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# Essays on Financialization, Innovation and Growth

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**A thesis submitted to the University of Huddersfield in partial fulfilment of the requirement for the degree of Doctor of Philosophy**

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**The University of Huddersfield**

# Abstract

The study shows the importance of financial sector and its impact on the economy through detailed empirical analysis along with theoretical developments. The study covers some very importance aspects such as financial development and growth, the relation of financial liberalization & financial crises and financial development impact on innovation. Another important aspect of the study covers the impact of innovation on unemployment.

The methodology adopted included picking up sample of 28 member countries of EU, acquiring data on the related variables and picking proxies where inevitable. Econometric models were developed and applied, and the results were obtained. The study uses panel data for the period between 1995-2019 and Econometric analysis used in the study included tests, Pooled OLS, GMM, DOLS, FMOLS and Granger causality test for empirical analysis.

The results from the empirical analysis showed that financial development showed a strong positive impact on growth in the EU-28 before the financial crises of 2008 but the impact had an inverse impact on the growth. The main cause of the adverse impact was triggered by the sub-prime mortgage crises. Further while analysing the impact of financial liberalization and bank risk absorption ability on banking instability showed a negative relationship for the considered sample. The impact of financial development on innovation showed to have significant positive impact, also R&D has a greater negative influence unemployment compared to innovation.

This paper highlights the fact that the correct allocation of credit will enable the firms to grow, but also the focus should be on innovative and growth-related projects which provides long term benefit to the economy. The leverage of the firms should be monitored at the firm level to use it as an early warning system for default.

This paper suggests both the monetary and financial stability policies should be well-coordinated. As the technology progresses there needs to be integration between the technology policy reforms in product innovation, reforms in process innovation, advancement in ICT sector, fintech and the financial and labour markets.

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# Chapter 1: Introduction

## 1.1 Introduction of the study

Financial sector is the backbone of any economy. Besides keeping the economy moving, it adds to GDP, pool of employment and overall economic prosperity of the country. But if left uncontrolled, it can dampen a few institutions which in turn may cast devastating effect around the globe. Such a devastating effect converged in recent past and surfaced as the financial crisis 2007-2009. Experts identify some key weaknesses in this regard. First was the inflated asset prices, the prices of houses which consequently caused the housing bubble. And then, likewise the prices of certain securities which insinuated the bond bubble. Second reason came from the womb of loose financial reforms causing excessive leverage which in turn caused heavy borrowing that adversely affected not only the financial system but also the economy. The lax financial regulation in turn rendered several intermediaries lethargic. This gave way to disgraceful banking practices not only in sub-prime but also in the domain of mortgage lending. Finally, the crazy quilt that pre-existed in bits and pieces, got properly stitched and tailored, to bring doom (Juneyoung Lee & Keun Lee, 2021).

The 2007-2008 financial crisis, which is commonly named as sub-prime mortgage crisis was triggered by the failure of a long series of derivative-based consolidation which was marked with mortgage-backed securities. These securities entailed extremely high-risk loans against the homeowners. The backing proved to be a false ‘safe’ investment. The banks offered lending to debtors that they were never able to afford them. The banks bundled these debt instruments and aptly resold them at a sky-kissing profit. The crisis fanned out and triggered a wave of negative impact on the

financial sector crossing borders and entering limits of hazard. The governments at the same time failed to intervene with stern financial regulations which helped crisis redouble at a much faster pace than expected. The U.S. stock market, in the hands of existing and potential scale of errors of the banks, had to lose the investment confidence. The wave engulfed NYSE, which bounced back to hit the value of the U.S. economy (Wei Li, Zhanwei Zhang & Yang Zhou, 2021).

According to Sebastian Kohl (2021), the signs of crisis became obvious in the mid of 2007. At that time the financial markets were going to fall flat in terms of finding solution for the sub-prime crisis and that the problems were at the same time reverberating to cross U.S. borders. There was a fear of unknown around. In other regions for example, Northern Rock had to resort to the Bank of England to beg for emergency funding in the hands of liquidity problem. Finally, in the last quarter of 2007, Swiss bank UBS was seen to be the first major bank to announce a loss of more than $3 billion.

As postulated by Stefano Di Bucchianico (2021), as the year 2008 dawned, the Fed was seen cutting its benchmark rate to the extent of three-quarters of a percentage point. This happened to be its biggest cut in a quarter-century, it resulted into slowing down the economic operations. The second month of the year witnessed that the British government had to nationalize Northern Rock. In the third month globally renowned investment bank Bear Stearns, which had been considered as a pillar of Wall Street since 1923, faced the fate of collapsing and hence was acquired by JPMorgan. The first quarter of March 2008 was marked with The Demise of Bear Stearns and during the winter of same year the U.S. economy was tossing in the hands of full-blown recession. Then the financial institutions' liquidity struggle lingered along the stock markets around the globe which were destined to tumble.

The carnage insinuated by multivariate factors fanned out its gruesome impact across the financial sector. In U.S., the IndyMac Bank happened to be one of the largest banks ever to face demise and the government seized its two biggest home lenders, Fannie Mae and Freddie Mac. Followed by the collapse of the Wall Street bank Lehman Brothers in winter went bankrupt. This was an historic blow in the history of U.S. In the meanwhile similar other institutions also emerged as emblem of the devastation triggered by the global financial crisis Schularick and Taylor (2012)

The U.S. indexes started undergoing historical worst losses on record, in the same month, financial markets started experimenting free fall. So much so The Fed, the Treasury Department, the White House, and Congress had to decide to intervene and put forward a comprehensive executable plan in order to undo the suffering of the sector and restore the dwindling investor confidence.

The lesson from the crisis that we can get is to read early signals. In the first week of October 2008, The Wall Street bailout package succeeded in getting approval. The package entailed three interventions, one was an action to purchase of mammoth bulk of the "toxic assets," second was an injection of colossal investment in bank stock shares, and third was to offer financial lifelines to great financial institutions like Fannie Mae and Freddie Mac. This is believed that in the hands of this crisis more than 500 banks failed between 2008 and 2015. The number was surprisingly 25 in the preceding seven years, as the figures have been furnished by the Federal Reserve of Cleveland. Most of these failed banks were small regional banks, and all of these had been acquired by other big banks. No doubt the deal entailed depositors' accounts as well.

However, the chief failures were not in fact the banks in their traditional Main Street sense but these were the investment banks. These investment banks dealt with

institutional investors. At the top of these was Lehman Brothers and Bear Stearns that was disallowed a government bailout. This was however JPMorgan Chase who ultimately bought the residuals of Bear Stearns, an extremely economical deal. But unfortunately, the JPMorgan Chase, Goldman Sachs, Bank of American, and Morgan Stanley, were the ones labelled as “too big to fail.”

Every coin has two sides, every cloud has a silver line, this must be observed in each crisis. At the same time there were big gainers as well. For example, the Warren Buffett that invested billions in Goldman Sachs and General Electric and other similar companies, in the name of patriotism, and earned huge profit.

According to Waltraud Schelkle & Dorothee Bohle (2021), later on, the government passed Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010, which was great intervention. This act benefitted the economy through several frontiers. On the financial side, the act inhibited some of the fishy activities of most of the biggest banks, secondly it enhanced oversight of activities on the part of government and pushed them to contain larger cash reserves. On the consumer side, it discouraged and pre-empted the predatory lending. Those regulations undoubtedly helped prevent reoccurrence of a crisis similar to the 2007-2008.

In fact, bubbles always pop up where the price of a stock or any other commodity can get inflated far beyond than what intrinsic value it has. But the damage is contained for a few over-enthusiastic buyers and then it vanishes. Unfortunately, the financial crisis of 2007-2008 was unique and it grew big enough. Ultimately when it burst, it devastated full range of economies and damaged millions of people. It engulfed even those who were not part of the bout of mortgage-backed securities.

The financial setback had several ramifications. It perturbed the political stability. This came out due to the inability of developed nations who failed to pursue social

welfare investments. Then came the global poverty reduction processes during recessionary times which dwindled investor confidence. The wave again spread to other countries as well. Countries in the EU, such as Greece, Spain and Italy, had to face stark decreases in their GDP and increase in their unemployment which exceeded as high as 20% in some countries. Thus, in the short run there were hardly any measures available to undo it.

Today several global organizations are striving to pre-empt the occurring of the similar crisis again. In that they are reducing interest rates to monitor borrowings and investments, they are also busy in providing tax benefits to the unemployed and underemployed. At the same time, they are subsidizing new business ventures in order to ensue meaningful recovery globally.

The banking and financial regulatory changes are also plenty across the world. These global safety nets and prevention policies are potentially bent upon stopping occurrence of such crisis again. The real turnaround triggered in early 2009. The cause being the passage of the unpopular Wall Street bailout. This bailout restrained the banks' operations.

## 1.2 Aims and objectives of the study:

Following are the aims and objectives of the study:

1. To develop relationship between financial development and economic growth and the effects of financialization among members states of EU.
2. To study the impact of financial liberalization on banking crises.
3. To investigate the impact of financial development on innovation.
4. To examine the role of financialization in development of the financial sector.
5. To examine the impact of both patents and R&D on unemployment separately.
6. To add to the existing literature with updated data and findings using advance research methods.

## 1.3 Research questions:

The research question evolves around the query that to what extent the financial development effects the economic growth in European Union and how financialization plays its role with respect to finance-growth nexus.

1. How can we develop relationship between variables like financial development and economic growth and can understand the effects of financialization among members states of EU?
2. To find the impact of financial liberalization and bank risk on financial crises. What is the impact of both patents and R&D on unemployment?
3. What are the possible effects of financial development on economic growth in the EU member states?

5. What possible role can financialization play in development of the financial sector?

6. To what extent does the financial development effect innovation such that it helps in generating new knowledge?

## 1.4 Significance of study:

The study provides deep insight into some very pivotal macroeconomic variables and their interrelationship with each other. The relationship between variables like financial development and economic growth is very significant in its own place because financial development has direct bearing on economic growth. It goes one step further to realize possible impact of patents and R&D on unemployment. Again, unemployment is extremely important variable. It clarifies the vacancy-status and the required number of workers/officers in the light of future demand and supply. The impact of financialization on economic growth is again important because increase in GDP is an indicator or increase in output and by the same token employment because production cannot increase without increased employment. Also the study investigates the impact of financial liberalization and bank risk on financial crises. Then the role that financialization can play in development of the financial sector carries a lot of weight. Financial sector play key role in mobilization of credit for the businessmen that can garner huge returns. Finally, the financial development directly affects innovation, and both help in generating new knowledge. Hence, the present study has huge amount of utility and significance for the knowledge community, researchers, banking community, business community, banking regulatory authorities, economists, researchers, European Union, and the masses.

The current study addresses the issue keeping in view scenario in EU in three ways. One by picking up Financialization, Development and Growth aspect. The paper studies the role of financialization in the growth of real sector coupled with the relationship of financial development and economic growth before and after the financial crises of 2007-2009. This is obvious that like any economic or financial intervention like financialization, is destined to cast its impact on economic growth. The financial sector provides the lifeblood to the economy without which it cannot survive at all. Though the same financialization has been witnessed to degenerate growth in certain cases.

Second aspect of the study is consideration of Liberalisation, Risk and Crises. This study explores the impact of financial liberalization as affecting bank's risk with respect to banking stability. The liberalization on the part of government may not be compatible with a given structure of bank. Thus, the current study examines how financial liberalization and bank risk- taking activities could potentially lead to financial crises in the case of European's sampled countries. Nevertheless, the study investigates the direction that interplays between the factors of financial liberalization and the occurrence of financial crises.

The third dimension that current study considers is the relationship between Development and Innovation. Nevertheless, the study does not overlook the impact of financial development on innovation. In the case of European Union, the study examines if financial development promotes innovation, or it does the otherwise. Per se, the financial development ought to promote banking innovations, but at times as has been shown in this research, it has failed to.

## 1.5 Methodology used in empirical parts of the study

We have followed the methodology as proposed by Rajan and Zingales (1998). Using panel data for EU-28 countries, monthly data was used when examining the impact of financial development on economic growth using the sample between 1998 to 2018. Variables included in this part of the study were Business credit, Business credit interest rate, Exchange rate to USD, Household Credit, Money supply and Private sector credit. Estimation techniques included to enquire the relationship were Pooled OLS, Random effect test and GMM estimation technique.

For the investigation of financial liberalization and banking crises the sample used was yearly between 1996 to 2019 for EU-28 countries. Variables used to investigate the impact are Bank non-performing loans, financial freedom index and Bank Z-Score. Estimation techniques to enquire the impact included GMM, DOLS and FMOLS.

The third empirical part of the study enquiring the impact of financial development on innovation included the yearly sample of 1996 to 2019 for the EU-28. The variables included in the investigation were following, Patents by Residents, Patents by Residents, bank Deposits to GDP (%), bank credit to. Bank deposit (%), Private credit to deposit money banks and other financial institutions to GDP (%), Unemployment rate and Gross domestic expenditure on research and development (% of GDP). Estimation techniques to enquire the impact included GMM, DOLS and FMOLS.

Research and development expenditure are considered a proxy variable for the inputs of innovation activity and is also considered as controlled variable.

For estimation, the panel unit root test as recommended by Dickey and Fuller (1979, 1981) is used to check for the existence for the panel stationary, the most popular and reliable test. Fisher type ADF tests are allowed for individual root processes. The null

hypothesis for both the tests is that the series contain a unit root. Regarding robustness check, the co-integration of the vectors of the relationship under consideration have been examined. This study employs three dynamic estimation techniques, namely generalized method of moments, dynamic OLS and fully modified OLS. This study employs Generalized Method of Moments (GMM), which is preferred over pooled OLS when analysing the panel data, the main issue arises when the pooled OLS fail to solve the problem of endogeneity in the panel data.

As recommended by Arellano and Bover (1995) that GMM deals with the problem of autocorrelation, also it helps in solving the problem of heterogeneity.

We have then employed the Panel co-integration test which bears more benefits compared with the unit root test on the Panel data. The study uses co-integration relationship by Dynamic Ordinary Least Square (DOLS) and Fully Modified Ordinary Least Square (FMOLS). Pedroni (2001) explored the ways and methods that can be used for estimation and analysis of cointegration vectors in heterogeneous panels, which are thus based on (FMOLS) fully modified ordinary least square. The author uses Monte Carlo simulations in the study to compute the t-statistic for larger sample and relatively small samples.

## 1.6 Structure of the Study

The structure of the study is as follows; chapter 2 starts with the introduction to theoretical foundations of financialization in post Keynesian tradition. Followed by brief review of The General Theory of Employment, Interest and Money. The next sections highlight the major contributions made by famous post-Keynesian contributors, followed by the critiques of financial globalisation and liberalisation. At the end of chapter 2 there is brief overview of the Boom, Bust and Financial Crises, followed by the overall summary of the chapter.

Chapter 3 is the review of the literature, starts with an introduction, followed by the chronological review of the empirical perspectives which includes both the data and variables along with the techniques of analysis. The next section of the chapter 3 provides a chronological summary of competing perspectives for all three empirical chapters that are part of the study. The next section states an assessment and Identification of potential areas for contribution, followed by the proposed research questions for all three empirical chapters and finally a summary of the chapter.

Chapter 4 discusses the approach adopted for research methods, starting with an introduction, followed by the detailed outline methodology which is used in each empirical chapter along with the explanation. Chapter 4 then presents a table explaining all the variables used along with the sources of these variables and a short summary of the chapter at the end.

Part 2 of the study begins after chapter 4, the first three chapters of the part 2 are the original empirical chapters that are part of the study, chapter 5 is about financialization, financial development and economic growth. Chapter 6 is about the financial liberalization, bank-risk and financial crises. The third empirical chapter is

about the impact of financial development on innovation: recent evidence from European Union.

Finally, chapter 8 is the last chapter of the thesis, which consists of concluding remarks, the first section of the chapter is introduction, followed by contribution to existing knowledge and understanding. The next section of the chapter gives the limitations of the study, followed by a section on options for further research and finally the chapter summary.

# Chapter 2: Theoretical Foundations

## 2.1 Introduction

This chapter explains the timeline of financialization, beginning with the review of Keynesian General Theory and then discussing post-Keynesian contribution to the financialization. After so many episodes of the financial crises around the world, the financial crises have been studied very deeply in order to understand the cause and effect with respect to financial crises.

According to Engelbert Stockhammer (2021), to begin with, the General Theory has been a turning point in the history of development of economic thought. Presented by Keynes, the General Theory is made to fluctuate the employment and output in a capitalist economy, while at the same time to change the perspective of standard theory. General theory shows why there are fluctuations between the output and employment in the economy.

Keynes' theory focuses on investment, but the theory suggests that the existing forces supporting the equilibrium of the financial market should be removed and then should one evaluate the capital assets in the market. According to Keynes the capitalist financial institutions are unstable given the fluctuations present in the market.

The General Theory's standard argument is that the behaviour of the capitalist economy cannot be explained by tacking money. The use of finance cannot be supported by the model that is based on barter. The General Theory starts with a monetary economy which supports money as a type of bond rather than just as a medium of exchange.

Keynes clearly states that the concept of money in the world has not been given proper importance. A standard money theory and how an investor sees a real asset are totally different. Keynes argues that in the world predictions are made about the

future which can change the level of employment within the economy. These depend upon investor confidence and the possible future environment of the business. Similarly, the most important aspect regarding the prediction of future is clearly linked to the financial variables which can change a lot of other things within the economy, including employment, innovation, growth and development. (Mehmet Akif Destek & Muge Manga, 2021)

To be precise the pricing of financial assets and valuation of capital assets are clearly dependent on the financial experts' views on the prediction of what they think is going to happen in future. To Keynes, dealing with a financial system should be easy and not complicated as financing should be simply seen as an economic contribution from investor.

As per Keynes, capitalist economies consider the separation of saving from the investment which in individualistic capitalism act altogether. The separation of saving function and investment function means that borrowers are separated from the lenders which can increase the chance of moral risk that involves uncertainly and especially the moral hazard as said by Keynes.

So, if the individuals start to minimize the moral risk principle then people might just hold on to the money which would decrease the financing opportunities available to the investors resulting into less investment within the economy thus the employment level would not reach its maximum.

In the post-Keynes era, there are numerous studies (Tobias et. al., 2021) that deal with the financialization at the macroeconomic level. The literature mainly features finance-led growth regime. Though the literature itself shows many disagreements for which this channel is not appropriate, the reason being that in literature, it can be

clearly seen that the studies vary with respect to capturing the effect of financialization.

One can look at the financialization at the macroeconomic level, in contrast to the basic economic functions of economy, such as demand and consumption. Financialization may play a role to lower the financial fragility, at the same time financialization could also increase the investment which is linked with increased profitability encouraging the firms to invest.

Moreover, financialization can also increase the level of consumption within the economy from both credits-led or wealth effect (Maki and Palumbo 1990) or the consumption increase through the distributed dividends. (Thomas Palley, 2021)

The point to make here is that it is easy to find counter arguments for Keynes, based on the past events like in Keynesian theory this has been suggested that financialization would slow down consumption within the economy if there are any changes in the level of wages.

The literature of financialization shows both positive effects and negative effects. The timeline with the financialization is important because the technology associated with finance has been bringing new products into the market, with new products other, risks are also introduced into the system which have not been encountered for before.

At the same time innovation in financial sector, now also known as fintech is a major feature of the economy which can introduce new products and instruments into the market. At the same time the quantity of the existing products and instruments in the market increases through fintech.

So, both the addition of new products and increase in the existing products and instruments lead to more financing. Increased availability of finance increases the

prices of assets relative to the prices of current output and this leads to increase in the investment in the EU.

The quantity of money in an economy is endogenously determined as described by Keynes. In our sampled economies it is meaningful to separate both hedge and speculative finance. Hedge finance is appropriate when money arising from cash-flows which is resulting from operations is enough to meet any payment requirements. (Juneyoung Leea & Keun Leeb, 2021)

Speculative finance is good when the cash-flow from operations are expected to be less than the future payment obligations even though the present value of expected cash receipts is greater than the present value of payment commitments. Then the speculation unit is expected to be fulfilled by raising new funds to meet the financial obligations.

There are some important factors regarding speculation that the firms need to continue to refinance their position because any increase in the interest rate will increase cost of the money for the firm while on the other hand the return on the assets may be the same.

Most firms use debt in order to finance their payment obligations, the biggest setback for them is when the market value of their assets becomes smaller than the value of their debt which goes up.

The financing mentioned above shows the options available in the capitalist economy to generate money which is linked to the financial structure which is susceptible to financial crises. If everything is going well that too in future can lead to a financial crisis due to a reason that firms usually go too far with the debt trap.

### Post-Keynes Era of Financialization

The increased importance of financial factors such as distribution, growth, investment and growth, the developments and related consequences have been generally labelled as 'financialization' by many authors (Stockhammer, 2004; Krippner, 2005; Lavoie, 2008).

Stefano Di Bucchianico (2021) states that financialization is the main cause of increased role of financial markets, financial actors, financial motives and the financial institutions in the operation of both local and international markets.

In the last few decades there have been major changes in the financial markets of both the developed and developing nations. The major development that has brought rapid development in the financial system is financial technology which has brought many new products and instruments in the market along with improvement in the traditional banking system.

In this part of the chapter, the emphasis would be on finding what actually the financialization is all about with a view to better integrate these developments keeping in view the Post-Keynesian models.

## 2.2 Post-Keynesian framework for the analysis of financialization

### 2.2.1 Financialization and macroeconomic instability:

First of all, the deregulation of credit markets also known as financial liberalization can be a reason behind the increasing debt levels of firms and private households as well, the increasing debt level also adds to the financial fragility. About financialization in the U.S as Davis (2009) mentioned that in the last 20 years the U.S market has seen constant increase in the household debt-to-income ratios and at the firm level debt-to-equity ratios. These developments show the growth but at the same

time instability in the financial system as well. The main risk with debt-led growth is that economy is vulnerable to debt deflation and a breakout in the economy could lead to very long recession.

The increasing leverage ratios with high debt levels are not the main reason for economic expansion. These developments as mentioned above were not new to the Minsky's financial instability hypothesis where Minsky (2917, 1982) demonstrated that Lavoie and Seccareccia (2001) stated that when the debt levels are very high in the economy then leverage ratios increase so it is possible to have lower utilization and profits.

The increasing the level of interest or debt commitments for firms might be related to very high debt ratios regardless of their other effects like capacity utilisation and capital accumulation. The paradox of debt by Steindl's (1952) was discussed later by Lavoie (1995).

The possibility that even if the shareholder-creditor conflict is still ongoing, the economy manages to find steady state with the high level of leverage ratio targeted by banks (Dallery & van Treeck, 2008).

In another study by Cordonnier and Van de Velde (2008, p. 14) the dark side of the financialised capitalism was mentioned by stating that when the firms realize that the actual profits are low and so they are disappointed by the system then they are more selective in the future investment that they want to make in order to bring the profit levels up. If the firms attempt to do this, it can further lead to lower aggregate demand thus causing more problems in the economy.

### 2.2.2 Capitalism to Financialization

Since the early twenty century finance had become stronger in terms of financial capitalism and after that in the early twenty-first century came the financialization,

now the market grows so big that it gets out of control and specific narrative of finance is seen in a different perspective.

In history whenever the finance grows, the rents increase followed by the increase in the financial instability. Financialization has introduced un-stability at a greater level in terms of social and financial instability with the credit boom-and-bust cycles which then certainly lead to financial crises. (Constantinos Alexiou, Abdulkadir Mohamed & Joe Nellis, 2021)

History shows us the two developments of the financial stability and financial crises. Firstly, Hyman Minsky strongly supported the theory that capitalist market economies have the propensity to get destabilized. The second theory is the narrative of Irving Fisher which explains the debt-deflation theory regarding the great depression and the same idea has been supported by Charles Kindleberger's with results based on estimations from the financial crises. The whole second narrative is much closer to the theory of Keynes, which states that economy itself is not going to necessarily create equilibrium on its own.

The theory is based on animal spirits where humans play a role which creates the boom and then a sudden bust because of the debt-led consumption leads to a financial crisis. That is why Keynes always put strong emphasis on the government interference to control the financial system that produces more of the quality credit and financial innovations that do not destabilize the whole system. Completely opposite is the approach of neo-classical economies that states the economy will come to equilibrium on its own until the government interferes. This narrative has been well-supported by the monetarists.

Modern-day finance has promoted the above narrative, which is also efficient market hypothesis, the narrative supports that markets should not be intervened in order to

maintain stability, if this was true many financial experts believed the same before the financial crises of 2007-2008, so the narrative of neo-classical has changed since then, meaning that with time and experiences the narratives change as well.

There were a few orthodox economists who were anxious about the excessive growth in the finance. James Tobin in 1984 expressed his concern over excessive growth of the finance. Tobin's idea was that the surplus capital in short run is hence becoming inefficient and there should be rather long-term investments in the real economy. It was Tobin who proposed the tax on the international foreign exchange transactions to discourage those and encourage the investment into production to support real economy.

On the other side the economist like Tobin who though maintained that the sudden high growth of finance is damaging the real economy, Magdoff and Sweezy (1985) ruled out it through an article called "The Financial Explosion" in which they explained that capitalism would adopt financialization, but the economy would be highly vulnerable to stagnation.

Over the time the role of the capitalist states was transformed in order to tackle the growing demand of financialization. At that time when lender of last resort was fully incorporated into the system to bail out banks providing liquidity at a short notice. The Federal reserve after the stock market crash of 1987 adopted the policy of too big to fail at the end for the crash for the whole equity market but again that did not work well enough because then again, the decline of the stock market in 2000 was unavoidable. In the capitalist's view somehow, it could be said that the financialization becomes the need to save and grow money with stagflation in the economy.

### 2.2.3 Keynes and The General Theory of Employment, Interest and Money

The work of John Maynard Keynes cannot be forgotten, the way he figured out the causes of Great Depression of 1930's and while doing that he gave economics a whole new look was amazing. The society remembers the work of Keynes, but a few conservative economists have forgotten the work he has done. Every economist knows the basic principle, but he mentioned that to get out of recession, you need to spend money.

The General Theory of Employment, Money, and Interest then is a work for modern economy, it is even good now as it was at that time. The idea explained in his theory clearly suggests that economy will be back to normal but somehow politics have changed that. (Engelbert Stockhammer, 2021)

### 2.2.4 Boom and Bust Cycle explained in the General Theory

The boom at the end of its peak, proved that businesses are doing great, so as the sales increase but on the other hand the cost might be increasing as well because of the increasing interest rate and at the end the expected profits by the businesses are high. The speculation in the market is somehow increases when the investors move away from investing any further and give preference to liquidity. The investors' behaviour only changes if they believe that in the future the expected profits are going to decrease.

The problem starts with the expected profits, followed by the changes in interest rate but when the cycle has already begun then even cutting down on the interest rate won't move the economy into recovery because of the uncertainly present among the

players in the economy. Confidence is key aspect which plays a vital role for a business to make decision.

Taking an example of the stock market crash, everybody who has invested somehow has made a loss. Coming back to the point Keynes explained that to recover people need to spend more. The spending comes in the way that the investment made is going to get replaced by the old product or services in order for the economy to go into recovery mode. (Thomas Palley, 2021)

At the same time the economy just can't be put into recovery just by decreasing the interest rate because as explained earlier the problem before the interest rate is uncertainty around the expected return, which makes the government to take necessary action to step in to restoring confidence in the market.

It is not the case that when you decrease the interest rate it does not take the economy out of the slump, at the same time increasing it in the period of boom to increase the interest rate to discourage the overinvestment is necessary. Ketteni and Kottaridi (2019) investigate the effect of credit market deregulation on economic growth. The authors chose to have an extensive study in this area by including 66 countries, the dataset included material from pre-crises 2000 and ended 2013 after-crises. The data obtained in study was taken from "World Development Indicators." The study has used the following variables in the study, Real GDP per capita, GDP per capita growth, gross fixed capital formation as percentage of GDP and lastly population growth. Using an advance econometric technique for analysis, the authors employed marginal integration to a Partially Additive Linear Model, the authors claimed that no study had used the same method in the same context before. The finding of the study is hence interesting as well, the study found the relationship between credit market deregulation with growth to be U-shaped, increasing deregulation, adding to the

growth till a certain point before it starts affecting it negatively. The authors also added that liberalization affected differently in case of developing and developed economies and from emerging economies due to the underlying condition of these economies.

The overinvestment at the time of boom can be of two kinds, firstly genuine overinvestment, which would have made a loss anyway regardless of the cycle. Secondly the disappointing investment, where it would have been successful if the bubble would have not busted. The first kind explained here is the one which is actual waste of both money and other resources. Coming back to the point that again the solution to fix it is not to increase the interest rate which would probably decrease investments which were going to do good anyway and meaning the whole propensity to consume will also decrease.

## 2.3 Developments in Post-Keynesian Economics

The critical evaluation of the prevailing theories of Keynesianism and monetarism was imperative. So, Victoria Chick's contributions are very well-known in the Post-Keynesian era, she is famous for her book "The Theory of Monetary Policy" in which she the book was published in the year 1973 (Jonas Bertilsson & Håkan Thörn, 2021). From the beginning of work of Chick, the main focus has been on Keynes, mentioning that if you follow Chick's approach then you need to study "The General Theory" in much detail that could be beneficial to better understand the ideas put forward by Keynes. Despite the fact that not every Keynesian scholar will agree with Chick's conclusion, at the same time all of them would admit that she is the one who wrote a full-length book on what "The General Theory" is all about named "Macroeconomics After Keynes, A Reconsideration of The General Theory."

Victoria Chick's work from the beginning does not support Keynes' work but gives a critical analysis of his work, in addition she always compares his work with other economists to see similarities and differences between the theories to check the real-life implications of different economic theories. While comparing the theory of Keynes and Schumacher, Chick mentions that both theories had similarities and differences among them. She described them as both the economists were more interested in the direction of the economy in the long run while keeping in mind the ethical effects of the direction of the economy. The importance given to the value was same by both of them, but the solution was different if we want to promote a good life and the ways to achieve the same.

In one of the latest papers by Chick, she is seen much concerned about the original "General Theory" which was somehow lost in the modern date and is sometimes referred to as Keynesian economics which is not the same but a transformed theory.

Chick then points out that the reason being that the Keynesian economic theory could not explain the stagflation of the 1970's. Another important contribution by Chick was the paper she wrote after the sub-prime mortgage crises in relation to the Northern Rock in 2008. In that she clearly demonstrates that the massive expansion trend that the bank was following was very risky. She emphasized that the Financial Services Authority knew that its business plan was very dangerous but still has been unable to persuade Northern Rock.

The personality of Victoria Chick was more of an independent character and was based on the diversity of theoretical views; however, she did not take sides on the ideology or methodology. From the beginning her contribution to PKE (Post Keynesian Economics) has been tremendous as she specialised in international trade theory at Berkeley, she wrote a thesis on Canada's 1950 flexible exchange rates experience.

After a few years she wrote a book "The theory of monetary policy", where she used the same approach for both the Keynesian and Monetarists while staying sympathetic and critical to both schools of thought. At the end she rejected both of the schools of thought declaring them as theoretically inadequate.

The next big contribution by her was "The Theory of Monetary Policy" which showed clearly that the mainstream macroeconomics was inadequate. The main contribution of Victoria Chick to Post-Keynes school of thought was that she published Macroeconomics after Keynes. With this book she clearly put a distinctive mark on the post-Keynesian school of thought. It can be said that macroeconomics after Keynes built up her confidence to work towards contributing regularly in order to complete the post-Keynesian paradigm (Wei Li 1,2, Zhanwei Zhang 3 and Yang Zhou, 2021).

Victoria Chick has the ability to expose the hidden assumptions in the theories and also analyse the rationale behind the theory's structures. Her analysis is not limited to theory, but she can very-well incorporate the methodology as well.

She is known to relate the theories and methods with real world issues and advise more appropriate and logical method to the approach at the same time; she is known for criticising Keynes framework where need be.

At the same time, it could be said that the Victoria Chick's methodological approach is much similar to that of Keynes although Victoria Chick's approach is different as she explores different theories for different situations to link them up with real life world.

The establishing of a proper link between the growth in capital and R&D expenditures and finally the amount of the pricing markup has been a pivotal area. In a similar context, Alfred Eichner is known for his famous book Megacorp and Oligopoly which was published in 1976. He is well known for his innovative microeconomic theory but basically dedication towards modern post-Keynesian economics enabled him to contribute a lot.

Alfred Eichner besides the academia work, also helped form the social networks and institutions of post-Keynesian economics in the U.S. Alfred Eicher while writing articles or books tried to integrate the core and basic ideas of Keynes which he helped to form. In his time, it is also his contribution to the post-Keynes that he not only carried out the work of Keynes but also, he knew the importance of heterodox economics, the reason being that he used to closely and critically analyse the work done by his counter parts.

Alfred Eichner's post-Keynes contribution started with his PhD thesis which was titled "The Emergence of oligopoly: Sugar Refining as a Case Study." The first post-

Keynesian survey was published by Eichner and Jan Kregel in 1975 which also demonstrated the new paradigmatic theory. In a similar paper, they showed the key features that were linked to post-Keynesian: the Keynesian reversed causality, which demonstrates that saving is determined by investment which is also associated with past timeline along with the investigation of growth and cycles.

The major purpose of these theories by Eichner and Kregel was to compare the post-Keynesian economics with neoclassical economics, the conclusion given by both authors was that to show that post-Keynesian economics was to explain the real-world scenarios whereas neoclassical economics showed the model existing in an imaginary world, the reason was that they showed that the former could be explained empirically.

Eicher's contribution to post-Keynesian was way forward to the theory and organizational skills. It is well known that he put in a lot of effort to provide alternative theories to neoclassical economics. He is considered not only for adding his work to post Keynesian but also linking post Keynesian work to policy implication by appearing before legislative and as well as the congressional committees.

Eicher's showed his strong influence on the idea that post-Keynesian is better able to explain the real world than the neoclassical, only by being able to make people understand he once wrote "valley of darkness" (1983.b). He also had a strong influence on the young students and researchers, he always wanted every student to stick to post-Keynesian rather than neoclassical economics. He wrote an article called "something better" in 1985 to convince his students about what he is saying about sticking to post-Keynesian. (Engelbert Stockhammer, 2021)

The work on post-Keynesian economics kept on going. In his classical book "A Guide to Post Keynesian Economies" published in 1979 in which he made sure that the young readers could get all the essential ideas of post-Keynesian theory at one place. While at the same time he accumulated articles from many prominent authors at that time which were rolled back by great publishers like Challenge Magazine which gave the young students an opportunity to learn the latest ideas from just one handbook.

The work done by Eichner is as relevant today as it was when it was rolled out, looking at his last book "The Macrodynamics of Advance Market Economics" was published after his death yet the book is still considered accurate and great. He had sent the book to his colleagues and friends to access so that he can improve the final version but after his death it was published by M.E Sharp in 1991. The book is known to be refreshing new theories and relevant ideas.

Eichner's commitment to endorse a reliable alternative to neoclassical theory made him work towards proposing a model that would allow us to move "towards a new economics".

The new economy proposed by him would constitute large social and economic institutions "large corporation, industrial trade unions, credit money and the state." These all could be seen in his work Eichner (1983b, 1985, 1987). As he stated that these institutions had a huge influence which could change the way how the economy works, in continuation with the work of Keynes.

His plan was to work block by block with empirical understanding which rolled out the famous "The Macrodynamics of Advance Market Economics", this book proposed a new model, the basic purpose of the book was to serve as a function of advance use of, money through capitalist economics. In order to do so it required a

complete opposite side of the neoclassical theory. Eichner's inspiration came from some famous post-Keynesian economists such as Luigi Pasinetti, Eichner explain that the economy has large sub-systems as well which require as much attention as any large system. The approach explained by Eichner "system approach" simplifies the dynamics of overall economic system. Eichner put emphasis on the sub-system which he also called blocks, he added if they are clearly identified and analysed the way they work, we would be better able to understand how they affect the overall economy. He added that decision taken in one block has an equal implication and thus the consequences for the other blocks comprised in the economy are clear which eventually effect the overall economy. This was again in line with post-Keynesian approach. Another important factor discussed in the financialization context is financialization and macroeconomic instability where study clearly states debt-led growth is very harmful for the economy, it is a bubble created through debt to lead growth which would bust at any time thus is has negative macroeconomic effects.

Eichner (1985) put emphasis on the mega-corps which usually meet the demand but have excess capacity as well, which makes it adjustable for demand if need be. Eichner claims that in good markets as well as in labour and credit markets, it is the supply side of the economy which adopts to the demand not the other way around.

Frederic Lee (2000a, b) stated that Eichner's efforts were immense in organizing and developing post-Keynesian economics as well as in setting up post-Keynes school in North America.

Another very famous Post-Keynesian is Paul Davidson, whose contributions are very well known. When Paul Davidson started his career as an economist, right from the start he had put emphasis on the necessity of presenting a substitute to the modern macroeconomic mainstream.

As mentioned by Holt et. al. (1998) that Paul Davidson sees himself as 'Keynes-Post Keynesian.' Paul Davidson has mentioned again and again that to be a real Post-Keynesian, the understanding of the Post-Keynesian in regard to both theory and methodology has to be based on the Keynes which would be based on The General Theory. Davidson has published biography of Keynes in the year 2007.

Paul Davidson has not only criticized the mainstream macroeconomics but has been putting forward some substitutes from the early years of his career, that was an influence of Sidney Weintraub, which led him to do the macroeconomics analysis within the framework of the new macroeconomics model that Keynes had shown in Chapter of The General Theory.

In the year 2011 Paul Davidson published an amended and up-to-date version of his Post- Keynesian Macroeconomic Theory.

Paul Davidson was very keen to present the principle of effective demand as the appropriate macroeconomic model among the other economists, this was the time when he was working under his mentor Sidney Weintraub, where he has added his work to Weintraub (1958: Ch. 2) in his early days. Also, later on he had presented the updated version of his theory as Davidson (1983).

In the beginning of 1964 along with his fellow Eugene Smolensky, he wrote a book in regard to macroeconomics that would come out as a substitute to the mainstream interpretations of Keynesian macroeconomics. Right from the start of the book, it is very clear that the book is following Keynes. One highlight of the book was that based on the assumption of a true uncertain future, that the actions of players in the economy other than the government would bring full employment. The book wasn't popular because of the fact that other economists did not agree what Paul Davidson and his fellow had to say thus it did not become the best seller.

Davidson in year 2003-2004 wrote another book The Fundamental Post-Keynesian Macroeconomic textbook. The professors and supervisors of Davidson for some reason refused to read the book as it is admitted by many Post-Keynesian and Davidson himself. Davidson did not stop writing he wrote another textbook in the year 2011.

Paul Davidson mentioned that Keynes as the dominant economist who had the best way to regard the theory and methodology but also the right sense of macroeconomic analysis (Davidson, 2007). A strong belief among both Keynes and Davidson was that economic theory is hence nothing without its connection to real economy, the purpose of the theory is to address the issues in the real world. The economic problems changes over the period of the time thus economic theories have to be seen in the right appropriate perception. The problem-solving phenomena of economic theory should be the core of all economic research. (Davidson,1996).

There are major contributions made by Davidson in his book "Money and Real World" (1972), and the book was very well known for its real-world implications. In 1982 he published "International Money and the Real World", again the book was known for explaining implications for open economy and real world. Both of these books are clearly evident that Davidson followed the path of Keynes to link the theory with real world. Later on in 2002 he rolled out "Financial Markets, Money and the Real World", with financial markets on the rise he had linked the theories with real world financial markets. The books like "Keynes' Solution: The Path to Global Economic Prosperity (2009)" and "The Post Keynesian Macroeconomics – A Foundation for successful Economic Policies for the Twenty-First Century (2011)" were great contributions.

By the year 1978 the Journal of Post Keynesian Economics, for the first time went into press with editors Sidney Weintraub and Paul Davidson. With the passage of time, it became a well renowned journal, and popular among both the mainstream economists and the heterodox minded economists. Journal of Post Keynesian Economics carries immense importance not only because of the theoretical provisions but also because of its methodological sense (Sebastian Kohl, 2021).

Davidson (1992) mentions that the Post-Keynesians know the fact that the model they use depends on the current economic situation rather than using one general economic model which could not resolve the problem. Davidson always challenged the orthodox methodology, as described by Rotheim (1996) that when he started doing that he was considered as a mainstream economist just because of the criticism but which however was not the case.

Davidson has not received the status he deserved among the economists but that did not bother Davidson at all. According to him Robinson mentioned that Keynes once said, “In economics you cannot convict your opponent of error, you can only convince him of it.”

Wynne Godley was another very popular economist, his model led to help in forecasting.

Wynne Godley’s major contribution was towards presenting and developing the stock-flow consistent approach to macroeconomics, he demonstrated model based on accounting which gave him an opportunity to lead among the orthodox forecasters. His contributions in forecasting led him to predict adverse developments in the UK economy along the 70’s and 80’s and also in global recession of 2001 and 2007.

