They employed OLS and panel data techniques. According to the empirical evidences there is neither the market-based nor the bank-based financial system matter for growth. That is to say, while legal system efficiency and generally financial system development foster industry growth, creation of new firms and efficient capital allocation, having a bank-based or market-based financial system actually does not seem much.

Calderon and Liu (2003) obtained a bi-directional causality between financial development and economic growth with the use of Geweke decomposition test on collected data of 109 developing and developed countries. Christopoulos and Tsionan (2004) introduced the use of panel unit roots and panel cointegration techniques to determine the causality patterns.

Nevertheless the causal relationship is contributed by financial development more in developing countries than in developed countries.

CHAPTER 3

EMPIRICAL ANALYSIS

This section presents our empirical findings and organized under two subsections. The first subsection describes data used in the empirical analysis as well as the data sources and outlines the methodology. The second subsection presents the empirical results based on Granger causality tests with a framework of a panel cointegration.

3.1. DATA and METHODOLOGY

The balanced panel of data refers to the European Union Member Countries, Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom and also two candidate countries, Croatia and Turkey. The data of Romania and Greece has been excluded from EU-27 and included Turkey and Croatia as two strong candidates. Greece and Romania are not included in the investigation because of data availability. The data on the balance sheet of each bank in these counties are obtained from the Bankscope and covers the period 1993-2006. The real per capita Gross Domestic Product as an indicator for economic growth is, however, obtained from the

International Financial Statistics (IFS). The bank concentration is proxied by the Herfindahl-Hirschman Index (HHI).

In order to analyze the relationship between bank concentration and economic growth in European Union countries, we use panel data methodology. The use of panel data methodology gives us the opportunity to measure how the change in bank concentration over time affects economic growth among these countries. (Levine et al., 2000)

Hsiao (1986) show that, the use of panel data methodology allows country heterogeneity to be controlled, which under other circumstances may cause critical misspecification problems. Consequently, more informative data, less collinearity among variables, more degrees of freedom and more efficient results may be obtained (Nasser, 2009). Panel data enables to construct more complicated models than cross-section and time-series models. In the analysis, a specific set of European Union countries is being inquired. In pooled cross-country and time-series data, unobservable fixed effects may be correlated with the included explanatory variables to create omitted variable biases. In order to correct them, panel estimation is employed with country-specific fixed effects. Therefore the fixed-effects model is the most appropriate specification. Specifically, the estimation model is,

$$EG_{it} = \alpha_i + \beta_i BC_{it} + \gamma Z_{it} + \varepsilon_{it} \quad i = 1, \dots, N, \quad t = 1, \dots, T \quad (1)$$

where the subscript i represents European Union countries and subscript t represents time from 1993 to 2006. EG_{it} is the level of economic growth, measured by the growth of real per capita GDP in the i th country for the time-period and our measure of economic growth. BC_{it} indicates measure of banking sector concentration variables. Z_{it} denotes a set of variables that controls for other factors associated with economic growth. The error term is ε_{it} .

3.1.1. PANEL UNIT ROOT TEST

Most of the economic time series are non-stationary and regressions between such data are usually artificial. Generally, Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF), and Philips-Peron (PP) tests have been used for testing the existence of unit roots in time series data. But, it is now widely accepted that in time series analysis DF, ADF, and PP tests suffer from low power in rejecting the null of a non-stationary series. Because panel data series have a time dimension, this allows testing for unit roots in panel data and applying panel unit root tests.

According to the recent literature, panel based unit root tests have higher power than unit root tests based on individual time series like DF, ADF, and PP tests (Levin and Lin, 1992). Contrary to the traditional unit root tests, panel data unit root tests take advantage of the additional information provided by pooled cross-section time series to increase test power. Additionally panel unit root tests lead to statistics with a normal distribution in the limit (Baltagi, 2005).

One of the most common used panel unit root test is the Im, Peseran, and Shin (2003) test, henceforward denoted as IPS. Consider a following AR(1) process:

$$Y_{it} = \alpha_i Y_{it-1} + \varepsilon_{it} \quad (2)$$

where $i = 1, 2, \dots, N$ cross-section units or series that are observed $t = 1, 2, \dots, T_i$; α_i are the autoregressive coefficients. The errors ε_{it} are assumed to be independently and normally distributed with zero means and potentially heterogeneous variances for all countries and years. If $|\alpha_i| < 1$, Y_t is defined as weakly stationary. Furthermore, if $|\alpha_i| = 1$, then Y_t contains a unit root and meaning that Y_{t-1} will not provide any information in the estimation of Y_t . The IPS

