T.C.

YASAR UNIVERSITY

GRADUATE SCHOOL OF SOCIAL SCIENSES

DEPARTMENT OF ECONOMICS

MASTER THESIS

THE RELATIONSHIP BETWEEN FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH: EVIDENCE FROM BRICS AND TURKEY

Can KARABIYIK

SUPERVISOR

Assoc. Prof. Dr. F. Dilvin TAŞKIN

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YAŞAR ÜNİVERSİTESİ

SOSYAL BİLİMLER ENSTİTÜSÜ TEZLİ YÜKSEK LİSANS TEZ JÜRİ SINAV TUTANAĞI

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Adayın kişisel çalışmasına dayanan tezini 35 dakikalık süre içinde savunmasından sonra jüri üyelerince gerek çalışma konusu gerekse tezin dayanağı olan anabilim dallarından sorulan sorulara verdiği cevaplar değerlendirilerek tezin,

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YEMİN METNİ

Yüksek Lisans Tezi olarak sunduğum "Finansal Kalkınma Ekonomik Büyüme İlişkisi: BRICS ve Türkiye Örneği" adlı çalışmanın, tarafımdan bilimsel ahlak ve geleneklere aykırı düşecek bir yardıma başvurmaksızın yazıldığını ve yararlandığım eserlerin bibliyografyada gösterilenlerden oluştuğunu, bunlara atıf yapılarak yararlanılmış olduğunu belirtir ve bunu onurumla doğrularım.

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ABSTRACT

MASTER THESIS

THE RELATIONSHIP BETWEEN FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH: EVIDENCE FROM BRICS AND TURKEY

Can KARABIYIK

Yasar University

Graduate School of Social Sciences

Master of Economics

Main objective of this study is to investigate linear and causal relationship between financial development and economic growth by providing empirical evidence from BRICS Countries and Turkey. Theoretical and empirical finance-growth nexus literature has been examined in depth, theoretical link between finance and growth is explained in detail and terminally panel regression method and Dumitrescu Hurlin Causality Test are estimated to acquire practicable policy implications. Empirical test are conducted by employing panel data between 1994 and 2011. Financial development is divided into two sub-sectors, namely banking sector and stock market, to analyze sector specific effects. Three proxies are employed for banking sector development, namely, ratio of private credit to GDP, ratio of deposit money bank's assets to GDP, ratio of liquid liabilities to GDP and on the other hand two proxies, ratio of stock market capitalization to GDP, ratio of stock market total value traded to GDP, are selected for stock market development. According to the panel regression results all of the banking sector indicators have statistically significant impact on economic growth; however only credits issued to the private sector has positive effect on economic growth. Additionally stock market development has insignificant effect. Causality Test results indicate demand-following pattern for banking sector, while any causal relationship has not been found between stock market development and economic growth.

Keywords: Financial Market Development, Economic Growth, Panel Regression, Dumitrescu Hurlin Causality Test, Unit Root Test

ÖZET

YÜKSEL LİSANS TEZİ

FİNANSAL KALKINMA EKONOMİK BÜYÜME İLİŞKİSİ: BRICS VE TÜRKİYE ÖRNEĞİ

Can KARABIYIK

Yaşar Üniversitesi

Sosyal Bilimler Enstitüsü

Ekonomi Anabilim Dalı Yüksek Lisans Programı

Bu çalışma temel olarak finansal kalkınma ile ekonomik büyüme arasındaki doğrusal ve nedensellik ilişkilerini BRICS Ülkeleri ve Türkiye'den deneye dayalı bulgular sunularak incelemeyi amaçlamaktadır. Bu çalışmada, uygulanabilir politika çıkarımları elde edilebilmesi amacıyla finans ve büyüme literatürü derinlemesine incelenmiş, finansal piyasalar ile büyüme arasındaki teorik bağ detaylı bir şekilde açıklanmış ve son olarak panel regresyon metodu ile Dumitrescu Hurlin Nedensellik testleri tahmin edilmiştir. Ampirik testler 1994 ile 2011 yıllarını içeren panel veri seti kullanılarak gerçekleştirilmiştir. Finansal piyasalar sektörlere özgü etkilerin incelenebilmesi açısından bankacılık sektörü ve menkul değerler piyasası olarak iki alt sektöre ayırılmıştır. Bankacılık sektörünün kalkınmışlığı için kullanılmış olan göstergeler özel sektöre verilmiş olan kredilerin GSYİH'ya oranı, mevduat bankalarına ait olan varlıkların GSYİH'ya oranı ve geniş para arzının GSYİH'ya oranı iken menkul değerler piyasası kapitalizasyonunun GSYİH'ya oranı ve menkul değerler piyasası işlem hacminin GSYİH'ya oranı menkul değerler piyasasının gelişmişliği için seçilmiştir. Panel regresyon test sonuçlarına göre tüm bankacılık sektörü göstergelerinin istatistiksel olarak anlamlı olmasına rağmen sadece özel sektöre verilmiş olan krediler ekonomik büyüme ile pozitif ilişkiye sahip olduğu görülmüştür. Ayrıca tüm menkul değerler piyasası gelişmişliği göstergeleri istatistiksel olarak anlamsız bulunmuştur. Nedensellik testi sonuçları bankacılık sektörü için talep takipli kalıbı işaret ederken menkul değerler piyasası gelişmişliği ile ekonomik büyüme arasında nedensellik ilişkisine rastlanamamıştır.

Anahtar kelimeler: Finansal Kalkınma, Ekonomik Büyüme, Panel Regresyon, Dumitrescu Hurlin Nedensellik Testi, Birim Kök Testi

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ABBREVATIONS

BRICS	Brazil, Russia, India, China, South Africa
GDP	Gross domestic product
G	Annual GDP growth rate
LLG	Ratio of liquid liabilities to GDP
PCG	Ratio of private credit to GDP
DMCG	Ratio of deposit money bank assets to GDP
SMCG	Ratio of stock market capitalization to GDP
SVTG	Ratio of stock market value traded to GDP
SCH	Average years of schooling
INF	Inflation
TRADE	Trade openness
FEM	Fixed effect model
REM	Random effect model
GFDD	Global Financial Development Database
HDI	Human Development Index

CONTENTS

INTRODUCTION

This thesis aims to procure some work and information about the nexus of finance-growth. Economic growth which defined as increasing in the production capacity of goods and services (Parasız, 2008) is one of the most studied and discussed subject of economics.

On the other hand the notion of financial development can be defined as increasing, improving and becoming widespread of financial instruments that used in an economy (Erim ve Türk, 2005). Literature is broad on the subject of finance-growth nexus however consensus on it has not been able to build yet. Many economists suggest that financial market development positively effects economic growth, while others disagree and ignore. For example Schumpeter (1911) who made one of the earlier contributions on this subject asserted that properly functioning banking and financial systems accelerate level of technological innovations by providing finance opportunities and these lead to increase in productivity and growth through new production methods.

Conversely, Robinson (1952) claims that demand for financial services are created by economic growth and the financial markets simply follow it. Additionally Lucas (1988) who is one of the pioneers of the development economics suggest that, role of the financial system in growth process is over-stressed. However present-day economists are aware of the crucial effects of financial market development on economic growth and economic development.

As a beginning this thesis aims to illustrate the role of financial system on economic growth. According to the theory of economics, an economy progresses on three stages which are firstly traditional sector, secondly manufacturing sector and tertiary "services" sector (Fisher, 1939). Financial sector which is a part of tertiary sector provides essential funding transmission mechanism for previous two sectors especially for manufacturing and entrepreneurial activities. With reference to Hicks (1969), technological innovations that formed industrial revolution was invented before the earlier periods of industrial revolution in England but it need to wait for

the emerge of financial revolution. Because it is hard to accomplish the large, long range innovative projects without well-functioning financial markets.

Financial markets take entrepreneurs under review and mobilize savings to highest potential productivity increasing activities for financial needs, diversify risks related to these innovational businesses and promote innovation rather than existing production technics. Better functioning and more improved financial systems enhance likelihood of prospering innovative activities and also force the pace of economic growth. Conformably deteriorations in financial system decrease growth rate by decreasing level of innovation (King and Levine, 1993a). Additionally financial system can promote entrepreneurial activities through reducing transaction costs and bureaucracy. Comparatively it is easy to set up a business, in a well-functioning entrepreneurial economy, without costly and time drain bureaucratic processes. Therefore existence of successful financial markets that mobilize the excess funds of savers to the entrepreneurs who have shortage of funds, is essential (Baumol, Litan and Schramm, 2007).

Besides that, information asymmetries in financial markets may cause to adverse selection problems (Akerlof, 1970). These adverse selection problems may lead to financial crises which is harmful for the economic growth. Well-functioning financial systems are able to reduce asymmetric information problem. Therefore economic growth is dependent majorly on effectiveness of financial system that channels funds and evolution of financial system effects economic growth by way of technologic innovation and capital accumulation.

Systematic crises and structural problems in emerging countries reveal the importance of financial system (Altunç, 2008). How this precise legislative regulations and contract implementation structures in some economies have been established while others have not? If the way of development strategies for financial markets that promote and shape economic growth can be discovered, it will increase our understanding of long run growth rate differences among countries and living standards can be improved through economic development. For this reason crucial question was asked by Patrick (1966) that whether financial sector or real sector leads to the long run process of economic development and what is the direction of causality? He developed two hypotheses which are Demand-Following and Supply-

Leading. On one hand according to the Demand-Following hypothesis evolution and development of the financial markets arise out of increasing demand in real sector. In sum direction of causality originates from real sector growth to financial sector development. On the other hand direction of the causality runs from financial market development to the real sector growth because transmission of savings to the productive and innovative investment opportunities via financial system provides necessary sources to the real sector. If these mechanisms are understood better, more successful and specific public policies may be submitted to countries. The direction of causality is essential, since efficiency of different economic development policy implications may be developed through understanding of mechanism between finance and growth. However direction of causality has still remained ambiguous.

This study have the intention to determine direction of causal relationship between financial development and economic growth in six countries which are Turkey, Brazil, Russia, India, China and South Africa for the period of 1994-2011. These countries except Turkey are called as BRICS countries. This study is composed of five sections. Chapter 1 is introduction section and gives guideline of the study.

Properties and general specifications of financial sector and real sector are described and also classical and endogenous growth theories are explained in Chapter 2. Additionally dynamics between classical, endogenous growth models and financial development are evaluated. Studies of finance-growth nexus are disclosed in literature review section which is Chapter 3.

Chapter 4 gives information about data and methodology of this study. In this section employed variables are explained in detail and Unit Root Tests, Panel Regression Model and Dumitrescu Hurlin Causality Analysis are represented.

Chapter 5 is the empirical section of this study. As a beginning Unit Root Tests, Panel Regression Model and Dumitrescu Hurlin Causality Analysis tests are implemented and test results are clarified in the next phase. Ultimately conclusion section takes part in Chapter 5. Financial development and economic growth relationship, direction of causality in Turkey and BRICS countries are utilized accordingly with test results and also general assessment are made in conclusion part of the study.

CHAPTER 1

FINANCIAL SECTOR AND REAL SECTOR

1.1 Financial Sector

Financial markets may influence long-run economic growth positively. Since, it has capability to pool deposits of small savers, channeling them to the profitable promising investment projects and also reduction of adverse selection problem in credit markets (Bencivenga and Smith, 1991). Financial sectors are divided into two parts as Banking Sector and Stock Market in this study, because there are distinctions when we are talking about explicit roles of banking sector and stock market in stimulating economic growth.

1.1.1 Role of Stock Markets

Despite some economists regard stock markets in developing economies as "casinos" and consider them as having insufficient constructive effect on economic growth, recent studies indicate that stock markets can enable necessary rise to economic development (Levine, 1996). Stock market development smooth the way of selling and buying assets of savers and shareholders through decreasing transaction costs that stimulate economic growth (Bencivenga Smith and Starr, 1996). Furthermore stock markets increase efficiency of investment and the capital allocation. Hereby economic growth is facilitated indirectly. Because of reducing and diversifying risk, some investors are more reluctant to invest, however they can buy and sell their shares rapidly through stock markets. This characteristic of stock market provides independence and liquidity to the customers (Ake, 2010). The cost of foreign investment can be reduced by attracting foreign investors' funds through a more developed stock market. In this respect effective capital allocation and economic growth are stimulated by the existence of liquid stock markets via lessening of principal agent problem and also asymmetric information (Adjasi and Biekpe, 2006). On a firm level paper, Demirgüç, Kunt and Maksimovic (1996) states that in economies with more developed stock markets stimulate the enterprises to grow faster. Despite stock markets' positive contributions to the long run economic

growth performance, its impact is, at maximum, a minor proportion of that of the banking sector development (Arestis, Demetriades and Luintel, 2001, p.37).

1.1.2 Role of Banking Sector

Many economists especially Bagehot (1873), one of the pioneers on this subject, suggest that more developed banking system can detect creditworthy companies, channel savings and increase level of transactions. Through process of transferring funds which is the primary function of financial markets, is performed substantially by banking system. Banking system has an intermediary role between savers who have excess of funds and investors who have shortage of funds. Principal objective of banking system is obtaining deposits from savers and allocate these funds to investment activities via credit channels. Banking system encourages households to save more by providing interest return and channelize these resources to the most productive activities. Thereby traditional credit mechanism and risk management facilities are facilitated by financial intermediary institutions, real and financial sector reserves can be allocated at Pareto optimality conditions (Lian et al., 2006). Hereby banking system provides risk-free depositing chance for savers and also stimulates economic growth also through employment.

1.1.3 Definition of Financial System

Economic agents primarily tend to invest by using their own resources. When planned investments exceed aggregate saving, agent needs for additional financial resource to materialize his/her project. At this point financial markets involve to integrate fund suppliers and fund demanders together. Financial markets can be defined as meeting point of economic agents who has available funds in excess and who has shortage of funds (Aydın, 2004).

In addition to fund demanders and fund suppliers, financial system includes several components. These components are shown in Figure 1 which is graphical projection of financial system.

