What makes an International Financial Centre (IFC) Competitive? An empirical study of the determinants responsible for the competitiveness of an IFC

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ABSTRACT

International Financial Centres (IFCs) serve as focal points for implementing international agreements and other transactions between financial sectors located around the world. The competitiveness of an IFC depends on its function to provide easy access to the capital, stability in financial markets and a dynamic business eco-system. The purpose of conducting this study is to identify the most relevant determinants that significantly affect the Global Financial Centres Index (GFCI) ranking of the countries across the world. First published in 2007, the GFCI is considered as the primary source for ranking IFCs globally. GFCI is an index which ranks financial centres based on over 61,499 assessments of financial centres across the world provided by 10,252 respondents to an online questionnaire of GFCI (GFCI33, 2023). The collected date represents 153 key indices provided by sources including the World Bank, the Organisation of Economic Cooperation and Development, and the Economist Intelligence Unit. It utilises qualitative (online questionnaires) and quantitative (economic indices) dataset to publish reports biannually.

Through this paper, an attempt has been made to conduct an empirical study of the determinants responsible for the competitiveness of an IFC based on GFCI ranking. To facilitate this study, extensive data has been collected for 196 IFCs (unique financial jurisdictions) along with 238 key factors (determinants) over a period of fourteen years (2007 till 2020). In addition to revisiting some of the existing empirical studies on this subject, this dissertation attempts to further build on the existing empirical research and analyses the impact of unique key factors on the GFCI ranking through the application of a panel regression. From extensive set of variables, the study adopts 17 most relevant determinants (summarised below) by using a Decision Tree approach.

The variable of Business Regulations is constructed by using the Ease of doing business index source from the World Bank (GFCI 33). The variable of corporate taxes is constructed by the sum of tax bases and tax rates dataset source from KPMG (GFCI 33). Indexed sourced from Transparency International is used to construct the variable of Corruption Perception Index (GFCI 33). The variable of Credit Market Regulations is constructed by international consortium group by measuring the deposit based financing source from World Bank (GFCI 33). Government size, Property Rights and the Legal System, Reliable Money, Freedom to Trade Internationally Regulation, and Gender equality in legal rights are five broad categories used to construct Economic Freedom Overall Index Variable source from Fraser Institute (GFCI 33). The study adopts the variable of freedom of trade which is sourced from WTO constructed upon non-tariff barrier in exports and imports of a country (GFCI 33). The variable

of Global Competitiveness Index is constructed by the macroeconomic and the micro/business aspects of competitiveness into a single index (GFCI 33). The data on volume of high tech exports is modelled and calculated as a function of foreign demand and of price competitiveness in order to construct variable of High Tech Exports source. The variable of inflation is constructed by using Consumer Price Index (CPI). The variable of Internet uses as a percentage of population is derived by dividing the number of Internet users by total population and multiplying by 100. The variable of Labour Market Regulations is constructed through using of the Rigidity of Employment Index. The variable of Legal System Property Rights is constructed by encompassing index of Legal verification and guarantee systems, fair legal rules, and formal compensation mechanism. The variable of quality of roads is constructed through collecting data on the transportation infrastructure and financial spending by using (IRI) International Roughness Index (GFCI 33). Spending, revenue, and employment are all ways to construct the variable of size of a government. An aggregate of money growth (money supply growth minus real GDP growth), standard deviation of inflation (GDP deflator), CPI inflation in most recent year, and freedom to hold foreign currency in bank accounts are used to construct the variable of the sound money index. The index is measured on a scale of 0 (worst) to 10 (best). The variable of percentage of Urban Population is constructed by Individuals living in urban areas as a percentage of total population. A long and solid life, being educated and have a respectable way of life are the three indicators to construct the variable of HDI.

The results of the Panel regression show that all the variables positively impact the GFCI ranking except business regulations, labour market regulation, legal system property rights and HDI.

This dissertation also establishes to arrange the IFCs in groups (Clusters) based on similar shared characteristics. This has been possible by adopting criteria of developing a centroid for each cluster against each determinant for a number of observations (Years). As a result, each cluster includes all those countries that are experiencing similar characteristics throughout the range of observations (years). By introducing the Elbow method of clustering, the study has identified five optimal groups (clusters). In order to deal with complexities of missing values in the dataset and arranging the IFCs in these five optimal groups based upon a centroid (mean) value, this study has undergone an appropriate clustering methodology using the Majorisation-Minimisation Algorithm named as K-POD means clustering. It is evident that each centroid is seen as representing the average observation within a cluster across all the variables in the analysis. All the observations in a cluster ranging between maxima and minima centrifuge around centroid value. The distances between cluster centroids show how far apart the centroids of the clusters in the final partition are from one another.

The study suggests that by minimising the hurdles created by business regulation laws, labour market regulation procedures and legalised process of property rights, the GFCI ranking will improve for the countries. It will help to pave the path of financial stability and creation of wealth. Similarly, by providing better health and education facilities, the Human development Index will help positively to improve the GFCI ranking of countries.

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Acronyms

IFCs	International financial centres (IFCs)
GFN	Global Financial Network (GFN)
FDI	Foreign direct investment
SMEs	Small and Medium Enterprises
GFCI	Global Financial Centres Index
EDB	Economic Development Board
ESMA	European Securities and Markets Authority
SSE	Shanghai Stock Exchange (SSE)
GDP	Gross Domestic Product
FE	Fixed Effect Model (FE)
RE	Random Effect Model (RE)

Chapter One – Introduction

1.1 Concept of International Financial Institutions (IFCs)

International Financial Centres (IFCs) are centres that serve as focal points for implementing international agreements and other transactions between financial sectors located around the world. (Z/Yen group, 2022). IFCs are cities with high concentrations of financial firms that conduct cross-border transactions (Cassis 2010). A financial centre is a city that gathers all financial institutions of a country, works to improve economic relations and the business environment, and conducts domestic and international credit and financial transactions. Globally, there are various financial centres that work to regulate financial activities to stimulate financial operations.