test assumes that the persistence parameters vary freely across cross-sections. The IPS test is consists of specifying a distinct ADF regression for each cross section as follows:

$$\Delta Y_{it} = \gamma_i + \delta_i t + \alpha_i Y_{i,t-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta Y_{i,t-j} + \varepsilon_{it} \quad (3)$$

where Δ is the difference operator; γ_i , is the intercept; $\delta_i t$ is the deterministic time trend; and p_i is the number of lags in the ADF regression. The lag order of α_i 's as well as β_i 's are allowed to vary across countries. A simple average of the individual countries is taken to calculate the t-statistics. Hence, the null hypothesis of non-stationary to be tested is:

$$H_0 : \alpha_i = 0, \text{ for all } i \quad (4)$$

against the alternative hypothesis:

$$H_1 : \begin{cases} \alpha_i = 0 & \text{for some } i\text{'s} \\ \alpha_i < 0 & \text{for at least one } i \end{cases} \quad (5)$$

This formulation of alternative hypothesis allows α_i varying across groups. It allows for some (but not all) of the individual series to have unit roots under the alternative hypothesis. Essentially, the IPS test averages the ADF individual unit root test statistics that are obtained from estimating (3) for each i ; that is:

$$\tilde{t}_{NT} = \frac{1}{N} \sum_{i=1}^N \tilde{t}_{iT_i}(p_i) \quad (6)$$

where \tilde{t}_{iT_i} is the ADF t-statistics. In the case where the lag order is always zero ($p_i = 0$, for all i), simulated critical values for \tilde{t}_{NT} are provided in the IPS for different numbers of cross sections N , series lengths T , and for test equations containing either intercepts, or intercepts and

linear trends. Using Monte Carlo simulations, IPS shows that the t -bar is normally distributed under the null hypothesis. In the general case where the lag order in (x) may be non-zero for some cross-sections, IPS shows that a properly standardized \tilde{t}_{NT} has an asymptotic standard normal distribution. Im, Peseran, and Shin then use estimates of its mean and variance to convert t -statistics into a standard normal z -statistic so that conventional critical values can be used to evaluate its significance. The z test statistic is defined as:

$$Z_{1NT} = \frac{\sqrt{N}(t_{NT} - N^{-1} \sum_{i=1}^N E[t_{iT} | \rho_i = 0])}{\sqrt{N^{-1} \sum_{i=1}^N \text{var}[t_{iT} | \rho_i = 0]}} \rightarrow N(0,1) \quad (7)$$

where t is as defined before, and $E[t_{iT} | \rho_{i=0}]$ and $\text{var}[t_{iT} | \rho_{i=0}]$ are the mean and variance of t_{it} . The IPS test statistic requires specification of the number of lags and the specification of the deterministic component for each cross-section ADF equation. To determine the optimal lag length, Akaike Information Criterion (AIC) is used. When testing for panel unit roots at levels, the individual constant and trend terms as in equation (3) are taken. If in no case we reject the null hypothesis that every country has a unit root for the series in levels, we then test for a unit root in first differences (Nasser, 2009). The IPS unit root test is used to test for stationarity of the panel data obtained for European Union countries.

3.1.2. PANEL COINTEGRATION TESTS

The integration concept first introduced into literature by Granger (1980). Cointegration denotes the presence of a long-run relationship between economic variables. The cointegration testing is to test whether two or more integrated variables deviate significantly from a certain

relationship. So, if the variables are cointegrated, they move together over time, and short-run disturbances will be corrected in the long-run. This means that if two or more series move closely together in the long-run, the difference between them is constant.

According to Granger (1981), when the series becomes stationary only after being differenced, in other words integrated of order one, they might have linear combinations that are stationary without differencing. These series are defined as cointegrated in the literature. After the order of integration has been defined, cointegration analysis could be applied to assess the long-run relationship between the set of the integrated variables. Conventional tests of cointegration contain the simple two-step test by Engle and Granger (1987) and Johansen (1988). Although these tests are generally used to test for the long-run relationship among a set of variables in the literature, they do not address cointegration tests in panel settings. So these tests suffer from severe size of distortion. (Leybourne and Newbold, 2003)

In order to handle these problems, panel cointegration methodology which investigates the long-run relationship between bank concentration and economic growth is applied. The thesis adopts the approach developed by Pedroni (1999). By enhancing the Engle-Granger and Johansen frameworks, the Pedroni methodology tests the long-run relationship involving panel data. Besides Pedroni, panel cointegration tests are presented by Kao (1999), McCoskey and Kao (1999) and Larsson et al. (2001). So it represents advancement for the conventional cointegration tests by accomplishing the problem of small samples. Moreover, this methodology enables different individual cross-section effects by allowing for heterogeneous intercepts and trend coefficients across cross-sections.