His first appointment at the UK Treasury was in the year 1956, it was the same time when the systematic collection of macroeconomic data had just begun.

His ability to determine and analyse short-term forecasting was very creditable which caught the eyes of seniors at the treasury namely Nicholas Kaldor along with Sir Claus Moser.

Wynne Godley very quickly became specialist in filtering data in a time when the computers were slow and expensive to use. He had shown he could predict a meaningful GDP, inflation etc. using the key indicators for annual budget preparation. In 1963 and in the following year Godley reviewed the methods used by National Institute of Economic and Social Research for computing and forecasting GDP and other indicators which could lead to policy changes. In the year 1964 when the labour party had just won, Godley was promoted to deputy director, his new office was still looking over the forecasting but limited to major policy interventions. The most important task included to compute the amount of Great Britain Pound Sterling devaluation. Other than that, he had worked on number of innovative tax schemes, out of which Selective Employment Tax was the greatest at the time which aimed to enhance investment in manufacturing industries.

In the year 1970, he was appointed as director of the Cambridge University Department of Applied Economics by Kaldor, Godley work on short-term forecasting and economic policy challenges. Godley has also obtained capital for the Cambridge Economic Policy Group; he assembled a team of labour market researchers and macroeconomists whose task was to forecast and prepare for Policy Review Quarterly which would impact the alternative policy.

Godley's career was not smooth as he had number of conflicts with the treasury, the reason being he knew his forecasting was more accurate, the first one was in tenure of labour government in 1973, where he had accurate prediction of higher inflation at the year end. He had worked against the system that was in place for real-time public

expenditure projection, which was introduced in the in the later years of 1960's, the idea behind was to improve Treasury's control over the multi-year spending programmes. However, Godley was right from the beginning of the decade of 1970's and it was proven that the Treasury was weakened, the reason being the new government of Labour Party had to counter this issue by introducing cash limits.

Further the public clash between the group led by Godley and Cambridge Keynesian led to further weakening of the trust of Treasury. The main argument between both groups was based on Godley's re-interpretation of basic micro-accounting identity. After some time, everybody recognised it, and then it was named as fundamental identity.

Godley's direct involvement in policymaking came to a stop after the Conservatives came to the power in 1979 and their decrease in public spending due to the recession of 1979-1980 started taking place which was caused because of restrictive spending. This gave Godley an opportunity to reunite with the colleagues at the Cambridge who had left behind the race to reinstate a Keynesian method to recurring mass unemployment. This had given Godley much time to think and work on re-assessment of textbook and Treasury and macroeconomics.

His work was widely known by Macroeconomists (Godley and Cripps, 1983) which had developed reconceptualization among economists, later on the same was edited many times by colleagues at Kings College London, Frank Kermode.

Godley claimed right from the start of his career that the full employment and price stability can happen at the same time without needing to assume lasting 'Phillips Curve' trade-off. Keeping in mid the United Kingdom's social cohesion, Godley and Rowthorn rolled out dynamics of public debt in 1994, which showed the relationship between real interest rate and real GDP rate leading to a fiscal (deficit or surplus)

consistent with a stable ratio of debt-to –national-Income. The Keynesian regime continued. In order to measure the innovation, the authors used the following indicators to measure the level of innovation, firstly the number of patents issued, then a sub-class of patents along with industry level R&D expenses. In order to account for the financial development, the study used two different proxies to account for the equity market development following the earlier work of Beck and Levine (2002) along with following Rajan and Zinglas (1998) for creating the proxy of credit market development.

Later on Godley had given up the directorship in 1988 at the DAE and was not in the eyes of public until he was called back at the treasury in 1992 to perform one of leading roles in Chancellor's new Panel of Economic Advisers. It was hence a reward for his work between 1990-1992 for correctly projecting and forecasting the course of events. In the same year 1992 Godley wrote "Piece" which was more of an advice to the European Union named 'Maastricht Treaty for European Monetary Union' the idea was to stabilize Euro zone through creating barriers to stop instability and deflation. Later on Godley and Lavoie (2007) wrote that 'sovereign debt crises had proven to its position to be true in the light of events of Eurozone crises in 2010's.'

The first version of Godley's stock-flow consistent work for the U.S was published in 1999. In which he had made a point about increasing of indebtedness of private sector that would initiate rises which was then seen in the year 2001. After the global crises of 2007-2008, he was one of the best economists known to have predicted it in-time (Bezemer 2010: Schlefer 2013). Later on, he wrote Monetary Economics (Godley and Lavoie;2007b) an updated version which included watertight with the stock-flow model.

Godley led many post-Keynes' debates stock-flow-consistent models, connected economics internationally and also found an instant application in ecological economics.

Nicholas Kaldor was one of the major contributors who is known for his contributions towards Keynes' work. Kaldor was an important figure who represented the Keynesian analysis. Kaldor was a major figure of the Cambridge Keynesian School for almost 2 decades from 1950's onwards. Kaldor started criticising the European economic integration in the early 70's. Kaldor studied at the LSE during 1927 to 1929, while studying at LSE he was taught by Young. So, it was obvious Kaldor was following every work of Young, especially the notion of increasing returns through Young. Kaldor used to frequently refer to Young in his writing about increasing returns, he also regularly cited increasing returns as the driving force behind cumulative causation. As per Kaldor (1972) Young only missed one thing, the Keynesian income effects stemming from increasing returns.

When writing about trade and intertest rates, Kaldor knew the contribution of Wicksell in the area, he used to regularly refer him (Kaldor,1938, 1940, 1942). Hayek was at LSE as well while Kaldor was there. Kaldor challenged the work of Hayek (Kaldor, 1942) and attacked the Australian theory of trade cycle as Kaldor wrote in his early paper in 1939.

Kaldor has also worked for Myrdal as 'Director of the Research and Planning Division of the Economic Commission for Europe', Kaldor knew Myrdal way before when he was introduced to his Monetary Equilibrium (1933). It was not surprising to see Myrdal (1957) and later Kaldor (1972) challenging the equilibrium analysis. Later Kaldor (1985) again expressed his reservations against the equilibrium analysis.

Kaldor (1934) showed disappointment with equilibrium theorizing and he also stated that equilibrium is weakened in many real-world examples.

Kaldor (1939, 1940) showing the implications of cumulative causation to demonstrate that how economists encountered different business cycles at different times, at the same time the economy also experienced increasing or decreasing trajectory. Later on, Kaldor (1985) highlights the fact that changes in the quantity are far more important than changes in the prices, which triggers cyclical behaviour in commodity markets and at the macroeconomic level (Stefano Di Bucchianico, 2021).

Kaldor's major contribution to Post-Keynes was to provide an alternative to the neo-classical equilibrium theory and Kaldor presented the theory of cumulative causation, where he also showed policy implications based on the real world, not just scenarios.

Kaldor is really appreciated for the policy implications he had put forward, starting with economic analysis which focuses on economics moving with time and employing the major principle of cumulative causation along with an industrial policy to foster economic growth in England, for the introduction of expenditure tax to more equality along with the long-run growth and lastly for the income policy in order to control inflation.

Kaldor had contributed when the analysis had just begun with respect to European economic integration with regard to United Kingdom. He had a lot to say about United Kingdom joining the Euro Zone.

His approach was based on the analysis of economic growth, which according to him had moved towards more than one sector at least in the economy. (Kaldor,1996).

Kaldor mentioned that intrinsic imbalances are going to show up and affect along the way of trade integration at such a level. Kaldor strongly disagreed with the neo-classicals where they stated that difference in the market would come back to

equilibrium by itself after integration but Kaldor stated that real exchange rate adjustment was not so strong to bring it back to the equilibrium. Targetti (1992) and King (2009) wrote outstanding biographies which show how Kaldor made his point along with analysis against the idea of United Kingdom joining the Euro-Zone.

Another major contribution of Kaldor's was to propose expenditure tax rather than having income tax, which was a very well appreciated by Lukewarm among the post-Keynesians. Kaldor's idea was to encourage people save and then people make investments based on the saving. Kaldor (1955:53) mentioned 'that the idea is to tax people based on what they took out of the system rather than what they put in.' Kaldor also mentioned (1955:84) that the expenditure tax would make people delay unnecessary consumption.

The Post-Keynesians have not spent much time on the theories of Kaldor and his proposed framework of demand side analysis of productivity growth and economic growth. The exceptional approach of Kaldor helps Post-Keynesians separate them clearly from the neo-classicals and as well as the other heterodox approaches.

Kaldor's exceptional contribution in the history of economic thought and proposals to policymaking was based on the idea cumulative economic process, hence it carries great importance and employs this framework to key policy concerns. In the consequence of observing the economy as a dynamic method, he worked on many proposals to support the domestic economics on a righteous course of economic growth. The policies suggested by Kaldor were clearly not in the line of neo-classical economic thought, which is basically laissez-faire. Post-Keynesians in today's time could follow his methods and address the key issues present today.

Michael Kalecki is known for his very good empirical research and analysis. Kalecki was a brilliant empirical researcher, he is regarded as one the greatest economists and is placed alongside Keynes by "the Cambridge Journal of Economics." He first moved to Stockholm and later to London, where he met Keynes. It was very quick for Kalecki to get involved in the circle of Keynes in Cambridge, he met some famous economists besides Keynes, namely Joan Robinson and Maurice Dobb. Keynes liked Kalecki from the start, the reason being he managed to secure a scholarship for Kalecki and later in 1939, he got a job at Cambridge which was to look over the industrial cycles in the UK. Soon the Second World War started which led him to work for War finance and post war economic policy at Oxford University.

After working at many positions from labour Office to United Nations, in 1955 he returned to his home in Poland, this was because he wanted to work for the developing economies, address their economic issues and the economic problems of socialism. On his return, his critique was not very well taken, the reason being his theories were blamed to have affected the economy, thus resulting in removal of people working under him from their offices and even some sent into exile.

After the death of Kalecki, Jerzy Osiatynski started collecting his work to publish it. The same was done by Clarendon Press in Oxford in the early 90's. There is a lot of literature available on Kalecki's work, much of it concerned with contrasts with Keynnes' analysis in the General Theory. Even in the 21$^{st}$ century, there is growing interest in the application of Kalecki's analysis of the modern capitalism, that enables all to address other issues than mass employment of Keynes, like inequality, instability and debt difficulties that are a major part of Kalecki's work.

The mass unemployment in Poland and instability led Poland to become a free market from being a communistic economy. Kalecki's policy implications were neglected

when they were proposed, the same Polish economists returned to study his work and held a conference in 1999 to honour his work. The latest volume increases the experience of the 21st century problems which adds to the existing literature available on Kalecki's work, which includes the economic and financial crises experienced in Europe as well as North America.

Marc Lavoie shares his view of Michal Kalecki's importance in the Post-Keynes economics. He points out the central ideas of Kalecki's work on the evolution of economic crises, which concentrates on the income distribution, his profit equations and the shattered confidence in the economy due to recession would eventually add to the increasing interest rate on private debt. Marc Lavoie also clearly mentions that Kalecki's proposal of having liquid assets and that the function of liquidity preference pla`y an important role in the global financial crisis's management. Kalecki had written numerous papers which were based around his understanding of the trade cycle, the centre of operations, how profits are generated, the role played by the banks and other financial institutions, and influence of the market structure on systematic behaviour. Many of them showed up in Brownie print journals, now most of them are renowned journals such as the Economic Journal. These all articles led to establish the core of his book, "Essays in the theory of Economic Fluctuations,1939)."

Toporowski (2013) mentions that Kalecki's outstanding review of "The General Theory, Kalecki (1936)" set a new course for the history of economics in the reviewer's view. Firstly, it was widely read because of the language, later in 1982 it was translated into English. (Thomas Palley, 2021)

His important contribution started with business cycles when he wrote about theoretical studies of prices and business cycle which were later on published as 'Outline of a Theory of the business Cycle' Kalecki, 1933). The idea that investments

drive the business cycles which was stated in the paper caught eye of the few, but later on Keynes published 'The General Theory', so all eyes were focused on his theory. Kalecki was working very actively to publish for the bulletin of the Oxford institute, which was a serious critique of the British government, his writing used to mainly evolve around the rationing, money supply, budgetary policy and inflation. His writings in the bulletin clearly show that his concerns were supported by the empirical and statistical work within a broad theoretical framework. Kalecki has also written many articles on the full employment after the war. In order to capture the innovation, the authors used nine indicators, and constructed development of "Financial Development Index" using elven indicators of financial development. The authors by using the model proposed by Holtz-Eakin et. al., (1988), employed Granger causality test with dynamic panel VECM which enabled them to check causal relationship as well as variance of one variable through other variables under consideration.

Kalecki and Keynes were both the pioneers of what is referred to as post-Keynesian economics. Both Kalecki and Keynes are sometimes linked together for their work and sometimes their theories are also studied together, the discovery of their theories was sometimes simultaneous as well. Both of them made some major important contributions to the economic thinking, although they came from a different background but shared somehow common thinking when it comes to economics, it is visible in their theories.

Marc Lavoie's contribution to economics has been outstanding. The very well known "The Stock-Flow consistent" modelling approach, was the ground-breaking work of Wynne Godley and James Tobin during the 70's. The SFC model had been implemented by many researchers in the macroeconomics, but it was highly

recognized and became more famous when Godley and Lavoie's (2007) publication came. The paper not only demonstrated a general framework which could be used for the analysis of whole economic systems but also the prediction of the model for the global recession of 2007-2008 through identification of macroeconomic models integrating real markets with flow-of-funds analysis.

The first part of the whole model started to SFC approach in 1994, when Godley along with Marc Lavoie completed a long research project which came out as a publication of Monetary Economics.

Lavoie pointed out the similarities between the stock flow consistent approach and the theory of the monetary circuit (TMC). (Lavoie 2004). Some important issues highlighted by Lavoie through his research, were like firstly Lavoie along with Godley pointed out the problem that appeared in an open-economy framework, that the mechanisms had to be identified that set the exchange rate. Godley and Lavoie (2007a) clearly pointed out that wherever the real side of the economy and the financial side come across they are integrated within the stock flow consistent approach. They gave a good example, that any change in the level of portfolio for the agents will incline to alter the exchange rate which would feed back into real economy.

The model demonstrated by Godley and Lavoie had been under the process of development for a long time with improvements coming over the time. Godley had been working on a full stock flow consistent model based on an open economy Godley (1999c) while on the other hand a fixed exchange rate model for Eurozone was proposed by Lavoie (2003). Later on Godley and Lavoie (2007b) demonstrated a three-country model that is based on the eurozone economy, the work done earlier was serving as the basis of what they were trying to actually do.

Lavoie is the leader of research group of Central banks, Crises and Income Distribution. He has taught over 35 years. He has published over 200 articles, mostly in macroeconomics and monetary economy. With Wynne Godley, he has published the famous "Monetary Economics: An Integrated Approach to Money, Income, Production and Wealth" in 2007. He has recently published "Post-Keynesian economics: New Foundations" in the year 2014.

The works related to our model are plenty. In another distinctive study, Batuo, Mlambo and Asongu (2018) studied the linkages between "financial development, financial instability, financial liberalization and economic growth." The authors used a sample spanning over 25 years for 41 African countries. The authors constructed the indexes for both financial instability and financial development for empirical analysis. For analysis the authors chose Dynamic panel regression and system Generalised method of moment.

Hyman Minsky another very important figure in economies, started his career in economics at Chicago in 1941. Next year he spent summer at Harvard, where he worked with Wassily Leontief. He decided to stay there at the end of summer, while at his time at Harvard, Minsky met key Keynesian economist Joseph Schumpeter as well as Alvin Hansen.

Minsky had reservations about Hansen's work, he mentioned his work as "too mechanical." Regarding his work he added that his model is bringing the economy to full employment while only focusing on limited number of variables namely interest rate and government spending, and Minsky stated that the model completely ignores the fact that finance destabilized the economy. Minsky also had reservation about Schumpeter's work, he mentions that in his work he ignores the role of government on reduces the financial volatility and thus the probability of financial crises arises.

Later on after pointing out loopholes in both of their works, Minsky (2000, p.44) he shared his view of both Hansen's and Schumpeter's works as combined. The work showed how human psychology impacts financial decisions and how that can make an economy more fragile (Waltraud Schelkle & Dorothee Bohle, 2021).

Minsky spent his time with Army during World War 2, later on he came back to Harvard to complete his thesis under the supervision of Schumpeter. Schumpeter died in 1950 meaning that now Minsky had to complete his thesis under the supervision of Leontief. After completing his doctorate, he taught at a number of universities like Berkeley and Washington University. He worked as advisor to the Commission on Money and Credit at Berkeley and then at Washington he worked as director of the Mark Twain Bank in St. Louis for almost 20 years. Working at these two positions gave him on-hand experience and knowledge of how the banking and financial system actually operates.

After leaving the Washington University, he became a Scholar at the Levy Economics Institute in 1990. Sachs (1998) mentions that the primary cause of the financial crises during the 90's is the liberalization of financial markets in specific removal of limits on capital transactions, directing towards an increase in the capital inflow exposing to vulnerabilities. It is suggested that the overall liberalization of the external financial markets, local high interest rates attract foreign investors, particularly the ones who are interested in short run investments, which is often called as "hot money", in order to take advantage of the "deregulated and liberalized domestic financial markets" which appreciates the domestic currency, the appreciation in the currency further imbalances the trade balance leading to a further current account deficit for developing countries (Kregel, 1998, p.3).

Minsky's (1982, p.101) provides two important insights of "Stability… is destabilizing". The whole paradox is based on expectations of people which shows the people expect something better at the beginning, but the reality could be something else. Firstly Minsky (1975; 1982, ch. 11) provides his view which is unlike other economists who just follow Keynes on this, the firms are more focused on returning the borrowed money rather than focusing on capital gain because of the uncertain future. In simple words he mentions both for companies and individuals that borrowing takes place if the projected cash inflow is more than the repayment commitment.

Secondly, Minsky's (1982, Ch. 7) insight was related to lending. He was convinced that the bank lending and money creation could not be controlled through reserve ratio tool. Rather it was controlled by the assurance and increase in demand for loans. He also mentioned banks had several ways to attract more deposits e.g., sell their assets (loan or securities). In a few ways he agrees to have central policy implications, but he also states some areas are out of the reach for central bank regulations.

Minsky's contributions were not considered important in economics after his death in 1996. Economists were involved in the efficient market hypothesis and Keynesian policy tools, which led them to imagine that financial crises and panics along with business cycles are just a history now. In 2000's everything changed, that was because of the global financial crises, Minsky's work was given importance and were studied in detail by many. Many authors stated that the financial crises of 2008-2009 was really "a Minsky moment", Cassidy (2008). That is about all his work and his theories had been proved right which he had predicted decades ago.

Minsky's work of linking up business with finance was just incredible which became essential to understand that how forecasts and real-world events interact in our world.

Minsky provided in-depth analysis of how this work his analysis had showed the flaws in the financial system that increases the financial stability. He started with the understanding of Keynes regarding the volatility of investments, Keynes stated that the uncertainty of the cashflows from investments had an immense negative effect on the balance sheet of the companies. The government then steps in order to reduce the risk by using expansionary policies to avert debt deflation. Whereas Minsky added that by doing this, it only gives another way to the business to take out more loans which would also increase the overall investment but would not create a long-term economic equilibrium. The process of government intervention according to him actually leaves the economy more fragile than before.

Minsky had his own thinking right from the start, he did not follow anyone blindly. Like Schumpeter, Minsky thought capitalism as naturally unstable and vulnerable to periodic crises. Like Keynes, he agreed for the government intervention to be essential to avoid panics and crises. Unlike Keynes, he also though that the government intervention could lead to a good economic performance over the long time but on the other hand, the problem is that it would make people think it was their false brilliance that gave them wrong confidence to invest further.

Joan Robinson's contributions are numerous in economics. In 1922 she went to Cambridge to study economics. Later on she started teaching in University. She had put up a fight all throughout her career, she was fully incorporated with membership of the University of Cambridge after a long wait of 18 years. While at her time in Cambridge her numerous participations in knowledgeable debates in variety of field within economics enabled her to get recognised as major character both in the academic and non-academic circles.

At the beginning of career at Cambridge, she had been working with Piero Sraffa, who was lecturing ‘advance theory of value’ which was basically a silent critique on the inconsistencies with the Marshall’s theory as described by Robinson (1951). Richard Kahn was the second person, with whom she closely worked. This was the time of the Keynesian Revolution, the work undergoing at Cambridge was the foundation to many theories. Joan’s first book as her own contribution to the school of though was, ‘The Economics of imperfect Competition’ which was published in the year 1933.

Keynes’ time between his Treatise and The General Theory, detailed ideas were given to him by his colleagues, Joan in special was more interested in simplifying Keynes’s theories which seemed to be very complex, her aim was to attract more audience to the topic in simplified language that could be understood by all and also to expand the Keynesian work into different directions to apply the theory into real world. The General Theory was built up from many pieces such as ‘Essays in the Theory of Employment’ and ‘Introduction to the Theory of Employment.’

Other than the influence of Keynes in 1930’s at the Cambridge, there were other strong influences as well. Especially with an intellectual interest in Marxism, Joan read Marx with some kindness, but gave a strong critique where it needed to be, so she tried to distinguish between, what was ‘accumulation and economic growth’ and ‘mainly the labour theory of money’. While working on this, the notion led her to publish an essay on Marxian Economics in the year 1942 in which she revisited Marx’s theory with her analysis and rejected Marx’s value theory (Tobias J. Klinge, Rodrigo Fernandez & Manuel B. Aalbers, 2021).

In the Joan Robinson’s work from the 1930’s it could be clearly seen that she is interested in developing a long-run theory of output and accumulation in contrast to

the Keynes' short-run analysis. Later on in the 1950 it became the significant part of her research which led her to publish 'The Accumulation of Capital' in 1956 and later on 'Exercises in Economic Analysis' in 1960, along with another addition of 'Essays in the Theory of Economic Growth' in 1962.

In this particular area, Joan Robinson's contribution is considered as an analytical approach. Joan's analysis started from the golden ages working through the time, the model used by Joan contains Keynesian, Kaleckian, Marxian and the classical ideas.

Joan Robinson believed that it is possible to separate the scientific and ideological analysis which was clearly seen in her book 'Economic Philosophy'. Joan applied the conditions in two separate ways. Firstly, through the finding of the past economic theories she tried to discriminate, reading Schumpeter, the elements of fact and logic from the elements that she saw as 'metaphysical'. The second condition was to criticise the approach used in orthodox economics of getting consensus rather than developing scientific propositions.

Joan's numerous writings during post-war - were based on the development issues, which not only concerned China but overall economies as well. Joan Robinson wanted to appreciate the Chinese idea of development, the idea behind that was to show the development of planned economy affecting both the rural and urban areas of the country. She was monitoring and translating very complex events to support the Chinese policies which were thought to be very unsympathetic critiques. The last book published by her in 1978 was 'Aspects of development and Underdevelopment' in which she demonstrated the development path taken by both non-socialist developing countries and socialist countries.

Joan in her career had faced a lot of criticism due to damaging criticism on Marx and Sraffa which though it came out as the ideological tide supported by the economic

theory whose implication could be seen as to support the status quo. Joan had been presenting throughout her career challenging theories which she thought had loopholes, but all her critique was backed by a proper analysis. Financial liberalization which is considered as relaxation in the rules and regulation related to financial markets and institutions, started in early 1990s which resulted into emergence of more market-based system than the government controlling everything. Central banks were made more independent to provide benefit to the financial players and the economy.

Joann Robinson's diverse interests had been divided in many directions. During 1930 and 1983, she was very active writer, she had published number of books, articles in renowned journals, as well as short papers in newspapers and many reviews. Joan and other post-war economists at the Cambridge had severe reservations of what the economics had become at that time, she thought economics at that time as a knowledge which can solve the real-world problems. Joan had travelled many times to India and China which led her to think that economic theory becomes incompetent when applied to solve the problem of underdevelopment.

Sidney Weintraub's research interest were wide, covering the theoretical and applied economics and public policy which also included economic problems faced by developing countries. At the beginning Sidney was a mainstream economist, the reason behind his transition to post Keynesian economist was his starting work on microeconomics regarding the price theory.

After his war service he had published the book 'Price Theory' in August 1949, at the same time he was teaching at the St. John's University, he was teaching many courses at the university. To be precise, he taught a course called "Economics Analysis, Part 1 and 2". It seems that in the part 2 he was teaching "Income and Employment

Analysis", he later on published a book in 1951 with the same title. It appears he was working on that book since many years and if it was today, we would name the book as intermediate macroeconomics. The book is a proof that before people knew him, he was involved with macro and followed Keynesian. The change in Sidney from micro to macro was due to the influence of his time at London School of Economics that is during 1938-1939 where his mentor was Nicholas Kaldor.

Sidney's interest concerned both micro and macro, not just one which can be seen in the theories of the distribution of income, which came out in his book "An Approach to the Theory of Income Distribution" which came out in the year 1958. While he was writing this book, he faced a lot of criticism from the mainstream economists, he also felt as ignored by the same. This did not stop him when he published an updated version with an addition of aggregate supply/aggregate supply framework, his contribution with this addition was similar to what Keynes had in "The General Theory".

His first two books were published with Pitman and Sons, but with no longer publishing in economics from them, he was in the hunt for a new publisher for "Approach to the Theory of income Distribution' volume. His understanding was that besides mainstream Keynesian, there are American Keynesian, Sidney thought his writing at the macro level with this edition would undermine their understanding, the reason being no one would publish his book. He later on convinced an automobile publisher to publish economics, which the company did, and his book came out as published.

In the 1950's inflation was on the rise in the United States, in the year 1959 Sidney had written "A General theory of the Price Level, Output, Income Distribution and Economic Growth" as a problem solver for the inflation.

Sidney one day started moving around the income/expenditure identity and came up with a formula which shows 'the rate of change of the price level to the rate of change of money wages minus the rate of change of the average productivity of labour." This was Sidney's major contribution and finding, the book finally came out in the year 1959, the timing of the book was hence perfect that is the time of high inflation and unemployment. With the publishing of the book, he became the expert of the money wage. The book named "A General Theory of the Price Level", which he disclosed that he had only written in 4 days and it came out just in 10 days later with an addition of 'k'. Rodrik and Subramanian (2009) present their critiques of the financial globalization which are based on the investment constraint in contrast to saving constraint. They mention that "developing countries are investment constrained not because of a fundamental demand constraint on growth, but because there is some institutional weakness or because there are large learning externalities in investment." Weintraub revelations in the latest book had provoked many practitioners who refused to accept Weintraub's K could be proven to be more effective than it was expected. That did not stop him, he knew one day the whole world would widely recognise it, the reason he went to formulate the set of policy propositions, firstly the "watchtower" approach to inflation control and then his "Tax-based Incomes Policy." It was Weintraub who introduced his view of the "tax-based income policies" (TIP) which was intended to control the inflation without pushing the economy into recession. Weintraub's argument led the monetarist policies to keep a strict restraint on the money supply to fight inflation. Weintraub clearly presented the argument that a tax-based incomes policy could reduce inflation by an increase in the money wages along with the gain in the productivity. The idea he shared was that a big portion of production cost is in the form of salaries and wages which would thus keep it stable.

Further the argument, enables the Government to keep the wages low which can be done through the usage of tax system. Weintraub believed that the theory presented by him would enable the industry have a strong incentive to stand against the demand for increase in the wages, stabilize the prices and with this the economy would see growth and the government won't see the decline in revenues.

Weintraub to date is very well known for the interpretation of the theories of John Keynes. His famous "Price Theory", and then the "An Approach to the Theory of Income Distribution", another important book among many others was, "Keynes, Keynesian and Monetarists."

In order to capture the innovation, the authors used nine indicators, and constructed development of "Financial Development Index" using elven indicators of financial development. The authors by using the model proposed by Holtz-Eakin et. al., (1988), employed Granger causality test with dynamic panel VECM which enabled them to check causal relationship as well as variance of one variable through other variables under consideration. Malcolm Sawyer is the most recent well-known contributor in the Post-Keynesian era, who has contributed with considerable amount in both microeconomics and macroeconomics which also includes a large portion concerning the economic policy. Malcolm initially studied Mathematics at university of Oxford, from 1933 to 1966, the reason being his strong empirical skills. Later on he graduated from LSE in Economics with Distinction. Malcolm had strong academic record with a degree in Mathematics and Economics, making him a very competitive economist. Later on he became a lecturer at the University of London and served until 1977. He had also worked as an administrator at the OECD from 1974-1975 in Paris. He had made several contributions while working as a consultant to the Organisation for Economic Co-operation and Development on expenditure and income maintenance.

During 1977-1978 he had also work as a consultant for the “European Economic Community” on industrial matters.

Malcolm had gained a lot of on-hand experience dealing with analysis and policy making during his time of working for different organisations and projects. In 1978 Malcom came to University of York as a Reader, six years later he was promoted to Professor of Economics. In the year 1991 Malcom chose to work for University of Leeds as Professor of Economics. He headed the Economics Division twice at the University of Leeds, he had served on number of top positions at University of Leeds, which shows his immense ability as a researcher, economist, tutor and administrator. He had also been a member of the Royal Economics Society from 1998 to 2002.

Malcolm’s academic contributions are numerous, from being in the journals referee, he was the Managing Editor of the “International Review of Applied Economics”, he held this position since 1986, and his efforts are countless to bring this journal as one of the top-ranking journals. This journal has been around for a very long time when compared with other journals, but it is considered one of the top journals for being an open-mined economic journal. It is worth mentioning that he is on the editorial board of the “Journal of Post Keynesian Economics” since 1998 (Juneyoung Lee & Keun Lee, 2021).

Malcolm has taught various courses at undergraduate, post graduate and has also supervised PhD students. He has worked as an external assessor for many universities across Europe. Malcolm’s research accomplishments have been very ironic. His whole academic life is, as he always put emphasis on the “open-minded” approach to economics. The basic thinking behind this idea is to focus on specific paradigm which would be Post-Keynesian/Kaleckian for Malcom, on the other hand he did not ignore other paradigms. At the beginning his work was mainly based on industrial

economics, he made several contributions through several textbooks related to "Theories of the Firm" and "Economics of Industries and Firms."

Later on, Malcolm chose to take a different approach by taking industrial economics in the creation of approaches to macroeconomics leading through microeconomics where the imperfect competition theory is a major factor of the microeconomics of macroeconomics. It has changed into a more usual consideration of the political economy of market socialism which can lead to creation of different economic organisations where distributional features are paramount. This approach has been more closely followed based on the Keynesian "Price-Theory". Besides this even as of today Malcolm has been an active contributor to "The Economics of Michal Kalecki." Recently Malcolm started focusing on specifically Kaleckian analysis of money and inflation, which led him to development of his ideas on the "role of endogenous money in an industrialised economy".

A very thorough criticism on the basic idea that "money is exogenously determined by the decisions of the central bank" is a major contribution as he developed the arguments with a more pragmatic method that "treats money as an endogenous variable determined essentially by the liquidity preference of banking sector." Monetary policy has been another area where Malcolm had made contributions from time to time now known as "New Consensus Macroeconomics". Malcom has made numerous contributions to what is called a "third-way approach to economic policy" where he had developed his analysis led him to critique, the approach highlighted him with the new labour government policies.

Malcolm's research shows a lot of work done for the EU especially, the common currency issue, he had devoted much of his research towards the alternative of what has later on became Euro. He had worked a lot towards the alternative policy

framework that has been seen to be very useful regarding the Euro. Malcom is the author of 12 books and has edited over 25 economics' books, also he is the lead coordinator of Financialization, Economy, Society and Sustainable Development (FESSUD). It has been his initiative to organize ideas that could lead others to explore new areas within economics.

## 2.4 Financialization in developing and emerging economics: key Empirical Facts

There are number of themes that have been used by various authors in this context for example: micro level (firm-based studies) and macro level. In this section we will only be focusing on the studies being carried out at macro level. For a deep insight for studies at micro level see Detailed analysis of Firat Demir (Demir 2007, 2009a, 2009b) and Farhi and Borghi (2009). At the macro level the short-run investments with high return being easily availability and in addition to that the pressure from the financial players in the economy has resulted in many emerging markets. This has limited the number investments to be productive, which can be seen clearly in the reduction of it in the GDP (Kalinowski and Cho 2009; Bruno and Pimentel 2012 and Tan 2013). Araujo Bruno and Pimentel (2012) mention that Brazil not only saw decline in the Investment from the 1980's but as a result the overall GDP saw a fall by nearly 50 percent due to poor allocation of human resources. Correa et. al., (2012) stated that Mexico saw a constant decrease in the level of wages as a result of that majority of the labour now works for informal sector. In addition to the investment problem in the real sector, decline in the manufacturing has triggered the income inequality, the wealthier people in the economy are still growing their financial returns besides the decrease in the level of wages. Whereas in South Korea from the 1990's most of the workers are only offered contractual jobs lasting no longer than 12 months (Kalinowski and Cho 2009). Financial liberalization which is considered as relaxation in the rules and regulation related to financial markets and institutions, started in early 1990s which resulted into emergence of more market-based system than the government controlling everything. Central banks were made more independent to provide benefit to the financial players and the economy.

One of the most important problems associated with financialization was the extensive amounts of loans given to housing sector over the last few decades, which was the reason behind the global financial crises of 2007-2009. The bankers changed their business strategy by allocating a greater number of loans towards household in such amounts that quality of loans was neglected. Numerous studies have been devoted towards this specific area see Chang (2010) and Cho (2010) for South Korea, Rethel (2010), Gabor (2010) for Eastern Europe and Becker et. al., (2010) for Slovakia. There are many other, they all came out following the global financial crises. All these studies provide evidence that household credit was skyrocketing before the global crises, numerous studies across the globe show, it was not only the problem of developed countries but also the emerging economies and developing countries (Mehmet Akif Destek & Muge Manga, 2021).

Another important business strategy adopted by banks was to enter foreign countries, which enabled them to promote a healthy competition and save the domestic markets from the local giants. There are number of studies that point out the important role played by the foreign banks (Lapavisas and dos Santos 2008) for Brazil, Mexico and the Philippines, (Cetkovic 2011) for Eastern Europe and Erguunrs (2009) for Turkey. From these studies, dos Santos highlights the fact that evidence suggests that foreign banks are enabling the financialization practices that are healthy for the economy, as they have other way to obtain higher profits other than the lending for example trading. At the same time the foreign banks are known for increasing the financial instability in the domestic economy when they pump the foreign money into local borrowing to take profits home, Cho (2010) mentions South Korea was at the front of foreign banks' lending money before the crises which was destabilizing the financial system.

Housing markets have developed a lot because of the credit allocated to the specific sector, but this has not only been case of the developed countries but all over the world. The more money into housing market has also risen the household debt around the globe as for the case of South Africa, the prices of the property increased by more than 300 percent in between 1997 and 2008 (Ashman, Fine and Newman 2011). In 2003 the increased lending through credit card up surged which created a bubble along with the increased lending in mortgages which led to the increase in the prices of houses. (Cho, 2010).

Among all other factors associated with financialization, Microfinance saw a rise through financialization by involving in the global capital markets. Aitken (2010: 230) mentions that "microfinance has become a site of financialization that is an object transformed into an investable asset capable of generating financial profits for investors." With this the authors point out the "Microfinance Investment Funds" which made it possible for others to invest in institutions directly providing micro credit. These funds rose because of the reason that they have very low correlation with other assets (Aitken, 2010). Financialization through commodities has also affected the developing countries indirectly. During 2002-2008 commodity prices have seen to be creating a track for a boom and bust cycles (Akyuz, 2012).

Evidence does suggest that the investors initiated the instability when they tried to include commodities' futures in their portfolio to decrease the risk and diversify in their portfolio, such instability was result of their inclusion in the portfolio (Tang, and Xiong, 2010).

## 2.5 Critiques of Financial Globalisation and Liberalisation

If we consider the mainstream literature, it has put an emphasis on analysis of the markets especially the emerging markets and their currencies and financial crises following the events in the late 1990's. These crises are the ones which involve the boom-and-bust cycles, destroying the balance sheets of the companies, these developments led to show the importance of Hyman Minsky's (1982) "Financial Instability Hypothesis (FIH)" framework that can be used for analysis. Minsky claimed there was missing a part in the Keynes, "The General Theory" which needed an update as a capitalist finance within a cyclical and speculative context. His idea was simple that once the capitalist finance is initiated and the development of cash flows is examined in the different cycles of the economy then the full influence of the revolutionary insights and the alternative frame of analysis that Keynes developed becomes evident (Minsky, 1975a:129). From the time the book was published, it has changed the way of looking at the economics by looking at financial relations.

Since his "Financial Instability Hypothesis" came out it has been widely used in the context of emerging markets (Dymski 1999; Arestis and Glickman 2002; Schroeder 2002; Cruz, Amann, and Walters 2006; Frenkel and Rapetti 2009). These papers demonstrate a similar framework, in which capital flows are an additional element of financial instability. To explain the whole process, it starts with a financial liberalization policy reform, which initiates a step towards boom thus having an effect increasing interest rates which can make domestic return appealing for investors. Since the capital account is liberalized, the high interest spread motivates local and foreign investors to get the funding in foreign currency to invest in local currency assets. With the increase in capital flow growth, liquidity in financial markets has become very high which leads to increase in the prices of assets leading to more

capital inflows as it is seen in a profiting manner. The same capital flows lead to increase in the real exchange rate, which helps improve the country's current account situation. At the same time the boom starts to destabilize the balance sheets for many companies across the economy. The awareness motivates the investors to start to speculate overvaluation of the economy which is when investors across the economy somehow start to limit the exposure by limiting their investment. The further decrease in the level of investment leads to an economic slowdown of the boom, which further destabilizes the balance sheet of many companies. The economy at this point is really fragile and a small event such as failure of one financial institution would push the economy and the whole system to the edge of the financial crises and capital flows stop and return negatively. There is financial crash as the currency depreciates which causes a major problem for foreign investors as well as the whole economy. Palma (1998) mentions that "over-lending" and "over-borrowing" may be strengthened by distortions in incentives and regulations, "but they are essentially endogenous components of a free economy."

The critique of how the development of financial liberalization policies through the basics of finance-growth nexus could lead to many forms of informational problems. This was discussed by Nissanke and Stein (2003). They then compare their view with the great economists, Keynes, Minsky and Schumpeter, their theories have stated that "the central component of capitalist accumulation creates the potential for instability, since the uncertainty is pervasive and generates systematic risks, as opposed to the idiosyncratic risks created by moral hazard." Instead of reforming the whole financial system to make it strong, the countries choose to just resolve the underlying condition for a short period of time which might solve the problem at hand but not for very long.

Rodrik and Subramanian (2009) present their critiques of the financial globalization which are based on the investment constraint in contrast to saving constraint. They mention that "developing countries are investment constrained not because of a fundamental demand constraint on growth, but because there is some institutional weakness or because there are large learning externalities in investment."

Borio and Disyatat (2011) critique the basic, excess saving observation of global imbalances. They develop argument suggesting that this view confuses saving with financing which is basically a cash flow of funds from an external source whereas saving is a source of internal funding. They point out towards the open economy, and again mention about a confusion between net and gross flows that is created where "the net flows are simply the financial counterpart of trade and income factors, while gross flows are all the flows of funds moving across borders". Blbow (2010) presents a similar argument of global imbalances: "Simply put, in the context of monetary production economies the supposed excess saving can only arise together with the corresponding excess as spending being done by someone else, somewhere."

## 2.6 Boom, bust and financial crises

The demand of the credit is the starting point to initiate a step towards boom, but it is not the demand that triggers boom, it is the supply side of credit that responds to the demand of the credit, it is not the demand that adds to the fragility of the financial system but when it's responded by increase in credit supply. Empirical evidence from numerous studies confirms that the increased consumption of households is clearly linked with increased indebtedness of United States' households (Pollin 1988,1990; Bowles and Park 2005; Krueger and Perri 2006;). For a detail overview of the results see van Treeck (2012).

The supply of the credit responding to the demand of the credit adds fragility to the financial system which could lead to a crisis, this type of crises has often been labelled as “Minsky moment” (Financial Times, 2007; The Economist, 2009). The liberalization of the financial markets along with the increased financial innovations e.g., mortgage-backed securities, give bankers an opportunity to supply people loans which are unaffordable to them, this scenario is the same as Minsky’s work. Minsky labelled this scenario as normal which is a step towards instability after period of stability. (Constantinos Alexiou, Abdulkadir Mohamed & Joe Nellis, 2021)

The risk-taking increases with the time when the financial system is stable as players in the system decrease the safety margins, as they belief that they might be too wide to make good money Minsky (1986, p.220). At the same time players in the financial markets try to bypass the regulations by making new products with a slight change which does not fall under the prior regulation in order to explore more profits. As mentioned by Minsky (1986, p.250), the players in the financial system always find a way to overcome the regulations, while doing so they make money but destabilize the economy, the ones affect most are the one’s hit by unemployment and inflation.