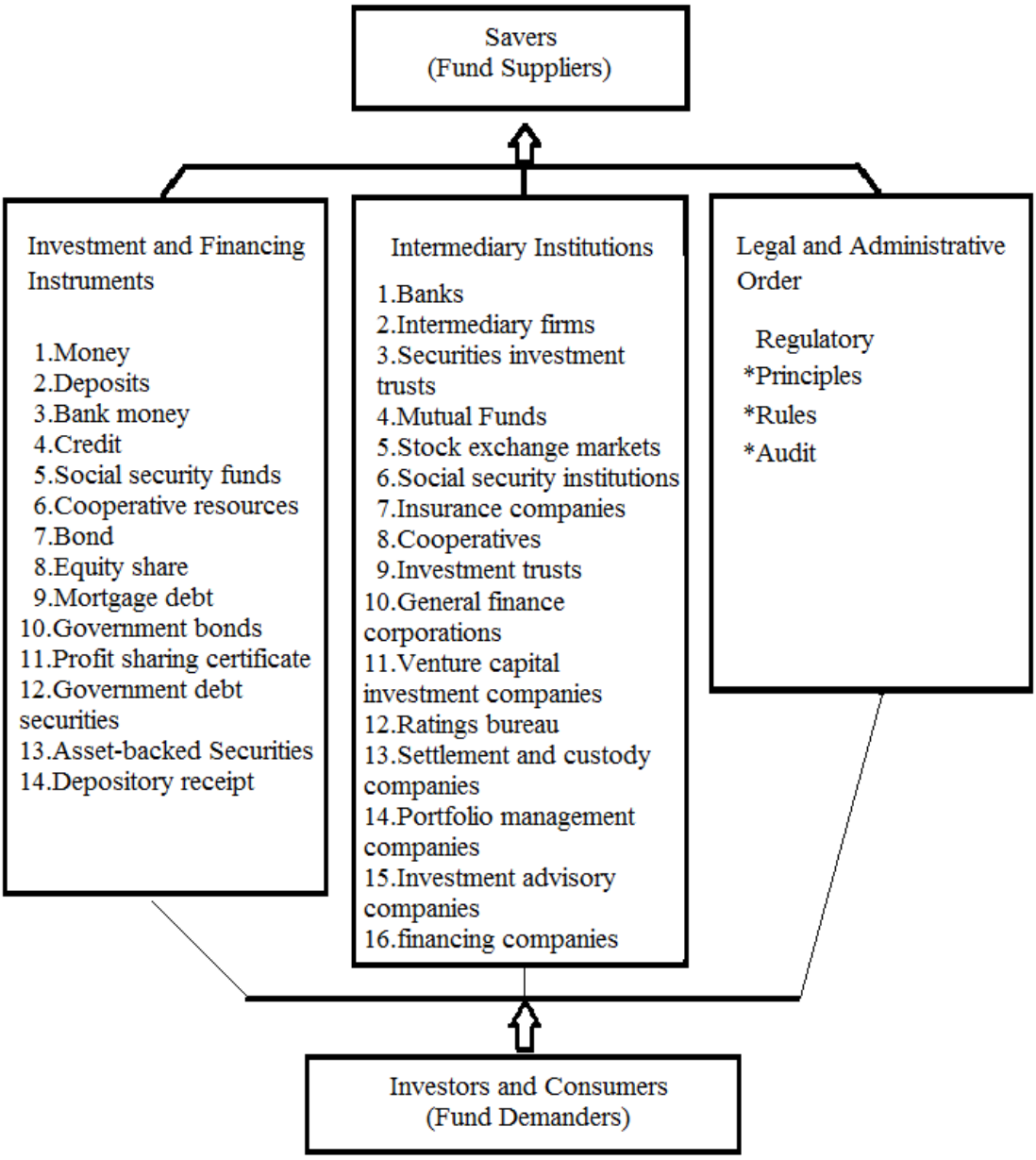

Figure 1: Financial System Scheme

Source: Canbaş and Doğukanli (2001), p.2

According to the financial system scheme, financial markets are consisting of five fundamental components:

- Savers
- Investment and financing instruments
- Intermediary institutions
- Legal and administrative order
- Investors

Intermediary institutions, investment and financing instruments and regulations help the fund transfer from savers to investors, herewith savings that necessary for financing of real sector is mobilized.

1.1.4 Transmission Mechanism between Finance and Growth

Development level of financial system is determined in accordance with its effectiveness of transmission mechanism that channels pooled savings to investment. In that case financial development is measured as full-effective functioning of financial system and transferring ability of scarce resources to promising investment projects through financial transmission mechanism that serve as a bridge between savers and real sector. Briefly financial assets act as a mask, in other words investments that made on a financial assets somewhat secretly connects investment that made on a real assets by another person (Parasız, 2009).

Wide range of studies have investigated and tried to determine these channels however there is no consensus on this issue. A number of different transmission mechanisms are mentioned in the finance-growth nexus literature.

Levine (1997) examines two channels that may effects economic growth. First one is capital accumulation. Financial markets influences capital accumulation through varying saving rates or reallocate funds to alternative capital generating technologies. Second channel is technological innovation. Financial system provides resources that necessary for innovative projects to entrepreneurs. In this way both productivity as well as economic growth is stimulated.

Tantamount to above-stated channels Calderón and Liu (2003) and Taghipour (2009) assert that development of financial markets may have impact on economic

growth through two channels. Firstly more enhanced financial system can ensure more rapid capital accumulation and secondarily improved financial systems allow for technological evolution or in other words productivity of capital.

Various financial system channels that can help to boost rate of economic growth are discussed by Beck (2011). In his view, financial systems increases level of transactions by a way of providing payment system and thus financial system can reduce transaction costs, pave the way for economies of scale by pooling savings, monitors and pursues promising investment projects and helps to lower agency problems that are related to management issues among bondholders and lastly minimizes liquidity risk.

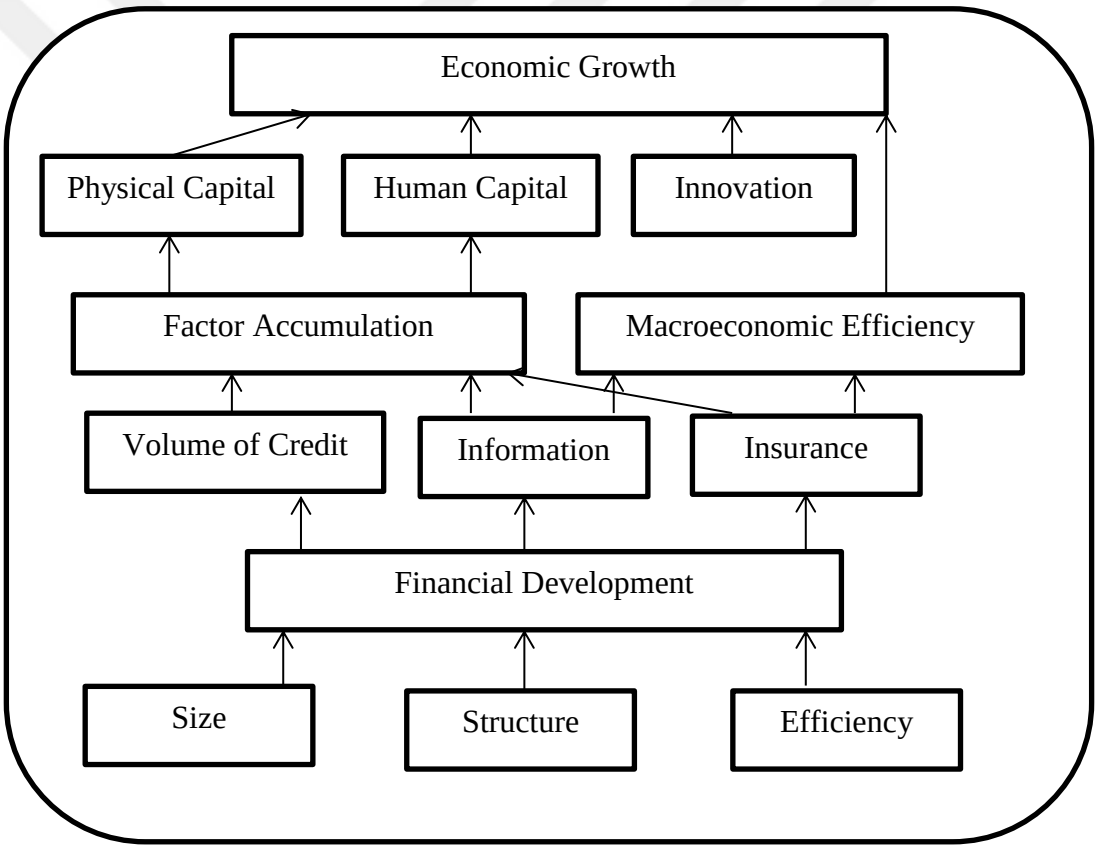

Figure 2: Financial Transmission Channels

Source: Neimke et al. (2003), p.191

Neimke et al. (2003) asserts that the financial system can influence driving forces of economic growth. These forces are capital accumulation and efficient allocation of resources as indicated in the Figure 2. Additionally various transmission channels between financial system and growth are classified in literature. These

channels are credit supply for investment projects, assurance of information and risk insurance. Hereby entrepreneurs can obtain requisite funds, conduct their business more stable thanks to lower level of information asymmetries. Additionally risk averse agents who are unwilling to make an investment because of economic environment uncertainties and entrepreneurial risk can be integrated with the real sector through risk management services of financial system.

In a nutshell financial system channels resources to economic growth by providing necessary funds to entrepreneurs, informing them about promising innovative business attempts and later on protecting them against risks. In particular insurance services are vital for economic growth, because investors may avoid risky investment projects even if they are more productive and profitable in the absence of insurance.

1.1.5 Functions of Financial Markets on Economic Growth

Financial markets are essential for dissuading households from consumption, promote them to save and channel these savings to productive investments to obtain adequate capital accumulation and economic progress. Increasing of available funds and transmission of acquired funds to investment areas are dependent on the development level and functioning of the financial systems. In economies with underdeveloped financial markets surplus receipts remains limited and mostly transferred into real estate, golden and foreign currency, therefore they cannot be canalized to procreative business activities (Canbaş and Doğukanlı, 2001). Besides proper functioning of financial system, asset magnitude and variety of financial institutions give chance consumers to get different financial services. At the same time accessibility of financial services are also important. Multiple branch office financial institutions abolish geographic limitations between fund demanders and fund suppliers (Güneş, 2012). Hereby financial services are able to spread throughout country.

Levine (1997) gathers together principal financial market functions on five baseline activities to formulate the massive literature on this subject of study. These functions can be listed as follows:

- Functions of Saving Mobilization
- Functions of Allocating Resources
- Functions of Exerting Firm Management
- Functions of Facilitating Commercial Activities
- Functions of Facilitating Risk Management

A Theoretical Approach to Finance and Economic Growth

Figure 3

Source: Levine (1997), p. 691

Figure 3 summarizes the theoretical approach to finance and growth. Correspondingly market frictions such as information and transactions costs are reduced by financial markets and financial intermediary institutions. Financial transmission mechanisms channel resources to real sector through either capital accumulation or technological innovation with the aid of financial functions. In this section of study primary functions of financial markets on economic growth are explained in detail.

1.1.5.1 Functions of Saving Mobilization

Promotion of saving and investment rates in an economy is one of the essential roles of financial system. In this regard pulling passive funds that are hold by households into economic system is crucial. As is known, saving volume is the fundamental determinant of the economic growth. Whereas funds that are not used for investment are called as leakage and are not considered as savings in the theory of economics.

Financial system pools together passive, small, dispersed funds and create broad-based supply of fund to finance large-scale investment projects. In this way, highly productive scale economies can be generated. Otherwise scale economies may not be financed in the absence of access to capital or sufficient number of fund suppliers (Mishkin, 2009). As a result, economy may be restricted into small and unproductive firms. Additionally research and development activities, the core of technological innovation and productivity, require higher degree of investment in the beginning. Therefore integration of small savings and mobilizing them into high-yield innovative projects are crucial for productivity and economic growth.

However fund suppliers may be reluctant to hold their assets in financial intermediary institutions because of two factors: transaction costs and information asymmetry problems (Levine, 1997). These factors can be collect under the title of cost of saving mobilization. Financial system can ameliorate saving mobilization through lowering costs of it and transfer these pooled funds to highly productive and profitable activities, hence economic growth is promoted (Greenwood and Smith 1997).

Financial system develops itself by bringing countless arrangement to reduce transactional and informational costs. The aim here is to increase effectiveness of financial services and eliminate worriment of households about financial markets. Correspondingly, saving mobilization has various mechanisms. Financial system provides fund suppliers opportunity of portfolio diversification, participation to high-yield investment projects and increasing the level of liquidity their financial instruments.

1.1.5.2 Functions of Allocating Resources

It is highly costly for individual fund suppliers to assess market conditions and get information about firms, managers in the process of decision-making about investment. Fund suppliers do not have chance to collect information about high-yield investments, however fund demanders have more accurate information in comparison with them. This fact may lead to asymmetric information and adverse selection problems which cause deterioration in financial markets. Additionally high information costs cause not to transfer of funds to most productive projects because of reluctant behavior of savers stemming from saver's lack of information. Furthermore costs may not be only obstacle to obtain information about business conditions. For example lack of time to research or lack of capacity may be a reason of information asymmetry.

Increase in demand of information in regard to market conditions, firms and managers can be considered among the reasons that bring financial systems in frontier. Therefore financial systems are needed to lower cost of obtaining information. Thus capital and resources can be allocated more efficiently to most productive sectors and promote productivity growth (Calderón and Liu, 2003). Financial intermediaries should produce and give most accurate information and assist economic growth by supporting most promising investment areas.

When potential investor cannot realize difference between high-quality corporation and low-quality firm, only mean value of equity will be paid by consumer. Low-quality corporation may find mean price attractive, but high-quality corporation does not consent to sell its equity at that prices. As a result funds flow to unproductive corporates and resources allocate inefficiently (Demirgüç-Kunt and

Levine, 1996b). That's why obtaining information about market conditions is paramount clause of effective allocation of resources.