For instance, Bermuda Island's Sydney International and Hamilton International financial centres have been designated as international financial centres, although they are not permitted to engage in cross-border financial operations. From this vantage point, the financial centres of New York and London are wholly international.

Z/Yen Group Limited, a British financial corporation, presents a good categorisation of the activities of international financial centres. This includes a Global Financial Centre – a hub that reflects the world's financial institutions, connecting national, regional, and global financial institutions; International financial centres – centres that serve as focal points for implementing international agreements and other transactions between financial sectors located around the world; Specialised financial centres – among the most common types of financial centres are specialised financial centres, which are centres that coordinate the world's leading banking, insurance, and financial institutions in a specific area of the financial market – these types of financial centres will specialise in only one type of financial need; Financial centres at the national level - the country's centre of trade, finance, and banking operations – these financial centres are also distinguished by the ability of the host country to conduct international financial transactions; in terms of operations and financial transactions, local financial centres are smaller than other financial centres – this type of financial centre is distinct from others in that it conducts financial transactions within the same country. One financial centre in the same category may also serve as an economic centre in another. London and New York are two examples of such financial centres (Narziev, 2021).

International Financial Centres (IFC) offer investors several advantages, including low transaction costs, low risks, and easy access to capital. Other obvious characteristics of financial centres include a qualified labour force, political stability, and income potential. Access to airlines, legal framework, regulatory framework, trade tax regime, and infrastructure all play

important roles in the competitiveness of financial centres. (Apak and Elverici,2008).

In addition to the existence of certain factors, such as an international service demand, a willingness to meet the international service demand, rule of law, good financial infrastructure, and qualified environmental settings, the formation of an international financial centre is required. (Yılmaz, 2011).

The study includes Z/ Yen group and Casis (2010) definitions to consider the aspects and potential of IFCs in order to regulate domestic and international economic growth. The international agreements stimulate financial activities and thus improve the ranking of IFCs located across the world. With an inter and intra economic potential of financial centres, the flow of international capital is increasing by the effect of globalisation. With increased capital inflows, financial sectors become more reliable to assist economic needs across the financial centres. As a result, cities (IFCs) with high concentrations of financial firms conduct cross-border transactions. So, the study considers international financial agreements and cross border financial transactions as key elements concerned with performance/competitiveness of financial centres. Similarly, deepening financial markets reduce the economy's vulnerabilities in the face of obvious capital outflows (Çevik, 2011). This is a benefit for developing countries in terms of economic development. Similarly, Companies across the world receive services from financial institutions in the country in which they operate. As a result, financial centres stimulate wealth concentration of businesses. (SERPAM, 2012).

1.2 Historical perspectives to International Financial Institutions

International financial centres have emerged as one of the core components of the global financial system in recent years. The expanding breadth of IFC activities, which currently include financial markets, international financial and lending contacts, insurance, etc., increases the importance and impact of IFCs as the global economy becomes more globally integrated. Financial hubs significantly contribute to the nation's overall economic growth and development.

A variety of historical, geographic, social, economic, and political aspects are combined in the construction and development of financial centres, making it a very complex and difficult process. Globalisation of the financial market and financial liberalisation processes are both related to the formation of international financial centres. The construction and growth of financial centres have been attributed to a variety of causes, including geographic location, multicultural elements, liberal laws, enticing tax and customs policies, immigration legislation, competitive financial service costs, etc. However, financial centres are not always built in locations with favourable economic, political, and social conditions. It involves political will

and success in addition to the combination and interaction of several components (Romanova et al., 2018).

Sassen (1991) proposes the concept of a global city by connecting it with cross-border activities such as finance and specialised sectors due to the advancement of technological information and the globalisation process. The twenty-first century has witnessed two decades with a dramatic increase in the IFC establishment. One school of thought considers the establishment of IFCs in relation to competition among cities. The competition between cities for promoting themselves as attractive havens for inward investments becomes fiercer and more popular. Competition among cities has gone worldwide with enormous foreseen advantages of being a financial centre in order to boost wealth and job creation. The other school of thought agrees on the significance of historical trade links, historical financial connections and financial development on the status of the IFC.

The presence of the financial centre is symbolic to a host country in terms of financial and industrial services, fascinating infrastructure and technologies, and a major contributor to the national GDP. It can be easily observed that Shanghai, Beijing, Shenzhen, Hong Kong and Guang Chou are largest cities and belong to the list of top 10 largest financial centres in Asia. The worldwide monetary focus permits a country to keep a consistent condition of financial development and improvement. It is on the grounds that the IFC gives the foundation for speculation and reserve funds that empower more open doors for innovative undertakings.

According to the history of financial centres, a variety of factors contribute to their establishment and development, including geographic location, multicultural factors, liberal legislation, stimulating tax and customs policies, immigration legislation, competitive financial service costs, and so on. However, financial centres are not always established in areas with favourable economic, political, and social factors. It necessitates the interaction and combination of various factors, as well as political will and success (Irina Solovjova et al,2018).

1.3 Importance of International Financial Centres for Economic growth

International Financial Institutions play an important role in economic growth through strategic planning and efficiency in the credit market. The process of financing is helpful to drive sustainability in the economy by focusing on the sourcing from global financial institutions. The global financial institution sources comprise investment portfolio, loans, debentures and aids with foreign direct investment (FDI). Economic centres occupy a key position inside the global financial system, improving the supply of credit, and inspiring competition in domestic banking structures. The result is a lift in investment and in the economic indicators, which in the long run helps task creation and growth.

IFCs offer low transaction charges, political stability, and finance accessibility. Rising performance inside the monetary zone with the help of IFCs can create favourable conditions for macroeconomic performance indicators together with employment, poverty, human capital development, monetary efficiency, and efficiency of capital market to generate finance for Small and Medium Enterprises (SMEs).