After the world has seen many global financial crises, developing countries moving towards the financial liberalization was criticized heavily. Stiglitz (1998) reasons the criticism with the following statement, “Macroeconomic stability and long-term development require sound financial markets, but the agenda for creating sound financial markets should not confuse means with end; redesigning the regulatory system, not financial liberalization, should be the issue.”

Given that the theoretical foundations of financial liberalization are weak including the assumptions, Arestis and Demetriades (1999) stated that they labelled the assumptions to be far from the reality e.g., “perfect information”. The author further

stated that the modern-day financial liberalization should have some basics of banking supervision and macroeconomic stability, but liberalization might still lead towards a more fragile financial system.

The primary cause of the financial crises during the 90's is the liberalization of financial markets in specific removal of limits on capital transactions, directing towards an increase in the capital inflow exposing to vulnerabilities (Sachs, 1998). It is suggested that the overall liberalization of the external financial markets, local high interest rates attract foreign investors, particularly the ones who are interested in short run investments, which is often called as "hot money", in order to take advantage of the "deregulated and liberalized domestic financial markets" which appreciates the domestic currency, the appreciation in the currency further imbalances the trade balance leading to a further current account deficit for developing countries (Kregel, 1998, p.3).

In regard to the external financial liberalization, Arestis and Demetriades (1999) state the following: "liberalization makes capital flows, especially portfolio flows, very volatile, which can have destabilizing effects. Still worse, these effects are not confined to the domestic economy, but may spread to the other economies through contagion, as recent South East Asian crises has vividly demonstrated." (Arestis and Demetriades, 1999, p.449).

Gibson and Tsakalotos (1994) stated that there is evidence that financial liberalization does not guarantee the increased level of investment with the economy for the developing countries. Rather it can create more credit availability which leads to debt-led consumption in the economy but cannot affect the industry. The core of development restructure and investment in new sectors of the economy, is where liberalization is being criticized for not being able to do so for the development.

Arestis and Demetriades (1999) mention that in the last few decades, many of the countries have liberalized their financial system which includes both developing and developed countries. Starting from removal of interest rate ceilings with little or no government involvement in credit allocation process. Many countries which went through liberalization process, their experience was catastrophic e.g., interest rate exceeded 20 percent (Sebastian Kohl, 2021).

## 2.7 Summary of Chapter

This chapter highlighted the main theories, and developments in the post Keynesian economics. The major objective was to give a brief overview in the context of financialization and to be more precise the implementations of financialization in real world throughout the time. The chapter explained how the theories have evolved over the time starting with "The General Theory" of Keynes. Major developments are highlighted in the post-Keynes Era of Financialization. The role played by other factors in the development of financialization such as financial technology is mentioned.

Another important factor discussed in the financialization context is financialization and macroeconomic instability where study clearly states debt-led growth is very harmful for the economy, it is a bubble created through debt to lead growth which would bust at any time thus is has negative macroeconomic effects.

Minsky's financial instability hypothesis is also discussed in detail which provides ground to many research studies in this area of financialization. The part of the thesis then focused on the history of finance from capitalism to financialization, the part clearly outlined the fact that whenever the finance grows it is followed by increase in the rents which then lead to financial instability.

It was very important to list the major developments and contributions made after Keynes in the specific area, the post-Keynesian economists mentioned in this chapter, had immense expertise and knowledge in the area. From Victoria Chick's contribution with "The Theory of Monetary Policy" to Sidney Weintraub's "Price Theory", all of the economists had made some important contributions, their work contribution and background is stated in the chapter.

Further key empirical facts are highlighted for financialization in regard to developing countries and emerging economies, the part of the chapter focuses more on macro level than micro level, this is with a view to provide insight about more country-based studies. Here the chapter clearly stated that issues related to financialization are equally important for developing countries as they are for developed nations or even worse, as the developing nations will set back in the process of development if an crisis arises. As financial globalization and liberalization are held responsible for financial crises, this part of the chapter outlines the developments in financialization that make the financial system more instable.

# Chapter 3: Review of the Literature

## 3.1. Introduction

Financialization is a very wide phenomenon, which includes the increasing role of the financial sector as compared to the overall growth of economy. Financialization includes the increasing roles of stock market, credit rating agencies, financial institutions and financial motives. These roles played by each actor in the process of financialization then have adequate effect on the domestic operation of an economy as well as international (Bist, 2018)

This chapter examines the literature on the financialization to check the impact of financialization and financial development on economic growth along with the role of financial liberalization and how financial development affects technology innovation.

The chapter starts with the literature on how the studies have been conducted, which includes the data and variables used by different studies, along with estimation techniques used by different authors for analysis. Moving forward the chapter provides a summary of chronological account of the three chapters one by one.

During the last four decades the economics around the world has undergone a deep transformation. The new change highlights a few important factors, firstly the role of markets has increased, and the roles of governments have decreased the case was very different a few decades ago. Secondly, due to globalization the financial transactions between the economics have increased dramatically. As of 2019 the Bank for International Settlements reported that the trading in the global foreign-exchange market for April 2016 was reported $5.1 trillion (average daily) has now increased to $6.6 trillion (average daily) which is by far the highest in the history. The same account reported by BIS in 1998 was 1.5 trillion (average daily), 3.9 trillion (average daily) in 2010. Therefore, the effect has increasing pattern since the 1980s when

economics around the world went through structural changes, which led to significant increases in financial transactions and the profitability of banks, clearly reflects the financialization effect on the real economies.

Many researchers and professionals argue that it was financial development that led to the financial crises 2007-2009, at the same time it is argued that in the modern world financial development is hence essential for the economic development. Financial liberalization which is considered as relaxation in the rules and regulation related to financial markets and institutions, started in early 1990s which resulted into emergence of more market-based system than the government controlling everything. Central banks were made more independent to provide benefit to the financial players and the economy (Bui and Bui, 2020)

Interest rates in the 1990s were freeing and the central banks reduced the reserve requirement which resulted in greater scope of profits in the financial sector, thus attracting all players in the financial sector than ever before. Slowly at the same time state-owned banks were privatized, which increased the competition among the banks, leading to opening of new domestic banks and foreign banks to start operating abroad. With the relaxation in the rules, in the 1990s banks' deposits contributed to GDP for most of advance countries unlike the 1980s.

More than a decade after the financial crises of 2007-2009, financial development was considered essential for an economy to grow. That is the reason financial sector had gone a complete transformation in the past, along it brings the negative externalities which is the reason why policy makers are keen to support financial development but in a way that does not lead the economy towards a financial crisis, as seen in the financial crises of 2007-2009 failure of a single bank could trigger a financial crisis.

## 3.2 Chronological Review of Empirical Perspectives

### 3.2.1 Data and Variables

In terms of investigating the impact of financial development on innovation led growth, Zhu, Asimakopulos and Kim (2020) used a sample of 50 countries. The data sample spanned over 26 years taken from 1990 to 2016. The authors before going into analysis admit that the work of Schumpeter (1934) and a few other studies clearly state that the innovation is healthier for the growth, but this study focuses on the role financial development. In order to measure the innovation level, the authors chose variables like patents, R&D expenditure, population and schooling. Major variables representing financial developed used in the study were private credit, liquidity, banking credit and domestic credit. For the empirical analysis the authors employed Linear system GMM and dynamic panel threshold. While employing the two-step system GMM, patent application was taken as the dependent variable. The estimation results showed that countries having high level on financial development tend to lower the innovation activities, the authors further added that it can be seen that the finance affect mentioned above on innovation can be further seen transmitted to growth. An important finding was that innovation had positive effect on growth that tends to vanish when the private credit exceeds the level of 60% of Gross Domestic Product.

A recent study by Roy and Kemme (2020) discussed the determinants of the financial crises over a long period of time but they specifically analysed the financial crises of 2007-2008. The authors collected the sample data on annual basis stretching from 1953 up till 2006. The study mainly focuses on finding the factors that led to financial crises. Using the vector error correction method, the authors found three time periods that contributed towards the financial crises of 2007-2008, the first time period

between 1980 and 1988 which contributed through the financial liberalization across many countries especially United States, second time from 1989 up till 1997 that contributed through the capital inflows associated with rising houses prices which collapsed after the European exchange rate mechanism. The last addition that triggered the recent financial crises as mentioned by the study was the Asian financial crises of 1997, it played its part by sharply increasing the asset prices.

Study based on emerging markets, Bui and Bui (2020) enquire the threshold effect of economic openness on banks risk-taking. The authors had selected a number of 42 developing and emerging economies. The data stretched over 14 years from the year 2000 to 2014. In order to investigate the relationship, the authors chose Trade openness as to measure trade, 5 financial development indicators and GDP growth. The study used linear regression model for analysis. The authors suggested that the results from the linear regression economic openness promote bank's good behaviour and hence proves less involvement of bank in risky activities.

China started to properly liberalize its financial system in 1993, and in a recent study based on Chinese banks by Wang and Luo (2019) investigated the direct impact of financial liberalization on the bank's risk-taking activities. The study spanned over 14 years from 2000 to 2014 and included 169 Chinese banks for empirical analysis. The study used Financial liberalization Index which was proposed by Quinn (1997) to assess the level of liberalization in China and bank Z-Score was used to measure the risk taking of banks along with other variables. The results of the study suggested that after the financial liberalization, the stability of banks increases. The authors also highlighted the fact that financial liberalization is more beneficial for larger banks along with banks that are state-owned and are older.

In the work of Asteriou and Spanos (2019) they revisit the relationship of financial development and economic growth in the light of global financial crises of 2007-2008. The study based on 26 European countries included the data sample for 26 years from 1990 to 2016. The author used the following variables in order to investigate the relationship: annual growth rate of the GDP, ratio of liquid liabilities to GDP, ratio of commercial bank assets to the sum of commercial banks plus central bank assets, stock market capitalisation to GDP, stock market turnover ratio, inflation and trade openness. Using the fixed effect model, the author stated that the results confirm that without the crises period in the sampled banks, financial development spurred economic growth. On the other hand, the result was completely opposite, that if the crises period is included then the financial development affects economic growth negatively.

Schnabel and Seckinger (2019) studied the role of foreign bank on economic growth in the context of financial crises. The data sampled spanned over 12 years from 2000 to 2012. A few countries among European Union were dropped from the sample due to the lack of the data so the total number of countries included in the sample were twenty-four. The main criteria for assessment used in the paper was entitled "Domestic bank assets/GDP" in contrast to "Foreign bank assets/GDP." The percentage change over the years for each country was used to assess the impact on economic growth. In order to investigate the relationship, the authors employed the approach of Rajan and Zingales (1998) in the context of banking sector integration, they also examined the difference between industry production growth rates depending on the presence of the foreign bank in the EU. The results suggested that all the countries included in the sample tend to have been positively affected by the presence of foreign bank with respect to industrial growth levels, the authors also

stated that during the analysis they found out the growth impact was stronger in crises time than the non-crises time.

The authors Wang, Chen and Xiong (2019) investigated the relationship between asset bubbles, banking stability and economic growth. The authors used a number of 26 countries, the data was collected from 2000 up till 2014, and was obtained from "Global Financial Development Database." The major indicators used in the study were as follows: real GDP per capita, Banking Z-score and Stock Volatility. The study used panel vector autoregression (PVAR) with the modification of Bayesian model averaging suggested by Koop and Korobilis (2016) to overcome the issue of over parameterization. The technique used in the paper has been widely used by other authors Dees (2007) to investigate the spill over of financial shocks. The results of the study made some important revelations, that the leverage ratio, credit spread and supervisory intensity, all three of them contributed towards the banking stability in the case of selected countries. Further the authors found the evidence that the instability of the banking sector works against the economic growth.

Ketteni and Kottaridi (2019) investigate the effect of credit market deregulation on economic growth. The authors chose to have an extensive study in this area by including 66 countries, the dataset included material from pre-crises 2000 and ended 2013 after-crises. The data obtained in study was taken from "World Development Indicators." The study has used the following variables in the study, Real GDP per capita, GDP per capita growth, gross fixed capital formation as percentage of GDP and lastly population growth. Using an advance econometric technique for analysis, the authors employed marginal integration to a Partially Additive Linear Model, the authors claimed that no study had used the same method in the same context before. The finding of the study is hence interesting as well, the study found the relationship

between credit market deregulation with growth to be U-shaped, increasing deregulation, adding to the growth till a certain point before it starts affecting it negatively. The authors also added that liberalization affected differently in case of developing and developed economies and from emerging economies due to the underlying condition of these economies.

Similarly, Batuo, Mlambo and Asongu (2018) investigated the linkages between the financial development, financial instability, financial liberalization and economic growth. The study is based on Africa with 41 countries included in the sample. Using annual data spanning over 25 years from 1985 to 2010. The authors used financial instability index in order to account for the proxy of financial instability, the study followed the approach of Klomp and Haan (2009) which had applied the factoring analysis on various financial stability indicators. For the financial liberalization index the authors followed the index constructed by Chinn and Ito (2002) and later in Chinn and Ito (2008) the authors provided an updated version of the financial liberalization index. The main model proposed by the authors aimed to check the impact of economic growth on financial instability while taking into consideration financial development and financial liberalization. The authors employed system GMM proposed by Blundell and Bond (1998) to overcome the issues of endogeneity. The findings of the paper suggested that financial development along with financial liberalization does affect the financial instability positively. On the other hand, financial instability is reduced with the increase in the level of economic growth. The authors also stated the role played by economic growth in reducing financial stability is greater before liberalization than after.

The work of Pradhan et. al., (2018) is quite different from other studies in the similar area. He studied the dynamics between the innovation, financial markets, venture

capital and economic growth. The study was based on 23 European countries. The selected sample for the study was taken from years 1989 to 2015 using time series data. The authors used real per capita economic growth in order to capture venture capital. The study used three stages of venture capital (early, late and total venture investments). In order to capture the innovation, the authors used nine indicators, and constructed development of "Financial Development Index" using elven indicators of financial development. The authors by using the model proposed by Holtz-Eakin et. al., (1988), employed Granger causality test with dynamic panel VECM which enabled them to check causal relationship as well as variance of one variable through other variables under consideration. The results from the study clearly indicated that venture capital investment (at all stages), innovation along with financial development do affect the long run per capita economic growth in the case of selected 23 European countries.

Akin to our model, Liu and Zhang (2018) investigated the role of financial structure in economic growth. The study was based on 29 provinces of China. The data sample spanned over the years from 1996 to 2013. The authors had used "the ratio of the total stock market capitalization to bank lending" in order to measure financial structure. This helped determine if the structure is market-based or bank-based, where a higher value indicated a market-based system. Further for the empirical analysis; the study used financial development indicators and economic indicators. The authors used Arellano-Bond difference GMM estimator developed by Arellano and Bond (1991). In order to compare the results ordinary least square is also employed in the study. To enhance the scope of estimation the authors employed, "correlated random effect model" with panel quantile estimation developed by Abrevaya and Dahl (2008) in order to examine the evolving effects and structural changes in the model being

used. Through the detail analysis the authors stated that with the increase in importance of number of markets in contrast to the banks in the financial market, the competition is increasing growth in the Chinese economy.

The works related to our model are plenty. In another distinctive study, Batuo, Mlambo and Asongu (2018) studied the linkages between "financial development, financial instability, financial liberalization and economic growth." The authors used a sample spanning over 25 years for 41 African countries. The authors constructed the indexes for both financial instability and financial development for empirical analysis. For analysis the authors chose Dynamic panel regression and system Generalised method of moment. The results of the study clearly indicated positive effects of the financial development and financial liberalization on financial instability in the case of selected 41 African countries. Another important finding stated by the authors is that the economic growth tends to reduce the financial instability, also the magnitude of the effect tends to be higher before the liberalization than after the liberalization.

The variables of our model have been somehow or the other have been covered amply. The work of Rousseau and Watchtel (2017) for example examined the role of financial deepening that either it spurs growth or causes a financial crisis through credit boom. The study took 17 countries for analysis for which the data stretched over 59 years from 1870 to 1929. The method used in the model was first developed by Barro (1991) which enabled the study to carry out cross country growth regression with some modification in the method of King and Levine (1993). The authors found out through empirical analysis that if the financial deepening is not excessive it would add to growth rather than leading towards the financial crises.

Similarly, Luintel et. al., (2016) studied the relationship between financial development, structure and growth. The study covered 69 countries for the empirical

analysis. They used the data from years 1989 through 2011 in a Bayesian framework. The authors employed novel dataset of Čihák et al (2013). The study included number of variables representing financial development along with GDP, gross fixed capital formation and purchasing power parity. The study used the co-integration test developed by Pedroni (1999) in order to check for the cointegration. The test confirmed that all the included empirical specifications are co-integrated. Then the authors used the Dynamic Ordinary Least Square (DOLS) with the Bayesian model which enabled the model for multiple breaks at different points of times. As the study was divided into three groups, the results showed that the low-income countries are not affected by the financial structure or financial development, but just general finance affects the growth positively. As for the two other groups, the model pointed out to one clear breakthrough in 2008, that because of the financial crises 2007-2008, it was clearly evident in the high-income countries that the integration of financial system with economic growth was possible.

Sehrawat and Giri (2016) investigated the role of financial development in economic growth within different Indian states. The study used annual time series data, starting from the year 1993 up till 2012. In order to investigate the relationship, the authors used two indicators to measure financial development like ratio of credit amount as a share of the state's output within the state, and ratio of deposit amount as a share of the state's output (gross state domestic product) within the state. In order to investigate the long-term relationship, the authors used Pedroni's panel co-integration test along with fully modified ordinary least square (FMOLS) to check for coefficients of cointegration. Further Granger causality test was also used to check for both short and long run relationships.

The work of Hyun Pyun and Jiyoun An (2016) examined the role played by financial integration in the spread of global financial crises. The study spanned over several years starting from 2001 and ending at 2013, based on the sample of 58 countries. In order to capture the economic spill over in the period of global financial crises, the authors compared the real economic growth of the U.S., being the hub of crises with other countries. The study examined business co-movement between the U.S and 57 other economies. Using the country pair panel data, the study followed the work of Davis (2014) on business cycle co-movements. The study employed simultaneous equation model along with three -stage least square (3SLS) for empirical analysis. The results confirmed that the integration of the equity markets had transmitted the negative shocks from United States to other countries during the financial crises of 2007-2008. The study also found out that the business cycle co-movement during the financial crises of 2007-2008, were stronger between the U.S and the rest of the world when the level of capital market integration between them was higher. On the other hand, if credit market integration was higher then there were weaker co-movements.

The credit shocks play pivotal role in destabilizing the economy. This was also found by Samargandi and Kutan (2016) when they investigated the effect of private credit shocks on economic growth, the study was based on number of 34 countries which included, the BRICS and 29 developed and developing countries. Using Quarterly data, the sample stretched from Quarter 1, 1989 to Quarter 4, 2012. The authors obtained the data from DataStream database. The variables used in the study were as follows “real GDP, consumer price index, credit to private sector and oil prices.” For the estimation purpose, the authors used “Global Vector Autoregressive model (GVAR), the model was introduced by Pesaran, Schuermann and Weiner, PSW (2004) and later Dees, Mauro, Pasaran and Smith, DMPS (2007) presented a better

version of the same model. The results of the estimation clearly indicated that private sector constantly affects economic growth, this result was confirmed by the authors at country level, the spill over and for all the countries as a group. Another important revelation made by the authors was that not all the BRICS countries had that much affect that can spread the shocks and also the significance of impact mattered differently for countries within BRICS.

Macroeconomic variables like economic growth, inflation and stock market are closely interrelated and mutually affecting. Pradhan, Arvin and Bahmani (2015) examined the relationship between economic growth, inflation and stock market development. Using the sample of 34 OECD countries. The authors included the large sample unbalanced panel data from years 1960 to 2012. The study used the following variables to examine the relationship: Inflation rate, Per capita economic growth, Market capitalization, Turnover Ratio and Traded stocks. The authors used the test suggested by Holtz-Eakin, Newey and Rosen (1988) called panel Granger causality test to determine the long-term relation between the variables mentioned above. Using the dynamic panel regression technique, the study focused on both short-rum measured through F-statistics and long-run measured through T-Statistics. The authors through the estimation technique found out that there is a long-term relationship among inflation, economic growth and stock market development simultaneously. Another important finding in the analysis was unidirectional causality from the economic growth and stock market development towards inflation in the short run and long run as well. Hence the authors stated that the stock market development is not adding to the growth in their case, especially in the long run.

At the same time the influx of finance serves like fresh blood into the body of the economy. Likewise, Peia and Roszbach (2015) revisited the financial and growth

nexus for the 22 advance nations. The data sample varied between the countries based on the availability of data, the average sample was taken from years 1973 to 2011. The authors measured economic growth through log of real GDP per capita. On the other hand, the stock market development is measured through log of "the ratio of stock market capitalization to nominal GDP." The authors used the test presented by Johansen (1988, 1992) which includes maximum likelihood procedures for the VAR, the authors also tested for structural breaks in the sample. The results of the study suggested that in 11 out of the 22 countries selected stock market exerts a casual effect on GDP. On the other hand, 16 countries showed to have a reverse causal link between economic growth and bank development. Study also revealed that at higher levels of banking development the impact on economic growth is much less.

Financial market has close relationship with insurance sector and the financial development of the economy which collectively directly or indirectly affect economic growth. This relationship was highlighted when Pradhan, Arvin and Norman (2015) examined the relationships between insurance market development, financial development and economic growth. The authors had taken 34 OECD countries. The data sample stretched over 24 years from 1988 to 2012. The authors used the following indicators for analysis, real per capita economic growth, six different variables were used to capture insurance market development and in order to capture financial development, an index based on 8 composites was used which included both stock and banking market development. The study employed unit root test as the basic tests, cointegration test specifically VAR has been employed to capture the dynamics between the variables under consideration and for estimation purpose, Granger causality test has been employed in the study to check the directional relationship. Firstly, the results of the study clearly demonstrated cointegration between the

insurance market development, financial development and economic growth. Further, in the long run both insurance market development and financial development seemed to add to growth in the case of selected 34 OECD countries.

No economy can survive without coping up with the emerging technological changes in the world. Thus Hsuan Hsu, Tian and Xu (2014) investigated the impact of financial development on technological innovation. The study was based on 32 emerging and developed countries. The sample spanned over 30 years from 1976 to 2006. In order to measure the innovation, the authors used the following indicators to measure the level of innovation, firstly the number of patents issued, then a sub-class of patents along with industry level R&D expenses. In order to account for the financial development, the study used two different proxies to account for the equity market development following the earlier work of Beck and Levine (2002) along with following Rajan and Zinglas (1998) for creating the proxy of credit market development. For the empirical analysis the study follows the work proposed by Rajan and Zinglas (1998) based on fixed effect identification strategy. The results of the study indicated that the well-developed equity markets tend to support innovation for the industries that are more dependent on the external finance. On the other hand, industries that are more dependent on the external finance are discouraged in terms of innovation process along with the development of the credit market. Both these results imply tilt towards high-tech industries.

Studying the dynamics of financial development, trade openness and economic growth Menyah, Nazlioglu and Wolde-Rufael (2014) took a sample of 21 African countries for their analysis, using an annual data sample from years 1965 to 2008. The authors had obtained the data from World Bank, the variables used in the study are as follows: economic growth was measured by real GDP per capita. Trade openness was

taken as-it-is and several indicators for financial development including Bank liquid reserves to bank assets ratio, Domestic credit to private sector (% of GDP), Interest rate spread and Bank concentration were also considered. The study used cross sectional dependency and homogeneity test as the basic test and panel Granger causality test as a primary test for analysis. The estimation results of the study showed limited causal relationship between financial development and trade openness and the results also indicated limited evidence of financial development leading to economic growth in the case of selected 21 African countries.

The topic that is close the heart of our model is financial liberalization and also if it affects banking crisis as is famously believed by various economists. In this regard Majerbi and Rachdi (2014) investigated the relationship between financial liberalization and systemic banking crises. The study took into account the effects on banking governance and institutional quality. In order to do so the study focused on some key areas such as, government stability, banking regulation and supervision, bureaucratic efficiency, law and order and deposit insurance. The study used a sample of 53 countries, also in order to measure the intensity of financial liberalization, the authors used Financial Reform Index which was constructed by Abiad et. al. (2008). Some important findings were stated in the paper using the model estimation approach. An inverted U-Shaped relation was reported among financial liberalization and bank crises. The authors revealed that it depends on type of economy that at which point further liberalization would lower the chances of financial crises. When tested for the impact of government and institutional measures, the results were significant which shows they do have an effect, but the effect could be both positive and negative depending on the type of economy. Overall, the other variables which

can work as controlling as mentioned above tend to exhibit a positive effect on reducing the probability of financial crises.

The risk-taking activities of banks have been long questioned as these can prove to be a reason behind a crisis but at the same time bank had been allowed to do so. Then empirically investigating, Cubillas and González (2014) took a sample of around 4334 banks in 83 nations and studied the sources of financial liberalization that contributes towards the risk taking of banks. The main source to account for financial liberalization, the approach of Abiad et. al. (2008) was followed by using the Index of financial liberalization along with the financial freedom index. The study had used 2SLS estimation technique along with dynamic panel GMM estimator as an estimation technique. The results based on the sample data from 1991 to 2007 showed, overall worldwide bank-risk taking activities increase after the period of financial liberalization that is through the sources of dependence on economic development. Another important finding of the study in the case of developing nations was that after a period of financial liberalization, the stability of the banks had affected negatively, that is it was not linked with the increased competition, but instead it happened due to more opportunities given to banks to get involved in risky activities. For the case of advance nations, the results showed a different picture, for example that banking stability increases after the period of financial liberalization, the source of which as mentioned by the authors is the increased banking competition. The study highlighted the fact that if severe capital requirements are used the negative affect of financial liberalization can be converted into positive affect for both developing and developed countries.

While investigating the impact of house prices on bank stability and the economic growth, Pan and Wang (2013) used a sample of 286 United States Metropolitan

Statistical Areas. The data sample included in the study stretched over Quarter 1 from 1990 to Quarter 4, 2010. Using Quarterly data, the authors used two house price indicators, namely the house price changes and the house price deviation from long-run equilibrium. Bank-specific variables are also part of the study such as non-performing loans, Z-score and return on assets. The study employed Pooled mean group (PGM) and mean group (MG) to investigate the determinants of house prices in the United States' selected areas. These two methods were first presented by Pesaran and Smith (1995) and later on by Pesaran et. al. (1999). The threshold model used in the study confirmed that the equilibrium house prices increased with the increase in demand due to income along with the growth in labour force, the results also confirm the adjustment in house price in the long rum equilibrium.

The Asian context is certainly different from other global contexts. The Asian part of the globe is marred with poverty, poor systems, resource lessness, lack of initiative for innovation and nevertheless quick vulnerability to crisis. In order to examine this plight, Hsueh, Hu and Heng (2013) studied the casual nexus of financial development and economic growth in the Asian countries. The study included the data from 1980 to 2007. The countries included in the sample were as follows, Philippines, Malaysia, Indonesia, Korea, India, Singapore, Thailand, Taiwan, China, and Japan. The study included four variables for financial development indicators. The main analysis was based on the bootstrap panel Granger causality model suggested by Kónya (2006), the authors used the specific model to overcome the issues of cross-section dependence and country specific heterogeneity. The authors also stated that the method suggested by Kónya (2006) did not need any tests to be performed before the actual estimation. The authors tested for the cross-sectional dependence as the selected sample was cointegrated. The test suggested that all variables selected for analysis affected the

economic growth along with the error term within the regression of each country that affected each other. The authors stated that the selected Asian countries are highly integrated, and the crises initiated in one country can easily be spread across all the selected sample countries.

Again, where financial liberalization has strengths, it is laden with weaknesses as well. It has to affect the probability of crisis. For example, Misati and Nyamonga (2012) investigated the impact of financial liberalization on growth and banking crises. The study sample spanned over years from 1983 to 2009 for the 34 Sub-Saharan African countries. Major variables used in the study were GDP per capita growth rates, government consumption as ratio of GDP, private investment, inflation, M2/GDP and domestic credit to private sector. The study used two models, to determine that these two different models were used firstly, the growth model and a banking crises model to check for the impact of financial liberalization. As for the growth model pooled regression was employed with fixed effects model. The growth model results showed clearly that banking crises had negative effect on growth. Financial liberalization tended to affect growth more negatively than fostering it over the period of time. The results of study showed that financial liberalization can add to banking instability thus suggesting that it can add volatility to the financial system. The authors through estimations also found out that the higher the inflation gets it slows down the growth and after that the financial liberalization strengthens the negative effect of inflation on growth.

By the same token, Masoud and Hardaker (2012) while examining the impact of financial development on economic growth used data from years 1995 to 2006 regarding emerging economies. A total number of 42 countries was taken as sample. The authors used the following variables: real per capita GDP growth rate, Population

growth, Secondary School enrolment rate, Investment ratio, Market capitalisation ratio, Value trade ratio, Turnover ratio, Bank asset Ratio, Domestic credit ratio, Economic freedom, Political stability, Export + import, GDP and Inflation. In order to investigate the relationship, the study employed endogenous growth model. The finding of results of the study suggested that stock market development positively affected economic growth in the case of selected emerging economies and the result remained consistent even after the impact of other controlled variables and the sectors' inclusion in the growth model. The authors stated that in case of selected emerging economies stock market development and banking sector work together to provide financial services rather than they separately do.

Financialization and liberalization saw an early rise first in the 70's, since then the frequency and intensity of the financial crises have increased magnificently. The banking crises data provided by Laeven and Valencia (2012) with the updated version after 2008, now including the financial crises of 2007-2008, identified around 146 banking crises, out of which 13 were reported to be of high intensity. For the same time between 1970 up till 2011, they reported that 218 currency crises along with almost 65 sovereign crises over that period occurred. Authors collected the data on the policy response for the crises period as was identified. Some important revelations made from the data collected were like this, fiscal and monetary policies were found to be used more intensively in the developed economies compared with the developing countries during the period of crises. Laeven and Valencia (2012) explained the reason behind the difference in use of policies, developed economies had better funding options thus by making use of fiscal policies they tackled the ongoing crises and at the same time advance economies tended to have more space to make use of the monetary policy. The authors also shared the effect of financial

crises on the real side of the economy, the results showed the emerging economies were less effected by the financial crises compared to the advance economies, whereas huge loss in public debt was also seen for the developed nations. The impact was justified by the authors that the magnitude effect was higher in advance economies because of the fully developed and highly integrated markets.

Again the impact of financial liberalization has to be measured on financial development of the country and its economic growth. So Ahmed (2010) used a sample of 15 Sub-Saharan African countries in order to establish the linkage between financial liberalization, financial development and growth. The sample in the study included yearly data from 1976 up till 2005. Ahmed (2010) used domestic credit to income and private credit to income as the proxies for financial development along with independent variables including GDP per capita, M1, government spending and inflation. The study employed Fully Modified Ordinary Least Square (FMOLS) along with Vector error correction model (VECM). The results suggested that the variables included in the study had causality between them as they had been obtained from the cointegration estimation. Further the result of FMOLS suggested that higher the financial development in SSA countries the higher the impact on fostering GDP per capita. However, Granger analysis showed that financial liberalization caused economic growth in only two countries out of the selected sample.

There are several cross-country studies that have investigated the impact of financial liberalization and banking crises, a few out of those focus on the role of capital regulation and supervision like P. Angkinand, Sawangngoenyuang and Wihlborg (2010) took these factors into account. Their work covered 21 developed economies and 27 emerging economies, their intention behind choosing two different sets of countries was to investigate the impact at different levels of developed. The study

spanned over 32 years starting from 1973 and ending at 2005. The results of the study suggested that the impact highly depends on the level of liberalization, as the liberalization adds to the possibility of the crises to a certain point after that the impact minimizes if the liberalization goes beyond that point. A clear U-shaped relationship was observed by the authors for the relationship of financial liberalization and possibility of occurring a crisis, the authors also highlighted the fact that the results stated above highly depended on the level of capital regulation and banking supervision. As for the two sets of countries the study found out that with weak regulations and supervision in less developed countries there can occur negative effects of financial liberalization but strong and developed countries can benefit from liberalization. The authors suggested that with correct level of banking supervision and regulation countries can benefit from financial liberalization.

The role of institutional quality cannot be overemphasized. At the same time the degree to which an economy is an open economy also matters. Both taken together portray a different scenario. As Law and Habibullah (2009) investigated the influence of financial liberalization, institutional quality and trade openness on the development of the financial market. The study included a sample of 27 countries including the G-7, Europe, East Asia and Latin America. The data collected for analysis spanned over 21 years from 1980 to 2001. The authors following the approach of Arellano and Bond (1991) employed panel GMM estimator to enquire the source of financial development along with Pesaran's et. al. (1999) approach the authors also employed Pooled Mean Group (PMG) estimator. The results of the study suggested, firstly that institutional quality and real income per capita are proved to be the determinants of banking sector development through the empirical analysis, on the other hand authors

also found that the trade openness tended to contribute more towards the stock market development and capital market rather than the banking sector development.

As discussed before, the same variables can show different type of interrelationship in different regions of the world. The degree of awareness, financial market structure and condition of the economy as a whole have major bearing. For example, Al-Khouri (2007) investigated the relationship of financial development and economic growth in seven North African and Middle East economies. The sample included in the study was taken from years 1965 to 2002. The author had obtained the data from International Financial Statistics database and The World Development Indicator database. The author further used three proxies as a measure of banking sector development firstly, Financial Depth Ratio, Bank Credit Ratio and Demand deposit to Money Supply. The study further included control variables that were found to be associated with growth in the literature. These variables included Government Consumption Ratio, The Degree of Openness of an Economy and Exchange Rate. The study adopted the model of Johansen and Juselius (1990) to check for co-integration before employing the VAR model. The study further used Granger causality test to determine long run relationship along with vector error correction model (VECM) in order to differentiate between the short run and long run dynamics of financial development and economic growth. The results of the tests suggested that there was a long-term relationship between the financial development and economic growth for the case of selected countries, however VECM results suggested that in the short run the claim that financial development boosts economic growth was very weak. The results of the study confirmed that there was a long-term relationship between financial development and economic growth in the case of Indian states. The

study also found out that there was a bi-directional causality between per capita credit and per capita deposit.

The model suggested by Danial and Jones (2007) investigated the relationship of financial liberalization along with economic growth and also tested for the possibility of the crises. The dynamic model developed by them constructed a transition period when the financial system started to liberalize. Their work showed that in the short run the financial liberalization increased the chances for occurrence of financial crises but at the same time it did enhance the economic efficiency. In the model the authors stated that the first impact of liberalization is that financing becomes cheaper thus there is an increase in the investment related activities, banks get involved in more risky projects and after some time banks will be willing to accept projects with low return. This scenario exposes banks to great risk because of low quality assets which can cause their default easily so the probability of occurring a crisis increases sharply.

The duration of time is another dimension. The short term and long term effects are different phenomena. Thus Christopoulos and Tsionas (2004) estimated the long-run relationship between financial depth and economic growth. The authors of the paper used an intensive analysis technique to explore the relationship. The study included 10 developing countries; data spanned over 30 years between years 1970 to 2000. The authors employed Fully Modified Ordinary Least Square to enquire the long run relationship. The intensive analysis included time series unit root test in addition to panel unit root test. Then the paper followed Johansen's (1988) co-integration framework to enquire the co integration of variables included in the study. The study also tested for long run and short run causality. The analysis of the study clearly indicated about the existence of distinctive cointegrating vector between the financial

development and economic growth. The analysis also showed a weak short run causality between financial deepening and growth.

Undoubtedly, the supervision or the leadership role has its bearing on the institution, for with change of leadership or supervisory system, the vision of the institution changes so do the operations and their results. For example, Noy (2004) investigated the role of financial liberalization and banking supervision in banking crises. In order to investigate the author included data from years 1975 to 1997 and took sample of 61 non-OECD countries. The study used three different proxies for supervision, along with a binary model for banking crises developed by Caprio and Klingebiel (1996,1999) where 1 represents period of crises and 0 period of non-crises. The study also used a binary model for domestic financial liberalization where 0 showed a control on interest rate (ceiling) and 1 if there is no control. The study suggested that liberalization is healthy for the economic growth but only if it is accompanied by the sufficient supervision and regulation otherwise it can lead to a crisis.

This goes without saying that the scenario in China is always different compared with other parts of the world. The authors Liu and Shu (2002) revisited the relationship of financial development and economic growth in China. The study included two proxies as a measure of financial development namely, the broad money to GDP ratio and the domestic credit to GDP ratio. The sample included quarterly data from Q1, 1983 up till Q4, 1997. The GDP data is not quarterly available in China, so the authors had calculated from GDP series based on monthly gross industrial output at 1990 constant prices. For empirical analysis the study employed dynamic panel data framework, also by using Granger causality test and fully modified ordinary least square, authors got satisfactory results. Specially using the Granger causality test in the study, the results showed to have a long run relationship between financial

development and economic growth for the case of China. Also, the authors highlighted the fact that in the case of China there was little evidence that financial liberalization led to economic growth.

The emerging global markets pose yet a different challenge. To examine this, Eichengreen and Arteta (2002) focused on the banking crises within emerging markets. Due to limited data for various countries the study focused on 75 developing countries. The authors followed the approach suggested by Eichengreen, Rose and Wyplosz (1996) to account for crises and non-crises period. The study by using Probit regression by maximum likelihood estimation technique, stated that the root cause of the banking crises in emerging markets is linked to rapid local economic growth, where reserves may remain lesser than the bank liabilities. The authors stated that financial liberalization and macroeconomies' effect and fiscal policies could lead to trigger a non-manageable lending boom. The study further added that when the quantity of the loans increases the quality lacks because then it is difficult to monitor. The results of the study pointed towards the increased risk associated with external financialization with which more capital inflows from abroad are expected.

The financial policies affect financial health and complexion of the economy. The work of Aretis and Demetriades (1999), revisited the finance-growth nexus with a different perspective taking into account the institutional considerations, financial policies and causality. The study included 12 countries with a mix of developed and developing economies for the purpose of empirical analysis, while the data sample stretched over 53 years from 1949 to 1992. The paper employed two key indicators for financial development, ratio of bank deposits to nominal GDP and ratio of bank credit to the private sector to nominal GDP, the ratios were used to estimate the size and intermediation by the banking system respectively. After performing the long run

causality test to estimate the long run relationship, the study found out bi-directional causality for the developed economies such as United States and United Kingdom but Japan had a unidirectional causality among the developed economy, the authors mentioned the reason, that is Japan belonged more to a bank-based category. On the other hand, the results suggested a weak link for the developing economies in finance-growth nexus. The authors added that the reason for that was the financial repression and strong government control. For the case of developing economies the author mentioned that it seemed to be finance following growth rather than finance fostering growth.

The mechanism of stock market plays a vital role, a stronger and methodical stock market would promote chances for economic growth. Levine and Zervos (1998) in their work studied that a well-managed stock market and banks fostered economic growth in the long run. The empirical analysis of the study was based on 47 countries and the data used was taken from years 1976 to 1993. The authors chose to include the variables that represented the size, volume and liquidity of stock market along with the current and predicted economic growth rates and capital accumulation. Some important variables used in the study were as follows: "Output growth, Capital stock growth, Productivity Growth, Savings, Capitalization, Value Traded, Turnover, Volatility, and Bank Credit." Techniques like Capital Asset Pricing Model (CAPM), Integration and Arbitrage Pricing Theory (APT), and Integration were used as estimated regressors. Following the approach of Adrian Pagan (1984) the authors employed two-stage least squares to drive consistent standard errors. The results obtained from the estimation suggested that controlling of the factors even do not change the results and that both stock market development and development of the banking sector affect the economic growth positively. The authors stated that the bank

provided different services than did the stock market. The study proclaims that the financial sector was an integral part of the growth process.

Despite the work of Schumpeter, King and Levine (1993) who studied the effect of finance on economic growth, the work of Goldsmith (1969), Mckinnon (1973) along with King and Levine (1992,1993) are still considered a basics for modern research. King and Levine extended the two prospects of the studies and conducted a cross country study while using the data for over 80 countries covering the span of 29 years between years 1960 to 1989. The authors of the study made four indicators to assess the financial development, firstly financial depth which is used to access the size of the financial sector against the economy to measure the development of financial sector. Secondly, the study used indicator showing importance of the financial sector which is measured as the ratio of deposit money, bank domestic assets plus central bank domestic assets. The two other indicators were intended to measure domestic asset distribution. One of the two is the ratio of claims on the nonfinancial private sector to total domestic credit and lastly the ratio of claims in the nonfinancial private sector to GDP.

The authors used Ordinary Least Square as the estimation technique, the result of the study suggested that the financial development is a good indicator to predict the economic growth, financial development is also linked with the rate of physical capital formation over the next decade and with subsequent efficiency of resource allocation. The authors mentioned that all the variables which are under consideration in the study are strongly and robustly correlated with growth. The results in the study clearly provide evidence on the financial sector services which strengthen the economic growth thereby increasing the rate of capital accumulation and also improving the allocation of capital. King and Levine (1993) further stated that in the

study there is no clear evidence of link between the financial sector policies with the long run growth.