Pedroni's method has seven residual-based statistics for the test of the null of no cointegration against the alternative of cointegration. These statistics are based on a model which considers that cointegration relationships are heterogeneous across cross-sections. The first four test statistics are defined as panel cointegration statistics and are based on the "within"

dimension approach. It involves the panel v-statistics, panel rho (r-statistics), panel non-parametric (pp-statistics) and panel parametric (adf-statistics) statistics. The last three statistics are group panel cointegration statistics and are based on a “between” dimension. The “between” dimension tests contain the group-rho, group-pp, and group-adf statistics as Pedroni (1999) presented the details and mathematical representations of the tests. All of the seven tests are based on the following regression:

$$Y_{i,t} = \alpha_i + \delta_i t + \beta_{1i,t} X_{1i,t} + \dots + \beta_{Mi,t} X_{Mi,t} + \varepsilon_{i,t} \quad (8)$$

where $i = 1, \dots, N$ cross-section units in the panel that are observed over periods $t = 1, \dots, T$ and $m = 1, \dots, M$ is the number of regression variables. The variables Y and X are assumed to be integrated of order one, e.g., I(1). The parameters $\beta_{1i}, \dots, \beta_{Mi}$ are the slope coefficients, α_i , is the member-specific intercept or fixed effects parameter, and $\delta_i t$ is the deterministic time trend, which is specific to cross-section units of the panel.

Under the null hypothesis of no cointegration, the residuals $\varepsilon_{i,t}$ will be I(1). The general approach is to obtain residuals from equation (8) and then to test whether residuals are I(1) by running the auxiliary regression,

$$\varepsilon_{it} = \rho_i \varepsilon_{i(t-1)} + u_{it} \quad (9)$$

where $\varepsilon_{i,t}$ are the estimated residuals from the long-run regression. Pedroni describes various methods of constructing statistics for testing for null hypothesis of no cointegration ($\rho_i = 1$). There are two alternative hypotheses: the homogenous alternative, ($\rho_i = \rho$) < 1 for all i (within-dimension test), and the heterogeneous alternative, $\rho_i < 1$ for all i (between-dimension test). So, the between-dimension test is less restrictive and enables for heterogeneity across members. In the case of the within-dimension test, a common value for all cross sections is

imposed, i.e., $\rho_i = \rho$. Pedroni presents that the seven panel test statistics, under appropriate standardization, is distributed asymptotically as a normal distribution and expressed as follows:

$$\frac{\theta_{NT} - \mu\sqrt{N}}{\sqrt{\nu}} \rightarrow N(0,1) \quad (10)$$

where μ and ν are the mean and variance respectively of the underlying individual series. The statistics can be compared to appropriate critical values, and if the calculated test statistics exceed the critical value, then the null hypothesis of no-cointegration is rejected implying that a long-run relationship between financial development and economic growth exists. Following the methodology employed by Pedroni (1999), the cointegration relationship we estimate is specified as follows:

$$EG_{it} = \alpha_i + \delta_i t + \beta_i BC_{it} + \varepsilon_{it}, \quad i = 1, \dots, N, \quad t = 1, \dots, T \quad (11)$$

where the subscript i represents country i and subscript t represents time. EG is the growth of real per capita GDP and BC denotes the measure of bank concentration. α_i is the country-specific effect, $\delta_i t$ is the deterministic time trend, and $\varepsilon_{i,t}$ are the estimated residuals.

3.1.3 GRANGER-SIMS CAUSALITY TEST

The Granger-Sims causality test is employed next to analyze the short run relation between banking concentration and economic growth (Granger, 1969; Sims, 1972). This approach is based on the estimation of two pairs of equation:

$$\Delta \ln GDP_t^c = \delta_0 + \sum_{i=1}^m \delta_i \Delta \ln GDP_{t-i}^c \quad (12)$$

$$\Delta \ln GDP_t^c = \delta_0 + \sum_{i=1}^m \delta_i \Delta \ln GDP_{t-i}^c + \sum_{i=1}^m \alpha_i \Delta \ln HHI_{t-i}^c \quad (13)$$

$$\Delta \ln HHI_t^c = \gamma_0 + \sum_{i=1}^m \gamma_i \Delta \ln GDP_{t-i}^c \quad (14)$$

$$\Delta \ln HHI_t^c = \gamma_0 + \sum_{i=1}^m \gamma_i \Delta \ln HHI_{t-i}^c + \sum_{i=1}^m \beta_i \Delta \ln GDP_{t-i}^c \quad (15)$$