1.1.5.3 Functions of Exerting Firm Management

Financial markets monitor investment projects that they funded in addition to the providing information services. As from credit has been made, managing of project and utilization of credit takes place whether in the shape of promised or not is monitored by financial system (Stiglitz, 1993). These functions called as monitoring and screening role of financial system.

While corporate managers regulate financial arrangement in the direction of advantage of their firm, financial intermediation institutions such as banks generate financial arrangement by looking out for their own creditor's interests. Liability of financial intermediaries against their creditors consist the main reasoning for that. Therefore managers and corporate owners are obliged to operate their firm in conformity with decisions of financial intermediary institution and creditors. Another reason is related to investment efficiency, since well-functioning financial market can successfully monitor issued investments to make it more efficient. If investment is going to be more productive, this process ends up with higher rate of economic growth (Hansson and Jonung, 1997). Otherwise activity of channeling savings to most promising investment fails in the absence of arrangements that affect corporate management.

1.1.5.4 Functions of Facilitating Risk Management

Risk is considered as possibility to lose in general manner. In financial terms risk can be defined as deviation between expected return and realized return. According to the other definition, risk is uncertainty about future value of asset. In that case there is always possibility to lose, in another saying risk for financial investments is probability of loss.

Financial markets and institutions have important functions such as to insure agents against to risk and to share these risks with them in the economic environment where contains information and transaction costs. In these circumstances financial

system may provide services for hedging, facilitating of commerce and risk pooling (Levine, 1997).

Liquidity of a financial asset measures as its ability to be converted into medium of exchange without losing its value. Liquidity risk may occur by reason of transaction and information costs asymmetries or by virtue of ambiguity in the turning financial assets into more liquid assets process. Financial markets and institutions enable savers to utilize risk diversification mechanism through portfolio diversification for lowering risk and offer different profitable alternatives (Fitzgerald, 2007). For example savers deposit their savings and so banks provide them liquidity and possibility to avoid risk (Bencivenga and Smith, 1991). Thus productivity, capital accumulation and economic growth are accelerated.

1.1.5.5 Functions of Facilitating Commercial Activities

Financial markets ease exchange of goods by the help of payment system. It is unthinkable that the evolving of worldwide trade and economic relations to present-day conditions without financial system. Under favor of bidirectional interactions between financial markets and technological innovations, technological change has been developed with the support of financial system and financial services take the advantages of these improvements. In the direction of technological opportunities, most of the exchange transactions are in progress in virtual environment.

Payment system that provided by financial markets and institutions constitutes one of the most important advantages to economic growth. Presence of well-functioning payment mechanisms are essential and needed for growth. There is a bilateral mutual effect between economic growth and payment mechanism, for this reason both of them has made progress together up until now. Additionally this mutual effect includes returns resultant from productivity and gives chance for emergent markets (Goaied and Sassi, 2010).

Time constraint and location constraint forms two components of information and transaction costs. These constraints prevent rapid, active and productive functioning of economy. Financial payment systems can drop them and enable to made faster exchange operations and contribute to the economic growth.

1.2 Endogenous and Neoclassical Growth Models and Their Interaction with Financial Development

In this sub-section of the study neoclassical and endogenous growth theories that major cause of disagreements on the finance-growth subject are explained in detail and implications of financial markets on economic growth are expressed for both growth theories respectively.

1.2.1 Neoclassical (Solow) Growth Model

Solow growth model was developed by Robert M. Solow in 1956. According to the assumptions of the Solow Model, only one homogeneous good is produced, economy is closed and technology is determined exogenously. Solow model is generated within the frame of two equations. These equations are Cobb-Douglas production function and capital accumulation equation. Capital is denoted as "K", labor is denoted as "N" and total output is denoted as "Y" to simplify the model. Production function can be seen as follows:

$$Y = F(K, N) = K^{\alpha} N^{1-\alpha}, \quad 0 < \alpha < 1 \tag{1.1}$$

Constant returns to scale is valid for the production function, interpretively if input doubles total output goes double. Firms pay "w" as wage per labor and "r" to capital owners as rent per capital in this economy that perfectly competitive. Firms solve following problem to maximize their profit:

$$\text{Max } Y = \text{Max } F(K, N) - rK - wN \tag{1.2}$$

According to the initial condition of the problem, firms continue to hire labor until marginal product of labor equals to the wage and hire capital until marginal product of capital equals to the rent.

$$w = \frac{dF}{dN} = (1-\alpha)\frac{Y}{N} \tag{1.3}$$

$$r = \frac{dF}{dK} = \alpha \frac{Y}{K} \tag{1.4}$$

Firms do not get any profit, because all of the income is distributed to the production factors capital and labor. It can be expressed in mathematical form as follows:

$$Y = r K + w N \quad (1.5)$$

Assume that output per worker is denoted as $y = Y/N$ and capital per worker is denoted as $k = K/N$. Let's rewrite production function by putting y and k:

$$y = Y / N = K^{\alpha} N^{1-\alpha} / N = (K / N)^{\alpha} = k^{\alpha} \quad (1.6)$$

According to the equation 1.6 output level depends positively on capital per worker and diminishing marginal returns are valid for labor. In sum while capital per labor increases production per labor increases on regressive rate as can be seen in Figure 4 as follows:

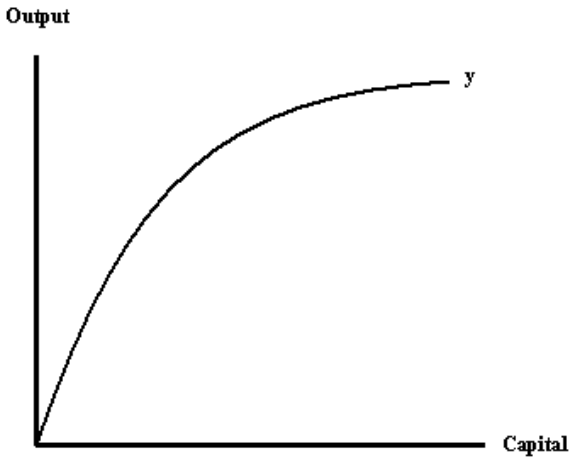

Figure 4: The Average Product of Capital

Source: Barro (2008), p.58

Capital accumulation equation is the second essential equation of the Solow model. It is denoted as follows:

$$\acute{K} = sY - dK \quad (1.7)$$

According to the equation 1.7 changes in capital accumulation equals to the difference between savings (sY) and capital depreciation (dK). Left side of the equation is continuous time form of $K_{t+1} - K_t$ and the dot on the top of the K indicate derivative over time. Mathematical projection of the capital change over time can be seen as follows:

$$\acute{K} \equiv \frac{dK}{dt} \tag{1.8}$$

Solow model assumes that labor / consumers save constant proportion "s" of their wage and closed economy. Therefore, savings and investment are equal to the each other. Additionally, investment is used only and only to accumulate capital and capital stock depreciates at constant rate which is "d". In a nutshell capital accumulation increases with the aid of investment and decreases because of depreciation. In these circumstances we can say that economy will grow as long as investment is greater than depreciation.

To understand changes in output per capita, capital accumulation equation should rewrite in terms of capital per capita. In this way Cobb-Douglas production function will show output per person regardless of changes in capital stock per person. To obtain per person equations for each variable, logarithmic function and differentiation are used.

On the other hand, population grows at constant rate "n" and population is shown as (N). Population growth at time "t" can be denoted as follows:

$$N(t) = N_0 e^{nt} \tag{1.9}$$

$$\text{Log } [N(t)] = \log [N_0 e^{nt}] \tag{1.10}$$

$$\frac{\dot{N}}{N} = n \tag{1.11}$$

And capital per capita equation is denoted as follows:

$$k = \frac{K}{N} \tag{1.12}$$

Firstly, logarithmic functions are used:

$$\log k = \log K - \log N \tag{1.13}$$

Secondly, differentiation is implemented:

$$\frac{\acute{k}}{k} = \frac{\dot{K}}{K} - \frac{\dot{N}}{N} \tag{1.14}$$

We are already know $\frac{\dot{N}}{N} = n$ and $\acute{K} = sY - dK$. Let's put these values to the equation above:

$$\frac{\acute{k}}{k} = \frac{sY - dK}{K} - n \tag{1.15}$$

$$\frac{\acute{k}}{k} = \frac{sy}{k} - d - n \tag{1.16}$$

$$\acute{k} = sy - (d + n)k \tag{1.17}$$

The equation 1.17 tells us that changes in capital stock per person are determined by three variables. On the one hand, saving per person is positively related to changes in capital per person. On the other hand, there is an inverse relationship between capital per person accumulation and changes in both depreciation and population growth. Depreciation causes to remain less capital to invest, furthermore increasing population decreases capital per capita. Population growth induces to decrease the level of capital per person. Solow diagram in Figure 5 can be analyzed to understand this phenomenon clearly.

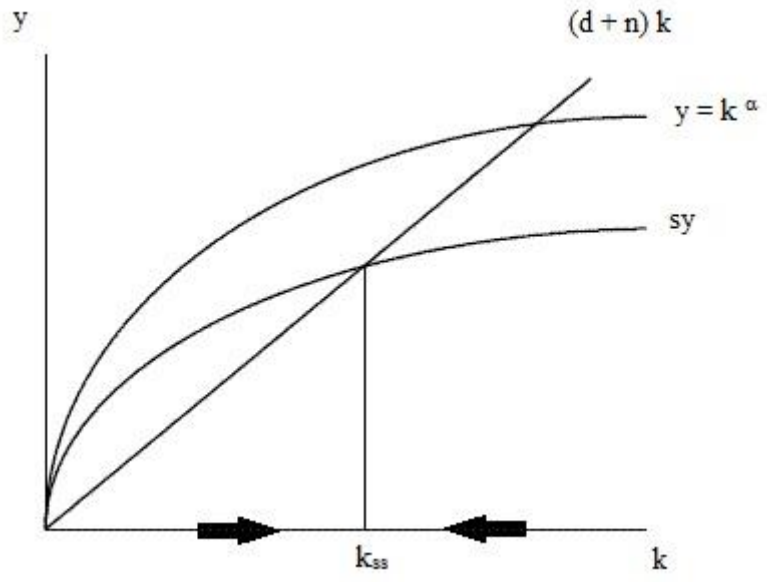

Figure 5: Solow Diagram

Source: Barro & Sala-i-Martin (2004), p.29

The curve of "$y = k^{\alpha}$" demonstrates per capita output. Per capita output curve has positive slope, however it increases on regressive rate in a consequence of diminishing marginal returns of capital. It means that as per capita capital increases, marginal productivity of capital decreases. Tantamount to Per capita output curve,

same interpretation can be made for per capita saving curve “sy” because it is fixed proportion of per capita output.

By contrast with capital accumulation, capital stock decreases in fixed rate as a result of depreciation and population growth. The difference between saving and depreciation indicates capital deepening, if it is positive. If economy starts on point that on the left side of k_{ss}, capital becomes deeper. However, each additional unit of capital contributes less to the capital stock. When economy comes to k_{ss} point capital accumulation equals to zero and depreciations equals to saving as can be seen in equation 1.18 here below:

$$0 = \acute{k} = sy - (d + n)k \tag{1.18}$$

$$sy = (d + n)k \tag{1.19}$$

This situation called as Steady-State where economic growth rate equals to population growth rate. In another saying per capita output growth rate is zero. According to the neoclassical growth theory economy inevitably goes towards to the Steady-State point without considering of beginning capital stock point.

1.2.2 Endogenous (AK) Growth Model

The AK model was developed by Sergio Rebelo (1990). The AK model does not use the diminishing marginal returns of capital assumption and simply shows that sustainable per capita income growth can be succeed even in the absence of exogenous technological progress. Essential feature of the model is that the AK model indigenizes technological progress.

The AK model assumes linear relationship between aggregate output (Y) and capital (K). Furthermore capital includes human capital besides physical capital. The AK model is derived from following production function with constant returns to scale:

$$Y = F(K, N) = AK^{\alpha}(HN)^{1-\alpha} \tag{1.20}$$

Human capital (H) indicates knowledge, experience and skills that belong to labor and A demonstrates exogenous constant. H will define as follows:

$$H = \frac{K}{N} \quad (1.21)$$

Hence we can get formation of Capital as described in equation 1.22:

$$K = HN \quad (1.22)$$

Equation 1.22 simply tells that human capital and physical capital are positively correlated, in another words working conditions with much more physical capital will increase labor's knowledge and skills. If we put equation 1.22 in to the equation 1.20 production function becomes as follows:

$$Y = AK^{\alpha}(K)^{1-\alpha} \quad (1.23)$$

Sum of the powers of production factors equals to the one on the production function which means constant returns to scale. As a result production function turns into following form:

$$Y = AK \quad (1.24)$$

When both sides of the equation 1.24 divides by N we get function of output per capita and it is denoted as:

$$y = Ak \quad (1.25)$$

Constant term A indicates quantity of output by using one unit of capital, A = y/k. Per capita investment can be written as:

$$i = sy \quad (1.26)$$

Marginal propensity to save is shown as "s". When equation 1.25 is put in to the equation 1.26 investment function becomes:

$$i = sAk \quad (1.27)$$

Under the assumption of constant technological progress, capital accumulation equation can be obtained conformably with Solow Model. Capital accumulation equation can be written as follows:

$$\Delta k = i - (d + n)k \quad (1.28)$$

$$\Delta k = sAk - (d + n)k \quad (1.29)$$

$$\frac{\Delta k}{k} = sA - (d + n) \quad (1.30)$$

On the strength of equation 1.30 income per capita growth rate can be obtained as follows:

$$\frac{\Delta y}{y} = sA - (d + n) \quad (1.31)$$

According to the equation 1.31 income per capita growth rate depends on the relationship between sA and (d + n). If sA is greater than (d + n) positive effects of investment will exceed negative effects of population growth and depreciation, correspondingly output per capita will increase continuously. In another words, sustainable growth is obtained without technological growth if sA is greater than (d + n). Occurrence of sustainable growth is shown in Figure 6 within the frame of AK model.