The performance of international financial centres in attracting funds needed for the development of neighbouring economies is a good indicator of their depth and breadth. Because of this feature, financial centres generate positive externalities for neighbouring countries (Akyol and Baltaci,2015). Similarly, the growth and development of the financial services sector are critical to the development and economic growth of both developed and developing economies. The presence of an international financial sector in an economy can contribute significantly to the development of the financial sector and the deepening of markets. Some positive effects on macroeconomic indicators, such as employment, capital inflows, and rapid business establishment, can be observed as financial sector efficiency rises with international financial centres. Concurrently, the liberalisation that has resulted from the establishment of international financial centres can assist economies in becoming more transparent and attracting international investment. This meets the need for the funds required for economic growth (Krishnan, 2018).

International financial centres have become one of the most important components of the international financial system in recent years. The establishment of international financial centres is linked to financial liberalisation and financial market globalisation. The increasing globalisation of the world’s economy increases the role and influence of IFCs due to the expansion of the scope of IFC's activities, which currently includes financial markets, international financial and lending relations, insurance, and so on. Financial centres contribute significantly to the country's overall economic development and growth.

1.4 Monetary policy as a prerequisite for financial institutions

The monetary policy of any country helps to promote bank lending and financial stability. According to recent report by Grimm et.al, (2023), monetary policy increases the financial credit stability and thus exaggerates the financial sector condition. By the report, conventional monetary policy increases the expected return in financial markets. So, it supports the effectiveness of monetary policy to pacify the financial credits in order to improve expected returns.

Banking channels prompt the financial flow through commercial and central banks. An organisation that oversees a state's or formal monetary union’s commercial banking system, as

well as its currency and monetary policy, is known as a central bank, reserve bank, or monetary authority. In contrast to a commercial bank, a central bank has exclusive authority over expanding the monetary base. The majority of central banks also have supervisory and regulatory powers to keep member banks stable, prevent bank runs, and discourage reckless or fraudulent behaviour. The central banks of the majority of developed nations are institutionally devoid of political influence. Laying out a worldwide monetary place for arising significant urban communities in the creating and developing business sectors is vital. These conversations inspire us to lead this observational investigation with the focal point on the monetary aspect of an IFC for the states to think about in a manner prompting the foundation of an IFC in the country.

Jao (1997) accentuates the substance of monetary market improvement in upgrading currency and capital market viability. Similarly, low interest rates for prolonged periods, improving of reserve requirements, the discount rate, and open market operations are other instruments for improving monetary market. Social factors like social security and expectation for every day also affect the status of the financial markets. The arrangement of significant urban communities by considering the connection between the headway of media telecommunication, globalisation, the hierarchical construction of the monetary establishment, and maker administrations addresses monetary prerequisites to manage everyday exercise. Similarly, the connection between monetary policies and financial institutions depends on utilisation of resources in a useful manner. The effect of monetary policy on financial centres is significant. It is due to the tool of monetary policy to set interest rate at a feasible level for motivating investment and saving in the economy. If the monetary policy of a country sets interest rate high, then it results in reducing investment by the investors due to high cost of borrowing loans from the financial institutions. The impact of monetary policies on financial development appears to be restricted not just where credit effectively takes care of speculative events (Hall, 1998) With an end goal to build the degree of cooperation of monetary establishments of a country to design policies for the financial institutions to support global financial needs, international financial institutions are driving various economic zones that are intended to empower the investment of monetary foundations. The world has observed the advancement of Metropolitan cities in the early twentieth century. Hall (1966) provides the taxonomic hierarchy of financial cities where New York and London claim the first and second major and largest centres on the world stage.

1.5 IFCs and GFCI by Z/Yen Group

Financial centres are typically financial businesses that operate in other areas of finance, such

as private equity, hedge funds, and reinsurance, or that provide a wide range of financial services, such as those related to mergers and acquisitions, public offerings, or corporate actions. A few examples of ancillary financial services include the provision of allied professional services like legal advice and accounting. The majority of IFC participants are banks, investors, the government, and financial markets. Various monetary issues have arisen as a feature of the globalisation and industrialisation process, including accessibility problem to finance, energy insecurity, an increase in Earth-wide temperature, aging and ecological disorders. These issues have become new difficulties, and they have, likewise, become more vital for the fulfilment of financial and social interests. It is generally recognised that the banking and money frameworks are by and large thought about veins for the whole economy and worldwide exchange.

The IFC is by all accounts one method for handling the issues of monetary nature. This is a reason we trust to check the effect of determinants associated with an IFC in order to approach significance of monetary system. Due to benefits of factors associated with an IFC, various nations in the world are aiming to develop the financial sectors of their country, for example, Indonesia, Thailand, Vietnam, the United Arab Emirates, and numerous others.

In order to accomplish the global standards provided by Z/Yen, 2023, the administrations across the world invested endless efforts to boost up monetary business. The research that Z/Yen Group conducted for the City of London in 2005 on the competitiveness of financial centres led to the development of the Global Financial Centres Index (GFCI). The past examination looked at a few focuses, regularly London, Frankfurt, Paris, and New York. At that point, the strength of financial centres was already widely distributed, and Z/Yen created the GFCI to provide a dynamic measure of the strength of financial centres worldwide. 2007 marked the release of the first edition of the GFCI. The 33rd edition of the index, which is updated twice a year, was released by Z/Yen in March 2023. The GFCI is a factor assessment index that assigns a rating to financial centres by combining two distinct sets of data. One set is key factors measured by a wide range of organisations, including the World Bank, the OECD, and the United Nations, which provided quantitative measures focused on countries and cities. In GFCI 33, a total of 153 key factors were utilised.