where $\Delta \ln GDP_t^c$ is the real economic growth rate of country c at time t and $\Delta \ln HHI_t^c$ is the Herfindahl-Hirschman Index for the country c at time t . Equation (12) and (14) are called restricted equation and equation (13) and (15) are called unrestricted equation. If $\alpha_1 = \alpha_2 = \dots = 0$ then, banking concentration does not Granger-cause economic growth. If $\beta_1 = \beta_2 = \dots = 0$ then, economic growth does not Granger-cause banking concentration. If both of the relationships that mentioned above are valid, then the two phenomena are independent. F-statistics must be used to check whether three conditions hold. Under the null hypothesis with normally distributed errors, it has a distribution $\frac{m}{n-2m-1}$ where m is the number of lagged periods and n is the number of observations. In the thesis, we always consider first differences (so $m = 1$) for the independent variables. Therefore, the test can be done by referring to the t-statistics of the unrestricted regressions rather than the F-statistics.

3.2. EMPIRICAL RESULTS

3.2.1. UNIT ROOT TEST

Pooled time series data are nonstationary and tend to exhibit a time trend. Recently, Hadri (1999), Breitung (2000), Levin et al. (2002), and Im et al. (2003) have developed panel-based unit root tests that are similar to tests carried out on a single series.

Table 1 reports Im, Pesaran and Shin (2003) panel unit root test on the bank concentration and economic growth variables. As seen in the table, the tests results indicate that null hypothesis of unit root is not rejected for the variables in level form. On the other hand null hypothesis of unit root is rejected for the variables in the difference form. Hence, evidence suggests that bank concentration and economic growth variables are nonstationary process. Therefore, panel cointegration techniques are used to determine whether a long-run relationship exists among the nonstationary variables in level form.

Table 1. Panel unit root test results

Variable	<i>Im, Pesaran and Shin W Statistics</i>
<i>Levels</i>	
$\ln HHI$	-1.016
$\ln GDP$	-0.980
<i>Differences</i>	
$\Delta \ln HHI$	-2.806*
$\Delta \ln GDP$	-6.122*

Note: The statistics are asymptotically distributed as standard normal with a left hand side rejection area.

* indicates the rejection of the null hypothesis of unit root at least at the 5% level of significance.

3.2.2. PANEL COINTEGRATION TEST

Having established that bank concentration and economic growth series are integrated of the first order, the second step is to test for the cointegration relationship between the two

variables. To achieve this, as explained earlier, we use the Pedroni panel cointegration test. Table 2 reports the panel cointegration test results. Table 2 presents seven test statistics: (i) v -statistics, (ii) panel rho-statistics, (iii) panel ADF-statistics, (iv) panel PP-statistics, (v) Group rho-statistics, (vi) Group ADF-statistics, and (vii) Group PP-statistics.

The Pedroni (1999) panel cointegration test statistics evaluate the null against both the homogeneous and the heterogeneous alternatives. The test results in the table show that only 13 out of 28 statistics reject the null hypothesis of no cointegration at the conventional 5% significance level for the both approaches (with fixed effects and both fixed effects and trends). This implies a long-run movement between bank concentration and economic growth, which is not strong.

Table 2. Panel cointegration test results

	lnGDP		lnHHI	
	Individual intercept	Individual intercept and Individual trend	Individual intercept	Individual intercept and Individual trend
<i>Panel v statistic</i>	-0.8328 (0.7975)	0.0141 (0.4944)	0.4070 (0.3420)	-1.6800 (0.9535)
<i>The panel ρ statistic</i>	-1.2165 (0.1119)	-0.1822 (0.4277)	-0.7691 (0.2209)	1.9697 (0.9756)
<i>The panel PP statistic</i>	-4.4039* (0.0000)	-10.1318* (0.0000)	-3.2627* (0.0006)	-2.8941* (0.0019)
<i>The panel ADF statistic</i>	-5.3177* (0.0000)	-10.2419* (0.0000)	-3.9812* (0.0000)	-5.0671* (0.0000)
<i>The group ρ statistic</i>	3.4141 (0.9997)	4.2626 (1.0000)	1.2765 (0.8991)	3.6433 (0.9999)
<i>The group PP statistic</i>	1.8418 (0.9997)	0.3157 (0.6239)	-3.1152* (0.0009)	-3.8206* (0.0001)
<i>The group ADF statistic</i>	0.2174 (0.5861)	-3.4546* (0.0003)	-4.0681* (0.0000)	-4.7651* (0.0000)

Note: The critical values are based on Pedroni (2004)

* indicates significance at the 5%.