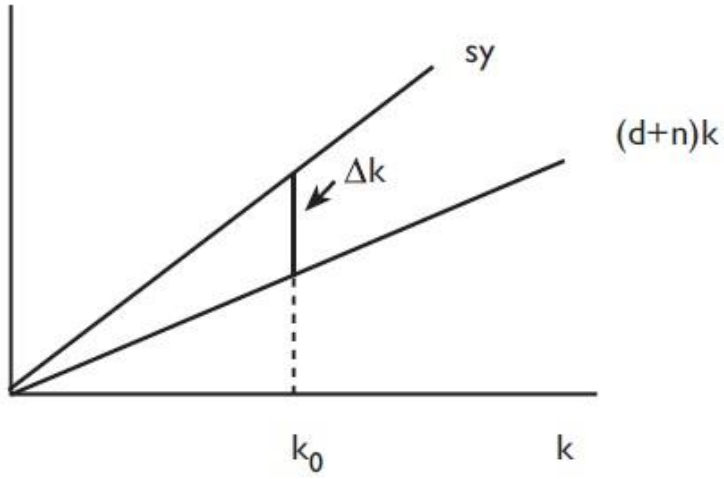

Figure 6: The AK Model 1

Source: Van Den Berg (2001), p.146

The gap between sy and (d+n)k measures quantity of increase in capital per capita. According to the AK model capital per capita increases continuously. These circumstances lead to increase in total output and capital stock at the same rate with sA – (d+n) as can be seen in Figure 7.

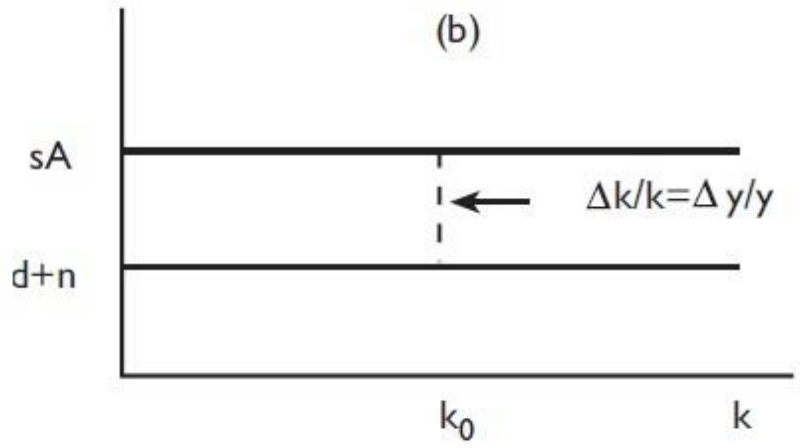

Figure 7: The AK Model 2

Source: Barro & Sala-i-Martin (2004), p.64

Accordingly output per capita will grow without technological advancement. This aspect constitutes first difference between Ak model and Solow model of growth.

Furthermore higher saving rate, lower depreciation and population growth rate leads to higher per capita output growth rate when sA is greater than (n+d). Hence increase in saving rate causes continuously higher output growth rate in AK model. This aspect constitutes second difference between AK model and Solow model of growth.

Countries with same A, s, d and a values and grow at the same rate even if they have different capital per capita and output per capita levels. Thereby convergence hypothesis that one of the assumptions of the Neo-classical growth theory is not hold for AK model. To clarify, poor countries with lower capital stock will not be able to catch rich countries that have a higher capital stock on their common Steady-State point. This aspect generates third difference between AK model and the results of the Solow model. In this situation assumption of diminishing marginal returns becomes invalid because physical capital not only helps to increase production but also has positive side effects on human capital. In a nutshell, when physical capital increases, it causes increase in knowledge and skills of labor. Therefore, law of diminishing marginal returns will not work. Key feature of AK model is either increase in

physical capital or increase in human capital will cause to increase in marginal return of capital.

1.2.3 The Relationship between Financial Development and Economic Growth According To the Endogenous Growth Theory

According to the Neo-Classical growth theory financial markets are only able to increase saving rate, thus per capita national income can be increased. However, this increment will not be permanent. Increase in saving rate just leads to raise the level of per capita GDP, however economy does not grow in the long-run. Therefore, neoclassical growth theory does not explain sustainable growth. In contrast endogenous growth models such as Romer (1986) and Rebelo (1990) allow long-lasting per capita national income growth rate via increment in aggregate saving rate and also technological progress. Recently accelerating concern on the issue of finance growth nexus arises from endogenous growth theories. Endogenous growth theories indicate that, sustainable economic growth can be actualized in the absence of exogenous technological progress. Hereby interaction between capital accumulation, human capital and research and development efforts may provide long-run economic growth. Although endogenous growth model cannot explain convergence approach that poor countries catch rich countries on their common steady-state point, it constitutes exclusive qualification of neoclassical model.

The simplest endogenous growth model, AK model, is used for explaining possible impacts of financial market development on economic growth by Pagano (1993). Production function where "A" is a exogenous constant and "K_t" is capital accumulation variable is denoted as follows:

$$Y_t = AK_t \tag{1.32}$$

Take into consideration of Q companies in a country. Each company produces to the extent of constant returns to scale, however productivity is a strictly increasing function of the total capital stock K_t. Individual production function of each company is $y_t = \beta k_t$ where y_t and k_t are individual production amount and individual capital stock respectively. Assume that β is considered as a coefficient by companies, however it counteracts to average capital stock in accordance with $\beta = Ak_t^{1-\alpha}$. Hereby total production can be denoted as $Y = Qy_t$.

It is assumed that only one homogenous good is produced for two purposes of investment and consuming. Population growth rate is zero and invested capital depreciates at the constant rate "δ" every year to simplify the model. Hence total investment function can be described as follows:

$$I_t = K_{t+1} - (1 - \delta)\, K_t \tag{1.33}$$

Economy faces with autarky. Capital market equilibrium condition is $S_t = I_t$, in words total saving equals to the total investment. It is assumed that constant fraction of saving, $1 - \gamma$, is loss in the financial intermediation operations. In that case γ is the remained amount of the saving that turns into investment.

$$\gamma S_t = I_t \tag{1.34}$$

In that case growth rate of the economy at the period t+1 can be obtained from equation 1.32 as follows:

$$g_{t+1} = \frac{Yt+1}{Yt} - 1 = \frac{Kt+1}{Kt} - 1 \tag{1.35}$$

The steady-state growth rate can be shown without denotive of time by using equation 1.33 as follows:

$$g_{t+1} = A\frac{I}{Y} - \delta = A\gamma s - \delta \tag{1.36}$$

The remarkable point up to this point is rate of saving "s = S/Y" that clarifies how financial development influence economic growth. According to the equation 1.36 financial markets can increase γ. In a nutshell, quantity of wasted resources may be reduced, much more fund may be channeled to investment, marginal productivity of physical capital and human capital may be raised with the aid of more investment and. As a result all of these factors can lead to increase in saving rate.

As stated before financial development may affect growth through three channels. Firstly, money saved by households does not turn into investment completely. The amount of "1 – γ" is taken by financial intermediary services as a service charge, additionally taxation and transaction costs may increase amount taken from households. However, improvement in financial system may decrease the amount of "1 – γ" and stimulate growth through more efficient usage of savings.

Secondly, financial system can increase marginal productivity of capital "A" through detecting different business spaces and incentivize entrepreneurs to these risky but active operations by providing risk sharing. Consequently growth will increase in parallel with productivity.

Thirdly, higher expected profit or reduced risk level may increase saving rate and accelerate growth. However, outcome of these factors may be different than expected. For example, expectation of higher return may lead to more future and present consumption that causes saving rate to decrease or decreasing risk level may result in excessive investment on riskier project and decrease in cautionary saving.

1.2.4 The Relationship between Financial Development and Economic Growth According to the Neoclassical Growth Theory

In this part of study the simple form of Solow (neoclassical) Model is used to represent impact of financial markets on economic growth. Aggregate production is contingent upon total capital stock, labor and technological progress in neoclassical growth framework. However, economic growth is dependent on changes in capital stock accumulation under the assumption of given rate of population growth and absence of technological progress. However, there is no linear increase in total capital stock and national income. Capital stock and national income increase over time but in a decreasing rate as a result of the assumption of diminishing marginal return of capital. On the other hand, saved capital depreciates in a fixed rate at the end of every period of time. Therefore, it is inevitable to be equivalent of the amount of capital that saved and depreciated at some point. At this point, capital accumulation comes to a stop and economy grows at the same rate with population. In other words, there will be no change in national income per person. It is called as Steady-State where output growth rate per person is zero.

Saving rate can be increased through financial markets and this leads to obtain more capital for production. Assume that saving rate increased from s to s′ via financial markets. Equation 1.37 can be investigated to illustrate effects of new saving rate:

$$\dot{k} = sy - (d + n)k \tag{1.37}$$

Initially capital accumulation increases as a result of increase in saving rate. Furthermore curve of saving goes sy to s′y and becomes steeper as can be seen in Figure 8.

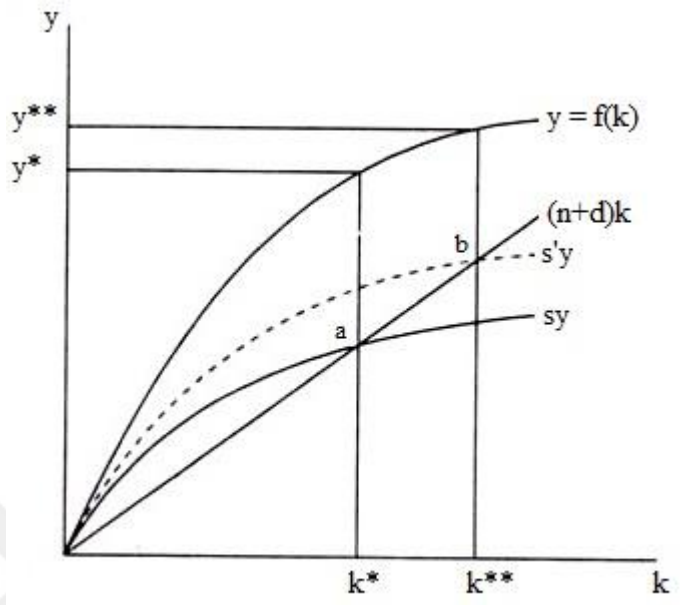

Figure 8: Solowian Paradox of Thrift

Source: Yeldan (2009), p.127

Higher level of capital per person and income per person are reached. While aggregate output increases at a decreasing rate as a result of diminishing marginal return of capital, saved capital depreciates constantly. Invariably economy comes to new Steady-State point from k* to k** where output growth rate per person is zero.

When saving rate is changed, economy goes towards to another Steady-State point (Yeldan, 2009, p.127). At this point capital and income per person are higher than before however increase in saving rate conduces to increase in growth rate in only short-run. In another words, growth of national income is independent from saving rate in the long run in neoclassical growth model by contrast with endogenous growth model. In the circumstances financial development causes transient positive effect on economic growth through increase in saving rates.

CHAPTER 2

LITERATURE REVIEW

2.1 Theoretical Studies

Schumpeter (1911) emphasizes the important role of evolvement of financial markets on the course of economic development in his pioneer study on finance-growth nexus literature. According to Schumpeter (1911), financial markets can facilitate innovative activities that promote productivity growth at initial phase and later on economic development. In his view individual needs to be an obligor before becoming an entrepreneur. To put it differently, entrepreneur is in need of funds to realize his/her new product or new production process. Well-functioning financial markets mediate between saving and productivity enhancing activities through their monitoring and screening abilities. Thus, resources are allocated efficiently to most promising investment projects and required productivity growth for economic development and economic growth can be achieved by courtesy of developed financial markets.

Gurley and Shaw (1955) criticize prevalent view that economic development depends on wealth, workforce, aggregate production and income. They state that researches concentrate mostly on real factors of economic development, while they generally ignore financial factors. They argue that financial system takes an important place for economic development via portfolio diversification. Improvement in financial services leads to reduction of risks, because investors have more option to invest. Thus, financial intermediation services become more widespread and effectively channeled savings increase capital accumulation which results in economic growth.

Patrick (1966) makes substantial contribution to the finance-growth nexus in his seminal work by suggesting two concepts, namely demand-following hypothesis and supply-leading hypothesis, to identify the direction of one way causal relationship between financial markets and economic growth. These two concepts are utilized frequently in recent studies.

According to the demand-following hypothesis, external resources become more needed for investors and financial services become more necessary for savers

in the process of economic development. More investment projects are designed and households can save more with the aid of increasing income. As a result, demand for financial services increases. Financial markets improve in line with increasing demand of financial services due to economic development. In brief, causality runs from economic development to financial development in demand-following hypothesis (Patrick, 1966).

Supply-leading hypothesis states that channeling savings to the innovative investment opportunities stimulates entrepreneurial activities in the modern sectors as from emerge of financial markets. Financial assets, supplied by financial system, are transferred from conventional sectors to promising modern sectors. By this way efficient allocation of resources can be ensured, entrepreneurs are supported and productivity is increased. Consequently, financial market development causes economic development in the supply-leading hypothesis (Patrick, 1966).

Additionally, phases of economic development are explained by Patrick (1966). Due to absence of sufficiently developed financial system, economy develops in accordance with supply-leading phenomena in the early steps of development. However, demand-following pattern dominates economy step-by-step in an advanced stage arising out of increasing financial service demand of business environment and households.

Pagano (1993) investigates the relationship between financial development and economic growth. Based on simple endogenous growth model "The AK Model" he claims that financial development may affect economic growth in following three ways:

- Through increasing the fraction of saving channeled to investment projects
- Through raising the marginal productivity of physical capital and human capital
- Through affecting saving rate

In his view relationship between financial development and economic growth can be explained more clearly as from building of endogenous growth model. Contrary to the neoclassical growth model assuming non-sustainable growth, endogenous growth model can associate long-run economic growth with efficient

financial markets. In brief improving financial system increases effectiveness of allocation of resources, reduces waste of resources in the process of financial intermediary, provides risk sharing services and encourages mobilization of idle resources, hence accelerates economic growth.