The other set is Financial Centre Assessments measures by using an online survey that has been running continuously since 2007 in which financial professionals from around the world rate the competitiveness of financial centres. Z/Yen used 61,449 assessments of centres provided by more than 10,252 individual survey respondents for GFCI 33. (GFCI, 2023).

1.6 Aims and Objectives

In particular, this dissertation will focus on addressing the following:

"What makes an International Financial Centre ("IFC") Competitive - factors that contribute to the competitiveness or failure of an IFC and how the competitiveness of established IFCs can be replicated elsewhere"

The intention of this study is to develop an understanding of IFCs currently operational globally and the factors that contribute to the competitiveness currently being enjoyed by a few. The study will also analyse the applicability of these competitiveness factors elsewhere in other and/or new IFCs. To this effect, this paper has been structured across the following key areas:

- An understanding of the available literature pertaining to the establishment and operations of an IFC;
- A review of the key factors which apply to these IFCs including those that are common across most IFCs and those which are unique to a particular one;
- A study of how these factors apply and affect the performance and/or competitiveness of these IFCs;
- Identification of key stakeholders for these IFCs and what impact they do/might have on;
- Identification of the key competitiveness factors and/or a 'competitiveness' model which may be applied to a failing and/or new IFC; and
- Review of how can study results impact and improve effectiveness of IFC.

1.7 Motivation behind selecting a study of IFCs

The study motivation is to find factors which are responsible for GFCI ranking through the lens of IFCs. It is important to the extent that currently, the world financial system depicts deficiency in promoting financial facilities due to COVID-19 pandemic or conflicts between countries on the issues of attaining autonomy. Currently, world social order is changing with conflict between China and USA, and Ukraine and Russia. As all these countries are main financial sources to promote finance and investment projects across the globe. So, it is important to investigate factors that can help out to identify global financial markets potential to support financial requirements of the leading financial centres and their associated countries. Moreover, with working experience in excess of 22 years across the broader spectrum of the financial services sector, the author has spent considerable time working for leading financial services regulatory authorities across key International Financial Centres across three continents; this includes significant leadership, regulatory, and management experience in strengthening financial institutions' corporate governance with strong expertise in financial

regulatory supervision (both conduct and prudential), and establishing effective regulatory compliance culture, strategic planning and implementation, and financial management with an excellent understanding of corporate audit, compliance and risk management functions.

In his recent leadership roles at IFC regulatory authorities, the author has been responsible for successfully devising the IFC regulatory authority's strategic priorities whilst clearly articulating delivery requirements for each of the regulatory outcomes. As part of Senior Leadership, he has been responsible for leading and managing several leadership committees and forums across Supervision and wider regulatory departments and functions, including but not limited, to, Strategic project boards, Regulatory Effectiveness Committee, Senior Leadership Forum, and High-Risk Business Forums. As in most cases, these regulatory authorities represent their respective governments and are independent with respect to their governance and controls framework. Objectives that are most common across all such regulatory authorities include, in addition to others, maintaining financial stability, and promoting, developing and contributing towards the growth of their respective IFCs. Given the level of seniority and leadership roles held, the author has been in a fortunate position to exert influence on the decision taken by the regulatory authorities of these IFCs when implementing policies and framework to improve and enhance the development and growth of their respective IFCs. This has led to the development of necessary interest by the author to gain a better understanding of each of the key factors which have an impact on the stability and growth (i.e., competitiveness factors) of an IFC.

The rest of the paper consists of five chapters. Chapter 2, literature review, illustrates and highlight some of the key research that has been carried out and is publicly available in this field relevant to the proposed research pertaining to the International Financial Centres. Chapter 3 relates to data and research methodology and provides an outline of the design and methodology of the research proposal supported with research hypothesis. This chapter also explains the methodology with respect to designed model of panel regression with fixed effect and testing the correlation caused by explanatory variables. The study encompasses the normalise data techniques to obtain Best, Linear, Unbiased estimators (BLUE). In order to normalise the results of the model, the primary condition of homoscedasticity, cross sectional dependency, non-auto correlation, and stationarity of the data fulfil by applying the Wooldridge's test, Augmented Dicky fuller test, F test for time effect, and Breusch -pagan test. In order to solve the problem of serial correlation and heteroskedasticity, the study utilises the sandwich estimator. After completing all the primary conditions for the panel regression method, the study applied two tests to determine whether a fixed or random effect model will be appropriate for the data analysis Chapter 4 pertains to the results analysis with cross-

sectional values of 197 countries across 17 determinants and explains the quantitative effect on the GFCI ranking. Chapter 5 purposes findings for future perspectives by interpreting results in order to propose a new ranking system for GFCIs. Chapter 6 elaborates the clustering analysis followed by conclusion and references.

Chapter Two – Institutional Background of IFCs

2.1 IFCs – a recent history

The concept of an International Financial Centre can be traced back to its early primitive life which started in the 11th century at the annual "free fair" of St Giles in Winchester, England (Coispeau, 2016). A key characteristic of this fair was that it was open for business to all comers and (most importantly) was free from restrictions that applied to foreigners in most market towns at that time. Fast forward from that time and we can trace the first modern model of an IFC established by the Dutch in Amsterdam in the 17th century (Sylla, 2015) where the city hall, stock exchange, commodities exchange, major insurance, brokerage and trading companies were located within a few blocks of each other, along with coffee houses which served as informal trading floors and exchanges that facilitated deal-making (Nang, 2017). The Dutch were followed, in the later centuries, by London, New York, and Tokyo as the leading established IFCs (Sylla, 2015). This financial modernisation led to the rapid growth of several economies during the 19th and 20th century. Whilst London and Paris dominated the financial modernisation during most of the 19th century, New York and Tokyo emerged as stronger yet dominant contenders during the latter half of the 20th century. In the latter half of the 20th century, Tokyo emerged as Asia's dominant "financial" and "banking" centre, as evidenced by the findings of Cassis and Bussière (2005). This study said that Tokyo became a stronger country in the second half of the 20th century on the basis of these findings. This era saw the rapid development of several other IFCs, including Brussels, Amsterdam, Frankfurt, and Hamburg (Cassis and Bussière, 2005).