3.2.3. THE GRANGER-SIMS CAUSALITY TEST

The coefficients of Equation (12) and (13) have been estimated by using Generalized Least Squares (GLS) method. The results are summarized in Table 3.

The t-statistics results in Table 3 indicate that the direction of the coefficients is negative. However, both causation from economic growth to market concentration and market concentration to economic growth are not significant.

These results indicate the absence of the short run relation between banking concentration and economic growth.

Table 3. The Granger-Sims causality test results

<i>Dependent variable</i> $\Delta \ln GDP_t$	
Constant	0.0936 (3.0043)*
$\Delta \ln HHI_{t-1}$	-0.0197 (-0.5263)
$\Delta \ln GDP_{t-1}$	-0.2728 (-1.4031)
<i>Dependent variable</i> $\Delta \ln HHI_t$	
Constant	-0.0515 (-1.0494)
$\Delta \ln HHI_{t-1}$	-0.0560 (-0.6216)
$\Delta \ln GDP_{t-1}$	-0.0519(-1.1976)**

Note: Numbers in parenthesis denote White heteroskedasticity-adjusted t-statistics for the parameter estimates.

* indicates significance at 5%.

CONCLUSION

The thesis has been investigated the long-run relationship and causality between banking market concentration and economic growth in the European Union member and candidate countries. The empirical results of the thesis present that there is a long-run relationship between bank market concentration and economic growth in the sampled countries, but is not strong.

According to the causality test results, the direction of causality cannot be determined since the statistics are insignificant. The results of the Granger-Sims causality test indicate the absence of the short-run relation between banking concentration and economic growth. This is an expected result since European Union is composed of developed countries predominantly.

The thesis has mainly focused in the literature on testing the role of financial intermediation, specifically bank market concentration in the process of economic growth. The results imply that concentrated banking system may affect the macroeconomic performance of the economy in the long run. If these countries achieve periods of economic expansions, the economy may change the level of banking concentration and hence create a stronger competitive environment.

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APPENDICES

A. HISTORY OF EUROPEAN UNION ENLARGEMENT

1) The Treaty of Paris

The Treaty of Paris was established the European Coal and Steel Community. It was signed on April 1951 between the Founding Six, France, West Germany, Italy, Belgium, Luxembourg and the Netherlands. The Treaty came into force on July 1952 and expired on July 2002. The Treaty established diplomatic and economic stability in Western Europe after bloody First and Second World War and had given birth to the new democratic organization of Europe. The ECSC served to the members for sharing the key resource of the war effort which are coal and steel.

2) The Treaty of Rome

On March 1957, the Founding Six, which mentioned above, signed two treaties, the Treaties of Rome. One of the treaties was the treaty establishing the European Atomic Energy Community referred to as the Euratom Treaty and the other one was the treaty establishing the European Economic Community (EEC) referred to as the Treaty of Rome. It was accepted and renamed as the Treaty which establishing the European Community by the Treaty of Maastricht in 1993. This treaty constituted the legal basis of the European Union. The Treaties of Rome came into force on January 1, 1958 and EEC has been altered many times.

Main purpose of the EEC is:

- i. To establish a common market in order to increase growth rate of the involved economies, and ultimately the well-being of their citizens.
- ii. Free movement of goods, employees, capital, services and the freedom of establishment.

- iii. To take joint decisions about the matters such as culture, competition, environment, energy, trade, consumer relations, transport and agriculture.

3) The Merger Treaty - Brussels Treaty

The Merger Treaty was signed on April 1965 and came into force on July 1, 1967. This treaty integrated the administrative bodies of the ECSC, the Euratom and the EEC into a single institutional structure. The Merger Treaty is accepted as the real beginning of the European Union. This treaty was abolished by the Amsterdam Treaty which was signed in 1997. Article 9(1) of the Amsterdam Treaty repealed the Merger Treaty as follows:

Without prejudice to the paragraphs following hereinafter, which have as their purpose to retain the essential elements of their provisions, the Convention of 25 March 1957 on certain institutions common to the European Communities and the Treaty of 8 April 1965 establishing a Single Council and a Single Commission of the European Communities, but with the exception of the Protocol referred to in paragraph 5, shall be repealed.

4) The Single European Act

In the 1980s there was discontentment among European Community members generating from the lack of free trade. A committee analyzed the possibility of creating a single market and determined the steps that would be needed to take. On December 1985, the European Council signed an agreement that would become the Single European Act. As a revision of the Treaty of Rome, the Single European Act was signed on February 1986 and came into force January 1, 1987. The Act codified European Political Cooperation, the forerunner of the European Union's Common Foreign and Security Policy.