2.2 Empirical Studies

First study on the subject of relationship between financial development and economic growth is practiced by Raymond W. Goldsmith in his influential book of *Financial Structure and Development*. Goldsmith (1969) uses several features of financial system to measure financial development. Under the assumption of financial development level which is directly proportional to quantity and quality of financial services, he suggests a measure that ratio of financial intermediary assets to gross national product as a financial system development indicator. Annual data from 35 countries with different economic structures is used in cross-country regression for the period of 1860-1963. His findings support the hypothesis that financial market development and economic growth are dependent on each other and positive relationship is detected between financial system improvement and growth in his study.

Roubini and Sala-i Martin (1991) analyze effects of financial development on economic development by using data from 53 countries between 1960 and 1985. They use financial repression dummy variable and reserves of commercial banks to measure the effect of seigniorage. They claim that government pursues financial repression policies to widen seigniorage revenue by increasing ratio of required reserves. According to their test results, financial repression and high level of required reserve ratios lead to remain fewer funds to finance productive sectors and lower economic growth.

King and Levine search finance-growth link in their two researches that are published in the same year. King and Levine (1993a) investigate impacts of financial system on economic growth through technological innovation and entrepreneurial activities. They use four economic growth indicators such as productivity, income growth, per capita income growth and investment level and additionally several indicators that measure size and relative importance of financial institutions. Their

research arrives at the conclusion that, improvements in financial services facilitate entrepreneurship and productivity growth which lead to economic growth.

King and Levine (1993b) examine idea of "Creative Destruction" articulated by J.A. Schumpeter. They claim that financial market development has significant positive correlation with economic growth. Furthermore, innovative production techniques can be considered as substitute for old and unproductive methods through the instrumentality of developed financial systems as Schumpeter described decades ago.

Using a sample of 16 countries, Demetriades and Hussein (1996) analyze direction of causal relationship between financial system development and economic progress. They use real per capita income growth to measure economic growth and broad money supply and provided bank claims to the private sector as financial development proxies. Little evidence is founded for supply-leading pattern; however their findings indicate strong evidence for two way causality. Moreover, they suggest that financial development may be influenced by different structures of different countries on the strength of their country specific analysis.

Levine (1997) claims that banking sector and financial institutions are more effective than stock market on the way to economic growth since banking sector can eliminate asymmetric information problems more effectively. Thus, problems arising from information asymmetries can be reduced and effective allocation of resources can be ensured. For these reasons he concentrates on banking sector when he measures financial development. He uses several indicators such as depth and credit to measure banking sector development. He uses two growth indicators in addition to the real per capita income growth; specifically capital accumulation and technological change. He finds out that each indicator of financial developments has significant positive relationship between growth indicators and financial development and is able to predict long run growth rates successfully.

Demirgüç-Kunt and Maksimovic (1998) examine juridical-financial distinctness and their impacts on firm's external source using ability that maintains growth. Their research contains data from 30 emerging and industrialized countries. They assert that well-functioning security markets and well-regulated juridical

systems are essential factors for firm growth that constitutes micro component of economic growth.

Kar and Pentecost (2000) investigate causal link between financial system improvement and economic progress in Turkey between the years of 1963 and 1995. They conclude that direction of causality differs with regard to indicators used for measuring financial system improvement. For instance, causality moves towards from financial system to economic growth when financial system development is measured by using ratio of broad money supply to GDP. On the other hand, causality turns to other way, when indicators related to banking sector and issued credits are used. Nevertheless, it would appear that causality moves towards from financial sector development to growth in Turkey.

Filer, Hanousek and Campos (1999) make causal research on the subject of finance-growth nexus on 64 countries. They focus on importance of security market and use size, turnover ratio and market activity as indicators for security market development between the years of 1985 and 1997. They found robust and positive correlation between security market and economic growth. Besides they suggest that causal relationship runs from security market to economic growth especially in advanced countries.

Beck et al. (2000) make a study of finance-growth link at firm, industrial and country level for the period of 1980 and 1995 and also analyze effect of financial structure. They measure financial development in four dimensional data that measure activity, size, effectiveness and total values of financial system. They claim that financial structure, which defines country has either bank based or market based form, does not matter for financial system development on the basis of their firm, industry and country based analysis. In other words, differences in the financial structure of countries are not sufficient to explain the gap between neither their degree of financial development nor economic growth rates. However, legislative framework of countries is more interpretive to explain level of financial development differences. Besides, legislative framework may boost growth through financial development that functions as a bridge between legal system and growth.

Levine, Loayza and Beck (2000) examine the effect of financial market development on economic growth, impact of legal arrangements and accountancy

mechanism on financial development. Their study includes 74 countries and three financial market development indicators such as broad money supply, relative importance of commercial banks and credits issued to the private sector. Used time interval in this study is between 1960 and 1995. They found that improvements in financial system have significant positive effect on real per capita income growth. Also, differences in legal arrangements and accountancy mechanism among countries can explain why some countries have more developed financial systems while others do not.

Calderón and Liu (2003) seek an answer for direction of causal relationship between financial development and economic growth. They analyze 109 countries consisting of 22 advanced and 87 emerging countries for the period from 1960 to 1994. Broad money supply and loans are issued to the private sector by financial intermediary institutions represent financial development in their study. Their findings assert that supply leading pattern is valid for all of the 109 countries. In other words, financial development takes the lead in the process of growth. Additionally they divide sample into two groups as advanced and emerging countries and result is bi-directional causal relationship between financial development and economic growth. They put forward that financial development needs time to affect growth and it affects growth through increment in capital stock and innovation.

In another study Christopoulos and Tsionas (2004) make causal research so as to clarify the finance-growth nexus by using data from 10 emerging countries between 1970 and 2000. Their explanatory variables can be summarized as proportion of investment, inflation rate and financial depth which containing total banking sector deposits. They suggest existence of one way causality running from financial development to economic progress. In other saying, finance leads to growth and economy follows supply-leading framework.

Hassan, Sanchez and Yu (2011) make causal research by use of quite large sample that containing all member countries of World Bank and countries with population that greater than 30.000 person for the years of 1980-2007. Besides, they split their sample into six geographic area and report area specific results for each. They found positive correlation between financial system progress and growth. They claim that there is bi-directional relationship in the short-run for all areas apart from

Sub-Saharan and East Asia Pacific. Furthermore economy follows demand-following pattern in Sub-Saharan and East Asia Pacific. Additionally, they suggest that data supports the hypothesis of demand-following pattern in poorest countries.

Čihák et al. (2013) measure financial market development for both banking sector development and stock market development by using four-dimensional index of financial market differential features that consisting of size, accessibility, efficiency and stability. Thus, each country can be ordered accordingly with its level of financial development. They assert that there is a positive correlation between level of financial development and economic development and negative relationship between financial development and inequality.

Further studies on the subject of finance-growth nexus are reported as a summary in Appendix 1.

CHAPTER 3

DATA AND METHODOLOGY

In this chapter we will firstly present the data set, data descriptions and the rationale behind the variable selection. Secondly, econometric methodology and its results will be elaborated.

3.1 Data

In this study we investigate the relationship between financial development and economic growth for six countries which are Turkey and BRICS countries, namely Brazil, Russia, India, China and South Africa. The primary objective of choosing BRICS countries is their similar economic structure with Turkey's. All of the mentioned countries are emerging market economies with common macroeconomic infrastructures.

Annual GDP growth rates are used as proxy for economic growth; however, financial development does not have direct measures. For this reason, financial development proxies are selected through delving into the relevant literature on financial development. In this study financial development is divided into two groups; namely, Banking Sector Development and Stock Market Development. On one hand, three proxies are selected for Banking Development, namely, ratio of private credit by deposit money banks and other financial institutions to GDP, ratio of deposit money bank's assets to GDP, ratio of liquid liabilities to GDP and on the another hand two proxies, ratio of stock market capitalization to GDP, ratio of stock market total value traded to GDP, are selected for Stock Market Development. These proxies measure size, depth, efficiency and activity of financial markets. Annual data is employed for the period of 1994-2011. Annual GDP growth rates are obtained from the WDI (World Bank, World Development Indicators). Financial development indicators are obtained from IMF-IFS (International Money Fund-International Financial Statistics) and GFDD (Global Financial Development Database).

Omitted variable bias can be avoided by employing other important factors of dependent variable in regression model. Therefore some other important determinants of economic growth, namely, mean years of schooling, inflation and

trade openness data are employed. Besides that this procedure will help to evaluate power of effect of both banking sector development and stock market development on economic growth. Data resource of trade and inflation is WDI and mean years of schooling values are obtained from HDI (Human Development Index). Additionally it is important to include initial GDP level of countries to investigate β-convergence which states indigent economies grow faster than wealthy economies. However fixed effect approach which is chosen panel regression method in this study is not allow for using fixed value time series. For this reason initial GDP is excluded from analysis. List of employed indicators are reported in Table 1 as follows;

Table 1: Selected Economic Growth and Financial Development Measures

VARIABLE		Indicator	Abridgment
Economic Growth		GDP Growth Rate	G
Financial Development	Banking Sector Development	Liquid liabilities/GDP	LLG
		Private Credit/GDP	PCG
		Deposit Money Banks Assets/GDP	DMCG
	Stock Market Development	Stock Market Capitalization/GDP	SMCG
		Stock Market Value Traded/GDP	SVTG
Economic Growth Determinants		Trade Openness	TRADE
		Inflation	INF
		Average Years of Schooling	SCH

First banking sector development indicator is liquid liabilities divided by GDP (LLG). LLG is a conventional measure of financial depth (Demetriades and Hussein, 1996). LLG includes sum of currency, demand and interest-bearing liabilities of banks and other financial intermediary institutions. LLG contains all bank, bank-similar and non-bank financial organizations therefore it can be accepted as widest available measure of financial intermediary services (Beck, Demirgüç-Kunt and Levine, 2010). Additionally greater LLG indicates more intense banking sector (Hassan and Sanchez, 2012).

Second banking sector development indicator is private credit by deposit money banks and other financial institutions to GDP (PCG). PCG is the ratio of claims provided by deposit money banks and other financial institutions on the private sector to GDP. PCG is a standard measure of financial market size in the financial development-economic growth nexus literature. PCG is a good sign for degree of financial services and financial market development has positive relationship with degree of financial services (Levine, Loayza and Beck, 2000). PCG includes only credits issued by private sector or credits issued to private sector, meaning that PCG excludes credits provided by central banks and also PCG does not include credits issued to government or government institutions. PCG is more precisely related to investment and economic performance, besides that cooperation between financial system and private sector is more representative for productivity growth effect of financial system than government sector (Calderón and Liu (2003). Positive correlation is observed between private credit level-GDP ratio and GDP growth rate (Yu, Hassan and Sanchez, 2012; Dudian and Popa, 2013; Ghali, 1999). Besides the aforementioned statements King and Levine (1993b) have provided empirical evidence on the negative correlation between private credit level-GDP ratio and poverty.

Third and last banking sector development indicator is ratio of Deposit money banks assets to GDP (DMCG). Deposit money bank assets include all saving accounts, checking accounts and time deposit accounts in banks and bank-similar financial intermediation institutions. It is a stock proxy to measure available resources for lending operations. A country with higher ratio of PCG indicates better functioning financial systems because households generally hold their savings in deposit money banks in developed countries (Demetriades and Hussein, 1996). This leads to provide more resources for new investment opportunities. On the contrary savings of households leak from economy, they do not turn into investment in economies with underdeveloped financial systems (Kar and Pentecost, 2000).

Second component of the financial development, stock market development, is explained by using two proxies. First proxy is stock market capitalization divided by GDP (SMC). Stock market capitalization is also known as stock market value. SMC is calculated as the share price multiplied by the number of shares outstanding. SMC measures size of the stock market relative to national output. SMC has positive

relationship with financial system's accomplishment to mobilize resources and vary risk (Demirgüç-Kunt and Levine, 1996a).

Second proxy for stock market development is the ratio of stock market total value traded to GDP (SVTG). SVTG is obtained by dividing total shares traded on the stock exchange market by GDP. SVTG measures liquidity degree that stock exchange market provides to the economy. Despite higher level of capitalization rate, trading volume may be insufficient. For this reason SVTG is important variable, because it complements the SMC (Demirgüç-Kunt and Levine, 1996a).

3.2 Methodology

In order to analyze relationship between financial development and economic growth we employ Panel Unit Root Tests so as to understand whether time series are stationary or not. Using stationary time series is of great importance to get reliable results since non-stationary data may cause spurious regression results which are misleading and defective. After applying Panel Unit Root Tests, the Dumitrescu-Hurlin Causality Analysis will be carried out in order to comprehend whether there is a short run relationship. If there is a relationship, this analysis will enable us to understand the direction of the causality. However, Dumitrescu-Hurlin Causality test does not the tell impact or strength of the relationship between variables therefore, as a third method Panel Regression Model will be employed to find out the strength of the interaction.

3.2.1 Unit Root Tests

Running regression analysis with non-stationary data causes unreliable test results (Granger and Newbold, 1974). In other words, it leads to spurious regression (Davidson and MacKinnon, 2004).

Unit root tests should be applied before proceeding regression analysis to avoid spurious regression problem. Panel unit root tests provide more consistent results in comparison with traditional unit root tests for such kind studies. Breitung and Meyer (1994), Maddala and Wu (1999), Quah (1994), Levin and Lin (1992, 1993) and Im, Pesaran and Shin-IPS (2003) are foremost technics among panel data unit root

testing methods. We will use Im, Pesaran ve Shin-IPS (2003) (henceforward IPS) model to test data against unit root.