## 3.3 Chronological Summary of Competing Perspectives

### 3.3.1 Perspective One: Development and Growth

Financial development and economic growth have long been linked together. There is large amount of literature available. The literature varies as to how the study is conducted and also due to different regions and different research methods under consideration. There is no clear consensus among the researchers on the direction and relationship of financial development and economic growth, mainly because of the time period chosen for the study along with the type of countries that are included in the study.

Detailed analysis was conducted by Čižo, Lavrinenko and Ignatjeva (2020) based on the European Union countries. The study investigated the significance of the impact of financial development on economic growth. The data sample stretched over 22 years from 1995 up till 2017. The authors used financial development index as a measure of financial development. The study after using the regression analysis found out that in the period before crises, financial development and economic growth had a positively strong linear correlation, however the period of crises and after crises shows a negatively strong correlation between financial development and economic growth.

The mix of one developed country, and two developing countries would garner different findings. For example Feng Wu et. al., (2020) in China, Japan and India analysed the impact of financial development and economic growth. The dataset included was taken from years 1960 to 2016. The authors used ARDL estimation technique along with structural breaks to determine the results regarding credit provided to private sector as a proxy for financial development. The results of the

study failed to find a long-run cointegration for real-GDP and private credit for the three countries under consideration, however a short-run cointegration was found.

The OECD countries yet present a different sample out of the global population. Afonso and Arana (2018) examined the impact of financial development on economic growth. The authors focused on the OECD countries and included the data from 1990 up till 2016. The study also tried to capture the financial crises of 2007-2008. The findings of the study suggested that when the increases in the development of the financial sector leads to an increase in the domestic credit then it exerts a positive impact on the per capita GDP.

The finance-growth nexus has been studied from various sources of channels within financial development that leads to economic growth. Taking a different approach Skabic (2017) focused on central and southeast European countries. Using the Granger causality test, the authors showed that economic growth leads to stock market capitalization. Also, the findings suggested that both stock market capitalization does affect economic growth in a positive manner. Similarly, Makiyan and Izadi (2015) also used Granger causality test to understand the relationship between financial development and economic growth. The study found out that there is one-way causality in the short run, however a two-way causality was found in the long run.

In another study by Madichie et al (2014) the short-run and long-run effects of financial development on economic growth were explored. The data sample included was taken from 1986 up till 2012 of Nigeria. The findings of the study suggested that the short run effect is statistically significant and positive, whereas the long-run effect is greater that tends to affect growth negatively in the case of Nigeria.

The work of Chakraborty (2010) considered the period of post reforms in the case of India while examining the impact of financial development and economic growth. The data included spanned over 12 years from 1993 up till 2005. The findings based on the quarterly data suggested that the stock market capital does not add to the growth, but findings suggested that capital and human growth rate tend to affect the growth positively.

The channels from which the financial development contributes towards growth has long been investigated through various channels, Odhiambo (2008) considered interest rate reforms to investigate the impact of financial deepening on economic growth. The study focused on Kenya, found out that financial liberalization along with financial reforms policies to determine interest rate helps improve the growth rate. The results of the study were confirmed by two models, dynamic formulation and cointegration.

Financial development and economic growth are eternally wedded together. Perhaps they are mutually reinforcing as well. But the first premise must hold ground as it happens to be so genuine. Kenourgios and Samitas' (2007) study based on Poland investigated the relation among financial development and economic growth. The findings of the study suggested that the financial indicators included in the study all impacted the economic growth in a positive manner. The authors further found out that the credit to private sector is one variable that stands out and has a huge impact on positive economic growth.

Using the dynamic panel estimation technique, the study conducted by Beck and Levine (2004) examined the relation of finance and growth while also accounting for stock market development, the findings of the study suggested that stock market

development along with external components of the banks exerts a positive impact on economic growth.

By the same token, Calderón and Liu (2003) examined the relation of financial development and economic growth specifically focusing on the direction of causality between the two. The study based on 109 developing countries. The data of sample stretched over 34 years from the year 1960 to 1994. The finding of the paper suggested following results. Overall positive impact of financial development on economic growth was found for all countries included in the sample, secondly a bidirectional causality was also found, meaning that financial depth fostered growth; on the other hand growth supported finance as well. After dividing the data sample into two categories, industries of developing countries, the study found out that financial depth played an important role in fostering growth for developing countries. Lastly the study found out that financial development fostered growth more through capital accumulation and technological changes.

The financial innovations require shield from intellectual property rights' body. Claessens and Laeven (2003) studied the property rights among industries through financial development with a view to support economic growth, the authors showed that the financial development helped in providing access finance which then enabled industries to have better access to property rights which eventually impacted economic growth positively. The work of Arestis et. al. (2001) took stock market development into consideration along with financial development to determine the impact on economic growth. The authors collected data from 5 developed nations to enquire the relationship. The findings of the study suggested that stock market development along with banking sector development exerted a positive impact on

economic growth. The significance of impact of banking sector development was higher than the stock market development.

In a detailed empirical analysis by Levine et. al. (2000) based on a number of 71 countries with data stretched from period over 35 years. Using the GMM estimation technique, the study demonstrated that financial development has a positive impact on economic growth for the sample under consideration.

Like many other researchers, Rajan and Zingales (1998) while determining the relation between financial development and economic growth found the relation to be positive in overall sense. Also he specifically found out that the foreign direct investment played a vital role in case of the industries to be more reliant in terms of casting effect on foreign funding, that tended to add more to growth when the financial system is well-developed.

The direct impact of financial development on economic growth is a major area for intervention. Patrick (1966) presented a detailed account of causality of financial development and economic growth. The author explained that at the early stages the direction moved from finance to growth, that is finance added to growth through real per capita capital formation. At a later stage the direction became growth-oriented towards finance, which was due to increased demand for the services provided by financial sector which caused an overall expansion in both the financial and real sector, which shows the causality in both directions in the case of finance and growth.

The role of the interest rate is really important in an economy to control or promote investment and saving. The reason being that interest rate's impact was huge that was investigated on economic growth in various studies and the basic concerned literature can also be found in neoclassical growth framework along with McKinnon-Shaw hypothesis. McKinnon (1973) and Shaw (1973) clearly mentioned in their work

that financial repression that is more controlled financial environment tended to bring volatility within the financial prices that too for interest rate as well and decreased the real growth rate. At the same time McKinnon (1973) and Shaw (1973) mentioned that financial liberalization appeared stronger to add to growth.

Similarly, along with the financial sector, the role of intermediaries cannot be ruled out. Schumpeter (1934) put emphasis on the role played by the financial intermediaries in the development of the real sector which is supported through the role of investment from the banks. There are two perspectives of the direction of causality between financial development and economic growth, but all studies do agree that there is a relation between financial development and economic growth. Firstly, there are few authors who have demonstrated (both empirically and theoretically) that a direction exists between financial development and economic growth. This narrative is supported by the works of McKinnon (1973), King and Levine (1993a) and Christopoulos and Tsionas (2004). While the opposite narrative of causality running from economic growth to financial development is supported by Gurley and Shaw (1967), Goldsmith (1969) and Jung (1986). They supported their argument by stating that when the economy is growing, there is an increased demand for financial services, which leads to growth in the financial sector as well in real sector.

### 3.3.2 Perspective Two: Liberalisation and Risk

Regulation of the banking sector plays a crucial role in limiting the excessive risk-taking activities of banks, Ashraf et. al. (2020) found the same relationship for a group of 111 countries. Using the OLS with pooled data the authors demonstrated that in the period when there are no crises, strict regulations reduce the level of risk taken by the banks.

Regulatory reforms have immense importance, usually major reforms are seen after a period of crises in order to avoid such events in the future. As shown in the work of Hamdaoui and Maktouf (2019) the impact of regulatory reforms could be seen in the actual financial system. The findings suggested that in the case of developing countries, is hard to overcome issues related to financial liberalization through regulatory reforms, as the financial system is not well-developed so the actual impact could take years.

Financial liberalization is criticized for the financial crises but there are number of studies that point out that financial liberalization followed by proper prudential regulation is not harmful. As Hlaing and kakinaka (2018) studied the relationship between financial policy reforms and financial crises. They used the control function (CF) method for the data sample ranging from years 1975 to 2005. The study highlighted that crises is followed by policy reforms and the study confirmed that financial crises does promote financial liberalization. Authors made an important revelation strengthening the argument that the prudential regulation is not seen to be the main aim of policy reforms after the period of crises.

Eichacker (2015) argued that the financial liberalization followed by the financial crises of 2007-2008 played a big role in destabilizing Western European economies. The results of the study confirmed that the entry barrier of liberalization is statistically

significant in the study which shows that some of the institutional variables have increased the chances of financial crises in Europe. The author highlighted that “all countries in the sample had the highest security market liberalization score by year 2000, most had that rankings as of 1992. As such measure is not helpful in distinguishing between countries, despite the evidence that some states have been engaged substantially more in securitization than others.”. Another study around the same time assessing the relationship of financial crises and policy reforms by Waelti (2015) found out that origin of the financial crises matters. Using the seven dimensions for the financial reforms the author reported same result for both local and foreign crises on financial reform. The study fell in line with confirmation of crises-begets-reforms hypothesis.

Apart from minor studies, the huge research works also prove the same results in connection with impact of various variables. Bumann et. al. (2013) conducted a meta-analysis which included 60 empirical studies. The authors suggested the following main results of meta-analysis: First we conclude that although our results indicate that, on average, there is a positive effect of financial liberalization on growth, the significance of this effect is only weak. Second, for most of the variables that may help explaining the heterogeneity of results about the relationship between financial liberalization and economic growth we do not find any significant results. There are two expectations. Our analysis suggests that data from 1970s generate more negative financial liberalization coefficients which suggests that financial liberalization policies carried out during the 1970s seem to have a stronger negative relationship with growth. Moreover, our results show that studies that take into account a measure of the level of development of the financial system report lower t-statistics for the relationship between liberalization and growth.”

United States financial liberalization started in 1977, it was the first year when the United States financial system was deregulated. As Galbraith (2012) mentions "deregulation was followed by de-supervision, as US regulatory authorities made calculated decisions not to investigate financial-sector practices." A major turn in United States history took place 1999 in which the 1933 Glass-Steagall Act was revoked. In was firstly made in the light of event happened during 20's and 30's so to avoid that this act was brought in 1933, the act simply meant to distinguish and separate the activities of investment banking and commercial banking, in order to save the depositor from excessive risk taking of bankers. Revoking the Act in 1999 opened new opportunities of profit plus the risk brought by it. Haldane (2010) demonstrates that 1933 Act of Glass-Steagall was really effective between 1933 until 1980 after which it started getting relaxed and finally was revoked. The Act revocation enables the investment side of the banks not only to get involved in commercial banks' activities but insurance and hedge funds as well. When the Act 1933 was repealed it allowed the mixing investment with commercial banking, it then allowed the banks to take advantage of risk management in order to write off loan's portfolio, which was also facilitated as Rajan (2010) mentions "a greater willingness to supply credit to low-income household, the impetus for which came in significant measure from the government."

Financial crises that are triggered by the quick shifts to make a safe move and liquidate the assets to meet financial obligations requires a financial system that is less restrictive for the risk-taking activities. Martin and Rey (2006) constructed a model with open economy, where the cause of the capital flight was due to financial liberalization in the case of emerging markets which caused the demand for the assets to fall thereby initiating a crisis.

There are a few studies which evaluated the impact of financial liberalization on bank performance, efficiency and productivity in between the years 1990 through 2000. These are based on the Southeast Asian economies. Williams and Nguyen (2005) provided an in-depth analysis in their study to capture the effects of liberalization of 1970, the study covers time period from 1990 up till 2003. The study investigated the relationship of bank performance with bank governance. Many of the Southeast Asian nations saw a change of ownership after the 1997 crises. The authors of the study concluded that the change in ownership is a vital factor for performance of the banks, also that the privatization of banks increased the efficiency and productivity of banks, whereas the foreign acquisition of local banks increased the profit efficiency but the effect on productivity performance was not significant.

In the literature, there is no clear consensus on financial liberalization enhancing growth effects, it has been a long debate, however Tornell, Westermann and Martinez (2004) contributed to the literature with their work in the specific area. The authors mentioned that despite the fact that financial liberalization is criticized as a root-cause for financial crises, it still adds to the growth of the economy. Mentioning that developing economies experienced financial liberalization, which was after the trade liberalization, it is clear that it has added to the financial system's fragility, which created more probability for a crisis to trigger but at the same time it has also made the growth rate of the same developing economies increase. The authors also noticed that boom and bust cycles are mainly associated with the economies that are fast growing.

Financial liberalization recently is considered as the main cause for financial crises, studying the same relationship, Mehrez and Kaufmann (2000) found out that the level of transparency within the financial system could play a vital role in the probability of

financial crises. The authors also stated that the countries that have low level of transparency are more likely to get hit by a financial crisis after a period of financial liberalization.

Likewise, Demirguc-Kunt and Detragiache (1999) investigated the relationship between financial liberalization and banking crises. The study included all countries whose data was available with the IMF. It excluding the ones which are either planned economies or economies in transition. The study spanned over 15 years from 1980 through 1995. Their choice of sample period was based on capturing the banking crises and financial liberalization at that time. The study used a Multivariate Logit model in order to check the significance of the impact of financial liberalization on financial fragility. The results of the study showed that factors like adverse macroeconomic developments increase the financial fragility. The authors added that when factors like these are controlled then financial liberalization on its own exerts a negative impact on financial fragility. Their study suggested that a strong institutional development can work as a minimizing force behind the negative effects of liberalization. The authors suggested that the institutions development need to be made strong before the liberalization process can begin otherwise financial liberalization would highly expose the financial system to negative shocks due to weak control.

The decades of 1980's and 1990's pose different scenarios compared with other decades of crisis. The work of Kaminsky and Reinhart (1999) demonstrated the effects of period of liberalization in the 80's and 90's, they claim that there has been a sharp increase in the banking crises. Study undertaken by Ronald I. McKinnon and Huw Pill (1999) stated that financial liberalization along with macroeconomic

disruptions can ignite the boom-and-bust cycles which eventually leads to failure of the banking system.

The direct impact of regulations in the financial sector are clearly evident in the real sector, in this regard, King and Levine (1993) mentioned that if the government places too many restrictions on the financial sector that would affect the growth negatively. Similarly exploring the same relation Easterly (1993) stated that major intervention within the financial system not only distorts the financial system but the growth in the real sector as well.

The role of government intervention in Keynesian sense is important in that the regulations promulgated by the government must help it regulate the banking sector. Koehn and Santomero (1980) for example stated that changes in the regulation made by the government to restrict the bank from excessive risk-taking is equally responded by the banks as they seek to have more weak assets on the balance sheet.

### 3.3.3 Perspective Three: Innovation and Development

The advancement in technology is a key factor in determining the long-term goals of the economic growth. There is no doubt that with the improved technology, the productivity is increased making use of fewer resources. Zhu et. al. (2020) investigated the effect of financial development on innovation as well as growth. Using data from 50 countries, authors found out that the financial sector growth may decrease the innovation activities in the countries. The study also found out that once the private sector credit exceeds 60% as a percentage of GDP, the effect of innovation on growth becomes insignificant.

The impact of financial development on innovation might be very different for developed and developing countries. Maskus et. al. (2019) study based on 20 OECD countries examined the impact of financial development along with patent protection on the level of industrial research and development. The data stretched over 19 years from 1990 up till 2009. The findings of the study suggested that the effect of patent protection differs between industries on the ground of research and development. The authors also found out that the patent protection leads to an increase in the research and development in the countries with limited credit markets. The countries with more developed bond markets showed a different result, where the industry R&D is more sensitive to patent rights.

In regard to finance, enhancing innovation activities can take placed through the channels through which the projects are financed. Pradhan et. al. (2018) considering the venture capital, investigated the impact of finance on innovation nexus. Using the sample of 23 EU countries with data from years 1980 to 2015, the study applied the Granger causality test and stated that the early-stage financing of the start-ups are

essential to be innovative. The authors also found out that growth is impacted positively by financial development and innovation activities for the chosen sample.

There has been a long debate if too much finance is good or bad for growth, similarly, taking the same approach Hook Law et. al., (2018) enquired the same for finance and innovation. The study was based on 75 countries with data sample stretching from 1996 up till 2010. The study used Generalized method of moments which showed the relationship between the finance and innovation to be U-Shaped. That clarifies that finance spurs innovation up to a level before it starts affecting it negatively if there is any more addition. The authors put emphasis on the institutional quality as the basics for the finance to support innovation activities within a country. A similar study conducted by Ramirez et. al. (2017) explored the relationship between financial development and innovation. The study spanning over years 2006 to 2013 used the binary response model on firm level data. The authors after estimation found out that financial development increases the level of innovation in a country, but the effect is more significant with improved allocation of funds and authors also stated that innovation-led technology also increases the level of growth.

Financial development and economic growth relationship have been studied for quite long now, but there are few numbers of studies that include the impact on innovation as well. Pradhan et. al. (2016) yet again provided a different insight with relatively large sample ranging from years 1961 to 2013. The sample included 18 European countries. The authors after looking at the results suggested that, for the chosen sample of study, in order for economies to grow at a good rate, globalization has to be more competitive viz-a-viz foreign competitors, and finally in order to grow in this situation, the economies need to be more innovative. The authors put emphasis on better credit allocation as an initial factor working towards more innovativeness, at

the same time in order to facilitate innovation activities a well-developed financial system is needed.

When financial development is under consideration there are number of different aspects that are considered in investigating its impact, Hsu, Tian and Xu (2014) specifically investigated the role of credit market along with equity market to find out its impact on innovation. The authors undertook data from 32 countries. The study used fixed effect model on the data taken from years 1976 up to 2006. The authors demonstrated that equity markets that are well-developed help achieve more innovation at every level where they are more dependent on funding from external sources. At the same time with same conditions the results suggested that credit market can decrease the level of innovation activities. Similarly, Tee et. al. (2014) studied a different aspect including stock market development along with financial development to determine its impact on innovation activities. The data sample included 7 countries taken from East Asia ranging, the period spanned over years 1998 to 2009. The authors used random effect model to enquire the relationship. The results of the study suggested that the size of both stock market along with financial sector on innovation activities mattered a lot, which is supported by the fact that more finance is available in the market. The authors put emphasized that financial sector is a crucial factor in fostering innovation activities.

Government support and ownership plays a vital role in innovation activities within a country. The level of innovation activities varies from country to country due to different approaches of government being adopted towards supporting innovation. Xiao and Zhao (2012) studied the effects of financial development on innovation activities while taking into account the ownership structure of government. The study suggested that high level of innovation activities was found to be impacted by

financial development with low level of government ownership. On the other hand, with high level of government ownership, the study showed a low level of impact from the side of financial development on innovation activities.

Given that destabilization of one bank triggers a likewise move around the domain that it encompasses, Maskus et. al. (2012) while studying the domestic and international financial development, revealed that the development of the domestic financial system tends to support the innovation activities. For the external factors, the authors mentioned that only foreign direct investment was found to be positively and significantly affecting the research and development. The study also stated that bond market contributed towards the funding of research and development.

Similarly, the credit market regulation casts a major impact on financial sector innovations. In the work of Barbosa and Faria (2011) this was demonstrated that credit market regulation contributes towards the innovation production. The study clearly stated that there is no doubt that financial development supports innovation process along with better information in the market and financing for firms to support innovation which is made easy through financial development. The authors through the analysis also found out that the higher the level of GDP per capita, the higher the number of innovation activities within a country. The study highlighted the fact that countries that have higher level of income are found more to be in demand for new products which is brought forward by research and development and innovation process.

Financial liberalization along with financial repression have always been discussed if they support or not. Tiwari et. al. (2008) found in the case of Netherlands that the more constrains that are placed on the financial sector it affects the research and development negatively. The authors also stated that firms bigger in size and maturity

face less constrains than smaller firms. Similarly, Mohnen et. al. (2008) examined the factors that act as a hurdle towards the innovation activities. The findings of the study suggested that financial constrains faced by the firms that are involved in innovative activities impacted the whole innovation process negatively in the case of Netherlands. The authors also mentioned that the firms' smaller in size are more found to be willing to get involved in innovation activities.

The FDI is always a big injection, it can impact several developments in positive manner, one could be its effect on innovative motives of bankers. Girma, Gong and Görg (2008) investigated the role of finance specifically in terms of foreign direct investment on innovation activity in China. The data sample included stretched from years 1999 to 2005. The sample included the data for over 400,000 firms in China. The findings of the study suggested that the more the R&D, the higher the number of innovation activities. The authors also found out that increased employee training is linked to higher level of innovation activities. The study also highlighted the fact the private firms could come across barriers to access funds which can undermine the innovation activities, on the other hand government-owned firms benefit from the finance structure.

Innovation activities are also dependent on the quality of education and the role played by political institutions. Enquiring the same relation along with impact of financial development, Varsakelis (2006) used the data of 29 countries for the period of 15 years from 1995 to 2000. The findings of the study suggested that the quality of the education exerts a positive impact on the level of innovation activities. The study also found to have a positive correlation between the level of innovation activities and development of government institutions.

The small firms form a different domain compared with the large one. The work of Giudici and Paleari (2005) was based on the survey on the financing of technology-based small firms in Italy. The study made some important revelations that could be used as a basics not only for Italy but for other small firms as well. Firstly, the study stated that the small firms are dependent on the information from various sources that are involved in the process of R&D, the information plays a vital role that is provided both by internal and external sources. In the case of Italy, the authors found out that the small firms do not rely on the patent in order to protect the innovation but are bound the market dynamics. The study highlighted the fact that internal financing is not enough for small firms to finance their innovation activities, but these firms take support from external sources availing of short-term debt or commercial credit.

When multifarious technologies are interacting, their convergence to a mega change is a must for economic gains. In the work of Aghion and Howitt (2005) this was clearly mentioned that the financial development is a vital factor in technological convergence. The study suggested that financial development helps support the innovation of new products along with processes that lead to increase the efficiency of production. The study made an important revelation that if the creditor hides the success of innovation then it could undermine financial sector. The study concluded that financial system that are not developed increase these types of risks and tend to hinder innovation activity.

The case of developed nations like France would always vary from the developing nations. Greenan and Guelelc (2000) in their work used the innovation survey based on France to enquire the impact of innovation on employment, the findings of the study suggested that the product innovation along with process innovation both add to the increased level of employment. Varadarajan and Jayachandran (1999) after a brief

study of the factors contributing to the addition in the growth of firms, showed that growth is highly positively in case there is new product innovation.

## 3.4 Assessment and Identification of Potential Areas for Contribution

- Cash holdings
- Value of cash holdings
- Investor protection
- FDI
- Contrarian strategy payoffs
- Operational risks
- Enterprise financialization
- Interest rate liberalization
- Imperialization
- Brexit agreement
- Recovery during Covid
- Group of 20
- Emerging Asian nations

## 3.5 Proposed Research Questions

Research questions:

The research question evolves around the query that to what extent the financial development effects the economic growth in European Union and how financialization plays its role with respect to finance-growth nexus.

1. How can we develop relationship between variables like financial development and economic growth and can understand the effects of financialization among members states of EU?

2. To find the impact of financial liberalization and bank risk on financial crises. What is the impact of both patents and R&D on unemployment?

3. What are the possible effects of financial development on economic growth in the EU member states?

5. What possible role can financialization play in development of the financial sector?

6. To what extent does the financial development effect innovation such that it helps in generating new knowledge

### 3.5.1 Essay One: Financialization, Development and Growth

The paper studies the role of financialization in the growth of real sector along with the relationship of financial development and economic growth before and after the financial crises of 2007-2009. Empirical investigation captures the idea if financial development that spurs growth (or decreases the growth level) in case of EU.

### 3.5.2 Essay Two: Liberalisation, Risk and Crises

This paper studies the impact of financial liberalization along with effect of bank's risk on banking stability. The paper examines how financial liberalization and bank

risk taking activities could lead to financial crises in the case of European countries. The purpose of the paper is also to investigate the causality of direction between financial liberalization and financial crises.

### 3.5.3 Essay Three: Development and Innovation

This paper estimates the impact of financial development on innovation. In the case of European Union, the paper examines if financial development supports innovation or decreases the level of innovation when there is an increase in the financial development.

## 3.6 Chapter Summary

This chapter is mainly based on the literature review. The review of the literature started with the chronological review of the empirical perspectives, firstly the studies included in this chapter showed that on what basis the data is selected, for e.g., capturing the effects of policy changes on the financial system. Further the different variables used in the studies were mentioned which were used for estimation and analysis, the chapter mentions all different aspects which had been taken into account by different studies e.g., some studies only focused on the banking sector and a few combined banking sector developments with stock market development. Financialization has been researched extensively, since it has huge impact on the real economy. The studies used while mentioning the research methodology were on the basis of how different researchers have been using different methods to enquire the same relation. We considered studies that focused on determining something specific for e.g., some studies used OLS to determine the results, other used extensive techniques to enquire the direction of causality through Granger causality test. The purpose of mentioning all different estimation techniques for analysis is to show how the research has evolved in this specific area in terms of selection of data, variables and estimation method over time and how the main concept of financialization has been further taken into account to enquire its impact on growth as well on crises and innovation.

Moving forward, the chapter discusses the chronological summary of all three papers that are part of the thesis, the summary starts with the most recent research in that specific area, then moving backwards, major studies are included in each chapter to show the latest research in the specific area then we have slowly moved towards the basics and important contributions conceded by the pioneers of that specific research

area. A lot of recent studies are based on some basic grounds e.g., King and Levine (1993) struggled for providing finance-growth framework which is the basic in modern day research if economists have to enquire the relationship.

The chapter then stated the research questions that are associated with each paper, they are presented in short form so as to understand the basic research question covered by all three papers.

# Chapter 4: Approach to Research Method

## 4.1 Introduction

In this section, the thesis states the empirical methodology used across all three chapters. The empirical models used in all studies are based on the theories and investigations of the desired relationships. For all three chapters, the enquired relationships are different, so a detailed background and choice of the models would be explained.

Financialization itself is a very broad concept, in order to narrow it down, this section would only focus the relationships under consideration.

Firstly, the time span of the study will be discussed for each chapter, then for each of the chapters data duration considered for study would also be mentioned e.g., monthly, quarterly or yearly. All three chapters are based on the 28 countries of European Union, but one chapter exempts 5 countries from the sample due to data being missing at large for those countries.

Selection of variables has immense importance as those variables are representing something, so for all chapters, all variables are selected very carefully. All variables used in the chapters would also be highlighted, along with the specifics, the reason to choose variables or if we are using a proxy variable.

At the end of this chapter a table contains all the definitions of variables that are part of the study along with another table that shows the data sampling techniques.

The choice of models was based on the literature with modifications in order to enquire the desired relationship. This section would explain models that are used in chapter 5, followed by chapter 6 and then finally chapter 7 with details of data techniques, econometric modelling and test used in the perspective papers.

When explaining the model used the reason behind each model would also be explained, this would be in addition to that what literature suggests. Some background on the models will also be shared for better understanding of the models used. All three chapters have got their reasoning for selecting an estimation technique. The estimation technique used in each of the papers has been carefully selected, so that the results are meaningful and accurate.

The literature shows many options when it comes about selecting a model, although with time new techniques are introduced, but the choice of techniques in all three chapters are based on a few factors, firstly how accurate the model is, secondly if there are some issues with the model that can arise, if those problems can be dealt with and lastly how good the model explains our data.

A detailed description of each model used is also stated, along with what the model will be finding along with the respective background or modification of model according to the desired need.

## 4.2 Data & Methodology used in Chapter 5

To begin with, chapter 5 is enquiring the role of financial development in the growth of real sector. The pioneer work in this specific area was firstly presented by Schumpeter (1911), later on did Goldsmith (1969), McKinnon (1973) and Shaw (1973) and are known as the major contributors in this area. The relationships among financial developments have been vastly explored in the past and in recent times, the financial sectors around the world have developed and expanded massively, which also gives many opportunities to researchers to explore this area. The research about basics provided by the authors mentioned above are still being used for analysis, but the exploration has changed with time for e.g., new instruments and services in the financial sector gave the opportunity to researchers to estimate the impact from a different angle. Moreover, financial services are considered as a mediator to fulfil the financial obligations from the real economy which gives it an immense importance. The increasing role of financial sector played role in growth is also associated with increasing the probability of occurrence of financial crises in the past few decades. Hence the research area is very closely looked into, the selection of model for chapter 5 was made considering the impact of banking sector on real side of the economy.

Firstly, the selection of data to enquire the result was selected for 20 years, starting from 1998 to 2018. The purpose to choose the exact years was to check the impact of financial development on economic growth before and after the financial crises of 2007-2008. Moreover, the inclusion of panel data into the chapter allowed the analysis to be both time and cross section. As monthly data is used in chapter 5, so panel data has been used which is more suitable for large samples.

Secondly, the chapter further develops a cross country study for EU-23, Bulgaria, Croatia, Cyprus, Malta and Romania but these countries were excluded from the

sample of EU-28 because of the data missing at large for these countries, financial development and economic growth have been analysed at both single country studies and cross-country studies as well. Also, the specific area has been explored at firm level and industry level. The reason behind choosing the cross-country study on EU was to determine the impact of financial crises of 2007-2008 on the relation of financial development and economic growth.

The financial development is just not measured with a single variable, financial development is known as the improving of quantity, quality as well as the efficiency of the financial system. As mentioned by Schumpeter (1911) that the role of the provider of the financial services includes mobilising funds, monitoring entrepreneurs along with managing risk and providing transactions services to customers. With time the role has been changing with new financial products coming into the market which has opened new areas for research. In this section, the thesis states the empirical methodology used across all three chapters. The empirical models used in all studies are based on the theories and investigations of the desired relationships. For all three chapters, the enquired relationships are different, so a detailed background and choice of the models would be explained.

Financialization itself is a very broad concept, in order to narrow it down, this section would only focus the relationships under consideration.

Firstly, the time span of the study will be discussed for each chapter, then for each of the chapters data duration considered for study would also be mentioned e.g., monthly, quarterly or yearly. All three chapters are based on the 28 countries of European Union, but one chapter exempts 5 countries from the sample due to data being missing at large for those countries.

Selection of variables has immense importance as those variables are representing something, so for all chapters, all variables are selected very carefully. All variables used in the chapters would also be highlighted, along with the specifics, the reason to choose variables or if we are using a proxy variable.

The choice of models was based on the literature with modifications in order to enquire the desired relationship. This section would explain models that are used in chapter 5, followed by chapter 6 and then finally chapter 7.

When explaining the model used the reason behind each model would also be explained, this would be in addition to that what literature suggests. Some background on the models will also be shared for better understanding of the models used. All three chapters have got their reasoning for selecting an estimation technique. The estimation technique used in each of the papers has been carefully selected, so that the results are meaningful and accurate.

The literature shows many options when it comes about selecting a model, although with time new techniques are introduced, but the choice of techniques in all three chapters are based on a few factors, firstly how accurate the model is, secondly if there are some issues with the model that can arise, if those problems can be dealt with and lastly how good the model explains our data.

A detailed description of each model used is also stated, along with what the model will be finding along with the respective background or modification of model according to the desired need.

Literature shows variety of methodologies used by researchers in the estimation of financial development and then checking for its effect on economic growth. The work of Goldsmith (1969) simply takes value of banks into account in order to estimate the financial development. Whereas in a recent study done by Prochniak and Wasiak

(2017) which incorporated many different ratios into the model i.e., capital to asset, all these ratios are an estimate which determine the performance of the banks. Beck, Levine and Loayza (2000) while estimating the financial development, used private credit as a main indicator of the financial development.

The model includes total of 6 independent variables (Business Credit, Business Credit Interest Rate, Exchange Rate to USD, Household Credit, Money Supply, Private Sector Credit). A brief description of each variable is given below. The reason to choose variables that represent the credit allocation in the economy was to learn about the boom-and-bust cycles while studying the effects of financialization on growth. In order to give a complete picture of the output in the economy using the high frequency data, as GDP itself is only available on quarterly basis and calculating it on monthly basis is not so reliable. There are many credit related variables used in the study as independent variables. The use of industrial production was to check the impact of the credit related variables on output. A study by Erkisi and Tekin (2019) shows a unidirectional causality to economic growth.

There are a lot of variables that are used by different authors for estimation purpose, but each variable has its own impact in a certain way. In order to estimate the relationship, the choice of variables plays an important role. While keeping in mind that chapter 5 focuses more on the banking sector development the choice of variables was made accordingly.

Monthly data was used in chapter 5 to better understand the results, but unfortunately in order to check the impact of financial development on growth, GDP data is not available on monthly basis, so industrial production was used as a proxy, knowing that it only represents one sector of the economy. The industrial production was used because the chapter focuses mainly on exploring the impact on real side of the sector

for which industrial production is a good indicator. In order to measure level of financial development, private sector credit is the major variable which is also used by Beck et. al. (2000), where they mentioned that credit provided to the private sector by financial institutions is a very good proxy for financial development. The argument of authors stated that the credit given to private sector separates it from the credit given to government and public entities which makes it a good proxy. Further the same variable is also used by known contribution of King and Levine (1993) and Levine et. al. (2000). Variables included in study to estimate financial development level are, business credit, business credit interest rate, exchange rate to USD, household credit, money supply and private sector credit.

All the variables included in the study were found to be integrated at First difference which is consistent with the structural break unit root tests. The study used ADF test for unit root estimation. The econometric equation used in the model shows how each variable used in the study is going to affect the dependent variable, industrial production on monthly basis has been taken as a proxy for the GDP.

The benchmark model is therefore

$$IP_t = \beta_0 + \beta_1 BC_{it} + \beta_2 BCIR_{it} + \beta_3 ER\$_{it} + \beta_4 HC_{it} + \beta_5 MS_{it} + \beta_6 PSC_{it} + u_{it}$$

Where IP is Industrial Production , BC is Business Credit , BCIR is Business Credit Interest Rate ,ER$ is Exchange Rate to USD , HC= Household Credit , MS= Money Supply , PSC= Private Sector Credit

Before going for the estimation analysis, as the chapter focuses on determining the long-run relationship between the financial development and economic growth, it was necessary to check that all the variables included in the study if they were integrated at least at one of the levels. Having used panel data with cross sections, the approach

suggested by Pesaran (2007) was adopted which enables starting of process of individual root test in a panel. In order to test for the integration of the variables in the selected data sample of EU-23 countries, ADF unit root test is employed in chapter 5.

After having found the variables being integrated at a single level, Ordinary Least Square is employed in the chapter to determine long-term relationship between financial development and economic growth. In the literature there are number of studies that are found to use OLS estimation technique in order to enquire long term relationship, specifically in growth regression for e.g., Samargandi et. al., (2015) and Levin and Zervos, (1998) have also elaborated. The advantage of using OLS with cross country study with similar profile is that the estimation results are more meaningful. After performing the Hausman test, having to fail the null hypothesis of the test, the null hypothesis of random effect was established to take as a better estimation technique. The advantage of using Random effect model is that it is known to produce superior estimates of the Beta when the correlation between the independent and dependent variables is low. The use of dummy variable is hence very important when something is being enquired that cannot be calculated numerically. In order to investigate the impact before and after the crises the chapter used dummy variable in the model with random effect test which enabled to break the sample into halves. By adding the dummy variable into the sample, it enabled the study to focus on the effect of financial crises where each of the dummy is linked to the effects of a particular country. As Baltagi (2008) mentions one of the problems that is even found in the fixed effect model with dummy variable included is that the estimator can face many problems which can be caused by the loss of degree of freedom.

There are some issues with Pooled OLS that it may ignore the heterogeneity for the countries which are part of the study sample. Further many of these variables that are

under consideration in the study are probably going to be endogenous, then the OLS estimators can be inconsistent. The Fixed effect model can deal with the issue of heterogeneity issue but can lack in dealing with the issue of endogeneity issue, the interpretation of these variables has to be handled with care because of the endogeneity issue. In order to overcome the issue of endogeneity, the GMM approach is used in the chapter, the GMM estimator was firstly proposed by Arellano and Bond (1991), these authors used it as a first difference estimator, later on Blundell and Bond (1998) updated the model by including level along with first difference with the series.

By using the GMM estimation technique the robustness of the results will also be obtained along with the correction of any heteroscedasticity, cross section dependence and serial correlation present in the model. GMM overcomes the issues which are present in the static model like fixed effect or pooled OLS which are not so efficient in eliminating the issue of heterogeneity problems. The chapter would then compare the result of the GMM estimation with the OLS and random effect in the model.

## 4.3 Data & Methodology used in Chapter 6

Chapter 6 examines the role of financial liberalization along with bank risk in financial instability. The work of Keynes (1936) pointed towards the important role of government in controlling investment for better allocation of funds. Financial liberalization has long been criticized for increasing the financial fragility, but not everyone sees it. The major well-known contributors in the specific area, like McKinnon (1973) and Shaw (1973) stated that the government restrictions on financial sector can decrease the performance level of the financial sector. McKinnon (1973) and Shaw (1973) are considered as pioneers in the specific research area, the

authors stated that financial liberalization can help overcome inefficiencies that are present in financial markets that is with increased demand and higher volume trading.

The literature shows that the role of financial liberalization has been less researched, the level of research in this area has increased lately, the massive liberalization in the 70's through 90's, followed by many financial crises has made role of financial crises hence really important. First of all, the dataset included in the study is stretched over 23 years from 1996 to 2019. The selection of data was important as like the literature shows using both bank level data for research in this area along with aggregate country level data is useful. The literature shows that using country level data might decrease the sample size. In this particular regard, the Rinaldi and Sanchis-Arellano (2006) suggested using aggregate data for the research based on EU countries as the data at individual level lacks. Thus, as the chapter 6 includes EU-28 in the research sample, aggregate country level data was used in the chapter 6 as suggested by Rinaldi and Sanchis-Arellano.

Financial freedom index is one of the components of economic freedom index, which is highly creditable and widely used in the literature (Kaufmann, Kraay and Mastruzzi, 2010). The estimation and results derived by it are highly compatible. Financial freedom was previously known as banking freedom. Financial freedom index is simply how independent the financial system is from the government of a country and it shows banking security as well.

Many authors have used financial freedom index in their study (i.e., Chortareas, Girardone and Ventouri; 2013, Lin, Doan and Doong; 2016). The value of the index lies between 10-100, in which 100 shows the most liberalization and 10 shows that the financial system is highly controlled by the government.

In a recent paper Chiaramonte, Croci and Poli (2015) investigated the accuracy of Bank Z-Score. The study was based on banks from 12 European countries over the time span of 10 years from 2001-2011. The authors compared Bank Z-Score with CAMELS to identify any time of uncertainty in the financial markets. The results showed that Bank Z-score is as efficient as the CAMELS, but they also stated that bank Z-score has an edge over CAMELS because it is less data-demanding thus making the analysis easy. Also that in case of larger banks and complex models, Bank Z-Score is proven to be a better proxy of bank soundness.

In the literature, many authors recognized non-performing loans as financial distress at the same time having negative overall effects on the social welfare and economic development (e.g., Barseghyan 2010; Zeng 2011). Certain moves aggravate completion in the banking sector that in turn impact banking policies. Salas and Saurina (2003) suggested that deregulation of the financial system increases the competition among banks in the EU. At the same time, there is plenty of studies that suggest that it increases competition, increases the chances of banks having high risk assets on their balance sheet. The banks respond to the increased competition with quantity of loans, which thus decreases the quality of assets (e.g., Bolt and Tieman 2004).

There are two independent variables used in this chapter, namely financial freedom index and banking Z-Score. The financial freedom index represents the level of government regulation on the financial sector, higher value denotes less government intervention. Financial freedom index is a reliable index, there are number of studies which have used financial freedom index as part of their research for i.e., Chortareas et. al., (2013) and Lin et. al., (2016).

Banking Z-score is an accounting calculation which shows how far away the banking system is from default. A higher value shows the banks are very far from default. As Chiaramonte et. al. (2015) argued that banking Z-Score hence is a good indicator which can be used to check the soundness of the banks. In the literature many authors have used Z-Score as part of their research see Laeven and Levine (2009) and more recently Lepetit and Rehault (2018).

The dependent variable used in this study is non-performing loans, the variable is a good estimator as the risk of default for a bank increases with the increased number of non-performing loans. Abdelkader et. al. (2009a) and Espinoza and Prasad (2010) use non-performing loans as a dependent variable in their study. In addition to the variables used in the chapter 6, shows that a change in financial regulation would take it's time before the actual impact can be seen on the financial system. Thus, keeping this in mind chapter 6 included one lag period among the regressors in order to enquire the difference among t and t-1. Many studies use the lagged variables to check the impact in real time for i.e., Louzis et. al. (2010).

The basic econometric equation used in chapter 6 is as follows:

$$BNPL_t = \beta_0 + \beta_1 FL_{it} + \beta_2 BZ_{it} + u_{it}$$

Where BNPL is banking non-performing loans measuring banking instability and FFI is financial freedom index measuring financial liberalization followed by BZ which is Banking Z-Score which measures the ability of the banking system to absorb risk.