5) The Treaty of Maastricht

The Treaty of Maastricht formally, the Treaty on European Union was signed on 7 February 1992 by the members of the European Community in Maastricht, the Netherlands. Upon its entry into force on 1 November 1993 during the Delors Commission, it created the European Union and led to the creation of the single European currency, the euro. The Maastricht Treaty has been amended to a degree by later treaties. For details on the content of the treaty as amended by Amsterdam, Nice and Lisbon, see the treaties of the European Union article.

6) The Treaty of Amsterdam

The Treaty of Amsterdam was signed on 1997 and came into force on May 1, 1999. It made consequential changes on the Treaty of European Union that had been signed at Maastricht in 1992. By signing the Treaty, the Member States engaged in a long and complex approval process. After two referenda and 13 decisions by national parliaments, the member states accomplished the procedure and The European Parliament approved the Treaty on November 19, 1997. Treaty of Amsterdam encloses 13 Protocols, 51 Declarations adopted by the Conference and 8 Declarations by Member States plus amendments to the existing Treaties set out in 15 Articles. The Amsterdam Treaty meant a greater emphasis on citizenship and the rights of individuals. The Treaty aimed to achieve more democracy in the shape of increased powers for the European Parliament, on employment, a Community area of freedom, security and justice, the beginnings of a common foreign and security policy (CFSP) and the reform of the institutions in the run-up to enlargement.

7) The Treaty of Nice

The Treaty of Nice was signed on February 2001 and came into force on February 1, 2003. It ameliorated the Maastricht Treaty (or the Treaty on European Union) and the Treaty of Rome (or the Treaty establishing the European Community). The Treaty of Nice reformed the

institutional structure of the European Union to withstand eastward expansion, a task which was originally intended to have been done by the Amsterdam Treaty, but failed to be addressed at the time. The Treaty provided for an increase after enlargement of the number of seats in the European Parliament to 732, which exceeded the cap established by the Treaty of Amsterdam. The Treaty restricts itself to setting out the principles and methods for changing the institutional system as the Union grows. The number of seats in the European Parliament for the new Member States, the number of votes allocated to them within the Council, and particularly the qualified majority threshold applicable in the future, will be legally determined in the accession treaties. (Press Release 31/01/2003, Memo 03/23)

8) The Treaty of Lisbon

The Lisbon Treaty, also known as the Reform Treaty, is an international agreement that ameliorates the treaties governing the European Union (EU). The Lisbon Treaty was signed by the EU member states on 2007, and came into force on December 1, 2009. It improves the Treaty on European Union (more commonly known as the Maastricht Treaty) and the Treaty establishing the European Community (the Treaty of Rome). In this process, the Rome Treaty was renamed to the Treaty on the Functioning of the European Union (TFEU). The stated aim of the treaty was "to complete the process started by the Treaty of Amsterdam [1997] and by the Treaty of Nice [2001] with a view to enhancing the efficiency and democratic legitimacy of the Union and to improving the coherence of its action." Remarkable changes included more qualified majority voting in the Council of Ministers, increased involvement of the European Parliament in the legislative process through extended codecision with the Council of Ministers, the elimination of the pillar system and the creation of a long-term President of the European Council and a High Representative of the Union for Foreign Affairs and Security Policy to present a united position on EU policies (sometimes described as an EU "foreign minister"). The Treaty also made the Union's bill of rights, the Charter of Fundamental Rights, legally binding.

9) Enlargement

Enlargement has been a fundamental characteristic of the Union's political aspect. The EU's founder countries as referred to "Founding Six", were willing to proceed with the Community while others remained skeptical. Britain, Ireland and Denmark were applied to the Community in 1969. Norway rejected to accept the invitation to become a member with the electorate voting against it. The United Kingdom which had refused to join as a founding member changed its policy after the Suez crisis and applied to become a member to the Community. Applying together with UK, Ireland and Denmark joined to the Community in 1973. In 1970s saw Greece, Spain and Portugal emerge from dictatorship and were willing to integrate their democratic systems by bonding themselves to the EEC. Greece joined the EU in 1981 and Spain and Portugal in 1986. Morocco and Turkey applied to the membership in 1987. While Turkey's application was accepted, Morocco's application was rejected as it was not considered European. Turkey received candidate status in 1999 and began official membership negotiations in 2004. After the downturn years of 1970s, European leaders launched to create a single market and set the Single European Act in 1992. After that the founder members of EFTA, Austria, Sweden and Finland joined the European Union in 1995. The largest enlargement in terms of people, landmass and number of countries, was made on May 1, 2004. The eight central and eastern European Countries, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia plus the Mediterranean islands of Malta and Cyprus were joined the EU. Because the less developed nature of these countries was of concern to some older member countries, EU placed temporary restrictions on the rights of work of the citizens of these new states to their countries. While Romania and Bulgaria were found not fully ready to join the EU in 2004, they acceded on January 1, 2007. Romania and Bulgaria, like the countries joining in 2004, faced with similar restrictions as to their citizens.