This period of financial modernisation let to the evolution of inequality and concentration of income and wealth in the hands of rich families who dominated a prevalent rigid class system at the time. Picketty (2014) explains this remarkably well and has suggested that wealth accumulates faster than the economic output. He also briefly teases out the correlation between inequalities within nations (i.e., financial economies) and the resultant financial development. Sylla (2015) explorers this further and asserts that such a correlation may hold; as modern financial systems effectively seek to maximise returns, those who have access to finance, which are much smaller proportion of the overall population, become major beneficiaries of these high returns.

This inequality within nations is one reason why most of the economies are pitching to develop their own financial centres aiming to maximise their gains at the expense of others. This race for financial modernisation has also fuelled the 'Globalisation' of our modern world. This is another factor that has played a key role in the strengthening of existing IFCs and the setup and

development of several new ones over the past few decades, in particular.

2.2 IFCs-Conceptualisation

An International Financial Centre may be explained in several ways. It can be defined as: a location where international financial operations are conducted on a large scale (Moosa, Li & Jiang, 2015); a hub where financial transaction of considerable volume and variety take place (Yildirim & Mullineux, 2015); a cluster of financial service providers serving the requirements of either a region or a continent (Cassis and Bussière, 2005); a location where international financial operations are conducted on a large scale and agglomeration of financial institutions providing financial services on an international level (Moosa, Li and Jiang, 2015); the grouping together, in a given urban space, of a number of financial services and a place where intermediaries coordinate financial transactions and arrange for payments to be settled (Cassis, 2006); or a place in which there is a high concentration of banks and other financial institutions, and in which a comprehensive set of financial markets are allowed to exist and develop, so that financial activities and transactions can be effectuated more efficiently than at any other locality (Jao, 1997). Though IFC is not a new concept, it has only really gained momentum recently as the world has come to embrace the financial modernisation and succumbed to the wave of globalisation. As such, historic literature, specific to the establishment of an IFC, is nominal. A few examples which supplement the IFC concept with historic facts are the Cassis' 'Capitals of Capital' (2006) and Coispeau's 'Finance Masters' (2016), as highlighted in the section above. Apart from these, the emergence and chronology of IFCs since the late 20th century has not been documented greatly save a handful sources. One such early source could be credited to Peter Hall (1966) who, in his book titled 'The World Cities', defined key and established cities as 'international cities'. The first two editions of Hall's book focused on seven such cities; these included London (UK), Paris (France), Randstad (Netherlands), Rhine-Ruhr (Germany), Moscow (Russia), New York (US), and Tokyo (Japan). Hall's work may be considered as an early predictor of conceptualisation of city systems which emerged during the 1970s and 1980s leading to a major world shift towards a global structure and giving way to the emergence of financial centres on the global spectrum. This led to further extensive work by Friedmann and Wolff (1982), Friedmann (1986), and Sassen (1991), which led to the identification and subsequent determination of major international cities as 'world cities' and 'global cities', and how these cities controlled the global economy. Friedmann (1986), as part of his study, identified London, New York, and Tokyo as major cities (global financial centres) whilst highlighted several other cities (e.g., Los Angeles, Frankfurt, Amsterdam, Miami, and Singapore) as relatively important as well.

Both, the very definition of an IFC and the key characteristics of those cities which have been identified as global or international cities (e.g., London and New York) evolve around the apparent presence of high concentration of financial services in a selected location. Research has been conducted in this area, naturally, as it has been generating considerable interest now for quite some time. For example, Porteous (1995) has researched on the reasons as to why financial activities tend to agglomerate in a specific location and not another.

Modern capitalism is embodied in financial centres, which serve as the control hubs for the world economy and crucial nodes in financial networks. Many people would anticipate a gradual shift in financial activity and influence away from the USA and Europe toward Asia in the wake of the financial crisis (French et al., 2009; Wojcik, 2013). The map of financial centres, however, evolves only gradually, and great political upheavals, frequently wars, are required to completely redraw it (Cassis, 2010).

Though, it is reasonable to understand the rationale behind this apparent, and over- the-time, concentration of financial services in one particular location, the recent technological advancements (in terms of speed and ease of communication and flow of timely and real-time information) beg to differ and, in fact, point to the other end of the spectrum. It can be argued that technology aids the de-concentrating and geographical dispersion of financial services away from these financial centres (Faulconbridge, 2004); a belief many supporters have highlighted through their research (e.g., Korbin, 1997; Cairncross, 1997). Also, there are those scholars who believe that despite the concentrations in a particular location, the understanding of multinational organisations (operating in many countries and across several continents) and their geographic impact remain underdeveloped (McCann, 2011) leading to the conclusion that much needs to be done still if one is to move away from a seemingly concentric location model for financial development.

Others concentrate on identifying the location specific attributes which relate to an IFC; e.g., Thrift (1994) uses London as a model IFC and argues that location specific characteristics and information define the advantages of a place as an IFC. Wojcik (2009) argues that ‘an important part of information used in financial markets is not easily transferable across space, resulting in the significance of local financial relations and spatial concentration of financial firms. This is also highlighted by Martin (1999) who identifies the importance of information collection and verification pertinent to financial services specific to a particular location, a financial centre. The importance of information in formulating the spatial creation of IFCs is further supported by Zhao et al. (2004) who use Beijing (China) as an example for a leading Chinese IFC and argue that ‘information problems have created the need for geographic agglomeration of financial activities based on the source of information’. They further argue that ‘geography still

provides strong justification of why major financial services continue to have a high degree of spatial agglomeration in particular locations, has substantially reduced friction of distance'. These are just a few examples of literature reviews which have critically analysed and concluded the importance of spatial presence and creation of IFCs, hub for financial services activities.