Whereas the t-1is used for independent variables in the next equation used in the chapter is as follows:

$$BNPL_t = \beta_0 + \beta_1 FL_{it-1} + \beta_2 BZ_{it-1} + u_{it-1}$$

The equation above estimates the econometric equation with t-1 for the independent variables. Equation 2 is the extension of equation 1 with the purpose of extending the

empirical analysis in the study, while it is using one lag for the Bank Z-Score and financial freedom index. The purpose of one lag is to check the effects of pervious year on the dependent variable. In the literature many authors have used the same method of lagged regressors to capture effects in different time periods e.g., Cotugno, Stefaneli and Torluccio (2010), Louzis et al. (2010).

More importantly, in this case it is more important to check for effects with a lag in regressor as the financial liberalization does not show the result immediately, but the actual result can be shown in the following years.

The chapter before applying any estimation technique, tested for the level of integration between the selected variables. To enquire level of integration between variables for chapter 6, two different tests were performed, ADF unit root test which was presented by Dickey and Fuller (1979) and Fisher PP which was presented by Phillips and Perron (1988). The reason for using two tests for enquiry integration was to confirm results of one with other. Both tests confirmed the existence of long-term relationship.

Moving forward in order to investigate the long-term relationship between the variables three different estimation techniques were used in chapter 6, namely GMM, Dynamic OLS and Fully Modified OLS. The application of fully modified ordinary least square can be seen in the work the Philips and Moon (1999) and the application of dynamic ordinary least square can be seen in the work of Kao and Chiang (2001). Using Pooled OLS can come across problems like endogeneity when we work on the panel data, first of all GMM overcomes this issue, GMM also helps overcome the problems of heterogeneity. The study then employs the Panel co-integration test which has equal or more benefits when one is employing the unit root test on the Panel data. The study uses cointegration relationship through Dynamic ordinary least

square (DOLS) and Fully modified ordinary least square (FMOLS). Stock and Watson (1993) proposed that the dynamic ordinary least square method is preferable over other methods in case of long run cointegration test being conducted among variables. DOLS and FMOLS are better than the normal pooled ordinary least square especially for panel data. DOLS is parametric approach, and estimates lagged first-differenced terms. Whereas the Fully modified ordinary least square is the non-parametric approach as stated by Harris and Sollis (2003).

Both the DOLS and Pooled OLS estimation techniques are used in the chapter because of the reason that they perform better in case of panel data than Pooled OLS.

While enquiring the performance of different tests Mark and Sul (2003) stated that the dynamic OLS can provide with more accurate results on panel data set. One main reason to include the dynamic OLS in the chapter was that DOLS deals with the issue of asymptotic bias which can be found in the ordinary least square estimation, DOLS overcome the issue by including the leads and lags in the estimation. Another advantage of using DOLS is that the t-statistic computed from DOLS when compared to OLS produces far better standard normal density.

Fully modified ordinary least square was initially designed to overcome the underlying issues when using OLS in panel data, for the problems of endogeneity and serial correlation, many authors have confirmed this, see Narayan and Sun (2007) and Pedroni (1999).

Fully modified ordinary least square is proposed by Pedroni (2001) which is designed for panel data. The method proposed by Pedroni (2001) solves the issues of non-stationary regressors along with simultaneity bias. Pedroni (2001) is the extension to the work of Phillips and Hansen (1990). The advantage of using FMOLS is that by using long-run covariance matrices, it fixes the dependent variable and after that it

employs simple OLS estimation technique to the other variables which are corrected for the endogeneity. The purpose for using all three GMM, DOLS and FMOLS was to enquire robustness of the results.

Further Granger causality test is employed in chapter 6, the use of Granger causality has to be employed with care when using panel data because the issue of cross sectional dependence can arise, in which shock in an country can affect other countries that are included in the sample, in order to overcome this issue modified Granger causality test presented by Dumitrescu and Hurlin (2012) is employed, the approach suggested by author works more efficiently with cross-sectional data as it permits each coefficient to be different in each of the cross sections. The modification of Granger causality test developed by Granger (1980) simply computes the results by running it separately for each cross section. Granger causality test is used in chapter 6 to determine the long-run relationship and the direction between the financial liberalization, banking non-performing loans and bank Z-Score.

The use of the test would enable us to determine if in the long run financial liberalization affects bank non-performing loans which is used as a proxy for financial instability, also the same test is used to determine that if the changes in bank non-performing loans leads to change in the financial liberalization, the reason being that the literature shows that the financial regulation and policies change after a period of financial instability or financial crises. Also, the Granger causality would help determine if changes in bank Z-Score lead to any changes in banking non-performing loans, this is hence important to estimate because when the bank's ability to take on risk changes or to absorb risk, it can have significant effect on the number of banking non-performing loans, again the test would help determine the two-way causality between both the variables. The study compared the two tests, first one the parametric

approach which is Dynamic OLS and then the non-parametric approach which is Fully modified OLS. The study suggested that because of the less assumption-based property of the parametric approach it requires more data for the results to make them more accurate which gives non-parametric approach an edge to be used in case of smaller samples. The study while using Monte Carlo simulations, provided evidence that shows, that even if there is ample amount of heterogeneity, the correction method within the non-parametric approach does far better in case of the group mean estimators and their t-stat.

Perroni (1999) and Harris and Sollos (2003) provide the information in much detail regarding how these two methods are superior to the pooled OLS regression.

As shown in the table 9 above, descriptive statistics for the dependent and two independent variables provide some highlights. Firstly, the dependent variable Bank non-performing loans to gross loans average around 7 percent, at the same time the highest goes to around 49 percent, which is very high than the mean which is around 6 percent and the minimum is less than 1 percent. These numbers show that there are few countries in the sample, which have high non-performing loans and others with very less.

Secondly, the highest value for Financial freedom index is 90, which shows highest level of financial liberalization of countries within dataset and on the other hand a few with 30 which is lowest. Bringing the average around 70 this is evident that most of countries in the dataset have high levels of financial liberalization.

Lastly Bank Z-Score has the highest value of around 48 percent and the lowest of less than 1 percent and the mean is around 12 which shows, countries included in the sample most of them are operating with less bank Z-Score; meaning, thereby that there are only few countries with high abilities to absorb the risk.

## 4.4 Data & Methodology used in Chapter 7

This chapter studies the role of financial development in innovation. The chapter also investigated the relationship of innovation with unemployment. The dataset included in the study ranges from years 1996 up till 2019. The chapter follows the approach of panel data model suggested by Rajan and Zingales (1998) which enabled researchers to study time series along with cross sectional data for example to study all 28 countries in the European Union.

There are number of studies which include both banking sector development and stock market development when accounting for financial development, see Doanh Le et. al. (2019). In the literature there are many studies that only focus on the banking sector development when accounting for financial development see Tee et. al. (2014). This chapter only focuses on the banking sector development as the impact has to be enquired on the innovation, while linking banking sector can be linked directly to the innovation activities, for e.g., providing funds to firms which are at initial stages and can later on be involved in innovation activities. On the opposite side, development of the stock market might impact innovation but is not directly linked as the banking sector development is, so this chapter only focuses on the banking sector development.

Variables that represent the financial development are chosen as independent variables. Financial development is a major aspect of economy, so considering variables that best represent the financial development is important. This paper chooses three different variables as proxies that best represent the financial development. Dutta and Sobel (2018) mentioned that these three variables are best measure of financial access, financial intermediation and depth of the financial market.

The dependent variable included in the chapter is patents by residents. Acs et. al. (2002) stated that when granted a patent to a local resident that represents new knowledge or something that is totally new as an output of innovation, patents by resident's act as a good proxy for innovation. The variable patents by residents have been used in the literature by many authors, see Ang (2011) and Pradhan et. al. (2016), further Maradana (2017) explains how good an indicator of patents by resident is.

As mentioned by the World Intellectual Property Organization (WIPO), patent when authorized, is a solo and an exclusive right for an invention, which denotes a new implementing or a new technology advancement within old techniques. Therefore, the number of patents granted within a country represent new knowledge or a completely new innovation as an output, reason being it is considered best proxy for innovation (Acs et. al. 2002, Varsakelis, 2006).

The objective of this study is not to differentiate between the kinds of innovation activities. The major purpose is to empirically examine the extent to which financial development effects innovation which helps in generating new knowledge.

In the absence of any stronger robust indicator, this study employs patent as a proxy to measure the innovation activities, as Griliches (1990) described it as the closest best proxy for incentive outputs. Further Acs et. al. (2002) demonstrates, by providing empirical evidence that patent data is an equally dependable proxy for measuring innovation activities at all levels.

Further 3 variables representing financial development sector are incorporated into the model, choice of variables that represents level of financial development is vast, but we followed the approach suggested by Dutta and Sobel (2018), in which the authors states that bank deposits to GDP, Bank credit to bank deposit and private

credit as a percentage of GDP, best represent the financial access, depth of the financial market and financial intermediation.

Following the variables of financial development, two controlled variables were added to the model, namely, gross domestic expenditure on R&D as a % of GDP and unemployment rate.

The reason to include R&D into the model is that in an economy R&D works as an input whereas patents by residents are noted as an output (measuring innovation), in order to see the direct impact of R&D on innovation this variable was introduced in the model. In order to add to the existing literature with updated data, this study aims to study this relationship in the case of EU. The study examines the impact of both patents and R&D on unemployment separately. The reason to estimate both separately is that there is high correlation between the patents (innovation) and R&D. The study employs system GMM estimation technique to produce the results for the European Union.

Unemployment rate was added as the chapter investigated the impact of innovation on unemployment in the case of EU-28. The chapter firstly investigates the basic econometric equation as follows:

$$IN_t=\beta_0 + \beta_1 BDGDP_{it} + \beta_2 BCBD_{it} + \beta_3 PCD_{it} + \beta_4 R\&D_{it} + u_{it}$$

Where, $\beta$ are the vectors of the estimated coefficients, i=1, N captures countries and t=1, T captures the years; IN denotes Innovation, measured by Patents from residents.

The above equation shows, the dependent variable as innovation which is measured by the proxy of patents by residents, on the other side the three dependent variables of financial development are followed by controlled variable R&D.

The second equation used in the chapter is as follows:

$$Unemplo_{it} = \beta_0 + \beta_1 IN_{it} + u_{it}$$

Unemplo, denotes the share of the labour force that is without work but available for work and seeking employment and IN denotes Innovation, measured by Patents by residents. The reason to examine this relationship is the criticism on innovation for promotion of jobless growth (Ricardo, 1951, p.392).

Equation 2 estimates the direct impact of innovation on unemployment. Hence unemployment rate is the dependent variable and innovation as the independent variable.

Equation 3 below investigates the impact of R&D on unemployment.

$$Unemplo_{it} = \beta_0 + \beta_1 R\&D_{it} + u_{it}$$

Unemplo, denotes the share of the labour force that is without work but available for work and seeking employment and R&D denotes the gross domestic expenditure on research and development (% of GDP).

Research and development expenditure are considered a proxy variable for the inputs of innovation activity and is also considered as controlled variable. In the literature it can be seen that there is a strong correlation between the research and development expenditure and patents at cross sectional or across industries (Teitel, 1994; Furman et al., 2002). That being the reason to remove the correlation effect while examining the effect on unemployment, this paper estimates equation 2 with innovation and equation 3 expenditure on research and development.

The reason to estimate both innovation and research & development separately is that R&D is regarded as the input whereas the innovation is measured by patents by

residents and is regarded as output, hence a strong correlation is found between them, also Furman et. al. (2002) suggested strong correlation between the two. In order for the results to be more accurate both R&D and Innovation were tested separately along with unemployment rate.

First of all, before performing any other test, the chapter employs panel unit root test as suggested by Dickey and Fuller (1979, 1981) in order to check the existence of the panel stationary.

After having established a long-term relationship among the variables, the chapter employs further estimation techniques to determine the nature of long-term relationship, three tests are employed in chapter 7, namely, Generalized Method of Moments (GMM), Dynamic OLS and Fully Modified OLS. The primary reason to use all three dynamic techniques in the paper was to determine the robustness of the results.

The reason to choose GMM, is that it overcomes the issue that arises when we use pooled data, that is problem of endogeneity. Normal pooled OLS can lack to deal with this problem. As Arellano and Bover (1995) mentioned that GMM estimation technique can better handle the problem of autocorrelation and GMM also helps solve issues related to heterogeneity.

The Panel cointegration tests included in the chapter are DOLS and FMOLS. The reason to choose Dynamic OLS and Fully Modified OLS is that these estimation techniques provide more accurate and consistent results compared with pooled OLS when dealing with panel data. Stock and Watson (1993) proposed the dynamic ordinary least square method to be effective over other methods on long run cointegration test among variables. DOLS and FMOLS are better than the normal pooled ordinary least square especially for panel data. DOLS is parametric approach,

and estimates lagged first-differenced terms. On the other hand the Fully modified ordinary least square is the non-parametric approach as stated by Harris and Sollis (2003).

Beck et. al. (2000) and Levine et. al. (2000) clearly states in their study that the issues of endogeneity and heterogeneity should be dealt with properly as there can be some serious issues in the estimation of the long run relationship among the variables with panel data.

Dynamic OLS is known as the parametric approach, which uses first lag with differenced terms while estimating. Dynamic OLS has been used in the literature for the same reasons of dealing with the problem that lies in the Panel data, see Bist (2018), this study followed the approach suggested by Kao and Chiang (2001). Dynamic ordinary least square addresses the issue of asymptotic bias included in the OLS estimate by including the leads and lags in the estimation. Also, the t-statistic computed from dynamic ordinary least square approximates the standard normal density that is far better than the ordinary least square.

Pedroni (2001) explored the ways and methods that can be used for estimation and analysis of cointegration vectors in heterogeneous panels, which are thus based on (FMOLS) fully modified ordinary least square. The author uses Monte Carlo simulations in the study to compute the t-statistic for larger sample and relatively small samples.

The reason to include FMOLS as part of the estimation analysis is based on three reasons, as mentioned by Christopoulos and Tsionas (2004), short-run adjustments can be made in FMOLS as they have consistency in long run relation, at the same time it corrects endogeneity problem within regressors and also does not disturb the time series properties among data.

The full application of FMOLS can be seen in the recent work of Bist (2018), where the author follows the approach suggested by Christopoulos and Tsionas (2004).

There is one difference between both the fully modified OLS and dynamic OLS that while both the models are dealing with the issues of autocorrelation in regression, the dynamic OLS allows addition of lagged and lead that into the variables where the fully modified OLS permits usage of Newey-West in the process of correction.

The chapter uses all three tests, GMM, DOLS and FMOLS for equation 1 mentioned above. All these tests were performed to confirm the robustness of the estimation results. For equation 2 and equation 3 only GMM estimation technique is applied, the same estimation technique was also used by Piva and Vivarelli (2004) to enquire the same relationship between innovation and employment. The probability of high correlation led to estimate the Innovation and R&D's impact separately on unemployment. Both equations were straight forward, thus only GMM estimation technique was used.

As shown in the table 15 above, there are descriptive statistics for the dependent variables, followed by independent variables of financial development and lastly the controlled variables. Firstly, the dependent variables Patents by resident's average around 4090, at the same time the highest figure is 51,736, which was from Germany in the year 2000 and the lowest is 2 that was by Cyprus in the year 2013.

The figures give an insight that with Europe, there are countries that have very high number of patents each year, at the same time there are countries that have very low number of patents each year which bring the average number quite low for the group.

Bank deposits to GDP (%) ranges for around 10 to 472 with an average of 74, similarly bank credit to bank deposit (%) ranges from around 18 to 367, so there is

huge variation among the groups, the EU sample shows that more countries have low values, thus the reason for lower mean of 116.

Private credit by deposit money banks and other financial institutions to GDP (%) show a mean of 79%, a maximum of 260% and a minimum of around 6%, again a huge variation among the sample is visible. Unemployment rate spans between 1.8 to 27 and with a mean of 7, meaning a few countries have high unemployment rate in the sample.

Gross domestic expenditure on research and development (% of GDP), surprisingly have a minimum spending of 0.2 percent, compared to a highest of 3.9 percent of the GDP with a mean value of 1.4. Highest money spending of 3.9 % of the GDP was from Sweden in the year 2001. Whereas the lowest was from Cyprus in 1998.

**Table 1: Key terms and definitions**

| S.# | Key Term | Explanation |
|---|---|---|
| 1. | Business credit: | Business credit includes credit extended by commercial banks and other deposit-taking institutions (excluding central banks) to private non-financial firms. Included are all credit institutions: domestic and foreign owned as well as private and public ones. |
| 2. | Business Credit interest rate: | The business credit interest rate is the average interest rate on the loan products offered by commercial banks to non-financial corporations. The business credit is a credit specifically intended for business purposes including secured and unsecured business loans to small or large business with variable or fixed interest rate. |
| 3 | Exchange rate to USD: | The amount of local currency units that can be exchanged for one USD. An increase (decrease) means USD appreciation (depreciation). |
| 4 | Household credit: | Loans provided by all the banks which include commercial banks and all other financial intermediaries that have deposits and are taking facility but do not include the central banks to households. The institutions included are public and private and also the home institutions and the foreign banks. Data is in Billions currency unit. |
| 5 | Money supply (broad money): | The money supply is the total amount of currency and other liquid instruments circulating in the economy. The indicator represents the broad money that includes currency outside banks; demand, time, saving, and foreign currency deposits of resident sectors other than the central government; bank and traveller's checks; and other securities such as certificates of deposit and commercial paper. |
| 6 | Private sector credit: | Loans provided by all the banks which include commercial banks and all other financial intermediaries that have deposit taking facility but do not include the central banks to private non-financial firms and households. |
| 7 | Bank Z- Score | This variable can be explained as an accounting calculation to how far the bank or banking system is free from default. |
| 8 | Financial Freedom | The Financial freedom index evaluates: the extent of |

| | | |
|---|---|---|
| | Index | government regulation of financial services, the degree of state intervention in banks and other financial firms through direct and indirect ownership, the extent of financial and capital market development, government influence on the allocation of credit and openness to foreign competition. |
| 9 | The ratio of Bank nonperforming loans to total gross loans (%) | The ratio of bank nonperforming loans to total gross loans are the value of nonperforming loans divided by the total value of the loan portfolio (including nonperforming loans before the deduction of specific loan-loss provisions). The loan when recorded as nonperforming is the gross loan value of the loan, not just the amount that is not being paid. |
| 10 | Patent applications by residents | Patent applications are worldwide patent applications filed through the Patent Cooperation Treaty procedure or with a national patent office for exclusive rights for an invention--a product or process that provides a new way of doing something or offers a new technical solution to a problem. |
| 11 | Bank Deposits to GDP (%) | The total value of demand, time and saving deposits at domestic deposit money banks as a share of GDP. Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits. |
| 12 | Bank Credit to bank deposit (%) | The credit to deposit ratio of a bank is an indicator of how much a bank lends out of its deposits or how much to its core funds are used for lending. |
| 13 | Private credit by deposit money banks and other financial institutions to GDP (%) | The amount of outstanding credit extended by banks to the non-financial private sector by deposit money banks measured relative to a country's GDP is a measure of the size of the financial sector. |
| 14 | Unemployment Rate | Unemployment refers to the share of the labor force that is without work but available for and seeking employment. |
| 15 | Gross domestic expenditure on research and development (% of GDP) | Gross domestic spending on R&D is defined as the total expenditure (current and capital) on R&D carried out by all resident companies, research institutes, university and government laboratories, etc., in a country. |

**Table 2: Data sampling**

| Variable | Used in chapter | Frequency | Observations | Measuring | Expression in Equation |
|---|---|---|---|---|---|
| Industrial Production (Proxy for GDP) | 5 | Monthly | 2591 | Growth | IP |
| Business Credit | 5 | Monthly | 2591 | Financial development | BC |
| Business Credit Interest Rate | 5 | Monthly | 2591 | Financial development | BCIR |
| Exchange rate to USD | 5 | Monthly | 2591 | Financial development | ER$ |
| Household Credit | 5 | Monthly | 2591 | Financial development | HC |
| Money Supply | 5 | Monthly | 2591 | Financial development | MS |
| Private Sector Credit | 5 | Monthly | 2591 | Financial development | PSC |
| Bank non-performing loans to gross loans | 6 | Yearly | 537 | Banking instability | BNPL |
| Financial freedom Index | 6 | Yearly | 690 | Financial liberalization | FFI |
| Bank Z-Score | 6 | Yearly | 613 | Bank risk taking | BZ |
| Patents by Residents | 7 | Yearly | 618 | Innovation | IN |
| Bank Deposits to GDP (%) | 7 | Yearly | 577 | Financial development | BDGDP |
| Bank credit to bank deposit (%) | 7 | Yearly | 587 | Financial development | BCBD |
| Private credit by deposit money banks and other financial institutions to GDP (%) | 7 | Yearly | 608 | Financial development | PCD |

| | | | | | |
|---|---|---|---|---|---|
| Unemployment Rate | 7 | Yearly | 700 | Unemployment | Unemplo |
| Gross domestic expenditure on research and development (% of GDP) | 7 | Yearly | 588 | Research and development | R&D |

**Table 3: Variables and Sources of Secondary Data Collection**

| Variable | Used in chapter | Source |
|---|---|---|
| Industrial Production (Proxy for GDP) | 5 | World Development Indicators Database |
| Business Credit | 5 | The Global Economy |
| Business Credit Interest Rate | 5 | World Development Indicators Database |
| Exchange rate to USD | 5 | World Development Indicators Database |
| Household Credit | 5 | The Global Economy |
| Money Supply | 5 | World Development Indicators Database |
| Private Sector Credit | 5 | World Development Indicators Database |
| Bank non-performing loans to gross loans | 6 | World Development Indicators Database |
| Financial freedom Index | 6 | The Global Economy |
| Bank Z-Score | 6 | World Development Indicators Database |
| Patents by Residents | 7 | World Development Indicators Database |
| Bank Deposits to GDP (%) | 7 | World Development Indicators Database |
| Bank credit to bank deposit (%) | 7 | World Development Indicators Database |
| Private credit by deposit money banks and other financial institutions to GDP (%) | 7 | World Development Indicators Database |
| Unemployment Rate | 7 | World Development Indicators Database |
| Gross domestic expenditure on research and development (% of GDP) | 7 | World Development Indicators Database |

**Table 4: Descriptive Statistics**

| Variable | Mean | Maximum | Minimum | Std. Dev. | Observation s |
|---|---|---|---|---|---|
| Industrial Production (Proxy for GDP) | 0.289057 | 5.324911 | (2.043795) | 0.800451 | 2591 |
| Business Credit | (0.026198) | 6.125576 | (0.484880) | 1.059784 | 3925 |
| Business Credit Interest Rate | (0.054291) | 6.612034 | (1.432725) | 1.016404 | 3617 |
| Exchange rate to USD | (0.031624) | 6.971737 | (0.234573) | 0.968622 | 2591 |
| Household Credit | (0.144747) | 5.069424 | (0.549916) | 0.806886 | 2591 |
| Inflation | (0.026456) | 5.718701 | (5.447592) | 0.964113 | 2591 |
| Money Supply | (0.050786) | 7.953805 | (0.43781) | 1.013966 | 2591 |
| Private Sector Credit | (0.168194) | 4.975146 | (0.530542) | 0.781465 | 2591 |
| Bank non-performing loans to gross loans | 6.217937 | 48.6758 | 0.081808 | 7.364305 | 537 |
| Financial freedom Index | 67.53623 | 90 | 30 | 13.91513 | 690 |
| Bank Z-Score | 11.64672 | 47.5733 | 0.0167 | 7.249765 | 613 |
| Patents by Resident | 4089.54 | 51736 | 2 | 9660.406 | 601 |
| Bank Deposits to GDP (%) | 73.89281 | 472.049 | 10.1831 | 62.6878 | 577 |
| Bank credit to bank deposit (%) | 53.99541 | 367.077 | 17.7947 | 53.99541 | 587 |
| Private credit by deposit money banks and other financial institutions to GDP (%) | 79.15811 | 260.704 | 6.392122 | 44.09211 | 608 |
| Unemployment Rate | 7.745 | 27.47 | 1.8 | 4.345857 | 700 |

## 4.5 Chapter Summary

This chapter briefly explained the methodology used in the three chapters of the thesis. As part of the methodology a number of things were explained, why we used specific method.

First of all, for all chapters the time frame was mentioned followed by the frequency of the data. Monthly data is used in chapter 5 and for chapter 6 and 7 yearly data is used. This thesis used panel data across all chapters. Different data is being used for all three chapters as the variables in each of the chapters are different. All chapters are mainly based on EU-28 countries but with the exception of one chapter where EU-23 was under consideration due to data being unavailable at large for a new country.

All variables used in three empirical chapters are listed in the table 1 above, which shows the sources of the variables along with in which country the specific variable was used. In this chapter a brief statement was also given for the reason for choosing the main variables and what literature says about it.

As all three chapters use the panel data which allows for time series along with cross sectional. The choice of model was hence really important. Chapter 5 uses pooled OLS along with random estimation technique with dummy variables. It is important to use pooled OLS estimation technique in this model, so that then with the random model, the dummy variables can be introduced, which were designed to enquire the impact of financial crises of 2007-2008 on economic growth. Knowing that there are few problems in pooled OLS estimation technique when using panel data, the chapter also later on used GMM estimation to check the robustness of results.

For all three empirical chapters, the selection of estimation technique was made on the basis of need of the model. Chapter 6 has fewer number of variables, but since the enquiry was more complex thus different estimation techniques were used, namely

GMM, DOLS and FMOLS, which overcome the issues that lie with the pooled OLS estimation technique. Further it was necessary in the model of chapter 6 to enquire the causality of direction hence Granger causality test was also employed.

Finally, about chapter 7, the model for this chapter was simple and was using the patents by residents which was proxy for innovation as dependent variable and other financial development related variables employed GMM, DOLS, and FMOLS in the chapter. Enquiring the impact of Innovation and R&D on unemployment, the study used GMM to enquire this relationship but Innovation and R&D have high correlation.

# Chapter 5: Financialization, Financial development and Economic growth

## 5.1 Introduction

This study at the first place examines the important relationship among financialization, financial development and economic growth for the case of EU countries. Then this research work examines the role of financialization in increasing indebtedness which includes household debt, gross disposable income and other credit related variables. The data observations used here are on monthly basis. Countries within the European Union have seen very high growth rates from time to time but the economies that joined the EU much later struggled through the transition period. European Union together is one of the largest economic blocks around the world which follows a single currency as well, so European Union plays an important role at both the economic level as well as the financial, which make European Union an interesting block to study for analysis.

The important fact to highlight is that there has been a lot of research regarding the finance and growth nexus in regard to both theoretical as well as at empirical level, but considering the impact of financialization, the area lacks the research and the empirical evidence regarding the effects of financialization Sawyer (2014). As a subordinate goal, the aim of the study was also to learn about the boom-and-bust cycles over the period of time and how important is the credit allocation which determines the direction of the economy. Another focus of this paper is to establish a link between the increased indebtedness with the increasing role of financialization in the case of EU. In order to learn about the boom-and-bust cycle and how credit availability changes the direction of economies in the EU; this study contributes by

investigating with empirical evidence and takes 20 years data into account and gives a break after 10 year at the 2008 crises.

Further the study is not based on traditional financial growth variables but takes into account different variables which show how either liberalization or repression has changed the direction of the economy over the time period. In order to capture the effects of credit allocation variables representing the credit availability in an economy, these variables are taken into account to learn about the effect of changes credit allocation and also to check the if financialization increases the indebtedness.

The contribution of this research is that it provides evidence that credit allocation through the process of financialization is a key to determine the driving force of economic growth. Also, the study is based on monthly data rather than yearly to have accurate results and findings. Along with the monthly data, in order to enhance the results in the study, data were collected at country level for European Union rather than the economic block as a whole.

The finance and growth nexus have long been studied but the mechanics of the research have been changing with the time, as the new products are introduced into the markets which give rise to an investigation from another angle recently the rapid expansion of financial markets as well as the equity markets has brought much attention from the researchers to financial markets rather than the traditional banking. Sehrawat and Griri (2016). Financial crises 2007 was triggered by the high volume of mortgages given in the years before which led to boom in housing resulting in collapse of the market and thus people became unable to payback and that led to very high default on mortgages. The policies before the time of crises were also supporting the investment in real estate with low interest rate, so the expansionary monetary policy also led towards the high default rate. Equity markets as well as the credit

markets had a clear effect on the rate of growth which showed that these markets can have a significant amount of effect as seen in 2008.

The major liberalization in the U.S during 70's along with financial globalization started many other things which were not so easy before, for e.g., the rise of the arbitrage market. There are number of factors which exposed the financial markets to risks greater than before for e.g., volatile exchange rate which can lead to trade imbalances, the time to correct it, is hence too long, which can further bring the damage through capital flows and eventually it is not the economic conditions that set the exchange rate for a country but the capital flows (Wang, Chen & Xiong, 2019)

Financial developments when studied by the researchers have a wide range of possible variables in order to determine the impact of financial sector development on economic growth like size of the financial institutions and the products that are offered by these institutions. Better information within the financial markets works better towards developing the financial system, in addition well informed markets create no opportunities for arbitrage to take place, so more the information the better does the financial system work (Pradhan, Arvin & Norman, 2015)

Compared to other sectors in the economy, financial sector is faced by more regulations due to which is the need of the hour that financial system is made transparent. Financial repression is the time when the policies regarding the rules and regulations in the financial system are stricter which can undermine the performance of the financial system as well as the real economy but at the same time there are less chances of occurrence of a financial crisis. Most of the economies around the world in the recent times have being following financial liberalization policies in which deregulation plays an important role, that is done in order to promote the rate of growth in the real sector by creating more opportunities for investors. The financial

crises in the last few decades have highlighted the loopholes that are found in the financial system or how financial intermediaries find ways to overcome the regulation as seen in the recent crises. Through this and other lessons learnt new rules and policies are made time to time in order to protect the financial system from exposing it to risk which could be avoided altogether.

Financialization is a wide term which has been sometimes described as financial deepening or financial liberalization whereas these terms do not cover all areas that are involved in financialization, as this term is a whole process through which the economies go through, as the financial sector is increased for an economy relative to its real sector. The way financial sector used to support the real economy changed when the economies left the industrial capitalism behind. The financial sector is now the need of the real sector to grow and work properly Shen and Lee (2006)

If the policies are made according to financial repression the effect of which could clearly be seen in the changes of interest rate which would not be so favourable to the businesses as before thus these can undermine the performance of the firms. The policies with financial repression are stricter, there are more rules and regulations in the financial markets. The changes in the rules and regulations within the financial sector directly affect financial development and thus the economic growth.

To summarize this part of the study, the important issues are laid out that are going to be discussed in later part of the study most importantly the role played by financialization and the credit allocation in an economy. Followed by the gaps in the literature of the studies which are going to be addressed later in this study. The research question of this study is what is the role played by the financialization in the stability of economies across European Union? Also, to determine the relationship between the two in the time of crises.

The structure of the paper is as follows; section 2 has an immense importance because it tends to develop the base of the study to understand the process of financialization in detail, and how it is associated with economic growth. Further it explains the financial liberalization and financial repression on how different period of times have reacted to different policies over time. Then further section 2 discusses the details of financial sector and the development of the financial sector over the time period and finally section 2 gives an overview of the role played by the financial intermediaries. Section 3 discusses the results and interpretation in detail followed by conclusion and policy implication.

## 5.2 Theoretical developments:

### 5.2.1 Financialization and Economic growth

Financialization and economic growth have a very important and clear relationship. In this section, the arguments are presented to demonstrate the importance of the relationship. The financial sector firstly had seen massive growth from 1960's.

The financial crisis of 2008 was clearly linked with high levels of debt given to household which they could not afford. Financialization clearly played a very important role when the financial institutions lacked the risk assessment of the customers or were too busy in selling out more and more loans to make money on quantity of the loans. This was the point that led the industry practitioners and scholars to realize that increased financialization can trigger a crisis in no time leading to financial instability globally and having adverse economic effects on world Misati and Nyamongo (2012)

The main point is that as the real sector within the economy grows as it is dependent on the financial sector mainly due to the credit, that they take in order to expand their operations which increases the dependence of real sector on the financial sector and the financial sector tends to make money out of the real economy. This too much dependence causes problem as we have seen in the financial crises of 2008 that the effects were not limited to financial institutions but also the real sector of the economy as well, so this interdependence at a large scale is not good for the economy as a whole Odhiambo (2008).

The point where it all began was the evolution of the shadow banking which is very different than the normal bank which plays the role of borrowing and lending but instead this system was new market which was then not as regulated as the traditional financial intermediaries which consisted of various entities such as investment funds or special purpose vehicles were created to avoid the regulations imposed on

traditional banks. Financial technology along with innovation of new financial products changed the direction of the financial industry i.e., bringing the complex products into the market with high risk such as mortgage-backed securities. Some argued that relaxation in the regulations of the financial sector tend to evolve through financialization and will be better able to manage the risks.

On the other hand, as a Post-Keynesian, Minsky (1986) stated that financialization for those markets which are not stale tend to boom the economy through the bubble for a short time before it is being hit by a recession. In the recent times argument about the past correlations could be very helpful in order to determine the level of risk. In the literature many studies found the relationship to be positive but, in some cases, researchers could not actually find a relationship between the two. Merton Miller (1998, p.14) suggests clearly in terms of contribution of financial sector towards the economic growth so evidently that it cannot be doubted.

The work of McKinnon (1993) provides an argument which supports the idea that increase in the size of the financial sector contributes to the economic growth. Since early 1990's the financial sector has seen growth at a large scale which not only includes the importance and growth of the financial intermediaries in contrast to the real sector, but other financial tools like derivates to hedge risk not only that another market has developed of crypto currencies which is a new investment platform affected by market information. Also, it works as a payment system. Fintech has evolved the way the financial markets used to work, Fintech with the innovation and improvement in the technology has made the normal banking function really easy for everyone and now those products with the help of Fintech are available to everybody regardless of the income.

Levine (2005) pointed out a few points which can help develop a sound financial system which would be helpful in promoting the economic growth along with less risk. The first point is to have perfect information within the financial markets for informed investment then the transfer of funds for large investors should be free of cost and also have a cost-effective system in place that supports the trade of goods and services. Lastly, to create transparency within the financial system this should be made better able to monitor.

The process of financialization has led to the development of a better developed system that supports the domestic and international banking system. In the developed economies, the improved banking system which leads to decrease in the cost of transaction are being made and the cost of monitoring the financial system.

Another question that arises with the increase in the role of financial sector that it does support the real economy, but that debt led growth is not feasible in the long run. The firms borrowing money will need more in the coming times, hence, nobody knows when to stop borrowing which creates a bubble with an increase in the prices and soon that leads to a bust.

### 5.2.2 Financial liberalization and Financial repression

Financial Liberalization is present when there is relaxation in the regulation pertaining to financial sector. It aims to promote growth and importance and on the other hand the repression is when there are more rules and regulations for financial sector in order to control it for shunning any problem to the economy. The researchers have been exploring both liberalization and repression in order to determine which is better for the economy, but the debate is still going on. In the past, both of liberalization and repression have been seen success and both phases have seen crises as well but in today's world with the advent of technology and globalization,

liberalization seems to be better option but there must exist rules and regulations in order to avoid any financial crises Roy and Kemme (2020)

The Financial liberalization started in 70's, mainly the U.S started to liberalize its financial sector, on the other hand the developing nations also saw a huge decline in economic growth due to poor policies which were meant to be strict for the financial system also known as repression that did not work out. The new thought was presented in the works of McKinnon (1973) and Shaw (1973) who argued that if the policies and regulations are not so strict in the financial system, such as not requiring so high reserves which can ultimately undermine performance through less money on hand for investment. The authors suggested that steps like these can increase the performance of financial system and support growth in a positive manner. On the other hand, Demirguc-kunt and Deragiache (1998) suggested that relaxing the regulation in the financial system does not necessary mean that it would benefit both financial system and growth but on the other hand it could be exposing the financial system to other risks.

In the work of Ang (2009), this was analysed that cost as well as the benefits are tagged with financial liberalization and financial repression. The author stated that making the policies is one thing but implementing them is another, so the impact of the policies highly depends on how strongly these are implemented. This study by Ang (2009) also determined for the case of India for example that when reserve cash requirement is levelled up by the central banks, the negative effect then is clearly obvious in the financial development as it slows down.

In the last 2 decades, the financial liberalization had changed the way the financial institutions used to work. If the banks are left on themselves to decide about credit allocation, they will go for financing of projects with lower risk and short turnover

than the ones with high turnover, yet they need more initial investment with long yields with long life span. So, interference of the policy makers is essential to determine the correct allocation of credit which provides growth but not only short-term returns.

### 5.2.3 Background on EU banking sector and financial development

European Union being the biggest economic block in the world, has no borders and enables member estate countries to enjoy goods from trading at no extra duties and all this is happening with the support of the financial sector which performs a crucial role in supporting the trade through an integrated financial system for member estates within EU. The role of financial institutions is very important across EU, investment funds enable investors across EU to diversify their portfolio by providing quality guidance and support. Financial integration report on Europe issued by the European Central Bank stated that financial integration within EU with time has become more elastic to absorb negative shocks in the past few years. Further the report mentioned the integration process of the countries in the EU has become strong after the crises of 2008, which can be seen in terms of price integration as well as the quantities across EU.

While analysing the less developed countries in Euro era which lately joined Euro era during the past 30 years, asset share of state-owned banks decreased significantly, and the asset share of foreign owned banks increased almost to double. Foreign banks have played a vital role in the financial sector development where they brought new products into these less developed economies which were previously not available. Also, the technology which helped fast and easy movement of money and thus

increased the competition, which then led to numerous mergers and acquisitions thus increased the size of the foreign banks in these economies.

### 5.2.4 The problem of too big to fail & the role played by the financial intermediaries

Too big to fail cannot be ignored especially after the crises of 2008 where it was seen that failure of single big bank could begin a financial crisis thus leading to an economic crisis. It was the process of financialization that led the banks to become so big. The work of Saunders and Walter (1994) mentions that a financial institution when grows too large in size then it would be going bankrupt and bankruptcy of a single bank could create chain as all financial institutions are somehow interconnected and the most likely outcome of this is credit freeze. Due to chain effect, the flow of the credit within the banks freeze which creates problems. Cost associated with supporting one bank is far better than cost of supporting the entire system.

Even when the banks know that they might land in danger even then they keep going, the reason being that financial intuitions know that they will be saved rather than let free to go default, this is how moral hazard issue is created in this regard. The work of Stiglitz (2010) stated that when banks are involved in making riskier investments then the major pay out from the investments are made first to stakeholders and then to the managers but if those riskier investments turn into huge losses, the taxpayer's money is lost through government bailouts.

Countries that have a larger and developed financial system are more likely to support economic growth in positive manner through the process of financial development (Levine and Zervos, 1998). The authors also stated that level of liquidity of the stock market can play a crucial role, the higher the better for an economy. Financial

institutions may also be able to help the liquidity within the markets which can thus have positive macroeconomic effects.

The work of Loayza and Ranciere (2006) mentioned that in short run the relationship is not visible, on the other hand in the long run, the relationship is quite evident, the authors further added that the positive impact could lead to financial stability in the system.

Information like any other sector, is also an important factor in financial sector, mergers and acquisitions are mainly based on information on companies that is provided through investment banks, and in the process the large firms sometimes takeover small firms which are not so efficient. Information plays a crucial role as it helps increase the competition within domestic market if it is easily available. The asymmetries are reduced in the market when the investment banks roll out the information regarding a firm to the general public (Morrison & Wilhelm, 2008).

Financial intermediaries perform all types of activities for the purpose of saving and investment process. The fundamental question here is whether the development of financial intermediaries exert a positive effect on economic growth? What is the impact of financialization on financial development and thus on the economic growth?

Čižo, Lavrinenko and Ignatjeva (2020) examined the EU countries to enquire the relationship among financial development and economic growth. The dataset included by authors in the study starts from 1995 up till 2017. The study showed to have a positive correlation before the crises period, however a negative correlation was found in the period of crises and after the crises.

Study based on China, Japan and India investigated the effects of financial development on economic growth. The work of Feng Wu et. al. (2020) included the

data from 1960 up till 2016, using the ARDL approach the authors showed that no long-run co-integration was found but in the case of short run cointegration was quite evident for the financial development and economic growth. Credit to private sector was used as a proxy of the financial development.

Similarly, Afonso and Arana (2018) empirically examined the relationship among financial development and economic growth, the data set included in the study stretched over 26 years starting from the year 1990, taking into account OECD countries, the time frame of data set allowed the researchers to analyse the financial crises of 2007-2008. The authors demonstrated that when the domestic credit is increased by the financial intermediaries, then the per capita GDP is positively affected by the market capitalization. While taking into consideration financial liberalization, Colle (2018) investigated its effects on growth, the study demonstrated that financial liberalization exerts a positive impact on economic growth, but it is subject to the fixed cost, so if it helps lower the fixed cost then through the increased competition within financial sector, it fosters economic growth.