The IPS model is denoted as follows (Hoang and McNown, 2006):

$$y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + \varepsilon_{i,t} \quad , t = 1, 2, \ldots, T \tag{3.1}$$

The null (H_o) and alternative (H_A) hypotheses are written as:

$$H_0 : \rho_i = 1, i = 1, 2, \ldots, N \tag{3.2}$$

$$H_A : \rho_i < 1, i = 1, 2, \ldots, N_1; \rho_i = 1, i = N_1 + 1, N_1 + 2, \ldots, N \tag{3.3}$$

Separate unit root tests are used for the N units of cross-section. The DF regression:

$$y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + \varepsilon_{i,t} \tag{3.4}$$

$$t = 1, 2, \ldots, T$$

or ADF regression is as follows:

$$y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + \sum_{j=1}^{pi} \theta_{ij} \Delta_{yi,t-j} + \varepsilon_{i,t\,t} \tag{3.5}$$

$$t = 1, 2, \ldots, T$$

is estimated and computation of t-statistic for $\rho_i = 1$ value is done. Let $t_{i,T}$ (i = 1, 2, . . . , N) denote the t-statistics of unit root testing for each individual series i respectively. Assume that $E(t_{i,T}) = \mu$ and $V(t_{i,T}) = \sigma^2$. Hence

$$\bar{t}_{N,T} = \frac{1}{N} \sum_{i=1}^{N} t_{i,T\,t} \tag{3.6}$$

and

$$\sqrt{N} \frac{\bar{t} - \mu}{\sigma} \underset{N}{\Rightarrow} N(0,1)_t \tag{3.7}$$

IPS test essentially combines the evidence that belongs to unit root hypothesis from performed N unit root tests on N cross-section units. The test assumes that T is cross-section invariant and statistical expectations $E(t_{i,T})$ and variance $V(t_{i,T})$ are the same for all countries or individuals.

3.2.2 Panel Regression Model Selection

The choice of convenient panel regression model among Pooled Regression Model, Fixed Effect Model and Random Effect Model is important to obtain significant analysis results. For this reason several methods are developed to confirm finding out of most convenient panel regression method. In the first stage of this procedure, selection is made between Pooled Regression Model and Fixed Effect Model by using Redundant Fixed Effects Tests. In case of selection of Pooled Regression, analysis proceeds without needing of any other test of selection. Otherwise Hausman test is employed to make a choice between Fixed Effect Model and Random Effect Model. Model selection tests are explained in next two sections of this study.

3.2.2.1 Fixed Effect Model versus Pooled Regression Model

The selection decision between Fixed Effect Model and Pooled Regression Model can be made by using Redundant Fixed Effects Tests. This test can be regarded as one kind of F-test and it helps to investigate null hypothesis implying that individual effects of countries are the same. Null hypothesis indicates that it is appropriate to employ pooled regression. In the case of different individual effects between at least two countries, test points out Fixed Effect Model which is represented by alternative hypotheses.

3.2.2.2 Fixed Effect Model versus Random Effect Model

Correlation between error term and regressors gives hint about selection either Fixed Effect Model (henceforward FEM) or Random Effect Model (henceforward REM). It is assumed that if error term and regressors are correlated, FEM may better fit to the data. On the other hand if they are not correlated REM is a preferable choice. Intercept coefficient may change across individuals but they do not change over time in the FEM. In short intercept is time-invariant. We can obtain different start points for different individuals or countries. FEM enable us interpret individuals and whole sample. Slope coefficient does not change across individuals or over time. On the other side individuality vanishes in the REM because mean value of intercept is used rather than respective intercept coefficients (Gujarati, 2004). Hausman (1978)

developed a specification test to determine the link between error term and regressors. Decision of model selection will be made by using Hausman Test.

3.2.3 Panel Regression Model

Panel data method is used in this study and some of the advantages of it are listed as follows (Baltagi, 2005, p. 4-7)

1)- According to the panel data method individuals, states or countries are heterogeneous. Panel data checks through heterogeneity, on the other hand time-series and cross-section studies do not. This leads to taking risk of obtaining biased and misleading results. From this point of view panel approaches are more reliable.

2)- Panel data is generated by integrating series of cross-section observations. By courtesy of this combination panel data can give more informational, variability data, moreover collinearity between variables are observed rarely for this type of data.

3)- Panel data is more appropriate to analyze dynamics of change such as dynamic process in macroeconomic variables.

4)- Panel data can determine and measure some interactions that are not identifiable in pure cross-section or pure time series data.

5)- More complicated and sophisticated behavioral models can be constructed and analyzed by using panel data in comparison with using pure cross-section or pure time series data.

6)- Gathering data in individual level can help to make more accurate measurement by reducement or elimination of bias.

3.2.4 Dimutrescu Hurlin Panel Causality Test

Granger causality test is commonly used method to determine existence and direction of causal relationships between time-series in applied econometric studies (Karaca 2003). Panel Granger causality test developed by Dimutrescu and Hurlin

(2012) is used to investigate existence and direction of causal relationship between financial development and economic growth.

Dimutrescu Hurlin Panel Causality Model is described as follows (Khan et al 2015).

Existence of heterogeneity in regression is the necessary condition for Dimutrescu Hurlin Panel Causality Model. Four types of causal relationship are defined by Dimutrescu and Hurlin (2012). The first one is called as homogeneous non-causality and it states that no individual causal link in the direction of A to B. The second definition is homogeneous causality which implies that lagged values of A and B are identical and there are N causal relationships. The third definition is named as heterogeneous causality. In case of presence of heterogeneous causality there are N causal relationships and dynamics of B can be accepted as heterogeneous. The fourth one is heterogeneous non-causality. It assumes unidirectional causal relationship in the direction of A to B for a subset of individuals. Number of causal relationships can be between one and N-1 in the heterogeneous non-causality model. Linear panel regression equation which is used by Dimutrescu and Hurlin (2012) is described herein below:

$$B_{i,t} = \psi_i + \sum_{r=1}^{R} \eta^{(r)} B_{i,t-r} + \sum_{r=1}^{R} \mu^{(r)} A_{i,t-r} + e_{i,t} \quad (3.8)$$

$$i = 1, \ldots . N \; and \; t = 1, \ldots . T$$

Where:

i: individuals

t: time period

R: lag length

Ψ, μ and η: parameters to be estimated

$\mu^{(r)} = (\mu^{(1)}, \mu^{(2)}, \mu^{(3)}, \ldots, \mu^{(R)})$ is the slope coefficient in equation 3.8. A and B variables have not got unit root and number of observed individuals is equals to N. R is same for all cross-sections. Autoregressive parameters $\eta^{(r)}$ and slope coefficients of regression $\mu^{(r)}$ vary for each cross-section however they are time invariant.

Thereby fixed effect model is employed to test causality. Null and alternative hypotheses can be reported as follows by using equation 3.8:

$H_0 = \mu_i = 0 \quad \forall i = 1,\ldots,N$

$H_1 = \mu_i = 0 \quad \forall i = 1,\ldots,N_1 \qquad 0 \leq N_1 / N < 1 \quad (3.9)$

$\mu_i \neq 0 \qquad \forall i = N_1 + 1,\ldots,N$

Null hypothesis implies that there is no Granger causality between variables and alternative hypothesis states that there is Granger causality for at least one subgroup of individuals. Although model is heterogeneous, null hypothesis carries out a homogeneous result while alternative hypothesis ends with homogeneous conclusion.

Test statistic which is used to test null hypothesis is average of Wald statistics:

$$W_{N,T}^{Hnc} = \frac{1}{N}\sum_{i=1}^{N} W_{i,T} \qquad (3.10)$$

$W_{i,T}$ is the Wald test statistics for i_{th} individual. It is used to investigate Granger causality. Walt statistics do not converge to chi square distribution for small values of T. Therefore Dimutrescu and Hurlin (2012) propose to use standardized test statistics for $W_{N,T}^{Hnc}$ by using mean and variance of this unknown distribution:

$$S_{N,T}^{Hnc} = \frac{\sqrt{N}\left[W_{N,T}^{Hnc} - \sum_{i=1}^{N} E(\widetilde{W_{i,T}})\right]}{\sqrt{\sum_{i=1}^{N} Var(\widetilde{W_{i,T}})}} \qquad (3.12)$$

$E(\widetilde{W_{i,T}})$ and $Var(\widetilde{W_{i,T}})$ in equation 3.12 denote mean and variance of $W_{i,T}$ respectively. If standardized test statistics $S_{N,T}^{Hnc}$ for $W_{N,T}^{Hnc}$ is greater that critical value, the hypothesis of homogeneous non-causality is rejected. $E(\widetilde{W_{i,T}})$ is expected to converge to R and $Var(\widetilde{W_{i,T}})$ is expected to converge to 2R and for large values of T. Because individual statistics $W_{i,T}$ converge to chi square in distribution. Hence standardized statistic $\bar{S}_{N,T}^{Hnc}$ converges to $\bar{S}_{N}^{Hnc}$.

CHAPTER 4

EMPIRICAL EVIDENCE AND CONCLUSION

4.1 Stationarity Analysis

In panel regression analysis, firstly panel unit root test should be controlled against to spurious regression problem resulted from spurious relationships between variables (Çelik and Akarım, 2012). Moreover Dumitrescu-Hurlin Causality test is highly sensitive to determining lag length. If the determined lag length is shorter than it is supposed to be, extra lags in VAR model may deteriorate efficiency of estimation. This methodology requires stationarity of series because non-stationary series may cause spurious causal relationship (Sims, Stock and Watson, 1990); (Toda and Phillips, 1993).

IPS test is employed to determine whether variables are stationary or non-stationary. The null hypothesis of the test is "series has got unit root". If null hypothesis is rejected, it means that series are stationary and we can continue further analysis. Otherwise, differencing process needs to be done until variables become stationary. IPS test results of variables used in this study can be seen in the Table 2 below.

Table 2: Unit Root Test Results

	Level		First Difference	
Variables	Statistic	Prob.*	Statistic	Prob.*
G	-2.44817	0.0072**		
DMCG	0.43570	0.6685	-1.82088	0.0343**
LLG	2.17702	0.9853	-2.43211	0.0075**
PCG	0.03863	0.5154	-1.81198	0.0350**
SMCG	-0.43165	0.3330	-2.63937	0.0042**
SVTG	1.42251	0.9226	-4.98218	0.0000**
TRADE	0.06107	0.5243	-6.49991	0.0000**
INF	-337.463	0.0000**		
SCH	2.27133	0.9884	-7.09463	0.0000**

*Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality

**Significant in 5%

According to the IPS test results G and INF variables are stationary in level, in other words G and INF are I(0). On the other hand null hypothesis cannot be rejected for DMCG, LLG, PCG, SMCG, SCH, TRADE and SVTG variables on the basis of probability values because it is greater than critical value 5%. It means that DMCG, LLG, PCG, SMCG, SCH, TRADE and SVTG variables have unit root. However we can reject null hypothesis after taking first differences for DMCG, LLG, PCG, SMCG, SCH, TRADE and SVTG variables. It means that they are I(1). In brief we will put DMCG, LLG, PCG, SMCG, SCH, TRADE and SVTG into the both model Panel Regression and Dumitrescu-Hurlin Causality with their first differences.

4.2 Panel Regression Model Selection Tests Results

In this part of this study the most convenient panel regression model is selected among pooled regression model, FEM and REM. In the first stage of this procedure, selection is made between pooled regression model and FEM by using Redundant Fixed Effects Tests. In case of selection of Pooled Regression, analysis proceeds without needing of any other test of selection. If test selects FEM, Hausman test is employed to make a choice between FEM and REM in the second stage.

4.2.1 Redundant Fixed Effects Tests Results

Redundant Fixed Effect tests are employed to select whether FEM or REM. Null hypothesis of this test indicates that it is appropriate to employ Pooled Regression and shows individual effects of countries are the same. If different individual effects between at least two countries exist, test points to FEM which is represented by alternative hypotheses. Test results can be seen in Table 3 as follows:

Table 3: Redundant Fixed Effects Tests Results

	Statistic	Probability
Cross-section F	14.764138	0.0000***

*** Significant in 1%

According to the test results we can reject the null hypothesis and accept the alternative hypothesis because probability value of Redundant Fixed Effect tests is smaller than critical value of 5%. It can be interpreted as FEM is appropriate model

for our data set. Next phase of the model selection analysis is to make a selection between FEM and REM by using Hausman test.

4.2.2 Hausman Test Results

Before proceeding to the panel regression analysis we need to determine which method, in particular REM or FEM, will be utilized. The null hypothesis of the Hausman test is "error term and regressors are not correlated". As it is seen from the Table 4 below we can reject the null hypothesis and accept the alternative hypothesis because probability value of Hausman test is smaller than critical value which is 5%. It means that error term and regressors are correlated and FEM is appropriate model for our study.

Table 4: Hausman Test Results

	Chi-Square Statistic	Probability
Cross-section Random	20.228051	0.0011***

*** Significant in 1%

Now we can proceed to panel regression model by using fixed effect estimator.

4.3 Panel Regression Results

The unbalanced panel estimations with fixed effects approach is performed. The used estimation method is panel least square. The estimated model is written as below:

$$G_{it} = \beta_0 + \beta_1 \Delta DMCG_{i,t} + \beta_2 \Delta LLG_{i,t} + \beta_3 \Delta PCG_{i,t} + \beta_4 \Delta SMCG_{i,t} + \beta_5 \Delta SVTG_{i,t} + \beta_6 \Delta TRADE + \beta_7 \Delta SCH + \beta_8 INF + FE_t + \varepsilon_{it}$$

Where *t* is the indices for time periods from 1994 to 2011, *i* is the proxy for six cross-sections and FE_t is indicator of unobserved fixed effects of selected time period.

Cross-section weights standard errors & covariance. In other words, panel corrected standard errors (PCSE) are taken into account when analysis is performed. By this way robust standard error can be obtained. It is an appropriate application to obtain valid standard errors of β coefficients in case of observed different error variances across countries.

The dependent variable is annual GDP growth rate as an indicator for economic growth and explanatory variables of financial development are classified in two groups which are stock market development and banking sector development. Stock market development proxies include stock market capitalization and stock market total value traded and banking sector development proxies contain private credit, liquid liabilities and deposit money banks assets.