London and New York are arguably the most established IFCs, and historic as well. As a result of their global dominance in the provisioning of financial services, these two enjoy extensive research and literature review, both existing and ongoing. Not only are these two well researched individually, they are also often used as case studies when examining other financial centres or global cities as well. Some interesting examples of research on London and New York include the works of Roberts (2008), Cassis and Bussière (2005), Fichtner (2005), Thrift (1994), Davies (2017), Norfield (2016), Moran (1990), Cassis et al (2016) and Friedmann (1986) just to name a few.

Yildirim & Mullineux (2015) highlight a very important aspect which has culminated through the growing interest in studying IFCs; competition. They delve into the argument that cities do indeed compete. Referring back to the beginning of this chapter, where Coispeau, (2016) traces our modern day IFCs to its primitive roots in the St Giles fair in Winchester, England, it can be argued that competition, even at that time, was ripe. The very reason St Giles fair was set open to general public highlights the need and its intention to compete with other prominent cities and their annual fairs at that time; a typical trait of competition practiced till date where simply enhancing the appeal of a particular product to a larger audience increases the chances of an entity to strongly compete against other industry rivals. With an ever growing population, hence the target market, competition has only become more severe and widespread. Cities are now competing across continents, thanks to the repercussions of globalisation. Buck et al. (2002) second the growing city competition and the resultant emergence of IFCs; a cause of rapid globalisation. As cities evolve to become IFCs, they increasingly compete to attract and retain the best human and financial resources which, in turn, help them retain the leading position amongst other competitors. This is also reflective in the work by Cassis (2006) which highlights the competition between Paris and Frankfurt on mainland Europe whilst targeting to outplay London as well.

An analysis of the current state of the leading IFCs could certainly identify at least one strong, or leading, contender on each of the continents. London, for example, leads all other, though substantial and significant in their own right, in Europe whilst New York outshines all other leading IFCs located in the Americas. Similarly, Tokyo is still leading in the South Asia/Pacific region though it is now facing real threat from the ever growing and strengthening Singapore

and Hong Kong. Even in the Middle East and North Africa region, Dubai is comfortably leading the other IFCs based upon comparison provided in the study of Cassis (2005). Though cities like Frankfurt, Paris, Toronto, Zurich, and Sydney appear less attractive by visualised GFCI ranking when compared to the likes of London, New York or Tokyo, it does not undermine the importance these other IFCs have in the global economy. Though not global, cities such as these are certainly significant markets regionally. To place relevant importance to each of these IFCs it is critical to identify and categorise the IFCs in accordance with those they are competing against. Perhaps, it would benefit to outline a helpful 'taxonomy' of the IFCs at this stage. Z/Yen Group (2007) has made an instrumental effort over the last decade categorising and analysing the global IFCs. For the purposes of this study, categorisation, put together by Z/Yen Group would be used extensively. It classifies the IFCs into 5 categories:

- global financial centres which require criteria satisfied by London and New York only;
- International financial centres where a significant volume of cross-border transactions is conducted;
- Niche financial centres, such as Zurich in private banking;
- National financial centres that act as hubs for financial services within one country; and
- Regional financial centres that conduct a large proportion of regional business within one country.

The categorisations support the earlier works of Friedmann (1986) who identified London, New York and Tokyo as global financial centres whilst classifying several other major IFCs (e.g., Frankfurt, Amsterdam, and Singapore) as regional or national centres in their own right. The categorisation above is helpful as it allows building a prospective view of an IFC with reference to its most relevant competition. It also acknowledges those IFCs which are not large enough yet critical and a leading IFC in the particular niche they target and operate in. Zurich is one such great example.

2.3 Global Financial Centre Index Report

Z/Yen Group (2007) published its first Global Financial Centres Index ("GFCI") report in 2007. This was the first of its kind publication which not only listed the major IFCs, it ranked these IFCs against each other as well. In its first report, it included a list of 46 IFCs. Since then, it has produced GFCI reports every six months in March and September every year. For its recent most GFCI 22 report published in September 2017, the list of IFCs had grown to 108 (Z/Yen Group, 2017) – a staggering increase of over 130% during the 10 year period. Put simply, the report acknowledged 62 IFCs (existing and new); an average of 6 every year. This just highlights the growth and importance that IFCs have gained in recent years. Though a

rudimentary measure being looked at in isolation, this does highlight the importance countries and their IFCs have begun placing on the GFCI Index as often the bi-annual reports are heavily sponsored by developing and new IFCs attempting to draw attention of the financial world towards their offerings and capabilities.

The GFCI has served as a crucial barometer for financial decision-makers, helping to highlight significant advancements being made in various IFCs and shedding light on cities' advantages and areas of expertise. Abu Dhabi Global Market (ADGM), the international financial hub in Abu Dhabi, is happy to co-host the release of the new GFCI 31 report with the Z/Yen Group in the centre of the capital of the United Arab Emirates. Dhaher Bin Dhaher Al Mheiri, the chief executive officer of the Registration Authority Abu Dhabi Global Market, presented the most recent GFCI 31 report. The financial industry is always evolving. The GFCI 31 index offers a helpful forum for discussion and debate on how the IFC environment may develop further and satisfy the demands of our quickly changing international financial sector. In this recent report, 126 financial centres were identified for this edition of the Global Financial Centres Index (GFCI 31). With the addition of Atlanta, Lugano, and Ho Chi Minh City, the number of financial centres in the main index has increased from 116 to 119. Seven associate centres are awaiting possible inclusion in the main index. Only one of the top 40 centres raised more than ten ranks, and none fell more than ten. Following three consecutive drops in the average rating, the average rating remained stable and less than one point lower than GFCI 30. Asia/Pacific centres generally recovered their losses from GFCI 30. This suggests that confidence in the region's economic strength and trade performance has been restored. The performance of North American and Western European centres was generally stable. The data on which GFCI 31 is based cover the period from now until the end of 2021. While we might have expected more volatility in the ratings as the world continues to recover from the Covid-19 pandemic, the index's broadly level ratings suggest that confidence was returning to the global economy in the second half of 2021. The rating is taken from GFFCI ranking. Based on over 29,000 financial centre assessments from an online questionnaire and over 100 indices from organisations like the World Bank, the Organisation for Economic Co-operation and Development (OECD), and the Economist Intelligence Unit, the Global Financial Centres Index (GFCI) ranks financial centres' competitiveness. The first index was released in March 2007. It has been published twice a year since 2015 by the China Development Institute in Shenzhen and Z/Yen Group in London. It is widely regarded as the best source for ranking financial centres. The thirty-first edition of the Global Financial Centres Index (GFCI 31) was released on March 24, 2022. For 119 financial centres around the world, GFCI 31 provides rankings and assessments of future competitiveness. The report for 2022 places New York first, followed by London and Hong