Batuo, Mlambo and Asongu (2018) studied the relationship of financial development and economic growth through financialization and financial instability. The dataset included in the stretched over 25 years, the authors had taken 41 countries into consideration for analysis. The findings of the study suggested that financial development along with financial liberalization exerts a positive impact on financial instability, the authors also highlighted the fact that the countries included in the sample showed to have lowered the financial instability with an increase in the economic growth levels.

However, the central and South Eastern countries carry huge importance and one must explore hypothesis over there as well. Skabic (2017) focusing on a number of

central and a few South eastern European countries captures the impact of financialization on economic growth. The author had used Granger causality test for empirical investigation. The findings of the study suggested that economic growth does promote stock market capitalization, but in the case of financial development the result was very weak. However, on the other hand economic growth is promoted through both the stock market capitalization and financial development.

In order to investigate the relationship among the economic growth and real exchange rate Habib, Mileva and Stracca (2017), included the dataset for 150 countries, spanning over 5 years. The authors found out that to have an inverse relationship between real exchange rate and economic growth, as when the real exchange rate depreciates the real GDP of the country increases and vice versa. Nyasha and Odhiambo (2017) while studying the finance-growth nexus at both empirical and theoretical level, pointed out the core issues of the complex relationship between the two, the authors mentioned that the relationship among finance and growth is very complicated, the authors also highlighted the fact that in order to establish the relationship there are various factors and determinants that need to be taken into account.

A study in Ghana furnished similar results as stated above. Abebrese and Pickson (2017) investigated the effect of financial development on economic growth in the case of Ghana. The study included the data from 1970 to 2013. The finding of the study suggested changes in the domestic credit of the country affects the real side of the economy.

At times financial development has not ushered economic development. Demetriades and Rousseau (2016) studied relationship among financial development and economic growth, the authors clearly mentioned financial depth is hence not supporting

economic growth directly, also the authors added that the relationship is highly dependent on the regulation within the financial system. Arestis (2016) studied the relationship among economic growth and financial development, in addition the author also focused on the effects of financial liberalization. The study stated that not even the financial crises of 2007-2008 has changed many things in the financial sector, but there has not been much improvement even since then, however the author suggested that there needs to be more policies in practice in order to avoid events any like this rather than just giving proposal of policies.

No doubt, financial development is a function of financial structure. Makiyan and Izadi (2015) examined the role of financial structure as well as the impact of financial development on economic growth for the selected countries. The dataset for the study ranges from 1989 to 2011. The study used Fully Modified OLS for analysis, the results from the regression suggested that, financial development exerts a positive impact on growth in overall sense. In addition to that, the authors also used Granger causality test to enquire the direction of causality for the relationship, the results from the Granger causality test suggested to have only one-way causality between the two in short-run, however in the long-run the causality was found to run in both directions.

By the same token, Arcand, Berkes and Panizza (2015) investigated the relationship among financial depth and economic growth. The authors used system GMM as an estimation technique, the findings of the study suggested that economies which have very large financial system, the effect on growth for those countries is minor, on the other hand the countries whose financial system is not so large tends to benefit more from finance in terms of supporting the growth, the authors highlighted the fact that finance fosters growth only up to a certain level, after the threshold level, it tends to

effect the growth in a negative manner. In a similar investigation, Law and Singh (2014) used the dataset of 87 countries, they used the dynamic panel threshold estimation technique. The authors demonstrated that there is clearly a threshold level in the case of finance to impact growth, they also suggested that the positive impact is only there till a certain level after which the impact becomes negative. The study highlighted the fact that it is not necessary that high level of finance is better for economy.

An important and pivotal work of Madichie el. Al. (2014) empirically investigated the relationship between finance and growth. The dataset was ranging from 1986 up till 2012 based on Nigeria. The authors used OLS and Granger causality test as an estimation technique. The results of the study suggested to have a positive relationship in the short run, however the same is not evident in the long run in the case of Nigeria. The authors using Granger causality test demonstrated that the causality runs from economic growth to financial development, while adding that there is no evidence of bi-directional causality among growth-finance.

North African countries certainly carry different manner of financial development and economic growth. For example Sghaier and Abida (2013) while studying the four North African countries, with dataset stretching over 31 years starting from 1980, empirically investigated the direct impact of foreign direct investment on the economic growth. The authors used GMM estimation technique for analysis. The findings of the study suggested that FDI exerts a clear positive effect on economic levels, the authors highlighted the fact that in order for FDI to be effective, financial development has to be there.

The work of Hye and Wizarat (2013), examined the linkage between financial liberalization index with economic growth, the dataset included in the study ranges

from 1971 to 2007. The study used ARDL estimation technique for analysis, the findings of the study showed that in the short run FLI and economic growth are positively linked, on the other hand in the long run the results are statistically insignificant.

Finance growth empirical work of Zhnag, Wang and Wang (2012) based on over 280 cities of China, the study stretched over 5 years, starting from 2001. The study used cross sectional regression analysis along with GMM estimation technique. The authors demonstrated that financial development exerts a positive impact in the case of selected Chinese cities.

Chakraborty (2010) using the quarterly data spanning over 12 years starting from 1993, study focused India, and it examined the period after reforms to study the impact of financial development on economic growth. The author used cointegration technique as well as the vector error correction method for empirical analysis. The findings of the study suggested that any increase in the market capitalization undermines economic growth in the case of India. The results also showed that human and capital growth fosters growth for the country. Similarly, Beck, Levine and Levkov (2010) through empirical analysis enquired the direct effect of deregulation and income distribution. The findings of study suggested that to have higher income inequality during the period of deregulation.

The work of Odhiambo (2008) enquired about the relationship among financial depth, saving and economic growth, by using the yearly data from the year 1969 up till 2005 for Kenya. The author used a different model than the traditional studies enquiring the same relationship, by developing a tri-variate model. For empirical analysis the study incorporated cointegration method and error-correction mechanism. The results of the study suggested that economic growth leads to saving mechanism while on the other

hand reforms made in the interest rate lead to development of the financial system. The author suggested that economic growth is supported by the financial depth but it should be handled with extreme care.

The finance-growth nexus has been explored by many authors, there are not many studies that focus on the transition economy. Kenourgios and Samitas (2007) worked on Poland, which is a transition economy and joined EU much later. The authors used quarterly data spanning over 10 years and starting from the year 1994. The study used cointegration test for analysis, the results of the study suggested that credit to private sector is one of the main contributors to economic growth in the case of Poland. The study also highlighted the fact that physical capital is also vital for the economic growth.

South Eastern Europe has also posed similar findings. Hagmayr, Haiss and Sümegi (2007) taking into account four economies from South-eastern Europe, studied the finance-growth nexus. The authors included yearly data stretching over 10 years, starting from 1995. The study followed a production function approach, the findings of the study suggested that capital stock market as well as the bond market exerts a positive impact on the economic growth for the selected four countries.

Shen and Lee (2006) revisited the finance-growth nexus for the selected 48 countries. The dataset included in the study was from 1976 up till 2006. The authors used the linear model demonstrated that only development of the stock market exerts positive impact on the economic growth for the selected sample. On the other hand, findings suggested that development of the banking sector can undermine economic performance.

Number of studies that came out at the same time, confirmed the relationship among financial development and economic growth to be statistically significant and positive

using the time series analysis. (Christopoulos and Tsionas, 2004; Bekaert, Harvey and Lundblad, 2005).

Using the GMM estimation technique, Rioja and Valev (2004) took a sample of more than 70 countries for empirical analysis. The authors investigated the relation of financial development with economic growth. The results of the study suggested that impact is dependent on the level of financial development within the country. Improvement in financial system in countries with underdeveloped financial system can exert an uncertain impact on economic growth. However, the countries which had intermediate financial development tend to produce huge impact on economic growth with improvement in financial system. Lastly, the countries with fully developed financial system can undermine growth with further development of financial system.

Using the industry specific and country specific data to enquire the role of financial development along with property rights in supporting economic growth, Claessens and Laeven (2003) demonstrated that financial development leads to better financial access which thus improves the property rights, which eventually boost the economic growth as well.

A mammoth work was done by a few researchers. The work of Calderón and Liu (2003) based on over 100 countries, examined the direct causality between financial development and economic growth. The data set included in the study spanning over 34 years starting from 1960. The authors using the Geweke decomposition test, demonstrated that, in the long run financial development clearly exerts a positive impact on economic growth. The authors also found out to have a bi-directional relation between financial development and economic growth in the case of selected countries.

The two studies as follows, Beck and Levine (2004) and Rousseau and Watchtel (2000) used a different approach than traditional finance-growth studies, the authors used dynamic panel estimation techniques for estimation. Both studies incorporated variables that best represent the stock market. The results of the empirical analysis suggested that a few external factors can play a vital role in promoting economic growth through banking sector development along with the development of stock market.

Stock markets cannot be isolated from research. Arestis, Demetriades and Luintel (2001) investigated the impact of financial development on economic growth while specifically focusing on the role of stock markets. The study based on number of five developed countries, used the quarterly data. The authors used vector autoregression (VAR) for empirical analysis, demonstrated that the overall effect of the stock market development is clearly visible on economic growth, but banking sector development might contribute less than the stock market towards growth if compared.

Hermes and Lensink (2000) enquired the role of financial system development, studied the transition economies, the authors clearly stated that in order for the financial markets to function properly, there needs to be regulation's updating along with enforcement these regulations, followed by the monitoring of financial markets. Levine, Loayza and Beck (2000) using the data for 74 countries, studied the financial intermediation and growth. The dataset included in the study stretched over 35 years starting from 1960. The authors using GMM as the estimation technique showed that financial development exerts a positive impact on the economic growth. The authors highlighted the fact that the channel for financial development and economic growth relation runs through total factor productivity.

Benhabib and Spiegel (2000) in their study on finance-growth nexus mentioned that financial development exerts a positive impact on the growth of total factor productivity as well as the rates of investments. The authors suggested that the results could vary based on the selection of variables that represent financial development, in addition the country specific results could differ.

The work of Rajan and Zingales (1998) examines if financial development led to promote growth through the cost of financing. The findings of the study suggested that firms that rely on the external funding are better able to work in countries that have a developed financial system. The authors also mentioned that the impact of these firms on economic growth is almost the double when working in a well-developed financial system.

The area of finance-growth nexus has long been studied, with time the techniques and way of investigating the result have changed but in the literature there is no clear consensus among the researchers on the nature of relationship between the two. Some authors have mentioned as the relationship can hardly be observed for e.g., Lucas (1988), at the same time there are some researchers who mentioned, that the relationship is so clear that it should not be questioned, Merton Miller (1998). Some of the researchers have pointed towards the important role of finance in supporting growth (McKinnon, 1973: King and Levine, 1993).

The work of Bencivenga and Smith (1991) suggested that the financial institutions can foster the economic growth through the reduction of liquidity risk. The corporate governance increases the productivity as well as the capital formation and finally boosts the economic growth.

The literature regarding the financial development and economic growth nexus has been studied empirically where the researchers have used data at the micro level

which could be either a sector or company. The empirical study based on a dynamic model conducted by Greenwood and Jovanovic (1990) examined the relationship between financial development and economic growth, the authors suggested that banks with better information on hand can lead to a better allocation of funds through making good investments thus leading to economic growth as well.

Patrick (1966) investigated the direction of causality at different stages for financial development and economic growth, the study found out that in the early stages finance fosters growth, however in the latter stages when there is an increased demand for financial services, real sector adds to the development of the financial sector as well.

Studies in the literature also shows the importance given to the role of intertest rate when studying finance-growth nexus, the studies investigate the direct impact of interest rate on the rate of growth, such literature is also developed by the neoclassical growth framework as well as shown by the hypothesis of McKinnon-Shaw. In the work of McKinnon-Shaw (1973) it was mentioned that increased restrictions on the financial system increase the volatility in the financial prices and the authors also mentioned that the impact of which can be seen on the economic growth as it slows down. At the same time the authors McKinnon-Shaw clearly mentioned that financial liberalization clearly exerts a positive influence on the rate of economic growth.

Schumpeter (1934) highlighted the important role that is played by financial institutions, he argued that investment function of banks is one of the important functions of banks which fosters economic growth in an economy, hence suggesting financial institutions are a main component of an economy. On the other hand, a few authors stated that the role played by financial institutions in the economic development is just overvalued.

The literature discussed above briefly compromises the studies that focus on the development of the financial sector and how these developments have affected the economic growth in various countries at different times. The studies summarized above included both cross country studies and single country studies. The literature also discusses the studies which focus on the financial crises and its effects on economic growth. In addition, the literature discusses the regulations related to financial development that enables to prevent any crises and how new regulations are made with the new products in the market. In this paper, the literature also discusses the various methods used by different authors to study the same relationship.

This study is mainly empirically focused, the reason being that some studies which were only theoretical have been excluded from the discussion. In addition, studies which were examining the indirect relationship between financial development and economic growth are also excluded from the discussion.

The main objective on which this paper is focused is to examine the effect of financial development on economic growth in the EU, in addition the paper studies the role played by financialization in development of the financial sector and its effects on economic growth. The paper also focuses on the financial crises of 2007-2008, it enquires the relationship of financial development with economic growth before and after the crises. The research question of this study is what is the role played by the financialization in the stability of economies across European Union? Also, to determine the relationship between the two in the durations of crises.

The financial development is broadly seen as the improvement in the quality of the financial system. Gehringer (2012) mentioned that the financial development acts as the source of betterment for the transaction system of an economy. The literature shows many indicators that are used to estimate financial development, this study

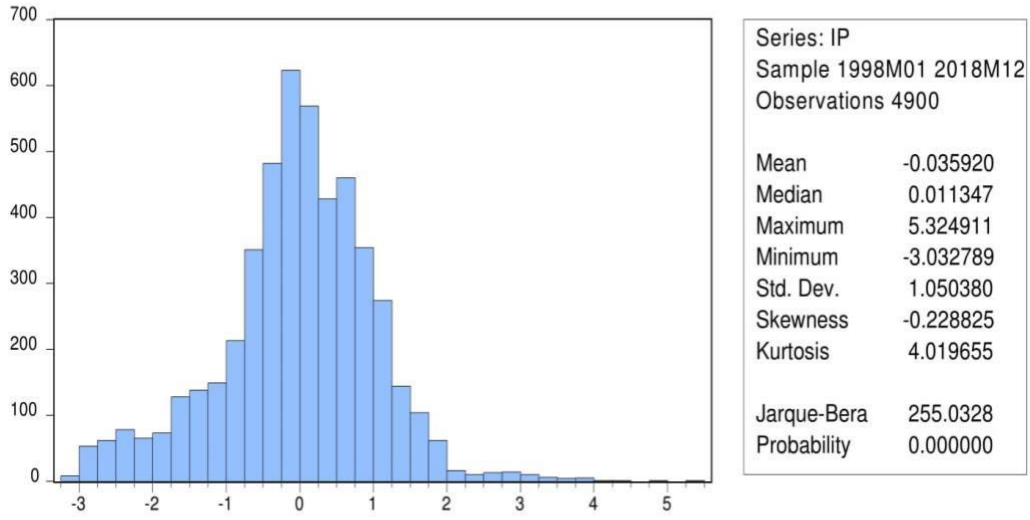
chooses the indicators more appropriate with the investigation. Different methods have been used by different authors in literature to estimate the impact of financial development on economic growth. The work of Goldsmith (1969) focuses on the value of assets for the bank to determine financial development.

Literature shows variety of methodologies used by researchers in the estimation of financial development and then checking for its effect on economic growth. The work of Goldsmith (1969) simply takes value of banks into account in order to estimate the financial development. Whereas in a recent study done by Prochniak and Wasiak (2017) which incorporated many different ratios into the model i.e., capital to asset, all these ratios are an estimate which determine the performance of the banks. Beck, Levine and Loayza (2000) while estimating the financial development, used private credit as a main indicator of the financial development.

The model includes total of 6 independent variables (Business Credit, Business Credit Interest Rate, Exchange Rate to USD, Household Credit, Money Supply, Private Sector Credit). A brief description of each variable is given below. The reason to choose variables that represent the credit allocation in the economy was to learn about the boom-and-bust cycles while studying the effects of financialization on growth. In order to give a complete picture of the output in the economy using the high frequency data, as GDP itself is only available on quarterly basis and calculating it on monthly basis is not so reliable. There are many credit related variables used in the study as independent variables. The use of industrial production was to check the impact of the credit related variables on output. A study by Erkisi and Tekin (2019) shows a unidirectional causality to economic growth.

Figure 1:

Histogram for Industrial Production (proxy for GDP)




Source: E-views

The figure shows industrial production for total number of 23 countries from European Union. It shows that number of countries lies in various ranges from 1998 to 2018. For all the countries the standard deviation is 1.05. The maximum value was 5.324 and mean value for all countries was – 0.0359 which shows some of the countries had serious economic troubles which brought the mean of all countries to a negative value. As it appears on the graph and skewness has a negative value of – 0.2288.

## 5.3 Results and Interpretation

### 5.3.1 Panel unit root test results

Table 5:

ADF test

| | ADF |
|---|---|
| | 1st Difference |
| Variables | Without trend |
| IP | 0.0000* |
| BC | 0.0000* |
| BCIR | 0.0000* |
| ER$ | 0.0000* |
| HC | 0.0000* |
| MS | 0.0000* |
| PSC | 0.0000* |

After performing the unit root test on Level, the study rejected the null hypothesis then performing the ADF test on 1st difference, the study failed to reject the null for all the series included in the model. The results demonstrates that all 7 variables part of the study have same level of integration. The integration among the series implies that there is hence a long term relationship between the series included in the study

### 5.3.2 Pooled OLS regression

The regression estimates from the pooled OLS is shown in the table 4 below, using monthly data from 1998 to 2018 for the countries from European Union. The effect of Business Credit, Business Credit interest rate, Exchange rate to USD, Household credit, Money supply and Private sector credit as independent variables were tested on Industrial Production (proxy for GDP).

Table 6:

Pooled OLS regression

| Variable | Coefficient | Prob. |
|---|---|---|
| C | (0.001359) | 0.9943 |
| BC/INF_MONTHLY | (0.94394) | 0.000*** |
| BCIR/INF_MONTHLY | (0.03214) | 0.1154 |
| ER$/INF_MONTHLY | 2.23603 | 0.000*** |
| HC/INF_MONTHLY | (4.06709) | 0.000*** |
| MS/INF_MONTHLY | (0.68853) | 0.000*** |
| PSC/INF_MONTHLY | 11.62914 | 0.000*** |
| F prob. | 0 | |
| R-squared | 0.220279 | |

*, **, *** denote rejection of null hypothesis at the 10%,5%,1% levels, respectively.

All the variables are statistically significant except Business credit interest rate. Business credit have a negative, statistically significant effect on the economic growth which shows that any increase in the business credit tends to decrease the economic growth within EU.

The result from the business credit interest rate result has a negative coefficient which is justifiable as the business credit interest rate increases, it would make the investments made by the firms decrease or reduction in efficiency due to high borrowing cost could affect the economic growth negatively but on the other hand the result is not significant as the probability is more than 10%.

Exchange rate to US Dollar shows that there is a positive and statistically significant relation between the economic growth and Exchange rate to US Dollar. The reason behind why US Dollar affects every economy in the world is that it is an economic superpower and thus has a major influence on every country. The result is as expected that when the EU exchange rate to USD will strengthen it will affect the economic growth positively in the EU.

Household credit is found to be negative and statistically significant which means they have an inverse relationship. It could be said that household credit has a dampening effect on economic growth, the finding supports the finance-economic theory that the total credits assigned to private sector mainly consist of household credit. Further the results suggest that an increase in the household credit could drop the rate of investment thus causing the rate of output in an economy to decrease.

Money supply was found to be statistically significant with a negative slope, when the money supply increases in the EU it has a negative impact on the economic growth in the long run. As the economic theory suggests that increase in the money supply does affect economic growth positively but only in the short run and thus the long run affect is not always predictable and is mostly found to be negative. Also, another reason behind this is that an increase in money supply would increase the inflation in long run which would have an adverse impact on economic growth. Private sector credit is found to have a positive beta sign and also statistically significant, which

shows for the span of 20 years private sector credit is adding to the growth in the case of EU.

### 5.3.3 Hausman Test

Results given in the table 5 below by using Hausman test which investigate whether the regressors are correlated with the individual effect. Therefore, the null hypothesis is that two models fixed and random effect test are equally effective, and the alternative Hypothesis is fixed effect test and is effective.

Table 7:

| Correlated Random Effects - Hausman Test | | | |
|---|---|---|---|
| Test period random effects | | | |
| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
| Period random | 9.843435` | 6 | 0.1314 |

The test p-value is 0.1314 and therefore the study failed to reject the null hypothesis. The result of the Hausman test suggest that random effect test would be more appropriate in the case of selected variables.

Random Effect Test

The result shows random effect test for European Union countries and it shows the effect of financial crisis in 2008 on the European Union countries by using the dummy variables. Each of the following variables Business credit, Business credit interest rate, Exchange rate to USD, Household Credit, Money supply and Private sector credit were separately tested with the dummy on the Industrial Production (proxy for GDP).

### 5.3.4 Random effect test

**Table 8: Random effect test**

| Variable | Coefficient | P |
|---|---|---|
| BC/INF_MONTHLY | 0.86067 | 0.000*** |
| BC/INF_MONTHLY*DUMMY | (1.29369) | 0.000*** |
| BCIR/INF_MONTHLY | 0.05463 | 0.0096*** |
| BCIR/INF_MONTHLY*DUMMY | (0.38719) | 0.000*** |
| ER$/INF_MONTHLY | 0.18674 | 0.0571* |
| ER$/INF_MONTHLY*DUMMY | (0.33091) | 0.0032*** |
| HC/INF_MONTHLY | 0.64483 | 0.000*** |
| HC/INF_MONTHLY*DUMMY | (1.027482) | 0.000*** |
| MS/INF_MONTHLY | (0.03675) | 0.5690 |
| MS/INF_MONTHLY*DUMMY | (0.237246) | 0.0021*** |
| PSC/INF_MONTHLY | 0.88769 | 0.000*** |
| PSC/INF_MONTHLY*DUMMY | (1.294606) | 0.000*** |

*, **, *** denote rejection of null hypothesis at the 10%,5%,1% levels, respectively.

The results here are more realistic than the earlier pooled OLS estimation, as now the study is using more specific and advance estimation technique of random effect. The business credit is statically significant with a positive influence on the economic growth before the crises period and result after the credit period obtained through

using the dummy variable is statically significant but becomes positive. The straightforward reason for is that after the crises of 2007 begun all credit almost froze to the businesses because of high uncertainty in the market.

Business credit interest rate in this case has a positive sign before the crises period and a negative sign after the crises period with both having the significant values. An explanation behind this is that any increase in the business credit interest rate before the crises period did not stop the businesses from borrowing and thus adding to the growth and on the other side it becomes opposite for the after crises period as it effects the growth negatively after crises period, an possible explanation is that after the crises, credit market almost froze and an further increase would discourage the businesses to borrow further with high uncertainly in the market. At beginning of the financial crisis 2008, the financial intermediaries found themselves to have little or no access to the money market where the banks can borrow from and even the capital markets were hesitating to lend money to the banks. So the borrowing rates of any kind went really high and a further increase in business credit interest rate impacting the growth more negatively.

Exchange rate to US Dollar had a positive impact on growth before crises and negative crises after crises period which means the growth is now affected negatively by the change in exchange rate to USD. There is a simple explanation that at times of recession like after financial crisis 2008, a currency is most likely to weaken against other currencies because the country then becomes less attractive place to invest. Thus, it explains why in European it hanged after 2008 financial crisis. Also, people sell one currency and buy the other one to invest which then further weakens the currency which is being sold to buy another thus further bringing down the effect of the exchange rate on growth as it can be seen in the case of EU.

As shown in the table 6 above the slope of household credit before the crisis was 0.64 but after giving a break and checking for the impact of financial crisis 2008 the impact of household credit decreased by 1.02 and the slope became negative which means that after the financial crisis any increase in the household credit was impacting the growth negatively which was positive before. The study highlights the fact that in the last 20 years the household credit has been most damaging to the EU economies among the other lending tools present. It had benefited the economies in the EU in short term but in the long-term the effect was highly adverse for the economies in the EU.

As the theory suggests, the money supply had a negative slope in the long run and after the crisis the impact became significant where the period before crises it was not significant and also the magnitude of the impact increased after crises. That means any increase in the money supply after the financial crisis 2008 affected the growth negatively.

While considering the dummy to check the impact of any changes in the beta coefficient of Private sector credit was found to be significant and slope was positive before the crisis that too with a large value of 0.88 but after the financial crisis 2008 it had come down to –1.29 which is a huge change in the slope from a high positive to a high negative value.

### 5.3.5 GMM Estimation

Table 9: GMM Estimation

| Variable | Coefficient | Prob. |
|---|---|---|
| BC/INF_MONTHLY | (9.43939) | 0.00*** |
| BCIR/INF_MONTHLY | (0.03213) | 0.1153 |
| ER$/INF_MONTHLY | 2.23602 | 0.00*** |
| HC/INF_MONTHLY | (4.06709) | 0.00*** |
| MS/INF_MONTHLY | (0.688530) | 0.00*** |
| PSC/INF_MONTHLY | 11.62914 | 0.00*** |
| R-squared | 0.220279 | |

*, **, *** denote rejection of null hypothesis at the 10%,5%,1% levels, respectively.

The results from the GMM estimation technique are somehow consistent with the Pooled OLS regression but the results are slightly different. All the variables used in the study are statistically significant expect the business credit interest rate according to the GMM estimation results. Business credit is found to statistically significant but with a high negative coefficient value, but the coefficient value is slightly lower than from the pooled OLS regression, which shows an increase in the business credit would lead to have a negative impact on the economic growth. Business credit interest rate can play an important role in the firm's investment decision making

which eventually impacts the economic growth directly, the results show to have a small negative coefficient value but it is not statically significant.

Exchange rate to US dollar is statically significant and has a positive coefficient value of 2.23602 which is consistent with many studies as US is the one of the largest economies in the world and has effects on the economies around the world. Many transactions and currency conversion are done majority in U.S dollars.

Household credit is statically significant with the GMM estimation with a high negative value of 4.06709. The possible reasoning for this is that the relaxed bank lending to customers in order to compete with other banks which is riskier because then the probability of defaulting is very high that is why household credit is proven to have an inverse relationship with economic growth. The 2008-2009 recession seems to be the perfect example of this case.

Money supply as well was statically significant with the negative value 0.688530 which shows if the money supply increases it tends to have a negative effect on economic growth in the long run which is consist with the economic theories of money supply.

The last variable used in the study private sector credit is with a slope of 11.62914 with a positive sign but it is statically significant. The economic theories and other studies suggest that private sector credit tends to be affecting the economic growth in a positive manner but the allocation of funds for that has to be efficient, in the case of European Union countries under consideration it is benefiting the economic growth.

## 5.4 Conclusion & Policy Implications

This study analysed the relationship among financialization, financial development, indebtedness and economic growth. All the countries from the European Union were included in the study except for Bulgaria, Croatia, Cyprus, Malta and Romania due the data being not available. The study included monthly data from 1998 to 2018 and the main purpose of the study was to highlight the major problems that emerge due to effect of finance on economic growth. Thus the current study has uniquely analysed the relationship among the variables like financialization, financial development, indebtedness and economic growth. These variables have never been taken together before, different researchers have discussed the relationship between the combination of these variables using the formula n minus one. Current study concludes that relationship between financialization and financial development is very strong and data has proved that with greater financialization the financial development has taken place at a much faster pace among the EU member states. The financialization has speeded up economic growth as well because the extended financialization, financial development fastens the growth process. Finally, the three factors like financialization, financial development and economic growth lower indebtedness in the banking sector because there is better fund-utilization and higher recovery rate. This happens on the behest of better macroeconomic indicators.

The results from the regression analysis suggest that before the crisis period of 2008, financial development had more positive impact on the economic growth whereas it shows that when the crisis begun, financial development had an adverse impact on the growth for a long time. Private sector credit was one of the variables included in the

study which had a huge fallout from affecting the growth positively at a considerable level to impacting the growth negatively when the crisis begun at a large scale.

Further sub-prime crisis period triggered the negative impact of finance on growth, suggesting that the impact of household credit went totally in the opposite direction when the crisis begun. The reason being that the credit market was frozen, and the circulation of money came very low. The study suggests that all types of lending had dried up during the crisis which further began to impact growth negatively and then there was a large cut in the consumer consumption and investment spending as well.

Financialization played an important role in the crisis as it was seen that before the time of crisis, the financial system was less regulated due to financial liberalization, which allowed the financial intermediaries take greater risk and that affected the financial system as whole as all the banks were inter-correlated. In addition, the study highlights another important factor that many types of lending rates play an important role in the financial system which determines the level of saving and investment which clearly affects the economic growth directly. So, it is very important for economy of any country to choose from the options of financial liberalization and financial repression.

The main cause of the financial development impacting the economic growth negatively after the crisis had begun in 2008 which was due to the financial liberalization which was benefiting the financial intermediaries more than the consumers. Further this was allowing them to take more risks and having even more mortgages than ever before.

The results suggest that a balanced level of restraints can support deepening the financial system in European Union and powerful restraint among all is the interest rate controlling. The economies later joining the European Union made the banking

system more integrated and entry of new foreign banks brought more competition and credit availability. The integration process helped overcome issues regarding the emerging market. After merging with EU, a lot of mergers and acquisitions took place which then enabled the large size banks becoming dominant players in the EU, thus then the problem of too big to fail persisted.

While as per the results based on the indicators the study concludes that the European Union as a group of member states has been more financialized but at the same time, the financialization has not been similar for each of the member state. For example, countries like Germany saw an increase in the GDP more than the financial assets whereas United Kingdom saw a huge increase in Finnicization.

Thus, the question to address here is that how the process of financialization has emerged over the last 20 years? Firstly, the finding of this study suggests that the financial sector has been firmly increasing its size and importance as compared to the real sector. Secondly the financial activities have affected every aspect of the economy when being hit by a crisis either as a large financial intermediary or an individual. Also due to financialization, the size of the financial intermediaries has increased over the period of time, not only that with more and more banks emerging, the access to easy and cheap loans was at its peak which is why consumer indebtedness especially has increased over the period of time which shows that household debt has increased, and the consumers are spending more than their disposable income. The study also highlights an important fact that the household consumption based on credit has also increased over the period of time due to the fact that financialization is bringing more choices and cheap credit. The banks in today's time are fewer in number than before but bigger and are offering services across the board making it easier for customer to approach to various products. Adding to that,

most of the services can be availed of online which makes it easier for customers to avail of the services and for banks to make money, yet it is necessary to have a sound financial system to promote stable economic growth. But at the same time, the financial services availed of with such an easy access can add to financial instability. With the ease many customers who previously won't have access to credit, can now borrow money from other sources (foreign banks operating locally) even with not a good credit score to finance household consumption. When things are fine then it looks good but with financial markets being so integrated a failure of a small bank could probably trigger a financial crisis through chain effect.

One of the important finding of this study is that the financial dependence of the people has increased so much that it endangers the economy and financial sector also because a huge amount of credit available to the economy is not directed towards the high growth projects. The credit is being used more for household consumption which means people are financing their daily needs thus the available credit is not being used in an effective manner for economic growth. The findings of this research suggest favouring long term policy for the development of the financial system to have a positive impact on the economic growth in European Union.

The decision making of the European Banking Authority (EBA) should be based on the criteria that involves transparency in the financial products and instruments and the financial sector as a whole in order to avoid any financial crises. The policy making of EBA should also be concentrated on the impact of financial decisions on real economy.

This paper highlights the fact that the correct allocation of credit will enable the firms to grow, but also the focus should be on innovative and growth-related projects which provides long term benefit to the economy. The leverage of the firms should be

monitored at the firm level in order to use it as an early warning system (see Visentin and Battiston, 2016) in addition to the limits set by the Basel 3 framework. Too much credit can have negative effects on the economy. The 2008 crisis is hence a strong evidence in this regard. The findings of this study highlight an important factor that credit allocation does affect the economic growth and also that the direction of the economy is dependent on it. If the allocation is efficient then the economy tends to grow and if the credit given for various purposes is not efficient and the risk factor is high with the credit given, then an economy will eventually be heading towards a crisis.

# Chapter 6: Financial Liberalization, Bank-Risk and Financial Crises

## 6.1 Introduction

There has been long debate as to which one of the two that is financial liberalization or financial repression is better for the economy. In the past few decades, most of the economies have seen the financial sector getting more and more independence with time. The data observations used in this chapter are on yearly basis.

In this study, I followed the heterodox macroeconomics approach for the analysis which gives us the chance not to just provide analysis rather align it with different schools of thought as well but we followed a broader approach. This study examines the long-run effect of financial liberalization on the banking crises, as to how the changes in financial liberalization create chances of crises in the EU or if it makes banks stronger or not. Also, this paper investigates the impact of financial sector's fragility on the banking crises and if these banks can absorb risk in the long run. This study uses the data sampled from year 1996 to 2019 regarding the EU-28.

Most of the researchers have been found favouring financial liberalization. McKinnon, (1973) and Shaw (1973) arguing in favour of liberalization stated that the excessive restriction imposed by the government on banking sector diminishes both the quality and quantity of the investment. Similarly, King and Levine (1993), stated that the intervention made by the government can have negative effects on the financial sector and in the overall sense. A subsequent contradictory study by Hamhaoui (2017) states that financial liberalization is found to be reason behind starting a financial crisis.

The global financial crises of 2008-2009 and the subsequent European crises have highlighted major weak links within the banking system. One factor that many

authors pointed out, is the bank's ability to diversify the risk in order to minimize the exposure to risks that can have a huge impact on the risk avoidance ability of the banks and thus can save them from failing.

After the financial crises 2008-2009, it is clear that the failure of one bank can lead to failure of other banks and thus the whole financial system can collapse. The governments' intervention to stop the start of the failure of one bank has been seen in the financial crises but has not been proven to be effective. Whereas the emphasis now is given on the bank's ability to absorb the risk by itself. That is why the greater the ability of the banks to overcome the exposure the risk, the lesser the chance to going towards failing and being bailed out by government.

A simple example of diversifying risk and increasing the Bank's Z-Score is Faia's et. al. (2016) work who state that the bank's riskiness reduces as the geographic expansion of European banks across European countries increases. Individual bank's non-performing loans is a good measure. Buyukkarabacak and Valev (2010) in their paper used bank's non-performing loans to identify period of crises, following their approach, in this study I have used bank's non-performing loans as a dependent variable. The probability of default for the bank increases as the non-performing loans increase. While examining other components' impact on the non-performing loans, there are a few studies that have used non-performing loans as the dependent variable ( e.g., Boudriga et. al. 2009, Espinoza and Prasad, 2010).

This study uses financial freedom index to measure financial liberalization, the index is based on many pillars with a view to access the financial freedom in different countries. In order to test for bank's risk this study uses Bank's Z-Score as the second independent variable. Bank Z-Score can be best described as bank's soundness.

There are number of studies which used Bank Z-Score while investigating different relationships. Bouvatier, Lepetit, Rehault and Strobel (2018) have investigated bank's insolvency and Bank Z-score, similarly Laeven and Levine (2009) used Bank Z-score to test for bank's risk. The nature of liberalization has changed over decades and it has taken different shape in various regions of the world. In this regard Arestis and Sawyer (2016) studied how liberalization has changed over the time, in contrast to the fact that how regulations and other authorities have been responding to the chances about the financial liberalization. Also, the authors pointed out some important factors, such as how the regulation could be proven to be effective.

Secondly this study uses a different approach in the modelling, while using GMM, which has been previously neglected by other authors. The advantage of using GMM is that it allows banks to overcome the issue of heterogeneity that lies within the panel data. Further this study uses dynamic ordinary least square and fully modified ordinary least square which are much better to use in case of panel data than the normal pooled ordinary least square. Perroni (1999) and Harris and Sollos (2003) provide the information in much detail regarding how these two methods are superior to the pooled OLS regression. The use of these tests in the past has been ignored by other authors while studying the same relationship. In addition, this study examines the role of Bank Z-Score, which is a reliable variable to check for the soundness of the bank; see Chiaramonte et. al. (2015) for details.

Lastly, I have kept in mind the time effectiveness of the financial liberalization, which the literature suggests that it takes at least 1 year for the result to be seen in case of the financial system. This study extends the examination with one lag period in the regressors to check for difference in t and t-1.

Ashraf et. al. (2020) studies the impact of changes in capital regulation on bank's risk in both the crises period and the normal period. The study uses bank level data from 111 countries. The study only uses pooled ordinary least square to obtain the results. The authors then demonstrate that strict capital regulations reduce the bank risk when there are no crises. The authors then, propose that the capital accumulated in period of no-crises can be used at times of crises to absorb financial distress.

While examining the effect of bank diversification on financial stability, Kim, Batten and Ryu (2020) tested the sample of OECD countries from years 2002 to 2012. The authors found out that the relationship is significantly nonlinear. The results showed that bank stability increases with moderate level of diversification but, excessive level of diversification can have a negative impact on the bank stability.

While reviewing the effect of financial sector reforms on the banking system stability, Hamdaoui and Maktouf (2019) show that when the regulatory reforms are made in the financial system, it takes a few years before the actual impact can be seen on the relationship between the relationship of financial liberalization and financial crises. The authors also pointed out that developing countries cannot offset the negative effects of financial liberalization through regulatory reforms, it would take many years before actual impact can be seen.

Policy reforms and their process of formulation and implementation has another impact on liberalization. Hlaing and Kakinaka (2018) take a different approach to analyse the factors behind financial crises, they take into consideration the financial policy reform process including liberalization. The study shows that after the financial crises, financial policy reforms do not strengthen the prudential regulation. The authors suggested optimal policy changes following a crisis to promote financial stability while removing the financial disturbances from the system. Comparing the

two contradictory studies based around the financial crises of 2007-2008, Batua, Mlambo, & Asongu, (2018) found that financial liberalization and financial development tend to affect the financial instability positively, whereas the financial instability is affected negatively by economic growth.

Regarding the presence of the foreign banks, Martin and Rey (2006) developed an open economy model, which shows the reason behind the capital flight is liberalization when considering emerging markets and stated that the reason behind triggering a crisis could be the fall in the demand for assets.

Williams and Nguyen (2005) mentioned regarding the foreign acquisition of local banks, that it adds to the profit of the banks but on the other hand productivity performance is unchanged, the statement was made after conducting a detailed research on the effects of liberalization in the 70's, the author further added that the increased profits are also associated with more profit taken by bank to home country. As mentioned by Befondi and Gobbi (2004), with the increasing number of banks in Italy, the number of non-performing loans is increasing as well.

Arestis et. al. (2004) studied this element by using the time series data about various countries, they were overcoming the short-coming of previous studies and thus their accounting for heterogeneity of coefficients showed that, the structure of the financial system does matter. Literature on financial liberalization as fostering growth shows both positive and negative impacts, there is no clear evidence of any one of them relationship. In this regard Tornell, Westermann and Martinen (2004) stated financial liberalization does promote financial fragility but at the same time it promotes economic growth. For the case of developing economies, the authors showed in the study that the growth rate of the developing countries increases after the period of financial liberalization, whatever the impact on financial fragility is.

Paraphernalia factors also affect impact of financial liberalization. For example Allegret, Courbis and Dulbecco (2003) stated that the negative effects of financial liberalization depend on other factors, as well as the financial markets and institutions. The authors put emphasis that the solution to financial instability, lies within the market factors and institutional dynamics of the financial system.

## 6.2 Results

### 6.2.1 Panel unit root test results

The panel unit root test has been used to find out the level of integration between the variables (Bank non-performing loans, Financial freedom index and banking Z-Score) as used in our study. This study used both ADF unit root test (Dickey and Fuller, 1979) and Fisher PP (Phillips and Perron, 1988) test to investigate the order of integration between the series. The results from panel unit root test are provided in table 10 below. The lag length selection is based on the Schwartz information criteria.

Table 10:

Panel unit root test

| | ADF | Fisher- PP |
|---|---|---|
| | Level | |
| | Level I (0) | |
| Variables | Without trend | |
| BNPL | 0.0000*** | 0.0108*** |
| FFI | 0.0000*** | 0.0000*** |
| BZ | 0.0000*** | 0.0000*** |

Note: Tests are performed without time trend or constant.

None of the series included in the study showed any trend in the graph, so the series were tested without trend at Level and the study failed to reject the null hypothesis, all

three variables were found to integrate at level. Therefore, it indicates that all three series included in the study are found to have same level of integration.

Both the ADF and PP unit root tests confirm that the variables under consideration are stationary at Level. The reason to use Fisher-PP along with the ADF test is that, the PP test process estimates the residual variance that is robust to autocorrelation. In the literature it is widely used as an alternative to the ADF test, for the purpose of confirmation of results.

The integration suggests long-term relationship among the variables taken into consideration.