Table 5: Fixed Effect Panel Regression Results

	Coefficient	Standard Error	t-statistics	Probability
C	6.124967	0.537954	11.38568	0.0000***
DMCG	-0.318348	0.180334	-1.765324	0.0810*
LLG	-0.389893	0.182055	-2.141618	0.0350**
PCG	0.351131	0.101102	3.473049	0.0008***
SMCG	0.025729	0.019316	1.331993	0.1863
SVTG	0.008722	0.017813	0.489617	0.6256
TRADE	0.031521	0.067427	0.467481	0.6413
INF	-0.011050	0.020406	-0.541524	0.5895
SCH	0.844071	0.730909	1.154824	0.2513

$R^2 = 0.565$ $\bar{R}^2 = 0.500$

AIC= 5.0443 SIC = 5.1596

*** , ** and * indicates statistical significance at the 1 , 5 and 10% level respectively

Fixed effect model is a panel regression method where slope coefficients are individual invariant and intercept values vary for each country both cross-sectional across countries and over time. Intercept values for each country are reported in Table 6 as follows:

Table 6: Cross Section Fixed Effects

Country	Fixed Effects
Brazil	-1.820046
China	5.623624
India	1.565251
Russian Federation	-1.553033
South Africa	-3.460192
Turkey	-0.446960

Parameter estimation for Fixed Effect Panel Regression model is summarized in Table 5. We find that GDP growth rate has strong positive relationship with ratio of private credit by deposit money banks and other financial institutions to GDP (PCG). PCG variable is significant at 1% level which is quite high. Slope coefficient of PCG variable indicates that 1 unit increase in private credit to GDP ratio causes approximately 0.35 unit increase in GDP growth rate. This gives evidence that domestic credit contributes to economic growth through providing financial resources for private sector investment.

Liquid liabilities (LLG) variable has significant but negative relationship. According to the slope parameter of the LLG, one unit increase in LLG leads to 0.38% decrease in GDP growth rate. Our analysis result is consistent with the results of Saci, Giorgioni and Holden (2009). They found that size of financial market which is liquid liabilities has negative effect on economic growth in developing countries for the period of 1981-2001. Main reason of the negative G-LLG relationship may be inadequate turning deposits into investment ability of financial intermediation institutions. Individuals prefer to hold their money in deposit money banks but mentioned resources have not been canalized to the real sector. As a result, source of finance might leak from the real sector.

Ratio of Deposit money bank's assets to GDP (DMCG) variable is significant at 10% level. DMCG has negative relationship with GDP growth rate. Assets of deposit money banks and economic growth have not moved together between 1994 and 2011.

Stock market development indicators which are stock market capitalization divided by GDP (SMCG) and ratio of stock market total value traded to GDP (SVTG) have both positive relationships with GDP growth rate however they are not found statistically significant.

According to the test results TRADE and SCH are positively correlated with GDP growth rate while INF has negative relationship with GDP growth rate. However all of these controlling variables are found statistically insignificant.

4.4 Dumitrescu Hurlin Panel Causality Test Results

In this section, causal relationship between financial development indicators and economic growth will be inter-relatedly investigated. Two major components of financial development are examined separately. In the first part of section causality between banking sector development and economic growth will be reported and in the second part of section causality between stock market development and economic growth will be explained. Dumitrescu-Hurlin Panel Causality Test, newly developed econometric technic, is performed to determine short-run existence and direction of causality.

4.4.1 Banking Sector Development-Economic Growth Nexus

Dumitrescu-Hurlin Panel Causality Test results for banking sector development and economic growth are summarized in the table below. We use three financial development proxies to measure progression in banking sector and to determine the way and presence of causality.

Table 7: Panel Causality Test Results Of Banking Sector Development Indicators

Null Hypothesis	**W-Stat**	$\overline{Z}$	**P-Value**
PCG Does not Homogeneously Cause G	3.06840	0.49877	0.6179
G Does not Homogeneously Cause PCG	5.31478	2.29446	0.0218**
DMCG Does not Homogeneously Cause G	2.62776	0.14654	0.8835
G Does not Homogeneously Cause DMCG	4.55170	1.68448	0.0921*
LLG Does not Homogeneously Cause G	1.95979	-0.38742	0.6984
G Does not Homogeneously Cause LLG	7.32409	3.90065	0.0001***

*** , ** and * indicates statistical significance at the 1 , 5 and 10% level respectively

According to the test results we can reject the null hypothesis of "G does not homogeneously cause PCG" at 5% significance level while we can accept the null hypothesis of "PCG does not homogeneously cause G". It means that unidirectional homogeneous causal relationship exists running from G to PCG, in other words G causes PCG. Conformably we can come up with there is a unidirectional causality in the direction of G to DMCG, in brief G homogeneously causes DMCG at 10% significance level. LLG has got unidirectional causal relationship with G tantamount to other two proxies. It can be interpreted as G homogeneously causes LLG at the 1% significance level. Test findings indicate that economic growth homogeneously causes financial development in banking sector. These results also provide the evidence for hypothesis of demand-following economy.

4.4.2 Stock Market Development-Economic Growth Nexus

Dumitrescu-Hurlin Panel Causality Test outcomes for stock market development and economic growth are reported on the following table. Two financial development indicators are used to measure improvement in stock market.

Table 8: Panel Causality Test Results of Stock Market Development Indicators

Null Hypothesis	**W-Stat**	$\overline{Z}$	**P-Value**
SMCG Does not Homogeneously Cause G	7.37643	3.94249	8.E-05
G Does not Homogeneously Cause SMCG	3.18055	0.58842	0.5563
SVTG Does not Homogeneously Cause G	3.24829	0.62946	0.5290
G Does not Homogeneously Cause SVTG	3.24864	0.62973	0.5289

*** , ** and * indicates statistical significance at the 1 , 5 and 10% level respectively

On the basis of test findings both null hypotheses "SMCG does not homogeneously cause G" and "G does not homogeneously cause SMCG" can be accepted. It can be argued that neither SMCG homogeneously causes G nor G homogeneously causes SMCG. In brief causal relationship does not exist between G and SMCG in the short run. Accordingly both of the null hypotheses for the G SVTG couple are accepted. It can be argued that there is no causal relationship between SVTG and G.

Our test results are consistent with the arguments in the studies of Beck and Levine (2004) and Levine (2002). They claim that banking sector has key role in the earlier stages of economic development in emerging market economies on the other hand stock markets are more effective in advanced economies. Gurley and Shaw (1955) also mention about leading role of the banking system in development process. In addition to this stock markets improve and thrive, meanwhile economy grows.

CONCLUSION

Enhancing savings and channeling them to most promising investment projects are essential for economic growth. These two functions are conducted substantially by financial markets and institutions, therefore understanding of the link between financial markets and economic growth is prominent.

This thesis aims to clarify the relationship between financial market development and economic growth. For this purpose theoretical background is explained in detail to make mechanisms that function as a bridge between finance and growth clear. Additionally, finance-growth link is empirically tested to reveal statistical existence and power of relationship by use of panel regression method. Empirical model is constructed by using panel data of Turkey and BRICS countries for the period of 1994-2011. Annual gross domestic product growth is used as proxy for economic growth and several indicators are employed to measure financial development. Financial markets are divided into two submarkets, namely banking sector and stock market to discover individual effects of each on economic growth.

Panel regression results indicate that banking sector development has statistically significant impact on growth while stock market does not. Insignificant effect of stock market development is consistent with the prevailed view for security markets of developing countries. Stock markets of Turkey and BRICS countries will develop and get wealth as economies grow. Policymakers should eliminate economic obstacles to develop stock markets. Taxation, law and regulatory arrangements should be prepared to support development of stock markets. Thus, it can contribute to economic growth as in advanced countries. On the other hand, banking sector development indicators, namely, assets of deposit money banks, liquid liabilities and credits issued to private sector are found statistically significant. Assets of deposit money banks and liquid liabilities have negative impact on economic growth while credits issued to private sector has positive one. These results indicate inadequate turning deposits into investment ability of financial intermediation institutions. If transmission mechanisms can be ameliorated by implementing appropriate policies, assets of deposit money banks and liquid liabilities may contribute to growth through several mechanisms and also credit mechanism that already positively linked to economic growth.

Despite the fact that economic growth is not indicator of living standards and welfare all by itself, it has a vital role on economic development. Therefore, it is essential to determine direction of causality between financial development and economic growth. Hereby efficiency of different economic development policy implications can be developed through understanding of mechanism between finance and growth. In this way structural changes that contribute to economic growth are encouraged and better decisions can be made in the way of economic development. For this purpose, Dumitrescu-Hurlin Causality Test is employed by using same data set with panel regression method and banking sector development and stock market development are analyzed individually as made in before. According to Dumitrescu-Hurlin Causality Test results causal relationship is not be found between stock market development and economic growth, while unidirectional link exits between banking sector development and economic growth. Dumitrescu-Hurlin Causality Test results are consistent with panel regression results. To clarify any statistical relationship is not found between stock market development and economic growth for the period of 1994-2011. However, one-way causality exists running from economic growth to banking sector development which indicates Turkey and BRICS economies follow demand-following pattern. In this sense, evolvement of financial markets is a consequence of increasing demand for financial services in real sector. Therefore, economic growth enhancing policies should be given precedence. By this way, financial markets become more improved and contribute to economic growth more efficiently.

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APPENDIX 1

	Name of Study	**Author**	**Method and Data**	**Empirical Results**
1	Fınancıal development and economıc growth ın Barbados causal evıdence.	Wood (1993)	Granger Causality Barbados 1946-1990 *M2/GDP	Supply-leading pattern.
2	Does financial development cause economic growth time-series evidence from 16 countries.	Demetriades and Hussein (1996)	Cointegration, Granger CAUSALİTY and ECM 16 countries *bank private credit/GDP *bank deposit liabilities/GDP	Little evidence for Supply-leading pattern and reverse causal relationship. Significant evidence for bi-directional causal relationship.
3	Finance and economic growth the case of Sweden 1834–1991.	Hansson and Jonung (1997)	Cointegration Sweden 1830-1990 *human resource *number of patent *per capita investment *total lending from the financial sector to the nonbank public	Period specific effects.

4	Fınancıal development and economıc growth assessıng the evıdence.	Arestis and Demetriades (1997)	Johansen Cointegration Analysis Us, Germany and South Korea 1979-1991 *M2/nominal GDP *stock market capitalization *index of stock market volatility	Country specific effects.
5	An exogeneity analysis of financial deepening and economic growth evidence from Hong Kong, South Korea and Taiwan.	Kwan, Wu and Zhang (1998)	OLS, Exogeneity test hong kong, south korea, taiwan *M3/GDP *trade/GDP *logEXPORT	Positive relationship.
6	Financial sector development and economic growth the South-Asian experience.	Ahmed and Ansari (1998)	Granger Causality with Cobb-Douglas production function framework India, Pakistan, and Sri Lanka *m2/GDP *quasi-money/nominal GDP *credit/nominal GDP	Supply-leading pattern.
7	Are financial deepening and economic growth causally related another look at the evidence.	Darrat (1999)	Multivariate Granger Causality and Multivariate ECM Saudi Arabia, Turkey, United Arab Emirates *currency/M1 *M2/GDP	Supply-leading pattern.

8	Financial development and economic growth an egg-and-chicken problem.	Shan, Morris and Sun (1999)	Granger No-Causality Test 21 countries *private credit/GDP *total factor productivity *(imports+exports)/GDP *investment/GDP *stock market index	Country specific effects.
9	Financial development and economic growth the Tunisian experience.	Ghali (1999)	Cointegration, Granger Causality test and ECM Tunisia 1963–93 *bank deposits/GDP *private credit/GDP	Supply-leading pattern.
10	Financial development and economic growth in Turkey further evidence on the causality issue.	Kar and Pentecost (2000)	Granger Causality Test and VECM Turkey 1963-1995 *M2/GDP *bank deposits/GDP *credit/GDP *private credit/GDP *private credit/credit	Demand-following pattern.
11	Financial development investment and economic growth.	Xu (2000)	Impulse Response Function and VAR 41 countries 1960-1993 *liquid liabilities/GDP	Positive relationship.

12	Financial intermediation and growth causality and causes.	Levine, Loayza and Beck (2000)	GMM and Cross-Sectional Instrumental-Variable Estimator 74 countries for GMM 71 countries for cross-sectional instrumental-variable estimator 1960-1995 *liquid liabilities/GDP *commercial bank assets/central bank assets *private credit/GDP	Positive relationship.
13	Do stock market promote economic growth?	Filer, Hanousek and Campos (2000)	Granger Causality Tests 64 countries 1985-1997 *market capitalization/GDP *turnover ratio *change in the number of domestic shares listed	Supply-leading pattern.
14	Financial deepening and economic development in china.	Zhang and Yao (2002)	Panel Regression, Cointegration Test and Granger Causality Test china 1979-1998 *bank deposit liabilities/GDP *ratio of currency to the bank deposit liabilities plus currency	Bi-directional causal relationship.
15	Financial development and economic growth another look at the evidence from developing countries.	Al-Yousif (2002)	Granger Causality and ECM 30 developing countries 1970–1999 *(M1)/nominal GDP *(M2)/nominal GDP	Bi-directional causal relationship.

16	Financial development and economic growth in mainland china a note on testing demand following or supply leading hypothesis.	Chang (2002)	Johansen Cointegration China 1987-1994 *monetary survey/GDP	Insignificant relationship.
17	Financial development and economic growth in India 1970–1971 to 1998–1999.	Bhattacharya and Sivasubramanian (2003)	Cointegration India 1970–1971 to 1998–1999 *M3/GDP	Supply-leading pattern.
18	Financial environment and economic growth in selected Asian countries.	Fasea and Abma (2003)	Granger Causality Test 9 countries 1978–1999 *balance sheet totals of the banking sector	Supply-leading pattern.
19	The direction of causality between financial development and economic growth.	Calderón and Liu (2003)	Geweke Decomposition Test 109 developing and industrial countries 1960-1994 *M2/GDP *private credit/GDP	Country specific causality. In general supply-leading pattern.
20	Financial development and economic growth evidence from panel unit root and cointegration tests.	Christopoulos and Tsionas (2004)	Panel Unit Root, Panel Cointegration Tests and Panel-Based VECM 10 developing countries 1970-2000 *investment/GDP *Bank Deposits/GDP	Supply-leading pattern.
21	Financial development and economic growth in Australia an empirical analysis.	Thangavelu and Jiunn (2004)	VAR Model Australia *bank private credit/GDP *Bank Deposits/GDP *turnover ratio	Supply-leading pattern.