Table 4. The Enlargement Table of European Union

#	State	Joined
1	Austria	1995
2	Belgium	1957Founder
3	Bulgaria	2007
4	Cyprus	2004
5	Czech Republic	2004
6	Denmark	1973
7	Estonia	2004
8	Finland	1995
9	France	1957Founder
10	Germany	1957Founder
11	Greece	1981
12	Hungary	2004
13	Ireland	1973
14	Italy	1957Founder
15	Latvia	2004
16	Lithuania	2004
17	Luxembourg	1957Founder
18	Malta	2004
19	Netherlands	1957Founder
20	Poland	2004
21	Portugal	1986
22	Romania	2007
23	Slovakia	2004
24	Slovenia	2004
25	Spain	1986
26	Sweden	1995
27	United Kingdom	1973

#	State	Joined
1	Belgium	1957Founder
2	France	1957Founder
3	Germany	1957Founder
4	Italy	1957Founder
5	Luxembourg	1957Founder
6	Netherlands	1957Founder
7	Denmark	1973
8	Ireland	1973
9	United Kingdom	1973
10	Greece	1981
11	Portugal	1986
12	Spain	1986
13	Austria	1995
14	Finland	1995
15	Sweden	1995
16	Cyprus	2004
17	Czech Republic	2004
18	Estonia	2004
19	Hungary	2004
20	Latvia	2004
21	Lithuania	2004
22	Malta	2004
23	Poland	2004
24	Slovakia	2004
25	Slovenia	2004
26	Bulgaria	2007
27	Romania	2007

B. DESCRIPTIVE STATISTICS OF THE DATA:

1) Table 5. Growth Rates, 1993-2006

	Loan	Asset	Deposit	GDP
Austria	-30.6	17.7	11.8	61.8
Belgium	66.1	121.9	111.9	70.8
Bulgaria	-84.8	-87.5	-88.2	237.1
Croatia	-37.2	-16.2	-28.0	310.6
Cyprus	-53.1	-31.1	-41.9	134.1
Czech Republic	-55.8	-43.6	-45.2	324.1
Denmark	-43.6	-33.0	-31.3	70.8
Estonia	70.4	76.8	74.0	374.4
Finland	40.7	96.4	59.7	131.7
France	20.6	55.1	25.6	63.7
Germany	88.5	225.6	148.3	1314.6
Hungary	-17.6	-15.0	-34.3	200.7
Ireland	-76.1	-77.5	-74.0	264.5
Italy	-67.5	-59.4	-61.8	75.7
Latvia	-20.5	-36.4	-32.8	405.4
Lithuania	-35.6	-24.2	-18.4	334.8
Luxembourg	40.2	35.2	33.6	121.8
Malta	-50.3	-63.5	-61.2	137.6
Netherland	-65.1	-43.1	-25.5	88.4
Poland	-15.0	16.0	6.0	298.0
Portugal	125.8	94.6	91.1	102.5
Slovakia	-70.1	-64.3	-72.3	300.7
Slovenia	-63.8	-55.4	-58.1	187.0
Spain	-66.9	-62.3	-67.9	114.4
Sweden	26.5	38.8	39.9	84.7
Turkey	-50.0	-50.3	-46.3	83.8
UK	-65.5	-63.9	-61.8	135.0