### 6.2.2 The GMM, DOLS and FMOLS estimation result

The estimation result from GMM, Dynamic OLS and Fully Modified OLS are based on panel yearly data from 1996 to 2019 for the countries of EU-28, table 11 given below lists the result obtained from the regression analysis. In the tables 11 & 12, this paper presents the coefficients values of the two independent variables along with their corresponding p-values.

Table 11:

GMM, DOLS and FMOLS estimation result:

Dependent variable BNPL

| | GMM | | DOLS | | FMOLS | |
|---|---|---|---|---|---|---|
| | Coef. | Prob. | Coef. | Prob. | Coef. | Prob. |
| Bank Z-score | -0.035493 | 0.0021 | -0.132478 | 0.0828 | -0.073181 | 0.0000 |
| Financial freedom index | -0.133109 | 0.0000 | -0.277469 | 0.0001 | -0.188276 | 0.0000 |

Note: These results are based on estimation of equation (1)

Three tests are used in the study GMM, DOLS and FMOLS, the best fitted model is Dynamic OLS.

The results obtained from the tests in case of all variables are significant and the coefficient sign remains the same across all tests but as expected the coefficient values vary across different tests in the model. At the same time the variation in coefficient values across all three tests are not too far from each other.

Banking Z-score has a negative coefficient sign that means when the Bank Z-score increases for the EU countries, the non-performing loans are reduced. That is consistent with the theory of higher Bank Z-score having a negative influence on the Bank non-performing loans, because it increases the banks' ability to absorb more risk.

Bank Z-Score also shows the soundness of the bank, so for the case of EU, the negative coefficient value demonstrates that it does explain the model to a good extent. As per the result when the Z-score assigned to a bank or overall bank Z-Score for a country increases in the EU, it reduces number of non-performing loans, which further reduces the instability in the financial system.

Financial freedom index also has proven to be having a negative coefficient value across all tests meaning that every increase in the financial freedom index leads to a decrease in the bank non-performing loans.

The financial freedom index indicates the independence of the financial sector of the country, that indicate that if the financial system becomes more independent then the non-performing loans tend to decrease, so there are lesser chances of bank going to default. Financial freedom index varies across different member countries of

European Union, but the overall effect tends to show that financial liberalization is hence beneficial for European Union causing the non-performing loans to reduce.

The economic block of European Union has immense importance, because the recent difficulties of a few countries within the EU (e.g., Greece) has highlighted some key issues. Bank run and people losing confidence in the banking system, have led to further increase instability of financial system thus it is relying on the government for a bailout, eventually the whole system is collapsing and the government is looking for a bailout package from EU.

This study does also show that financial liberalization has been proven to be beneficial for financial system within EU, but proper regulation and monitoring is required by the government.

Table 12:

GMM, DOLS and FMOLS estimation result with t-1 lag in regressors.

| | GMM | | DOLS | | FMOLS | |
|---|---|---|---|---|---|---|
| | Coef. | Prob. | Coef. | Prob. | Coef. | Prob. |
| (lag-t-1) Bank Z-score | -0.074077 | 0.037 | -0.152107 | 0.0389 | -0.093386 | 0.0000 |
| (lag-t-1) Financial freedom index | -0.109065 | 0.001 | -0.282905 | 0.0001 | -0.174392 | 0.0000 |

Note: These results are based on estimation of equation (2).

The test result with lagged regressors (t-1) shows, that all the variables are statistically significant. After testing the effect of lag (t-1), the coefficient values have deviated around what have been tested and showed in table 11 without the lag at t. As expected, the signs of the coefficients yet remain the same.

The results from the GMM show that the negative impact of lag (t-1) Bank Z-Score has yet increased now, on the other hand financial freedom index (t-1) now has a decreased negative impact on the non-performing loans.

On the other hand, with the same estimation using equation (2) dynamic ordinary least square results show that, both Bank Z-Score and financial freedom index, negatively impacts and increases slightly in case of the bank non-performing loans. That shows that with a time lag of 1 as per the results of DOLS, the increase in the negative impact leads to decrease in the non-performing loans. The results of the DOLS confirm that with the time lag, that with time these regressors are yet more effective in the case of financial liberalization. Makri et. al. (2014) in their study examined the determinants of non-performing loans and demonstrated that the effect of other variables on non-performing loans is more effective with a time lag rather than in the same period.

The results of fully modified ordinary least square yet show increase in the negative impact of Bank Z-Score and a decreased negative impact of financial freedom index on the bank non-performing loans. The existence of inverse relationship of Bank Z-Score and financial freedom index with respect to bank non-performing loans is yet again confirmed.

To be clear; the changes in impact are very slight in the three tests. Also, as stated earlier that in this paper the best model that fits in case of both equation (1) & (2) is the dynamic ordinary least square (DOLS).

### 6.2.3 Granger causality test results

Table. 13 below presents the estimation results of long run Granger causality tests. The findings of the test are for the period of 1996-2019 based on EU-28. This paper uses the estimation approach suggested by Dumitrescu and Hurlin (2012) which allows all the coefficients to be different across cross sections. This test simply runs Granger causality test individually for each for the cross-section.

Table 13:

Granger Causality Test

| Null hypothesis | Zbar-stat | Prob. |
|---|---|---|
| Bank Z Score does not cause homogenously cause BNPL | 15.4504 | 0.0000 |
| BNPL does not cause homogenously cause Bank Z score | 0.06042 | 0.9518 |
| FFI does not cause homogenously cause BNPL | 8.48995 | 0.0000 |
| BNPL does not cause homogenously cause FFI | 3.0222 | 0.0025 |
| FFI does not cause homogenously cause Bank z score | -2.5153 | 0.0119 |
| Bank Z score does not cause homogenously cause FFI | 4.70367 | 3.000006 |

Pairwise Dumitrescu and Hurlin (2012) show findings for all the 6 combinations of the variables in the test, for four of them the Z-bar statistics are found to be significant and two of them are insignificant. Implying that when a statement is significant, we reject the null and thus state that one does cause the other.

The important variables that the study is interested is are in line, Bank Z-Score does cause Bank non-performing loans over the period of time included in the study, but this relation is only one way, it becomes insignificant when tested opposite of it.

Financial freedom index does cause non-performing loans over the long period of time and the relationship is found to be bidirectional in this equation. The result of bidirectional relation between the two shows that when the financial liberalization changes in the EU, it changes the Bank non-performing loans as well. Also, the changes in bank-nonperforming loans change the level of financial liberalization within EU, the reason being that non-performing loans bring a financial stress in the financial system which is then most likely to be followed by reforms in the financial system and regulation, hence changing the level of financial liberalization as consequence.

Financial freedom index does cause bank Z-Score as per the test results but the relationship between both is unidirectional. This shows that within EU when the level of financial liberalization changes, it changes the bank Z-Score, this implies the direct effect of financial liberalization on the soundness of the bank.

## 6.3 Conclusion & Policy Implications

This study provides empirical evidence for EU-28 about the impact of financial liberalization and bank risk absorption ability on banking instability for the period of 23 years from 1996 to 2019. The literature in this specific area does not provide evidence since there is no consensus among the researchers on this, thus it is providing both the positive and negative relationships between financial liberalization and banking instability. The current study bears uniqueness and novelty in this regard that despite the fact that there is paucity of knowledge to validate or reject the relationship between financial liberalization and banking instability, the current study has furnished strong arguments. The detailed analysis has first provided premise in favour of the phenomenon. Later on it provides evidence against the fact that banking liberalization affects banking instability. Finally, through data analysis, the current study succeeds in furnishing a clear-cut verdict that financial liberalization affects banking stability positively.

This paper uses three tests, firstly GMM has been used to overcome the problem of endogeneity and simultaneity bias that lies within the panel data.

Then the paper uses Dynamic ordinary least square and fully modified ordinary least square to examine the relationship among the variables under consideration. DOLS and FMOLS are better than the normal pooled ordinary least square especially for panel data. DOLS is parametric approach, and estimates lagged first-differenced terms. Whereas the Fully modified ordinary least square is the non-parametric approach as stated by Harris and Sollis (2003).

The results show that the financial liberalization has a negative relationship with banking instability, meaning if the countries within EU have more independent

financial system (increase in financial liberalization) that leads to a decrease in banking instability and vice versa.

Similarly, the Bank Z-Score is also found to have a negative relationship with Bank non-performing loans which means when the banks' ability to absorb greater level of risks increases in the EU, the banking instability decreases.

The study then tested for Granger causality; the estimation results suggested there is unidirectional relation between bank Z-score and Bank non-performing loans ( bank z score to Bank non-performing loans) and the bidirectional relation between bank non-performing loans and financial liberalization, revealing that financial liberalization does affect bank non-performing loans but also bank non-performing loans affect financial liberalization that would be the result of changes in polices related to financial liberalization to control bank non-performing loans. Lastly financial freedom index and bank Z-score showed to have a unidirectional relation, which proves changes made regarding financial liberalization affect bank Z-Score.

This paper has implications for policymakers, as the decisions made by them have evident effect on the stability of the financial system. This paper suggests both the monetary and financial stability policies should be well-coordinated. The financial liberalization in a country should be set in accordance with the fact that how much should be the optimal level that would do good towards financial stability. Along with liberalization, controls should be in place for the financial sector to make it socially and economically viable.

Further this study suggests that no firm should be allowed to become 'too big to fail', that would limit the riskier investments made by the firm on the cost of taxpayer's money. Ring-fencing of investment bank division and other divisions could limit the exposure, as the UK government has done since 2019.

This study points out the responsibilities of central bank, that their core objective should be making and executing monetary policy and maintaining financial stability along with prudential supervision of banks.

Finally, as in the developed markets, markets are more efficient, on the other hand they are more prone to be involved in the riskier investments. Thus, making them more venerable to trigger a financial crisis. With globalization and advancement in technology, triggering the financial crises from a developed market could disturb the whole world's financial system. The developed markets can somehow still manage to get out of it, but the developing markets if hit badly by the financial crises, it puts them years back in the developing process. Therefore, along with regulations international coordination is necessary as well and regular updates of the regulations and reforms are the need of the financial system, in order to reduce the negative effects of financial liberalization.

# Chapter 7: The Impact of Financial Development on Innovation: Recent evidence from European Union

## 7.1. Introduction

As highlighted by Solow (1957) that innovation plays an important role in the long-term economic development and growth while giving countries competitive advantage as well. Holmstrom (1989) briefly explains, that innovation process is not only time-taking, but it is highly unpredictable as well. Along the way at the end, it could all be failed as well. Therefore, the importance of supporting innovation requires, well-developed financial system that plays a vital role for efficient allocation of credit and provide funds at lower cost to boost innovation.

This study examines the relationship between financial development and innovation across EU-28. The relationship was initially suggested by Schumpeter (1912). His theoretical work suggested that the importance of the impact of finance on innovation was huge and also for the economic growth. The financial intermediaries play a role of pillar for bringing about innovative interventions. King and Levine (1993) and Morales (2003) support the work of Schumpeter (1912) that the financial intermediaries support innovation activities. The authors suggested that the credit allocation by the banks is made with a view to promote technological innovation process, also banks are more likely to lend to innovation opportunities with a purpose that new products or process innovation enter the market.

Romer (1990) using the endogenous growth theory, demonstrates that technology, innovation and research and development are major drivers for economic growth. After the endogenous growth theory started to evolve, numerous authors used the theory to empirically study the impact of financial market development that contributed to the growth (for e.g., King and Levine, 1993; Pradhan et. al., 2014).

Further other studies developed the effect of innovation on growth (Cameron, 1998), in addition to that some studies have considered development of financial market development on technological innovation as well. (Hsu et. al., 2014).

Many authors developed the argument that the innovation is discouraged by financial obstacles and market frictions (Cabral and Mata, 2003; Mohnen et al., 2008). Studies in the past have provided evidence for the positive relationship between the financial development and innovation. (Ginarte and Park, 1997; Fitzgerad, 2006; Ang 2010)

As stated by Cabral and Mata (2003), firms should have easy access to capital, otherwise firms could not reach the optimal level and eventually that causes the firms to invest elsewhere rather than in innovation activities. The authors also mentioned, in order for the economy to grow and invest in innovation, a well-developed financial system is essential.

In today's world the access to funds is easier than it was before, with platforms like crowd funding and peer to peer lending, the entrepreneurs now have an alternative to the traditional bank loans. The innovation is ubiquitous since now platforms have emerged and have further increased which shows that with easier access to funds the innovation can increase.

In the literature, financial development has been studied across different platforms to examine different relationships. This shows the importance of financial development for the economy. Innovation related growth model of Aghion et. al. (2005) shows the importance of innovation for economics which supports different aspects, reducing the cost of monitoring and screening, reducing the cost to produce and hence causing sustainable growth.

Based on the discussion above, this paper aims to examine the extent of financial development that promotes innovation in the EU-28 based on the data from 1995-2018.

Within EU there is difference in regard to number of patents by each country, also difference in regard to the support of financial system to innovation and R&D is also observable.

Banking innovations cast positive effects on various macroeconomic indicators. Lachenmaier and Rottmann (2011) for example studied the effects of innovation on employment. Their study was based on Germany's manufacturing firms, that used over 20 years' data. The authors showed that there was positive effect of innovation on employment as both product and process innovation happen simultaneously.

This study is built on the work suggested by Rajan and Zingales' (1998), panel-based model which will enable the study to capture both cross sectional and time series dynamics between the financial development and innovation.

In the literature there are a few studies that examine financial development with innovation based on two aspects of the financial development, stock market development and bank-based development for e.g., see Le et. al (2019).

On the other hand, there are other studies that only take the development of the banking sector in account while studying the effect on innovation for e.g., Tee et. al. (2014).

This paper also takes into account the development of the financial sector, as it has direct effect on innovation as a means of providing funds for R&D and to support the innovation activity as a whole.

On the other hand, development of stock market tends to have somehow indirect effect on the innovation. Thus, to only consider bank-based development would enable this study to focus the direct linkage.

This paper thus revisits the role of financial development in innovation based on the European Union 28. Also, this paper examines the impact of innovation and R&D on unemployment. The reason to check for unemployment is valid because along the benefits of innovation, there is criticism on innovation for promotion of jobless growth.

The paper employs system GMM, to check the impact of financial development on innovation to overcome the issues related to heterogeneity, which is often found in the panel data. Further this paper employs dynamic ordinary least square and fully modified ordinary least square in addition to GMM to check for robustness of the tests. Both the DOLS and FMOLS have been proved better than normal polled old regression in many ways especially for panel data. Perroni (1999) and Harris ad Sollos (2003) provide details on how these two models are superior to the pooled OLS regression.

In addition, this study employs GMM to check the effect of innovation on unemployment and also the effect of R&D on the unemployment.

This paper contributed in the following manner, firstly this study uses different estimation techniques to explore the relationship within EU. Secondly, the same relationship in EU has yet not been explored in great detail, this study tends to fill in the literature and provide in-depth analysis for the EU. Lastly, what other studies lack while studying the relationship, is to check whether innovation adds to employment or it promotes jobless along with increasing growth.

### 7.1.1 Impact of technological innovation on employment

There are large number of studies conducted in determining the relationship between the technological innovation and employment. In this section the study highlights that how latest technology is dealing with the employment. The main concern that arises with this relationship is that whether the jobs are destroyed by the innovation that means re- employing the same people in technological advance sector or does it mean needing new skills for the new jobs created by those technological innovations? The number of jobs requiring less skills have decreased over the years but at the same time the question arises if is it because of the technological innovation or the globalization effect? Reason being that under globalization it's easier to access labour around the globe and get the work done wherever it is less costly.

When considering the technological innovation, it could be mainly in two ways affecting the whole employment level. The first product innovation where new products are being brought to the market and the other process innovation which means finding a better and more effective way of making an existing product which requires less labour input and hence increases output with the help of technology.

When the new ways are found to make the existing product efficiently it requires less labour that means it destroys jobs but at that same time the same amount of resources used in the product development leads to better productivity level, hence the labour used in the whole process is then laid off to save the cost but by the amount the new technology affects the employment depends how big was the change from the current production technique to the new technologically advanced production technique. While innovation affects employment, it cannot spare other parts of the economy. Lachenmaier and Rottmann (2011) found positive effects of process innovation on the employment growth whereas a similar study conducted by

Blechinger and Pfeiffer (1999) found that the process innovation causes the labour displacement which has negative effect on employment growth.

The second important factor of product innovation leads to a development of a new product which is then sold in the market. So if the product is successful to create the demand in the market then the demand related employment is created but the degree of it depends on how much is the demand for that new particular product?

The existing studies suggest that the product innovation had more positive effects on the employment creation. Whereas the jobs that are lost due to the process innovation had less negative effect on the jobs being lost. Assa, (2012) states that the process of financialization has not come without a price, the whole process has somehow caused inequality, slow growth and high unemployment. Acemoglu and Restrepo, (2018) studied implications of technology for growth and employment and suggested that the learning process of the labour is not well-established and with the advancement in technology many people lose their jobs for not being able to meet the new requirement of skills.

Product innovation can have overall negative effects as well where some are buying the new products in the market that means demand for the other product has decreased in the market which would have to bring the production down and certainly lay off labours as well. That is if the demand for the virtual banks (product of financial innovation) is going up in today's time that means the demand for traditional banks is going down and hence the staff required in the bank branches is falling as well but at the same time new job opportunities are created at the new virtual banks to work but these are requiring certain set of skills. The trade off like this is just an example because in this case the jobs created will be less than the jobs destroyed by

the virtual banks, because virtual banks do not have branches, so they will be requiring less staff to work.

This example is perfect now to state that the changes brought on how the employment level will change with the product innovation or process innovation depends on the nature of the product, the sector of the product and lastly how different is the product from the existing products in the market. The same example given above creates another question as well that the nature of new production technique that emerges either due to product innovation or process innovation; what skills are needed for the new method. If it requires new set of skills, then obviously new and less people will come in to operate in the new process and product innovation will be creating new jobs anyway.

Coad and Rao (2011) conducted their study based on high tech manufacturing industries in U.S. The study included a very large data set from 1963 to 2002 which was based on R & D, patents and employment. The study concluded that innovation and employment are highly positively related and also that the innovation tends to affect those firms more positively which are involved in employment growth as well.

When it comes to investment in R & D, the level of investment depends on the country and then on the firms within the country. The EU 2020 had a clear agenda of promoting the European economy as a whole based on the Research & Development which promotes the knowledge and innovation within the European Union which not only promotes the economic growth but the employment as well along with innovation.

### 7.1.2 The promotion of jobless growth through technology Innovation

There has been long criticism on technology innovation for promotion of jobless growth. Jobless growth tends to add value to the growth but at the same time the level

of employment is either same or decreasing. Jobless growth is now a major aspect especially for the developed economies which are highly advance and are heavily investing in the robotization, digitalization and artificial intelligence. Unlike other economies which are still not developed they have other concerns to be addressed first rather than investing in these areas. The era has begun where the race is between Man & Machine, Frey and Osborne, (2013) stated that in the few years the technological unemployment will be at its peak and also that some of the occupations will vanish because of the technology. Vivarelli, (2013) summarized in the study that it's the mankind who is requiring so much the technology to do everything for them so it would be humans' own mistake if machines take over most of their jobs.

Frey and Osborne, (2013) stated that more than 47 per cent of the total jobs could be in danger over the next two decades because of the technological advancement where jobs can easily be performed with algorithms.

Even with the jobless growth two main concerns arise that either this jobless growth is long term or short term. It could be both; where technology takes over the human in production could cause long term effects because the same people are now out of job but if a new advance method is brought to production technique that means joblessness is short term because the redundancy could be temporary and hence can go back to normal in short period of time.

The effect of technology on employment is also dependent on the type of competition the firms are facing. So if the competition they are operating in is perfect competition then it is likely that they are using more of machines in order to reduce cost with increased efficiency. They will also be ready to invest in new and advanced robot processes to minimize the cost and maximize the profit. On the other hand, there are firms which operate in monopolistic competition or any of that kind where the

products are unique or tailor-made so these types of companies tend to invest more in skill because of the nature of the business as it requires customised products to be made for their customers.

Automation in the production process especially in the industrial sector makes the job easier requiring less labour input and then the labour is laid off. This labor does not have specific skill-set to work elsewhere, so this automation does add to the economic growth marked with more output and less resource utilization but at the same time it could create unemployment for its labour. The labour that is laid off due to this automation process can then be reinstated in other sectors of the economy, but again they may not have opportunities to get certain trainings to acquire skills that are in demand of the market.

The countries which had been hit by the crises especially financial crises and the countries which once moved away from the industrial sector and entered more into services sector are now implementing policies which involve both technologies. The objectives of policies like these are to investment in R & D which lowers the cost of production (efficient production) through the advance manufacturing techniques and to bring back the jobs that are being outsourced to other lower income countries where the labour is cheap. The aim is to promote economic growth along with jobs.

It is not only technology that promotes the jobless growth but with increased globalization where many tasks are outsourced especially in the industries which are not labour intensive, companies like these can have employees worldwide, outsourcing the work to countries wherever the labour is cheap for that specific job. This would add to labor cost. Globalization along with increased information and communication technology is making jobs easy, one can find labour anywhere around the world. The IT equipment advancement helps people work remotely and

companies find it easier to outsource the job rather than hiring someone on full-time basis for a specific job, meaning a company can have different workers working as part-time. The task will be assigned to different persons who have the right skills for the jobs rather than having full-time workers and expecting them to do every task inefficiently. In order to be able to take advantage of the IT and working remotely workers need to constantly develop the skills as information technology changes really fast.

With the help of latest information technology and innovations we have overcome a major problem which previously haunted because people were not able to mobilize due to different reasons like financial obligations, family and legal constraints. Globalization did promote movement of goods and services, but the movement of labour is still restricted somehow. It is with the help of technology that workers can work from anywhere for any company around the world.

At the same time, issue arises that the company offering the job across the borders means someone in the home country of that company is losing that job. The company will be benefiting from it but at the same time it is jobless growth for the economy.

Schumpeter (1911) in his study stated that the role played by banks, that is lending for innovation and business purposes, evaluating projects and facilitating transactions is an essential element for technological innovation and economic development.

Using the dynamic panel threshold method, Zhu et. al. (2020) studied the impact of financial development on innovation and growth. The study was spanning over 1990-2016 for 50 countries. It demonstrated that growth of the financial sector might decrease the innovation activities. The study concluded that, the effect of innovation on growth becomes insignificant once private sector credit surpasses the level of 60%

as a percentage of GDP. Zhu et al. (2020) also made clear that, the estimation results of the study are not affected by the banking crises or European sovereign debt crises.

Maskus et. al. (2019) taking a different approach to the finance-innovation nexus, studied the effects of financial development and patent protection on industrial research and development. The study used 20 OECD countries, with data spanning over 1990-2009. The authors stated, that the impact of patent protection varies across industries on R&D. Countries with limited credit-markets tend to increase the research and development as a result of patent protection. On the other hand, the countries which had more developed bond markets, industry research and development was more sensitive to patents rights.

Pradhan et. al. (2018) developed the finance-innovation nexus based on venture capital, using data from 23 European countries spanning over 1989-2015. Employing the Granger causality test, the authors demonstrated that, investments in venture capital made at any stage, innovation along with financial development impacted the long run economic growth positively. The study also emphasised that financing is yet the need of start-ups which brings innovation.

Comparing the high-tech and low-tech industries within U.S, Japan and Europe and taking into account 879 multinational companies, with data spanning over 8 years from 2002 to 2010, Aldieri and Vinci (2018) pointed out that these multinational corporations tend to invest more in innovation and research & development.

In another similar study, Law et. al. (2018) researched the relationship of finance and innovation. The study spanning over 1996 to 2010, included data for 75 countries, including both developed and developing countries. Authors using GMM estimation technique, demonstrated that the relationship is U-shaped which shows, that finance supports innovations up to a certain level. Thereby meaning that more support

through finance works but after that a certain level it starts affecting the innovation activities negatively. Also, the authors added that the role of institutional quality is important factor, when it comes to financial development supporting innovation.

Focusing on the democratic levels of political institutions, to study the relationship among financial deepening and innovation Ho et. al. (2018) used panel data from 1970-2010. The results of the study showed that the deepening of the banking sector fosters innovation activities but, with a condition that the political institutions are fairly democratic. On the other hand, stock market deepening works fine while supporting innovation even with lower level of political democracy. Using firm level data for in-depth analysis spanning over 2006 to 2013, Ramirez et. al. (2017) investigates the relationship between financial development and innovation. Ramirez et. al. (2017) used binary response models to estimate the effect. The findings of the study showed that financial development enhances the level of innovation with better allocation of funds and investments, also it enables technology to foster growth.

Pradhan et. al. (2016) studied the relationship among innovation, financial development and economic growth. Using data sample from 1961 to 2013, the study was based on eighteen Eurozone countries. The study employed Granger causality test to check the relationship.

The findings suggested that within Eurozone, in order for the economies to grow and keep up with the competition faced due to globalization, innovation is necessary. To increase the level of innovation activities, efficient allocation of credit is required towards research and development, that needs a well-developed financial system.

In another research by the Cirriaci et. al. (2016) in Spain. The number of firms included in the research were 3,304, for the period of seven years from 2002-2009.

The study found out that the new, small, innovative and early-stage firms tend to be adding more to the employment rather than the non-innovative existing firms.

Van Roy et. al. (2015) examined the relationship, between innovation and employment, within the firms that are involved in patenting. The study used panel data set spanning over years 2003 to 2012. The study was conducted for nearly 20,000 patenting firms across Europe. The authors used generalized method of moments for estimation, the results were statistically significant and had positive effect in case of companies which are high tech manufacturing. On the contrary, results were non-significant for companies in lower-tech manufacturing and services concerns.

Elejalde et. al. (2015) estimates the impact of innovation on employment using firm level data spanning over 1998-2001 in Argentina. The authors used OLS estimation technique. The study showed that in the case of Argentina, process innovation does not impact employment at both composition and growth level, but at the same time innovation had a positive influence on skilled labour.

Examining the relationship of financial development and innovation, Hsu, Tian and Xu (2014) compared both equity and credit markets separately using data of 32 countries. The results based on years 1976 to 2006. By using fixed effect model authors show that better developed equity markets help the high-tech firms that are more reliant on external financing. On the other hand, in the same conditions, the credit markets depress the innovation activities.

Tee et. al. (2014) examined the role of financial development and development of stock market in innovation activities. The study tested the panel data spanning over 1998 to 2009, using random effects models on seven East Asian countries. The authors demonstrated that, the size of the financial sector and stock market

development has a positive effect on the innovation activities. The study highlighted the fact that for East Asian countries, the financial sector plays a vital role for innovation activities to rise.

Cross country study by Harrisson et. al. (2014) found that the impact of innovation on employment was positive as a result of product innovation for France, Germany, Spain and United Kingdom.

Bogliacino et. al. (2012) conducted a study using the data based on 677 European firms. The data collected on the firms included both the manufacturing and services firms, the data was taken from the year 1990 to 2008. The finding of the study suggested that, the relation between the innovation and employment is positive for the high-tech manufacturing and services sector. On the other side, the impact was barely there for the traditional firms.

Comparing both national and international aspects of the development of financial market, to test the impact on research and development, Maskus et. al. (2012) demonstrated that domestic financial development has a positive influence on the research and development. The study also revealed that bond market plays an important role in funding of research and development. As an external factor the study found out that, only foreign direct investment contributes to increase in research and development.

Using the World Bank survey for 46 countries which included around 28,000 firms, Xiao and Zhao (2012) made some important revelations in their study. They examined the effect of financial development on firm innovation. The study showed that, in the countries that have high level of government ownership showed little or no impact of financial development on innovation. While on the other hand, countries

which have low levels of government ownership in the banks, showed high impact on innovation.

Similarly, Lachenmaier and Rottmann (2011) using dynamic panel analysis studied the effect of innovation on employment. Using 20 years of data based on German manufacturing firms, they demonstrated positive effect of innovation on employment.

Barbosa and Faria (2011) showed an important aspect, according to them credit market regulation plays a vital role in innovation production. The authors emphasised that the financial development leads to innovation process, also the same contributes to better information sharing and providing easy access to funds, that firms need in order to get involved in the innovation process. The findings of the study also showed that higher level of per capita income is related to having more innovation activities, the authors reasoned this by stating, that higher income countries tend to have more demand for new products which come into market through innovation.

Empirical work focusing only on micro financing, came from Miller and Bound (2011) who stated that, the objective of these peer-to-peer finance systems not only include lending but address other aspects as well. Including the creation of new jobs opportunities and innovation of new products these interventions carry other advantages as well. These help governments achieve other types of goals that are associated with the government and corporate lending systems as well, the same can be done by the individual-to-individual lending also.

Lachenmaier and Rottmann (2011) using dynamic panel analysis studied the effect of innovation on employment. Using 20 years of data based on German manufacturing firms, demonstrated positive effect of innovation on employment.

## 7.2 Results

### 7.2.1 Panel unit root test results

The panel unit root test has been used to find out the level of integration between the variables (Patents by residents, Bank deposits to GDP (%), bank credit to bank deposit (%), Private credit by deposit money banks and other financial institutions to GDP (%), Gross domestic expenditure on research and development (% of GDP) and Unemployment) used in the study.

This study used ADF unit root test (Dickey and Fuller, 1979) to investigate the order of integration between the series. The results from panel unit root test are provided in table 16 below. The lag length selection is based on the Schwartz information criteria.

Table 14:

Panel Unit Root Test

| ADF | |
|---|---|
| Level | |
| Level I (0) | |
| Variables | Without trend |
| IN | 0.0026* |
| BDGDP | 0.0022* |
| BCBD | 0.0001* |
| PCD | 0.0133* |
| R&D | 0.0137* |
| Unemploy | 0.0000* |

Note: Tests are performed without time trend or constant.

Variables listed in table 16, did not show any trend in the graphs, hence the series were tested without trend at Level and the study failed to reject he null hypothesis, all six variables under consideration were found to be integrated at level. The corresponding p values for each variable are listed in table 16 above. The results show that all six series included in the study have same level of integration.

ADF unit root test is popular among the researchers, hence is known to be an effective test when testing for integration order of the series. The integration suggests long-term relationship among the variables taken into consideration.

### 7.2.2 The GMM, DOLS and FMOLS estimation result

The estimation result from GMM, Dynamic OLS and Fully Modified OLS are based on panel yearly data from 1995 to 2019 for EU-28, table 17 given below lists the result obtained from the regression analysis. In the table 17, this paper presents the coefficients values of the independent variables along with their corresponding p-values.

Table 15:

GMM, DOLS and FMOLS estimation result

| | GMM | | DOLS | | FMOLS | |
|---|---|---|---|---|---|---|
| Innovation | Coef. | Prob. | Coef. | Prob. | Coef. | Prob. |
| BDGDP | -0.279622 | 0.0000 | -0.13748 | 0.0000 | -0.180277 | 0.0003 |
| BCBD | -0.452438 | 0.0000 | -0.25352 | 0.0001 | -0.087777 | 0.0000 |
| PCD | 0.54951 | 0.0000 | 0.350904 | 0.0000 | 0.239162 | 0.0000 |
| R&D | 42.02649 | 0.0000 | 17.75977 | 0.0004 | 3.877443 | 0.0064 |
| unemployment | 1.175509 | 0.0386 | 0.512095 | 0.0211 | 0.321226 | 0.0198 |

Note: These results are based on estimation of equation (1)

Three tests are used in the study GMM, DOLS and FMOLS, the best fitted model is Fully modified OLS. The results obtained through all tests for all variables are significant and the coefficient sign remains the same across all tests but as expected the coefficient values vary across different tests in the model. At the same time the variation in coefficient values across all three tests are not too far from each other.

Firstly, Bank deposit to GDP (%) has a negative coefficient sign for the EU, which shows any increase in the bank deposit leads to a decrease in the innovation activity. The effect is negative because when more money is there in the bank, the bank is

benefiting from the interest provided by the depository institutions, then less money do people have in hand to spend on the innovation activities.

Bank credit to bank deposit (%) having a negative β sign, shows a negative impact on innovation. Any increase in bank credit to bank deposit (%) would lead to decrease in innovation activity. The estimation results show a negative result, because private sector is provided with more credit with more deposits taking place, but at the same time more money is being deposited in the bank, rather than it is in people's hands to spend on innovation activities.

Private credit by deposit money banks and other financial institutions to GDP (%), has a positive coefficient value, which means it has positive impact on innovation. Any increase in the level of private credit by deposit money banks and other financial institutions would have a positive impact. The magnitude of the impact varies across all tests. The positive relationship shows that more money in the private sector means, more opportunities for the private sector to be involved in the innovation activities.

Research and development expenditure (% of GDP), as expected has a positive impact on innovation for the EU. As this expenditure is measured in GDP, so the amount spent by each country across European Union would largely vary as the result of the size of GDP in case of each country. This relationship is in-line with results of Furman et. al. (2002) and Acs et. al. (2002).

The increased expenditure on research and development is closely linked with the ties of the banks and firms. The relationship develops stronger with the financial development, which thus may benefit or harm firms while they are getting access to firms. As Weintein and Yafeh (1998) suggested close ties between banks and firms make the access to funds easy but at the same time close ties can involve, more monitoring, which can block the funds to risky investments or projects which have

high rate of ratio (Cecchetti and Kharroubi, 2015). Furthermore, this does clear the concept that close ties between banks and firms is beneficial for the economy, as they are directing the funds towards something more meaningful, at the same time there will be a few firms unable to deliver due to lack of funds.

Getting financing from other than banks is now easy as many platforms have been provided by Fintech, such as peer to peer lending. Berger and Udell (1998) mention that other means of financing act as a saviour to young small innovative firms, which do not have access to funds so they cannot get from the banks. Germany has the largest GDP in European Union, that is 3,863,340 billion $, which was in the year 2019 and has been on top for very long. The country with lowest GDP within European Union is Malta, with only 18,292 billion $ for 2019. For example, considering even expenditure on innovation activities 1 % of the GDP for Germany will be more than the whole GDP of Malta, so the size of the country's GDP does matter when it comes to spending on research and development which contributes towards innovation.

It is clearly evident that the financial development brings about favourable conditions to support innovation activities. As more money is easily available in the market, thus it gives more opportunities to potential investors, who have goals to innovate and finally get a patent. Some projects are stopped at the very beginning level because of the lack of funding. As mentioned above the amount of money spent by each country on research and development is very important, the more the money spent means more innovation activities.

As mentioned by Grilliches (1991) that the knowledge production function improves with more money spent on research and development. Innovation itself is like a final product, but at the backend there is more going on, research and development is a

constant process of learning in order to develop something; either it's something completely new or a new method. The innovation activities reach the final stages as a result of many trial and error testing. Thus, that requires money, so the countries within EU which have better resources to spend money on research and development are clearly seen to be steps ahead than the countries which came through a transition period and are still struggling time to time.

### 7.2.3 GMM Estimation

Table 16:

Generalized Method of Moments

| Unemployment | Coef. | Prob. |
|---|---|---|
| Innovation | -0.0046 | 0.012 |

Note: These results are based on estimation of equation (2)

Results from the estimation of innovation on unemployment show a statistically significant result with a negative coefficient value, which indicates an inverse relationship between innovation and unemployment. The effect appears to be small but any increase in the innovation activities will lead to lowering the unemployment in the European Union. The theory suggests similar results as, when there is a patent granted for anything, that means that product or service will now be offered to the customers, thus requiring more human resources for production and distribution. These results are in-line with previous studies conducted by Blanchflower and Burgess (1998) and Greenan and Guellec (2000). Later on Lachenmaier and Rottmann (2007) using a static panel approach for both product and process innovation, found the relationship to be positive for both innovation techniques.

This paper uses only GMM system estimation technique for estimation of above results which were similarly used by Piva and Vivarelli (2004) to enquire the same relationship between innovation and employment and found, innovation impacted the employment positively in the case of Italy.

Table 17:

Generalized Method of Moments

| Unemployment | Coef. | Prob. |
|---|---|---|
| R&D | -0.669529 | 0.0001 |

Note: These results are based on estimation of equation (3)

Estimation result of expenditure on research and development and unemployment proved to be statistically significant, however negative coefficient indicates, an inverse relationship between the variables. Thus, stating that any increase in the expenditure on research and development would lead to lowering the unemployment within European Union.

If we compare innovation and R&D's impact on unemployment, the R&D has much greater impact on the unemployment as compared with the innovation. The reason being that patent is considered as final product and R&D as in input which also includes trial and error tests thus involving more resources at R&D than innovation wherein successful tests are awarded with patents.

## 7.3 Conclusion & Policy Implications

This study provides empirical evidence for EU-28, which investigated the impact of financial development on innovation. The period spanned over 24 years that is from 1995 to 2019. The study also investigates the impact of innovation on unemployment. Studies conducted before this in the specific area use different methods to enquire the relationship. This particular area in the literature has not been studied in-depth, thus this study fills the gap in the literature by providing empirical evidence from the European Union. The unique and novel contribution of this study can be discerned from the fact that the effect of innovation on employment has never been studied in isolation before. The emphasis that the current study has put on this variable is much greater and profound compared with the older studies. This study has brought to light the fact that how innovative intervention directly affect employment level of the country. The loop goes like more innovation employs innovative individuals which boosts employment level, then the effect of backward and forward linkages effect in addition. Additional innovations boosts banking business for which the sector requires more individuals for employment purpose. This element has not been covered by previous studies in such a depth.

This paper uses three tests, firstly GMM has been used to overcome the problem of endogeneity and simultaneity bias that lies within the panel data.

Then the paper uses Dynamic ordinary least square and fully modified ordinary least square to examine the relationship among the variables under consideration. DOLS and FMOLS are better than the normal pooled ordinary least square especially for panel data. DOLS is parametric approach, and estimates lagged first-differenced terms. On the other hand the Fully Modified Ordinary Least Square is the non-parametric approach as stated by Harris and Sollis (2003).

The study included three variables which closely represent financial development, which are widely used in the literature. The results show overall impact of financial development to be positive in the case of European Union. Further this study examined the impact of innovation and R&D on unemployment. Both innovation and R&D show a negative impact on the unemployment, which clearly indicates that innovation and R&D add to the employment for EU-28.

As discussed earlier in the results section, that the amount of money that is allocated towards R&D has a significant impact on the level of innovation. At the same time the size of the economy also has a significant effect on how much the economy allocates towards the R&D be it a case of large or small firms. Developed countries tend to have efficient allocation of money for projects related to R&D regardless of the size of the firms. As Tasesse (2005) mentions that innovation is impacted by financial development in terms of capital mobilization, the reason that more developed countries have more funds to be allocated towards the R&D projects.

In addition, this paper provided evidence of innovation having a negative influence on unemployment and so as the R&D. The results showed to have greater magnitude for the R&D than innovation. The reason being that R&D is the input for innovation, which includes testing and not everything becomes a success, basically this is interplay of trial and error. That shows us that R&D expenditures have a greater influence in reducing unemployment as compared to (patent) innovation. Another reason to this possible change in the effect for both variables on unemployment is that this paper use patent as a proxy for innovation activities, which is good enough, but at the same time not every endeavour gets a patent as a result of research and development.

The study has key policy implications for European Union. When innovation is acknowledged as a driving factor for a sustainable economic growth, the process of innovation contributing towards economic growth becomes vital for an efficient and effective policy targeting. The results and analysis of this study show, that while considering innovation, an economic block can benefit from the innovation of other countries and at the same time can also benefit from easy access to funds across the border. The new platforms available through financial innovation (for e.g., crowd funding) for funding should be encouraged where entrepreneurs may find access to money for innovation purpose who are denied money by traditional banks.

The policies related to the innovation and technological advancement need to become an integral part of the government policies.

As the technology progresses there needs to be integration between the technology policy, reforms in product innovation, reforms in process innovation, advancement in ICT sector, fintech and the financial and labour markets. The reforms in the financial markets are known to promote the entrepreneurs through providing more platforms of funding and various other products to help start a small business. Policies to create more employment opportunities with technological advancement also matter.

The technological advancement can create a gap between the skill supply side and skill demand side within a country, the reason being policies made to ensure that the advancement in the technology and improvement in the skills of labour are constant and complimentary to avoid any mismatch between the supply and demand side of the skills.

Innovation no doubt is directly related to creation of new jobs but also brings new products and services into the market, which encourages people to learn new skills and it overall makes economy more efficient.

Technologies polices need to be part of a broader package

Another reform that could particularly help in the technological sector is more private/public sector partnerships for the firms especially involved in the research and development.

The technology sector should be able to learn from the international players who are doing well-established in the sector and policies should be in place in order to provide access to foreign programmes as integrated with the local programmes.

The government should ensure that the policies are made to benefit from the grass root level to the national level while bringing the national reforms, also government should place incentives in the technology sector that brings the competition at the national level in order to achieve improved framework at national level.

# Chapter 8 Concluding Remarks

## 8.1 Introduction

This chapter encapsulates previous work done in this thesis, where it discusses the whole matter chapter-wise. In the end it dilates on the specific contribution made by this thesis. The thesis recognizes its contribution towards understanding of themes, theories, concepts, paradigms and ideas. It also explains old and contemporary theories along with their criticism. While doing so it takes into account major works of top-class economists and recognizes their work either laid down in research articles or books. Thus it clearly adds to body of knowledge and in terms of choosing EU-28 as sample. Then it admits its limitations in terms of non-availability of data in case of a few countries which were part of its sample. Finally, this chapter lays down potential area for future researchers.