Kong. The positioning depends on five files: business environment, development of the financial sector, infrastructure factors, human capital, and reputation and general factors The following categories are covered by sub-rankings in the index: insurance, professional services, banking, investment management, government, and regulation. However, the Russian Federation's invasion of Ukraine will have unforeseeable consequences for future ratings, except that it appears clear that the performance of Russia's financial centres in Moscow and St. Petersburg will suffer sharply as a result of broad international sanctions imposed on the Russian economy.

GFCI 31 was created by combining 150 key factors. Third-party sources for these quantitative measures include the World Bank, The Economist Intelligence Unit, the OECD, and the United Nations. The key factors were combined with 74,982 financial centre assessments provided by 11,934 GFCI online questionnaire respondents.

Chapter Three – Literature Review

This chapter will attempt to illustrate and highlight some of the key research that has been carried out and is publicly available in the fields relevant to the proposed research pertaining to International Financial Centres (IFCs). Although the current research will be explained in detail in this chapter, it does not comprise a holistic and/or a comprehensive overview of the subject matter; it merely presents a selected representative sample of the available literature that has been further expanded upon, explored and tested in greater detail through the research carried out and explained in this paper.

3.1. International Financial Centres

International Financial Centres are centres that serve as focal points for implementing international agreements and other transactions between financial sectors located around the world. (Z/Yen group, 2022). Countries and territories that have low tax rates and other characteristics that make them attractive investment locations are known as International Financial Centres (Step Report, 2019). Due to their contribution to the rapid expansion of the volume of international financial transactions, international financial centres have gained prominence in the global financial system (Falzon. 2019). The study uses the definition of IFCs given by Z/Yen group throughout the work. The justification to utilise this definition lies in providing GFCIs ranking by this group through compiling reliable well-structured key factors. The definition is useful for addressing the research question as it is based on the assessments of financial centres across the world by using detailed online questionnaire that reflects reliability of the IFCs data[1].

IFCs add to monetary movement by working on the expected productivity of business tasks. IFC-stimulated foreign investment seems to encourage more domestic investment. In a similar vein, the financial services provided by IFCs contribute to the competitiveness of the financial markets in their respective regions. Due to the degree of banking competition and the resulting stability of their financial architectures, countries close to IFCs offer greater access to credit. Worldwide IFCs can be ordered into various classes. For instance, Roberts (1994) identifies four distinct types of IFCs which include Domestic, Global, Regional, and Offshore financial centres. While global financial centres like London and New York are truly international centres serving a global clientele, domestic financial centres are focused on a specific nation and serve a specific national clientele. When a region is defined as a supranational rather than a subnational entity, regional financial centres serve a regional clientele. Lastly, offshore financial centres act as financial entrepots and carry out international transactions outside of the

[1] https://www.zyen.com/publications/public-reports/.

host nation's financial system.

Dufey and Giddy (1978) state that four main characteristics distinguish global financial centres that are global hubs of great financial activity: political and economic stability, experienced and efficient financial community; good communication and services to support; and a formal regulatory environment that is favourable to the financial sector and safeguards investors without imposing excessive restrictions. According to Dufey and Giddy (1978), offshore financial centres are a subset of entrepot financial service providers that specialise in facilitating transactions between residents and non-resident borrowers. The absence of costly and intrusive official regulation and taxation remains the primary draw for banks considering locating in offshore banking hubs.

According to Romnova et.al, (2018), financial centres make a significant contribution to the nation's overall economic growth and development. Expanding globalisation of the world economy raises the job and impact of global monetary focuses due to expanding the extent of exercises of IFC that as of now incorporates monetary business sectors, worldwide monetary and loaning relations, protection, and so on. Monetary focuses make a significant commitment to the, by and large, financial turn of events and development of the country. The foundation of worldwide monetary focuses is connected with monetary advancement processes as well as the globalisation of the monetary market. A number of factors contribute to the establishment and development of financial centres, as documented by their historical context: "multicultural factors," "liberal legislation," "stimulating tax and customs policies," "immigration legislation," "competitive costs of financial services," and other similar concepts.

3.2 Literature relating to the leading Financial Centres globally

3.2.1 Hong Kong

Of the papers that have been read relating to Hong Kong, Speak (1997) sums it up quite well and credits Hong Kong as the acting window and the interface to China for the rest of the world; and it has rightly acted so till recently. Without natural resources or any significant domestic market to begin with, Hong Kong had to respond to the external international factors and assume its role as the primary interface between the growing China and the rest of the world. The paper recognises that until the Chinese IFCs (e.g., Beijing and Shanghai) reach a significant development level, Hong Kong will continue to lead as a dominant player in the region. Schenk (2002) also recognises Hong Kong emerging as a leading IFC as a result of its strong and established banking system. Cheung and Yeung (2007) also conclude in their empirical study that rise of mainland China represents a potentially important push factor for the demand for financial services exports from Hong Kong, hence, further strengthening its

standing as a leading IFC.