22	Does financial development 'lead' economic growth a vector auto-regression appraisal.	Shan (2005)	VAR, Variance Decomposition and Impulse Response Function 10 OECD countries and China 1985-1998 *total credit *official interest rates *stock market index *CPI *investment *(import+export)/GDP *rate of change of total capital expenditure and productivity *rate of change of labor force	Supply-leading pattern.
23	Financial development and economic growth in the middle east.	Al-Awad and Harb (2005)	Johansen Cointegration, Granger Causality and Variance Decompositions 8 countries 1969–2000 *private credit/ monetary base *private credit *Real M1 *government spending	Demand-following pattern in the short-run.
24	Financial development and economic growth the case of Taiwan.	Chang and Caudill (2005)	VAR Model, Granger and VECM Taiwan 1962-1998 *M2/GDP	Supply-leading pattern.

25	Does financial development cause economic growth a panel data dynamic analysis for the Asian developing countries?	Habibullah and Eng (2006)	GMM technique for panel data 13 asian emerging countries 1990-1998 *credit/GDP	Positive relationship. Supply-leading pattern.
26	Financial development and economic growth evidence from china.	Liang and Jian-Zhou (2006)	VAR and Cointegration china 1952–2001 *per capita physical capital stock * the real interest rate *bank credit/GDP *liquid liabilities/GDP	Demand following pattern.
27	Financial sector deepening and economic growth evidence from Turkey.	Ardic and Damar (2006)	GMM Turkey 1996-2001 *bank deposits/GDP *education *health *openness	Negative relationship.
28	Financial deepening and economic growth linkages a panel data analysis.	Apergis, Filippidis and Economidou (2007)	Panel Cointegration and Panel Causality 15 OECD and 50 non-OECD countries 1975–2000 *M3/GDP *bank private credit/GDP	Bi-directional causal relationship.
29	Financial depth, savings and economic growth in Kenya a dynamic causal linkage.	Odhiambo (2008)	Cointegration and ECM Kenya *M2/GDP	Demand following pattern.

30	Financial development and economic growth a symbiotic relationship.	Handa andKhan (2008)	Granger Causality 13 countries 1960-2002 *Bank Deposits/GDP *bank private credit/GDP	Demand following pattern.
31	Financial development and economic growth cointegration and causality analysis for the case of Turkey.	Ege, Nazlıoğlu and Bayrakdaroğlu (2008)	Cointegration and Granger Causality Turkey 1987-2007 *real interest rate *share of investment *M2/GDP *Bank Deposits/GDP *private credit/GDP *credit/GDP *private credit/credit *liquid liabilities/GDP	Demand following pattern.
32	Financial development and economic growth the Egyptian experience.	Abu-Bader and Abu-Qarn (2008)	Granger Causality Tests, Cointegration and VECM Egypt 1960–2001 *M2/GDP *(M2-M1)/GDP *bank private credit/GDP *non-financial private sector credit/GDP	Bi-directional causal relationship.
33	Causal relationships between financial development, trade openness and economic growth the case of turkey.	Yucel (2009)	Granger Causality and Cointegration turkey 1989-2007 *M2/GDP	Bi-directional causal relationship.

34	Financial development and economic growth convergence or divergence.	Fung (2009)	GMM and Test for Conditional Convergence 53 countries 1967-2001 *private credit/GDP *(M2)/GDP	Income group specific effects.
35	Fınancıal development and economıc growth ın Sri Lanka.	Perera and Paudel (2009)	Johansen Cointegration and ECM Sri Lanka 1955-2005 *M1/GDP *M3/GDP *total deposit/nominal per capita GDP *private sector credit/nominal per capita GDP *total credit/nominal per capita GDP *private sector credit/total domestic credit	Supply-leading pattern exists only for broad money.
36	Financial development and economic growth literature survey.	Ozturk and Acaravci (2009)	Cointegration and GMM 24 sub-Saharan African countries 1975-2005 *bank credit/GDP *private credit/GDP *liquid liabilities/GDP	Bi-directional causal relationship in the short-run.
37	Financial development and economic growth an empirical analysis for Ireland.	Adamopoulos (2010)	VECM Ireland 1965-2007 *stock market index *bank private credit/GDP *industrial production index	Bi-directional causal relationship for stock market development. Demand following pattern in banking sector.

38	Financial development and economic growth in the WAEMU states.	Léon (2010)	Panel Regression West African Economic and Monetary Union 1962-2002 *liquid liabilities/GDP *savings/GDP *openness *inflation *government expenditure/GDP *population growth rate	Contribution of financial development to economic growth is positively correlated with income level of country.
39	Fınancıal development and economıc growth the experıence of 10 sub-Saharan African countrıes revısıted.	Akinlo and Egbetunde (2010)	VECM 10 Sub-Saharan African countries 1980-2005 *M2/GDP	Country specific causality.
40	Financial deepening, trade openness and economic growth in Latin America and the Caribbean.	Gries, Kraft and Meierrieks (2011)	VAR and VECM 13 Latin American and Caribbean countries 1960-2004 *bank private credit/GDP *Bank Deposits/GDP *Liquid Liabilities/GDP	Bi-directional causal relationship.
41	Financial development and economic growth in Vietnam.	Anwar and Nguyen (2011)	GMM Vietnam 1997–2006 *savings/GDP *credit/GDP *M2/GDP	Positive relationship.

42	Financial development and economic growth new evidence from panel data.	Hassan, Sanchez and Yu (2011)	Panel Regressions and Variance Decompositions All World Bank member economies and all other economies with populations of more than 30,000 people 1980–2007 *bank credit/GDP *private credit/GDP *M3/GDP *savings/GDP *trade/GDP *government consumption expenditure/GDP	Positive relationship demand following pattern in poorest regions.
43	Financial development and economic growth nexus in the MENA countries bootstrap panel granger causality analysis.	Kar, Nazlıoğlu and Ağır (2011)	Panel Causality Test MENA countries 1980–2007 *M1/GDP *M2/GDP *bank deposits/GDP *credit/GDP *private credit/GDP	Country specific effects.
44	Financial development, Islamic banking and economic growth evidence from MENA region.	Goaied and Sassi (2011)	GMM MENA countries 1962-2006 *private credit/GDP	Insignificant relationship.

45	The causality between financial development and economic growth panel data cointegration and GMM system approaches.	Rachdi and Mbarek (2011)	Panel Cointegration and GMM 6 countries from the OECD region and 4 countries from the MENA 1990-2006 *private credit/GDP *liquid liabilities/GDP	Positive relationship. Bi-directional causal relationship for OECD countries. Demand-following pattern for MENA countries.
46	A fragile link a new empirical analysis of the relationship between financial development and economic growth.	Gantman and Dabós (2012)	Dynamic Panels 98 Countries 1961-2005 *total private credit/GDP *gov spending/GDP *investment/GDP *trade openness/GDP *human capital *inflation rate *institutional quality, time-period dummy variable	Insignificant relationship.
47	A re-examination of financial development, stock markets development and economic growth.	Yu, Hassan and Sanchez (2012)	Panel Regression and Granger Causality Tests 98 Countries 1980-2009 *annual GDP growth rates *bank credit/GDP *private credit/GDP *M3/GDP *stock market capitalization/GDP *stock market value traded/GDP *ratio of trade to GDP *gov final cons exp/GDP	Region and income group specific relationships. In general short run causal relationship between and long-run relationship based on the panel regression.

48	Accounting regulation, financial development, and economic growth.	Akisik (2013)	GMM 51 countries 1997-2000 *stock market capitalization/GDP *bank credit/GDP	Positive relationship.
49	Bound testing approach for cointegration and causality between financial development, trade openness and economic growth in Bulgaria.	Dritsaki and Dritsaki (2013)	Granger Causality and Bound Testing Approach To Cointegration Bulgaria 1994-2009 *M2/GDP	Supply-leading pattern in the long-run. Demand following pattern in the short-run.
50	Does financıal development hold the key to economıc growth the case of Sub-Saharan Africa.	Kagochi, Al Nasser and Kebede (2013)	Panel Granger Causality Test 7 Sub Saharan countries 1991-2007 *private credit/GDP *stock market capitalization/GDP * stock market value traded/GDP *private credit/GDP *liquid liabilities/GDP * deposit money bank assets/GDP * stock market turnover ratio	Demand following pattern in banking sector. Bi-directional causal relationship for stock market.
51	Economic growth and financial development evidence from panel cointegration in India and Pakistan.	Pradhan (2013)	Panel Cointegration India, Pakistan 1970-2010 *liquid liabilities/GDP *private credit/GDP	Insignificant relationship.

52	Finance, instability, debt and growth the Turkish case 1980-2010.	İsmihan, Dinçergök and Cilasun (2013)	Cointegration Turkey 1980-2010 *private credit/GDP *domestic debt/GDP *overall macroeconomic instability	Demand following pattern.
53	Financial deepening and economic growth in Nigeria an application of cointegration and causality analysis.	Torruam, Chiawa and Abur (2013)	Cointegration Nigeria 1990-2011 *Stock of money supply *Credit/GDP *Foreign Credit/GDP *Inflation *Real Exchange Rate	Positive relationship. Demand following pattern.
54	Fınancıal development and economıc growth a new ınvestıgatıon.	Pan and Wang (2013)	Bayesian Dynamic Factor Model 89 countries 1970-2009 *private credit/GDP *Bank Deposits/GDP *relative importance of banking sector *liquid liabilities/GDP	Income group specific effects.

55	Fınancıal development and economıc growth evidence from Ghana.	Adusei (2013)	Fully-Modified Ordinary Least Squares (FMOLS), ECM and the Generalized Method of Moments Ghana 1971-2010 *credit/GDP *bank credit/GDP *M3/GDP	Reverse causal relationship.
56	Financial development and economic growth in central and eastern Europe.	Dudian and Popa (2013)	Panel Regression 11 European countries 1996-2011 *broad money growth *private credit/GDP *interest rate spread *nonperforming loans	Negative relationship between private credit and growth. Weak relationship between broad money growth and economic growth
57	Financial development and economic growth in India a study in the presence of endogenous structural breaks.	Mukherjee (2013)	Cointegration and Autoregressive Distributed Lag India 1971-2011 *Bank Deposits/GDP *investment/GDP *real deposit rate	Insignificant relationship.

58	Financial development, social development, and economic growth the causal nexus in Asia.	Pradhan et al (2013)	Granger Causality Test 15 Asian countries 1961–2011 *private credit/GDP *credit/GDP *M3/GDP *Total reserves *liquid liabilities/GDP *stock Market capitalization/GDP	Bi-directional causal relationship.
59	Finansal kalkınma ile iktisadi büyüme arasındaki nedensellik ilişkisi çok ülkeli bir zaman serisi analizi.	Yüce, Akinci ve Yilmaz (2013)	Cointegration and Causality Tests 44 countries 1980 – 2011 *credit/GDP *bank deposits/GDP *total deposits/GDP *M2/GDP	Country specific causality.
60	An econometric analysis of the relationship between millennium development goals, economic growth and financial development in South Africa.	Akinboade and Kinfack (2014)	ECM South Africa *credit/GDP *bank private credit/GDP *bank deposit/GDP *M3/GDP	Positive relationship.
61	Energy consumptıon, economıc growth and fınancıal development explorıng the empırıcal lınkages for India.	Mahalik and Mallick (2014)	Auto Regressive Distributed Lag Approach to Cointegration India 1971-2009 *bank private credit/GDP	Insignificant relationship.

62	Financial deepening and economic growth in gulf cooperation council countries.	Hamdi, Sbia and Tas (2014)	Panel ECM and Cointegration 6 countries 1980–2012 *M2/GDP *private credit/GDP * gross fixed capital formation to GDP	Bi-directional causal relationship.
63	Financial development and economic growth in an oil-rich economy the case of Saudi Arabia.	Samargandi, Fidrmuc and Ghosh (2014)	ARDL Bounds test Saudi Arabia 1968-2010 *M2/GDP *M3/GDP *private credit/GDP	Oil and non-oil sector specific effects.
64	Financial development and economic growth in India some evidence from non-linear causality analysis.	Nain and Kamaiah (2014)	Non-Linear Granger Causality Toda–Yamamoto and Diks–Panchenko Tests India 1990-2010 *financial depth, access, efficiency, stability of financial markets	Insignificant relationship.
65	Foreıgn dırect ınvestment, financıal development, and economıc growth a cointegration model.	Suliman and Elian (2014)	Structural Cointegration Model with a VECM Jordan 1980-2009 *stock market capitalization/GDP *bank private/credit	Supply-leading pattern.
66	Promoting effect of financial development on economic growth evidence from China.	Fang and Jiang (2014)	Panel Spatial Regression Model China 1999–2011 *bank loan balances *the total market value of listed companies *premium income	Positive relationship.

67	Quantitative analysis of financial development's impact on economic growth.	Wang et al (2014)	Cointegration and the Granger Causality Test Anhui Province 1980-2010 *total financial assets/GDP	Supply-leading pattern.
68	Financial development and economıc growth evıdence from 10 new European unıon members.	Caporale et al (2015)	Dynamic Panel Regression 10 Eastern European countries 1994–2007 *private credit/GDP *stock market capitalization/GDP ratio *liquid liabilities/GDP *interest rate margin *reformindex of financial institutional development	Banking sector and economic growth are positively correlated. Insignificant relationship between stock market and economic growth.