The overall theme of the thesis is based on financialization. Financialization means in other words laying down regulations and policies for shaping up a better banking system. This includes measures taken by the concerned authorities. Nevertheless, the role of monetary policy cannot be underemphasized. The rules and regulations are set in such a manner that the banks keep on earning profits and introducing new banking products to enhance their business and profitability. However, since the last financial crisis, the significance of financialization, government regulation and monitoring has become so mighty, more specifically during the last couple of decades. The loose policies have led the world to financial chaos where financial pillars named ‘too big to fail’ in fact put the whole world into hot waters. The banking policies for example in case of mortgaging allowed house=holds to borrow funds they were never able to return back. This created housing bubble. Further, failure of one bank had chain effect on failure of the whole financial sector within a country which further engulfed other

regions of the world. This was so because the banking institutions are inter-linked and their assets and liabilities are inter-dependent. Therefore, shock for bank would always adversely affect its stakeholders.

This chapter explains that the thesis has three empirical chapters, all of which are based on the concept of financialization. The first one explores the relationship of financialization, financial development and economic growth. Financial development takes into account introduction of banking services and products in order to capture bigger pie in cake of overall banking profitability. The financial development leads to more profitability and employment which in turn adds to tax revenue as well for the government. At the same time, economic growth does not flourish alone. Its fruits are multitudinous. Not only income and employment grow, but trade and overall prosperity also redoubles. Thus financial liberalization has its due impact ono financial development and economic growth simultaneously.

The second empirical chapter investigates the impact of financial liberalization on bank risk and banking stability. The bank risk in terms of bank recovery and risk in case of new product development and launching is so significant. Its duty of the central government to watch the movements of the banks so that no one is caught up in severe clinches. Not bad if there is proper counselling available for banks not to become too big to ultimately fail. The bank's stability is another important issue. The assets and liabilities' management, short- and long-term loans maintenance and other financial decisions all affect bank's stability. Again such stability has to be enduring.

The third and last empirical chapter shows the role played by financial development in innovation and its effect on employment. The financial development is natural to lead to more innovations. The innovations involve lots of investment and risk. The innovations at the same time require proper market. If market is not available the

innovation cannot be sold out. The developed market also depends upon developed financial market. Therefore, developed financial market and system are very fundamental. The sample of the study is European Union, which is an advanced region of the world. But there is at the same time variation within the sample, for few countries have strong macroeconomic variables while others have weak ones. For example GDP level is very different in different cases. Finally, the models for analysis purpose have been chosen on need-basis, that is only the most appropriate ones have been selected for any given type of analysis. Further, all of these were found befitting and were by the same token validated by researchers.

The second chapter of the thesis shows how the theories have evolved over time, starting from the Keynes' "General Theory." It then brings into consideration the contributions of other well-known economists chiefly Paul Davidson and Hyman Minsky. It then turns to post-Keynesian economics and starts debate from famous economist Malcolm Sawyer. It finishes it by critiquing the economic cycles marked with boom and bust.

Chapter 3 revolves around major theories specifically that of King and Levine (1993). In chapter 4, full details are provided on the selection of data, types of variables, nature of models used, regions selected, and the estimation techniques adopted. The adapted techniques and models have been validated by research scholars. Part 2 of the study includes all three empirical chapters in chapter 5, 6 and 7 in full. The findings of the relationship between financial development and economic growth have been shown in chapter 5. Chapter 6 enquires the impact of financial liberalization on bank risk and banking stability. The third empirical chapter of the study investigates the impact of financial development on innovation and employment as well.

The second half of the chapter 8 discusses contributions that the current thesis has made to existing body of knowledge and understanding, all in terms of presenting relevant theories, models and especially choosing the EU as a sample to mark its uniqueness.

Chapter 8 admits the limitations of the study. It admits that there was paucity of literature on certain topics and areas. At the same time in some cases the fact of non-availability of data has also been admitted. On certain occasions proxy variables have been replaced with the variables for which data was not sufficiently available. The chapter terminates by offering options for further research.

## 8.2 Contributions to Existing Knowledge and Understanding

This section highlights the contribution made to existing knowledge and research. First of all, the thesis is based on the concept of financialization, which is a broad term used for the increasing role of finance compared to other sectors. The thesis highlights the major theories, the pioneer works of famous authors, and major contributions in the area with the latest developments in the subject.

The thesis contributes to existing knowledge with empirical literature by specifically focusing on three key areas along with other developments. The first specific research area within financialization as part of the thesis is financial development and economic growth. The basic purpose of this research was to capture the effect of financial development on the real side of the economy thus the research provides empirical investigation along with the theoretical developments over the period of time, which includes how financialization and economic growth are related. There is a discussion on the financial liberalization and financial repression, a background has been provided on the European Union banking sector and financial development over the period of time and lastly an important issue has been highlighted after the crisis of 2007-2008, the problem of too big to fail and their role. Along with the theoretical contribution, the chapter of the study contributed with empirical investigation, which included investigating the effect of financial development on the real side of the economy with a focus on before and after the financial crises of 2007-2008. The complex finance-growth nexus was studied using OLS, fixed effect estimator and GMM estimation technique. A high number of observations were included in the model for accurate results by using monthly data.

Moving forward the thesis extended the research specifically focusing on the financial liberalization, bank risk and banking instability. The contribution made in this specific

area includes a detailed background on the financial liberalization, how financial liberalization allows banks to take extra risk with fewer restrictions and how it effects the banking stability.

The chapter contributes to the empirical literature on financial liberalization, bank risk and banking stability in the following way. Firstly, this research part of thesis used financial freedom index, which is not previously used in the same investigation but has been used by other authors such as Lin et. al., (2016), it is considered as a reliable indicator for empirical investigation. Secondly the research part of the thesis used extensive research techniques for empirical analysis, such as GMM along with the dynamic models, DOLS and FMOLS. Thirdly the chapter investigated the causality of direction between the financial liberalization, bank risk and financial stability by using Granger causality test. As this is a cross country study, the panel causality test restricts the cross-section dependence within the countries across EU-28. This part of the thesis provided in-depth empirical analysis for the case of EU-28. Furthermore, the data set used for the EU-28 countries in the analysis is the maximum data available from 1996 up till 2019.

The third main contribution came from the investigation of financial development's impact on innovation, along with the impact of innovation on unemployment. The contribution in this research area included a detailed background on the role of finance in promoting innovation. It considered the channels, provided a detailed discussion on the effect of technological innovation and employment along with how technology innovation can promote jobless growth.

The research in this specific area has been linked with works of authors but it has not been investigated empirically investigated in much detail in the case of EU-28. The empirical part of this chapter contributes in the following manner. Firstly, like any

other studies this chapter uses a large cross country data set for the maximum time available from years 1996 to 2019. The research in this area contributes by using three estimation techniques, GMM, DOLS and FMOLS for the investigation of general model, and only GMM to investigate innovation's impact on employment and R&D's effect on employment; both estimated separately. Other studies lack in investigating that if innovation increases or decreases the level of unemployment, reinforcing financial development's effect on economic growth in the case of EU-28. Number of tests were used as part of the empirical investigation for robustness checks to confirm the results across different estimation techniques.

## 8.3 Limitations of the Study

- Firstly, a larger dataset for each of the variables would have worked better with the model, the data available for 2 of the empirical chapters that are part of the thesis is limited as the data set for certain variables are not available before 1996, despite this the dataset used in each of the empirical chapters has provided good findings.
- Another major limitation of the study is the issue of limited literature, in fact finance-growth nexus has plenty of the literature available but on the other hand, as the thesis includes another part of the financialization in one of the empirical chapters while enquiring the impact of financial development on innovation, literature on the financial development and innovation is very limited.
- There are only few studies that look into this specific area, if there were a greater number of studies available, it would have been better to understand the dynamics and carry out more profound research but despite this fact the chapter produced some decent results from the estimation analysis.

## 8.4 Options for Further Research

As the empirical chapters could not capture the effects of Pandemic because it only started in 2020 and the data is not sufficient as of yet to carry out the research.

This current pandemic due to covid-19 has opened many options for researchers to explore, even in the context of financialization. The following areas could be explored, firstly through assessing the economic impact of pandemics, financial system of a country is directly impacted by the economic cost associated with it. Secondly the impact of current pandemic could be investigated on the banking and insurance sector, by all means banks are at the forefront to face the vulnerability of the economic downturns which are brought about by the non-performing loans where people are unable to return the loans. The cost of financing can also be investigated after the pandemic and its effects on economic growth. Lastly the impact of current pandemic could be investigated on government policies' changes especially related to financial system and how changes in the regulation of financial system changes the bank's risk taking and banking stability. The current pandemic Covid-19 is showing signs that it is going to have downturn against economies for many years to come and yet at a very large scale. The research areas mentioned above are going to be a major part of research of financial and economic academics.

## 8.5 Chapter Summary

The first chapter considers the relationship between financialization, financial development and economic growth. The second empirical chapter examines impact of financial liberalization on bank's risk-taking ability and bank stability. The third chapter investigates what role is played by financial development in promoting innovation, it also examines its effect on employment. The sample belongs to European Union. The second chapter discusses the theories that have evolved starting with Keynes' General Theory. It then takes into account contributions of other famous economists like Paul Davidson and Hyman Minsky and other post-Keynesian economists like Malcolm Sawyer. Finally, the chapter brings into light the critiques with respect to financial liberalization, giving proper weight to cycles of boom and bust.

Chapter 3 reviews the literature, by discussing basic economic modelling proposed by King and Levine (1993). The choice of data and variables are validated through various economic theories. Then comes the chronological summary of three empirical chapters coupled with research questions.

The chapter 4 fully covers details on the selection of data, variables, model, region, and estimation techniques. The theoretical base has also been proved here. Part 2 of the study covers chapter 5, 6 and 7. This simply highlights the significance of finance for economic growth.

Chapter 5 proves financial development and economic growth go hand in hand. Chapter 6 shows that an increase in the level of financial liberalization in case of EU, leads to a decrease in the level of financial instability. It also establishes causality of direction between the financial liberalization and banking instability, which at times could be bidirectional.

The third empirical chapter of the study highlights the impact of financial development on innovation and employment. The results are surely positive in favour of this proposition. Then this chapter explains contributions this study has made to existing knowledge and understanding. First of all, it enlarges the concept of financialization, it then explains major theories, and brings to light the pioneer works of famous economists and authors. The literature review is rich which clearly adds to body of knowledge of the subject. There is a detailed discussion on the financial liberalization and financial repression. The complex finance-growth nexus has also been touched using OLS, fixed effect estimator and GMM estimation technique.

This thesis used financial freedom index, which is unique and has been used by great economists like Lin et. al., (2016). It also used extensive research techniques for empirical analysis, such as GMM, dynamic models, DOLS and FMOLS. The use of Granger causality test has been prudent. The study also contributed in terms of researching financial development's impact on innovation, and also the impact of innovation on unemployment. Then it explored role of finance in promoting innovation.

The chapter covered limitations of the study. For this thesis we could not get larger dataset for each of the variables because data for certain countries was not available before 1996. Second, the literature available was so scarce, especially literature on the financial development and innovation was very limited. This chapter offers options for future research. For example the future researchers may take into consideration the impact of Covid-19 since it did not spur at the time this study was being carried out. For example areas like the economic impact of pandemics on financial system, the impact of pandemic on the banking and insurance sector, cost of financing during and after the pandemic and finally its effects on economic growth can be considered. The

impact of the pandemic can also be investigated on government policies and the changes occurring to financial system and resultantly affecting the whole economy.

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# Appendices

**Appendices 1: Google drive hyperlink for the data used in all three empirical chapters 5,6 & 7.**

https://drive.google.com/file/d/1jvpmclYY_SqjvY0PWO9rZFtsnxBltPnN/view?usp=sharing

**Appendices 2: ADF Test Unit Root Test for Variables Included in Chapter 5**

**A. Industrial Production Proxy ADF at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: IP
Date: 03/04/21 Time: 05:17
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 1 to 11
Total number of observations: 4842
Cross-sections included: 20

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 23.6495 | 0.9814 |
| ADF - Choi Z-stat | 2.64248 | 0.9959 |

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

**B. Industrial Production Proxy ADF at 1st Difference**

Null Hypothesis: Unit root (individual unit root process)
Series: D(IP)
Date: 03/04/21 Time: 05:15
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 10
Total number of observations: 4842
Cross-sections included: 20

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 2166.61 | 0.0000 |
| ADF - Choi Z-stat | -44.1490 | 0.0000 |

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

**C. Business Credit ADF at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: BC
Date: 03/04/21 Time: 05:20
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 13
Total number of observations: 3765
Cross-sections included: 19 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 30.1588 | 0.8138 |
| ADF - Choi Z-stat | 2.33655 | 0.9903 |

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

**D. Business Credit ADF at 1st Difference**

Null Hypothesis: Unit root (individual unit root process)
Series: D(BC)
Date: 03/04/21 Time: 05:21
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 12
Total number of observations: 3755
Cross-sections included: 19 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 780.587 | 0.0000 |
| ADF - Choi Z-stat | -21.0092 | 0.0000 |

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

**E. Business Credit Interest Rate ADF at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: BCIR
Date: 03/04/21 Time: 05:23
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 1 to 4
Total number of observations: 3555
Cross-sections included: 19 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 38.6563 | 0.4399 |
| ADF - Choi Z-stat | 0.11608 | 0.5462 |

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

**F. Business Credit Interest Rate ADF at 1st Difference**

Null Hypothesis: Unit root (individual unit root process)
Series: D(BCIR)
Date: 03/04/21 Time: 05:24
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Total number of observations: 3556
Cross-sections included: 19 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 660.571 | 0.0000 |
| ADF - Choi Z-stat | -22.0595 | 0.0000 |

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

**G. Exchange rate to USD ADF at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: ER$
Date: 03/04/21 Time: 05:26
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 1
Total number of observations: 4257
Cross-sections included: 20

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 44.4874 | 0.2884 |
| ADF - Choi Z-stat | -1.86929 | 0.0308 |

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

**H. Exchange rate to USD ADF at 1st Difference**

Null Hypothesis: Unit root (individual unit root process)
Series: D(ER$)
Date: 03/05/21 Time: 06:49
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0
Total number of observations: 4257
Cross-sections included: 20

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 1545.06 | 0.0000 |
| ADF - Choi Z-stat | -37.6835 | 0.0000 |

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

**I. Household Credit ADF at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: HC
Date: 03/04/21 Time: 05:28
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 15
Total number of observations: 3844
Cross-sections included: 19 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 53.2781 | 0.0510 |
| ADF - Choi Z-stat | 2.00652 | 0.9776 |

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

**J. Household Credit ADF at 1st Difference**

Null Hypothesis: Unit root (individual unit root process)
Series: D(HC)
Date: 03/04/21 Time: 05:29
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 14
Total number of observations: 3837
Cross-sections included: 19 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 735.743 | 0.0000 |
| ADF - Choi Z-stat | -17.7665 | 0.0000 |

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

**K. Money Supply ADF at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: MS
Date: 03/04/21 Time: 05:30
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 13
Total number of observations: 4327
Cross-sections included: 20

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 14.1307 | 0.9999 |
| ADF - Choi Z-stat | 8.50200 | 1.0000 |

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

**L. Money Supply ADF at 1st Difference**

Null Hypothesis: Unit root (individual unit root process)
Series: D(MS)
Date: 03/04/21 Time: 05:31
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 11
Total number of observations: 4321
Cross-sections included: 20

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 1216.80 | 0.0000 |
| ADF - Choi Z-stat | -27.1989 | 0.0000 |

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

**M. Private Sector Credit ADF at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: PSC
Date: 03/04/21 Time: 05:32
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 6
Total number of observations: 3736
Cross-sections included: 19 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 37.9652 | 0.4711 |
| ADF - Choi Z-stat | NA | |

Test statistic value of 'NA' due to the present of a p-value of one or zero
** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

**N. Private Sector Credit ADF at 1st Difference**

Null Hypothesis: Unit root (individual unit root process)
Series: D(PSC)
Date: 03/04/21 Time: 05:34
Sample: 1998M01 2018M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 12
Total number of observations: 3710
Cross-sections included: 19 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 645.658 | 0.0000 |
| ADF - Choi Z-stat | -17.5942 | 0.0000 |

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

## Appendices 3. Estimation Results from chapter 5

**A. Pooled OLS Regression**

Dependent Variable: IP/INF_MONTHLY
Method: Panel Least Squares
Date: 03/03/21 Time: 05:34
Sample (adjusted): 2002M01 2018M04
Periods included: 196
Cross-sections included: 19
Total panel (unbalanced) observations: 2472

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.001359 | 0.189913 | -0.007156 | 0.9943 |
| BC/INF_MONTHLY | -9.439396 | 1.121154 | -8.419354 | 0.0000 |
| BCIR/INF_MONTHLY | -0.032131 | 0.020402 | -1.574898 | 0.1154 |
| ER$/INF_MONTHLY | 2.236029 | 0.140008 | 15.97076 | 0.0000 |
| HC/INF_MONTHLY | -4.067091 | 0.890977 | -4.564756 | 0.0000 |
| MS/INF_MONTHLY | -0.688530 | 0.137821 | -4.995830 | 0.0000 |
| PSC/INF_MONTHLY | 11.62914 | 1.866841 | 6.229313 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.220279 | Mean dependent var | -0.175081 |
| Adjusted R-squared | 0.218381 | S.D. dependent var | 10.64235 |
| S.E. of regression | 9.408814 | Akaike info criterion | 7.323999 |
| Sum squared resid | 218216.0 | Schwarz criterion | 7.340459 |
| Log likelihood | -9045.462 | Hannan-Quinn criter. | 7.329978 |
| F-statistic | 116.0647 | Durbin-Watson stat | 1.899442 |
| Prob(F-statistic) | 0.000000 | | |

**B. Hausman Test**

Correlated Random Effects - Hausman Test
Equation: Untitled
Test period random effects

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|---|---|---|---|
| Period random | 9.843435 | 6 | 0.1314 |

** WARNING: estimated period random effects variance is zero.

**C. Business Credit Random Effect with Dummy**

Dependent Variable: IP/INF_MONTHLY
Method: Panel EGLS (Period random effects)
Date: 03/03/21 Time: 04:50
Sample (adjusted): 1998M01 2018M04
Periods included: 244
Cross-sections included: 20
Total panel (unbalanced) observations: 3192
Swamy and Arora estimator of component variances

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.297978 | 0.295131 | -1.009647 | 0.3127 |
| BC/INF_MONTHLY | 0.860676 | 0.058031 | 14.83123 | 0.0000 |
| BC/INF_MONTHLY*DUMMY | -1.293698 | 0.076530 | -16.90440 | 0.0000 |

**D. Business Credit Interest Rate Random Effect with Dummy**

Dependent Variable: IP/INF_MONTHLY
Method: Panel EGLS (Period random effects)
Date: 03/03/21 Time: 04:52
Sample (adjusted): 1998M01 2018M04
Periods included: 244
Cross-sections included: 19
Total panel (unbalanced) observations: 2776
Swamy and Arora estimator of component variances

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.410293 | 0.382412 | -1.072907 | 0.2834 |
| BCIR/INF_MONTHLY | 0.054633 | 0.021075 | 2.592345 | 0.0096 |
| BCIR/INF_MONTHLY*DUMMY | -0.387196 | 0.031846 | -12.15856 | 0.0000 |

**E. Exchange rate to USD Random Effect with Dummy**

Dependent Variable: IP/INF_MONTHLY
Method: Panel EGLS (Period random effects)
Date: 03/03/21 Time: 04:54
Sample (adjusted): 2000M01 2018M04
Periods included: 220
Cross-sections included: 20
Total panel (unbalanced) observations: 3332
Swamy and Arora estimator of component variances

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.247017 | 0.272251 | -0.907315 | 0.3643 |
| ER$/INF_MONTHLY | 0.186745 | 0.098120 | 1.903231 | 0.0571 |
| ER$/INF_MONTHLY*DUMMY | -0.330911 | 0.112093 | -2.952115 | 0.0032 |

**F. Household Credit Random Effect with Dummy**

Dependent Variable: IP/INF_MONTHLY
Method: Panel EGLS (Period random effects)
Date: 03/03/21 Time: 04:56
Sample (adjusted): 1998M01 2018M04
Periods included: 244
Cross-sections included: 20
Total panel (unbalanced) observations: 3293
Swamy and Arora estimator of component variances

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.365721 | 0.314561 | -1.162639 | 0.2451 |
| HC/INF_MONTHLY | 0.644830 | 0.049312 | 13.07658 | 0.0000 |
| HC/INF_MONTHLY*DUMMY | -1.027482 | 0.066928 | -15.35211 | 0.0000 |

**G. Money Supply Random Effect with Dummy**

Dependent Variable: IP/INF_MONTHLY
Method: Panel EGLS (Period random effects)
Date: 03/03/21 Time: 04:57
Sample (adjusted): 1998M01 2018M04
Periods included: 244
Cross-sections included: 20
Total panel (unbalanced) observations: 3422
Swamy and Arora estimator of component variances

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.132823 | 0.242072 | -0.548694 | 0.5833 |
| MS/INF_MONTHLY | -0.036753 | 0.064521 | -0.569636 | 0.5690 |
| MS/INF_MONTHLY*DUMMY | -0.237246 | 0.077050 | -3.079127 | 0.0021 |

**H. Private Sector Credit Random Effect with Dummy**

Dependent Variable: IP/INF_MONTHLY
Method: Panel EGLS (Period random effects)
Date: 03/03/21 Time: 04:59
Sample (adjusted): 1998M01 2018M04
Periods included: 244
Cross-sections included: 20
Total panel (unbalanced) observations: 3144
Swamy and Arora estimator of component variances

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.369593 | 0.304804 | -1.212560 | 0.2254 |
| PSC/INF_MONTHLY | 0.887690 | 0.052563 | 16.88823 | 0.0000 |
| PSC/INF_MONTHLY*DUMMY | -1.294606 | 0.069957 | -18.50571 | 0.0000 |

**I. GMM estimation result chapter 5**

Dependent Variable: IP/INF_MONTHLY
Method: Panel GMM EGLS (Period random effects)
Date: 03/03/21 Time: 05:02
Sample (adjusted): 2002M01 2018M04
Periods included: 196
Cross-sections included: 19
Total panel (unbalanced) observations: 2472
2SLS instrument weighting matrix
Swamy and Arora estimator of component variances
Instrument specification: C BC/INF_MONTHLY BCIR/INF_MONTHLY ER$ /INF_MONTHLY HC/INF_MONTHLY MS/INF_MONTHLY PSC /INF_MONTHLY
Constant added to instrument list

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.001359 | 0.189845 | -0.007159 | 0.9943 |
| BC/INF_MONTHLY | -9.439396 | 1.120750 | -8.422392 | 0.0000 |
| BCIR/INF_MONTHLY | -0.032131 | 0.020395 | -1.575466 | 0.1153 |
| ER$/INF_MONTHLY | 2.236029 | 0.139957 | 15.97652 | 0.0000 |
| HC/INF_MONTHLY | -4.067091 | 0.890655 | -4.566403 | 0.0000 |
| MS/INF_MONTHLY | -0.688530 | 0.137771 | -4.997632 | 0.0000 |
| PSC/INF_MONTHLY | 11.62914 | 1.866168 | 6.231561 | 0.0000 |

## Appendices 4. ADF Unit Root Test and Philips Perron Test for Variables Included in Chapter 6

**A. Bank Non-Performing Loans ADF Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: BNPL
Date: 03/04/21 Time: 07:09
Sample: 1995 2019
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Total number of observations: 646
Cross-sections included: 28

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 133.582 | 0.0000 |
| ADF - Choi Z-stat | -5.91984 | 0.0000 |

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

**B. Bank Non-Performing Loans PP Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: BNPL
Date: 03/04/21 Time: 07:08
Sample: 1995 2019
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett ke...
Total (balanced) observations: 672
Cross-sections included: 28

| Method | Statistic | Prob.** |
|---|---|---|
| PP - Fisher Chi-square | 83.1021 | 0.0108 |
| PP - Choi Z-stat | -3.37909 | 0.0004 |

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

**C. Bank Z-Score ADF Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: BANK_Z_SCORE
Date: 03/04/21 Time: 07:10
Sample: 1995 2019
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 4
Total number of observations: 653
Cross-sections included: 28

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 142.256 | 0.0000 |
| ADF - Choi Z-stat | -6.78198 | 0.0000 |

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

**D. Bank Z-Score PP Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: BANK_Z_SCORE
Date: 03/04/21 Time: 07:12
Sample: 1995 2019
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett ke...
Total (balanced) observations: 672
Cross-sections included: 28

| Method | Statistic | Prob.** |
|---|---|---|
| PP - Fisher Chi-square | 158.677 | 0.0000 |
| PP - Choi Z-stat | -8.02578 | 0.0000 |

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

**E. Financial Freedom Index ADF Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: FFI
Date: 03/04/21 Time: 07:13
Sample: 1995 2019
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Total number of observations: 637
Cross-sections included: 27 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 238.789 | 0.0000 |
| ADF - Choi Z-stat | -7.47580 | 0.0000 |

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

**F. Financial Freedom Index PP Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: FFI
Date: 03/04/21 Time: 07:14
Sample: 1995 2019
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett ke...
Total (balanced) observations: 648
Cross-sections included: 27 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| PP - Fisher Chi-square | 296.107 | 0.0000 |
| PP - Choi Z-stat | -9.94358 | 0.0000 |

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

## Appendices 5. Estimation Results from Chapter 6

**A. GMM Estimation Result without Lag**

Method: Panel Generalized Method of Moments
Date: 04/23/20 Time: 06:46
Sample: 1995 2019
Periods included: 25
Cross-sections included: 28
Total panel (balanced) observations: 700
2SLS instrument weighting matrix
Instrument specification: C BANK_Z_SCORE FFI
Constant added to instrument list

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| BANK_Z_SCORE | -0.035493 | 0.033734 | -1.052149 | 0.0021 |
| FFI | -0.133109 | 0.031609 | -4.211154 | 0.0000 |
| C | -0.213304 | 0.035917 | -5.938764 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.030679 | Mean dependent var | -0.196976 |
| Adjusted R-squared | 0.027898 | S.D. dependent var | 0.947459 |
| S.E. of regression | 0.934149 | Sum squared resid | 608.2264 |
| Durbin-Watson stat | 0.362451 | J-statistic | 1.88E-30 |
| Instrument rank | 3 | | |

**B. DOLS Estimation Result without Lag**

Dependent Variable: BNPL
Method: Panel Dynamic Least Squares (DOLS)
Date: 03/31/20 Time: 04:15
Sample (adjusted): 1997 2016
Periods included: 20
Cross-sections included: 27
Total panel (balanced) observations: 540
Panel method: Pooled estimation
Fixed leads and lags specification (lead=3, lag=1)
Coefficient covariance computed using default method
Long-run variance (Bartlett kernel, Newey-West fixed bandwidth) used for coefficient covariances
Warning: one more more cross-sections have been dropped due to estimation errors

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| BANK_Z_SCORE | -0.132478 | 0.076079 | -1.741307 | 0.0828 |
| FFI | -0.277469 | 0.071009 | -3.907518 | 0.0001 |

| | | | |
|---|---|---|---|
| R-squared | 0.585486 | Mean dependent var | -0.105340 |
| Adjusted R-squared | 0.166333 | S.D. dependent var | 0.953370 |
| S.E. of regression | 0.870478 | Sum squared resid | 203.0724 |
| Long-run variance | 0.772035 | | |

**C. FMOLS Estimation Result without Lag**

Dependent Variable: BNPL
Method: Panel Fully Modified Least Squares (FMOLS)
Date: 04/23/20 Time: 04:41
Sample (adjusted): 1996 2019
Periods included: 24
Cross-sections included: 28
Total panel (balanced) observations: 672
Panel method: Weighted estimation
Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| BANK_Z_SCORE | -0.073181 | 0.016233 | -4.508063 | 0.0000 |
| FFI | -0.188276 | 0.011111 | -16.94548 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.038158 | Mean dependent var | -0.169937 |
| Adjusted R-squared | 0.036723 | S.D. dependent var | 0.957513 |
| S.E. of regression | 0.939768 | Sum squared resid | 591.7195 |
| Long-run variance | 0.642238 | | |

**D. GMM Estimation Result with Lag**

Dependent Variable: BNPL
Method: Panel Generalized Method of Moments
Date: 04/23/20 Time: 06:48
Sample (adjusted): 1996 2019
Periods included: 24
Cross-sections included: 28
Total panel (balanced) observations: 672
2SLS instrument weighting matrix
Instrument specification: C LAG1BANK_Z_SCORE LAG1FFI
Constant added to instrument list

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LAG1BANK_Z_SCORE | -0.074077 | 0.035524 | -2.085229 | 0.0374 |
| LAG1FFI | -0.109065 | 0.032326 | -3.373878 | 0.0008 |
| C | -0.188265 | 0.036780 | -5.118616 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.029582 | Mean dependent var | -0.169937 |
| Adjusted R-squared | 0.026681 | S.D. dependent var | 0.957513 |
| S.E. of regression | 0.944653 | Sum squared resid | 596.9955 |
| Durbin-Watson stat | 0.378775 | J-statistic | 1.45E-29 |
| Instrument rank | 3 | | |

**E. DOLS Estimation Result with Lag**

Dependent Variable: BNPL
Method: Panel Dynamic Least Squares (DOLS)
Date: 04/23/20 Time: 06:44
Sample (adjusted): 1998 2016
Periods included: 19
Cross-sections included: 27
Total panel (balanced) observations: 513
Panel method: Pooled estimation
Fixed leads and lags specification (lead=3, lag=1)
Coefficient covariance computed using default method
Long-run variance (Bartlett kernel, Newey-West fixed bandwidth) used for coefficient covariances
Warning: one more more cross-sections have been dropped due to estimation errors

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LAG1BANK_Z_SCORE | -0.152107 | 0.073237 | -2.076904 | 0.0389 |
| LAG1FFI | -0.282905 | 0.069437 | -4.074259 | 0.0001 |

| | | | |
|---|---|---|---|
| R-squared | 0.674639 | Mean dependent var | -0.066363 |
| Adjusted R-squared | 0.308777 | S.D. dependent var | 0.962498 |
| S.E. of regression | 0.800219 | Sum squared resid | 154.3245 |
| Long-run variance | 0.632742 | | |

**F. FMOLS Estimation Result with Lag**

Dependent Variable: BNPL
Method: Panel Fully Modified Least Squares (FMOLS)
Date: 04/23/20 Time: 06:45
Sample (adjusted): 1997 2019
Periods included: 23
Cross-sections included: 28
Total panel (balanced) observations: 644
Panel method: Weighted estimation
Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LAG1BANK_Z_SCORE | -0.093386 | 0.017549 | -5.321442 | 0.0000 |
| LAG1FFI | -0.174392 | 0.011402 | -15.29541 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.050856 | Mean dependent var | -0.140547 |
| Adjusted R-squared | 0.049378 | S.D. dependent var | 0.967468 |
| S.E. of regression | 0.943280 | Sum squared resid | 571.2364 |
| Long-run variance | 0.633477 | | |

**G. Granger Causality Test**

Pairwise Dumitrescu Hurlin Panel Causality Tests
Date: 04/01/20 Time: 06:42
Sample: 1995 2019
Lags: 3

| Null Hypothesis: | W-Stat. | Zbar-Stat. | Prob. |
|---|---|---|---|
| BANK_Z_SCORE does not homogeneously cause B... | 13.4144 | 15.4504 | 0.0000 |
| BNPL does not homogeneously cause BANK_Z_SC... | 3.50046 | 0.06042 | 0.9518 |
| FFI does not homogeneously cause BNPL | 8.93061 | 8.48995 | 0.0000 |
| BNPL does not homogeneously cause FFI | 5.40838 | 3.02220 | 0.0025 |
| FFI does not homogeneously cause BANK_Z_SCORE | 1.84123 | -2.51530 | 0.0119 |
| BANK_Z_SCORE does not homogeneously cause FFI | 6.49155 | 4.70367 | 3.E-06 |

## Appendices 6: ADF Test Results for Variables Included in chapter 7

**A. Patents by Residents (Innovation) ADF Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: PATENT_APPLICATIONS__RES
Date: 03/04/21 Time: 07:29
Sample: 1995 2019
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 4
Total number of observations: 575
Cross-sections included: 27 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 87.5664 | 0.0026 |
| ADF - Choi Z-stat | -1.30473 | 0.0960 |

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

**B. Bank Deposits to GDP ADF Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: BANK_DEPOSITS_TO_GDP____
Date: 03/04/21 Time: 07:30
Sample: 1995 2019
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Total number of observations: 639
Cross-sections included: 27 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 88.4188 | 0.0022 |
| ADF - Choi Z-stat | -3.49200 | 0.0002 |

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

**C. Bank Credit to Bank Deposit ADF Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: BANK_CREDIT_TO_BANK_DEPO
Date: 03/04/21 Time: 07:32
Sample: 1995 2019
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 4
Total number of observations: 636
Cross-sections included: 27 (1 dropped)

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 99.9223 | 0.0001 |
| ADF - Choi Z-stat | -3.64909 | 0.0001 |

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

**D. Private credit by deposit money banks and other financial institutions to GDP ADF Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: PRIVATE_CREDIT_BY_DEPOSI
Date: 03/04/21 Time: 07:34
Sample: 1995 2019
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Total number of observations: 665
Cross-sections included: 28

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 82.0320 | 0.0133 |
| ADF - Choi Z-stat | -2.59056 | 0.0048 |

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

**E. Gross Domestic Expenditure on Research and Development (% of GDP) ADF Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: RESEARCH_AND_DEVELOPMENT
Date: 03/04/21 Time: 07:34
Sample: 1995 2019
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 4
Total number of observations: 646
Cross-sections included: 28

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 81.8573 | 0.0137 |
| ADF - Choi Z-stat | -2.75599 | 0.0029 |

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

**F. Unemployment Rate ADF Test at Level**

Null Hypothesis: Unit root (individual unit root process)
Series: UNEMPLOYMENT_RATE
Date: 03/04/21 Time: 07:36
Sample: 1995 2019
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 4
Total number of observations: 639
Cross-sections included: 28

| Method | Statistic | Prob.** |
|---|---|---|
| ADF - Fisher Chi-square | 124.809 | 0.0000 |
| ADF - Choi Z-stat | -4.84973 | 0.0000 |

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

## Appendices 7: Estimation Results from Chapter 7

**A. GMM Result**

Dependent Variable: PATENT_APPLICATIONS__RES
Method: Panel Generalized Method of Moments
Date: 05/18/20 Time: 07:19
Sample (adjusted): 1995 2018
Periods included: 24
Cross-sections included: 28
Total panel (unbalanced) observations: 619
2SLS instrument weighting matrix
Instrument specification: C BANK_CREDIT_TO_BANK_DEPO BANK_DEPOSITS_TO_GDP____ PRIVATE_CREDIT_BY_DEPOSI RESEARCH_AND_DEVELOPMENT UNEMPLOYMENT_RATE
Constant added to instrument list

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| BANK_CREDIT_TO_BANK_DEPO | -0.452438 | 0.072202 | -6.266255 | 0.0000 |
| BANK_DEPOSITS_TO_GDP____ | -0.279622 | 0.058589 | -4.772622 | 0.0000 |
| PRIVATE_CREDIT_BY_DEPOSI | 0.549510 | 0.102602 | 5.355745 | 0.0000 |
| RESEARCH_AND_DEVELOPMENT | 42.02649 | 4.432553 | 9.481328 | 0.0000 |
| UNEMPLOYMENT_RATE | 1.175509 | 0.567217 | 2.072416 | 0.0386 |

| | | | |
|---|---|---|---|
| R-squared | 0.172247 | Mean dependent var | 4089.540 |
| Adjusted R-squared | 0.166854 | S.D. dependent var | 9660.406 |
| S.E. of regression | 8817.712 | Sum squared resid | 4.77E+10 |
| Durbin-Watson stat | 0.082617 | J-statistic | 5.217731 |
| Instrument rank | 6 | Prob(J-statistic) | 0.022358 |

**B. DOLS Result**

Dependent Variable: PATENT_APPLICATIONS__RES
Method: Panel Dynamic Least Squares (DOLS)
Date: 05/18/20 Time: 07:21
Sample (adjusted): 1997 2018
Periods included: 22
Cross-sections included: 24
Total panel (unbalanced) observations: 516
Panel method: Weighted estimation
Fixed leads and lags specification (lead=1, lag=1)
Long-run variance weights (Bartlett kernel, Newey-West fixed bandwidth)
Warning: one more more cross-sections have been dropped due to estimation errors

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| BANK_CREDIT_TO_BANK_DEPO | -0.253515 | 0.061971 | -4.090841 | 0.0001 |
| BANK_DEPOSITS_TO_GDP____ | -0.137477 | 0.022915 | -5.999365 | 0.0000 |
| PRIVATE_CREDIT_BY_DEPOSI | 0.350904 | 0.056458 | 6.215265 | 0.0000 |
| RESEARCH_AND_DEVELOPMENT | 17.75977 | 4.855923 | 3.657341 | 0.0004 |
| UNEMPLOYMENT_RATE | 0.512095 | 0.219769 | 2.330154 | 0.0211 |

| | | | |
|---|---|---|---|
| R-squared | 0.878246 | Mean dependent var | 3581.473 |
| Adjusted R-squared | 0.584745 | S.D. dependent var | 9793.021 |
| S.E. of regression | 6310.652 | Sum squared resid | 6.01E+09 |
| Long-run variance | 18279658 | | |

**C. FMOLS Result**

Dependent Variable: PATENT_APPLICATIONS__RES
Method: Panel Fully Modified Least Squares (FMOLS)
Date: 05/18/20 Time: 07:23
Sample (adjusted): 1996 2018
Periods included: 23
Cross-sections included: 26
Total panel (unbalanced) observations: 568
Panel method: Grouped estimation
Cointegrating equation deterministics: C
Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)
Warning: one more more cross-sections have been dropped due to estimation errors

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| BANK_CREDIT_TO_BANK_DEPO | -0.087777 | 0.017425 | -5.037497 | 0.0000 |
| BANK_DEPOSITS_TO_GDP____ | -0.180277 | 0.049476 | -3.643707 | 0.0003 |
| PRIVATE_CREDIT_BY_DEPOSI | 0.239162 | 0.037884 | 6.313062 | 0.0000 |
| RESEARCH_AND_DEVELOPMENT | 3.877443 | 1.415232 | 2.739793 | 0.0064 |
| UNEMPLOYMENT_RATE | -0.321226 | 0.137459 | -2.336884 | 0.0198 |

| | | | |
|---|---|---|---|
| R-squared | 0.978944 | Mean dependent var | 3596.757 |
| Adjusted R-squared | 0.977685 | S.D. dependent var | 9545.047 |
| S.E. of regression | 1425.867 | Sum squared resid | 1.09E+09 |
| Long-run variance | 89754.07 | | |

**D. GMM Result Innovation**

Dependent Variable: UNEMPLOYMENT_RATE
Method: Panel Generalized Method of Moments
Date: 04/06/20 Time: 02:19
Sample (adjusted): 1995 2018
Periods included: 24
Cross-sections included: 28
Total panel (unbalanced) observations: 619
2SLS instrument weighting matrix
Instrument specification: C PATENT_APPLICATIONS__RES
Constant added to instrument list

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| PATENT_APPLICATIONS__RES | -0.004600 | 0.001832 | -2.511261 | 0.0123 |
| C | 920.4453 | 19.20439 | 47.92891 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.010118 | Mean dependent var | 901.6317 |
| Adjusted R-squared | 0.008513 | S.D. dependent var | 441.8285 |
| S.E. of regression | 439.9437 | Sum squared resid | 1.19E+08 |
| Durbin-Watson stat | 0.119444 | J-statistic | 3.13E-30 |
| Instrument rank | 2 | | |

**E. GMM Result Research & Development**

Dependent Variable: UNEMPLOYMENT_RATE
Method: Panel Generalized Method of Moments
Date: 04/06/20 Time: 02:22
Sample: 1995 2019
Periods included: 25
Cross-sections included: 28
Total panel (balanced) observations: 700
2SLS instrument weighting matrix
Instrument specification: C RESEARCH_AND_DEVELOPMENT
Constant added to instrument list

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| RESEARCH_AND_DEVELOPMENT | -0.669529 | 0.173077 | -3.868385 | 0.0001 |
| C | 961.8643 | 26.15447 | 36.77629 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.020989 | Mean dependent var | 882.6300 |
| Adjusted R-squared | 0.019586 | S.D. dependent var | 434.5857 |
| S.E. of regression | 430.3087 | Sum squared resid | 1.29E+08 |
| Durbin-Watson stat | 0.131182 | J-statistic | 4.38E-28 |
| Instrument rank | 2 | | |