2) Table 6. Average Annual Growth Rates, 1993-2006

	Loan	Asset	Deposit	GDP
Austria	-0.72	5.35	5.47	4.38
Belgium	6.60	7.98	7.98	4.59
Bulgaria	-8.32	-6.71	-2.61	88.48
Croatia	-1.69	-0.26	-1.33	12.27
Cyprus	-3.46	0.08	-1.45	7.17
Czech Republic	-2.82	-2.32	-2.78	12.37
Denmark	-2.73	-1.52	-0.92	4.59
Estonia	8.64	9.09	10.08	13.03
Finland	3.36	6.63	4.86	7.13
France	1.81	4.06	2.43	4.23
Germany	6.10	10.53	7.98	76.87
Hungary	-0.15	-0.39	-2.27	9.20
Ireland	-6.27	-5.62	-4.41	10.66
Italy	-3.04	-2.16	-1.81	4.73
Latvia	-0.79	-1.93	-1.64	13.45
Lithuania	-1.28	-0.89	-0.35	13.34
Luxembourg	2.99	2.57	2.52	6.75
Malta	-5.06	-7.13	-6.65	7.04
Netherland	-5.63	-1.45	0.69	5.32
Poland	0.06	2.22	1.67	11.67
Portugal	13.30	11.91	12.10	5.88
Slovakia	-2.59	-2.55	-2.93	11.89
Slovenia	-3.26	-1.07	-1.45	9.14
Spain	2.55	6.97	3.37	6.42
Sweden	2.10	2.78	2.93	5.24
Turkey	15.44	9.92	13.96	8.71
UK	-4.30	-4.21	-1.21	28.89

3) Table 7. Descriptive Statistics, 1993-2006

	Mean	Max	Min	Std. Dev.	Obs #
Loan	0.2222	0.7200	0.0260	0.1443	378
Asset	0.2166	0.8120	0.0250	0.1339	378
Deposit	0.2188	0.8310	0.0230	0.1409	378
GDP	17508.0	88231.6	1148.5	13813.1	378

4) Table 8. Correlation Matrix

	Loan	Asset	Deposit	GDP
Loan	1			
Asset	0.936	1		
Deposit	0.928	0.979	1	
GDP	-0.255	-0.213	-0.213	1

According to the correlation matrix, all variables obtained from balanced sheet have negative relationship with GDP. However the relations are weak. The correlations among balance sheet variables are very high. Therefore it is reasonable to use one of these variables since the highest correlation with GDP belongs to Loan. In this study Loan has been used to calculate HHI.

C. HERFINDAHL-HIRSCHMAN INDEX (HHI) :

The Herfindahl-Hirschman Index (HHI) is the most widely treated summary measure of concentration in the theoretical literature. The HHI is the sum of the squared bank market shares. It is a benchmark measure for the evaluation of other bank concentration indices and gives more weight to larger banks. In the United States, the HHI plays a significant role in the enforcement process of antitrust laws in banking. The HHI is often called the full information index because it includes features of the whole distribution of bank sizes. Namely, the HHI shows the importance of larger banks. For n firms in an industry with market shares s_i , ($i= 1,2,\dots,n$), the HHI is defined as;

$$HHI = C_H = \sum_{i=1}^n s_i^2$$

By definition $(1/n) < HHI < 1$, where n is the number of banks in banking industry. While in the case of monopoly the maximum concentration of unity occurs, in the case of each bank has an equal share of $(1/n)$, the minimum concentration occurs.

Although the HHI is the most popular concentration measure, there are several indicators to measure the concentration of banks which are presented below at the Table 5. Policy makers select the appropriate concentration indices depending on the features of their banking market. They also take into consideration the perceptions regarding the relative impact larger and smaller banks have on competition in a certain market, and their perceptions regarding the relative impact of size distribution and number of banks. These features substantially state the most suitable index.

Table 9. Banking Sector Concentration Ratios

Ratio	Ratio range	Ratio form
The k bank concentration ratio	$0 < CR_k = 1$	$CR_k = \sum_{i=1}^k s_i$
The Herfindahl-Hirschman Index	$1/n < HHI < 1$	$HHI = C_H = \sum_{i=1}^n s_i^2$
The Hall-Tideman Index	$0 < HTI = 1$	$HTI = 1/(2 \sum_{i=1}^n i * s_i - 1)$
The Rosenbluth Index	$0 < RI = 1$	$RI = 1/(2C)$
The comprehensive industrial concentration index	$0 < CCI = 1$	$CCI = s_i + \sum_{i=2}^n s_i^2 * (1 + (1 - s_i))$
The Hannah and Kay Index	$1/s_i = HKI = n$	$HKI = (\sum_{i=1}^n s_i^\alpha)^{1/(1-\alpha)}, \alpha > 0 \text{ ir } \alpha \neq 1$
The U Index	$1/n = U = 8$	$U = (\sum_{i=1}^n s_i * (s_i * n^{(\alpha-1)/\alpha}))^\alpha$
The Hause Index	$0 < H_m = 1$	$H_m(\alpha, \{s_i\}) = \sum_{i=1}^n s_i^{2-(s_i * (HHI - s_i^2))^\alpha}$
Entropy Measure	$0 = E = \log n$	$E = -\sum_{i=1}^n s_i * \log_2 s_i$

Source: Bikker (2000)