The political will and government assistance in the creation and growth of IFC represent a highly crucial component, according to our review of the research literature. This is supported by Luxembourg's experience, which continues to promote its competitiveness on a worldwide scale and has aspirational goals to establish itself as a major financial hub. The recently established LUXFIN 2020 strategy clearly demonstrates this. In the cases of Singapore, Hong Kong, and Ireland, the national strategy and support for the development and competitiveness of the financial centre also played a significant role (Hong Kong Special Administrative Region Government, 2015; Arner and Gibson, 2015). Asian markets, including Hong Kong, typically have a high concentration of listed companies run by entrepreneurial shareholders, primarily SASAC and families that are in their second or third generations of founders. Despite the fact that institutional investors in Hong Kong do not possess the same level of influence as those in Western markets, the Hong Kong Principles of Responsible Ownership have the explicit goal of bringing investors closer to this type of entrepreneurial ambition. The majority of Hong Kong's governance is therefore probably not going to be much affected by the principles, and they may even give shorter-term shareholders more power to reduce the long-term value of corporations. Despite this, the principles are still useful. As an International Financial centre, Hong Kong is obligated to adopt and implement global best practices norms, and instruments. For decades, such global practices have originated in the United States and the United Kingdom. It makes little difference whether those practices are well-suited to the requirements of the Hong Kong market. Given the type of shareholder that controls Hong Kong listed companies, responsible ownership can be expected to be practiced (Donald, D.C., 2020). New York maintained its first place in the GFCI 31, with London falling back in the ratings to give New York a significant lead. Hong Kong and Shanghai rank third and fourth respectively (Mainelli, and Wardle, 2022).

3.2.2 Singapore

The historical growth of Singapore as a nation-state, city, and society has a significant impact on its development as an IFC. Given its size and status as a city-state, Singapore’s IFC development story has involved a confluence of economic, political, and social factors within the physical boundaries of the city. Therefore, observed a not less sudden concentration of such dynamics, forming the path dependencies and deviations that have characterised the city-rise states to prominence as an IFC. Singapore became an IFC in 1965, the same year it became a sovereign state. Singapore recognised the financial services sector as a major engine of growth in the real economy and a stand-alone business from the time it became an independent country (Montes,1999).

The phenomenal development of Singapore as a ‘world city’ and a leading IFC amidst its much larger and dominant neighbouring countries reflects the competitiveness of the country to deliver favourable financial services. It highlights that long before Friedmann and Sassen (reference in the sections above), the leading scholars and economic geographers, ‘began to articulate scholarly understandings of the global city, the ambitious postcolonial government of the Southeast Asian city-state of Singapore was self-consciously trying to create one’ (Heng,2014). Singapore’s success is largely placed on its excellent infrastructure and global connectivity. However, as an IFC with well-established connectivity and presence, legal structural problems are inevitable; such legal issues (Mien, 1997). Singapore’s development as a leading IFC and credit it to the country’s persistent and stable development (Giap, 2009).

The city-outward state's orientation as an IFC would be driven by the early globalist approach. Singapore's historical development as an IFC is closely linked to the political will and policy changes made by its government to expand the financial industry, particularly through the work of its top financial regulator, the Monetary Authority of Singapore (MAS). The government's historical role in Singapore's economic and financial development suggests a need to take policy into account. As a result, the Singaporean government has been "actively involved in the design and growth of the financial industry" from the beginning. A large part of such planning and guidance entails identifying specific financial activities with growth potential, focusing on these activities, and encouraging their development through the provision of tax and other fiscal incentives (Tan, 2006). Such 'niche creation' efforts are an important part of Singapore's financial sector development policies, with initially identified and targeted niches eventually becoming important components of Singapore's financial sector. These efforts demonstrate how Singapore's founding, subsequent development, and competitiveness are the result of the government's efforts to identify, target, and develop markets or niches with growth potential. As a result, the state has played an important role in Singapore's development as an IFC (Ngiam, 2010). Singapore's success as Southeast Asia's premier financial and industrial centre was the result of the state's efforts (Austin, 2004).

At the start of the 1970s, as Singapore's financial markets expanded, there was an increased demand for more centralised control and oversight of their quickly developing and increasingly sophisticated financial markets. As a result, the Monetary Authority of Singapore Act was passed on January 1, 1971, creating the Monetary Authority of Singapore (MAS) (Monetary Authority of Singapore 2012a). Despite being the autonomous central bank and statutory organisation, this makes the MAS a significant policy arm of the Singaporean government in overseeing and promoting the financial services industry (Jarvis, 2011; Woo, 2014). The Economic Development Board (EDB), which was established in 1971 to serve as the lead

agency for economic development, was replaced as the lead agency for financial sector development by the MAS, as noted by a former managing director of the MAS because the financial services sector requires specialised domain knowledge. The creation of the MAS established the groundwork for numerous significant financial sector changes that would aid in the internationalisation of Singapore's financial markets, which had a noticeable impact on Singapore's growth as an IFC throughout the 1970s (Koh, 2013b). During this time, two significant financial sector reforms were passed, paving the way for the development of two crucial industries. First, in 1973, the Singapore Stock Exchange (SES) was founded. This made it possible for businesses to raise funds on the equity market and, more significantly, was a critical first step in creating a robust and liquid stock market. Second, the removal of exchange regulations in 1978 made it possible for Singapore's foreign exchange market to emerge. Singapore is the world's largest foreign exchange hub as of 2013 (Aquino, 2013). The different parts of Singapore's history as a relatively new nation-state were inextricably entwined with the growth of the island nation as an IFC. As a result, the political, economic, and policy factors that have developed throughout the course of Singapore's history have a significant impact on Singapore's position and competitiveness as an IFC. This implies a considerable degree of "path dependency," with particular events and actions favouring and supporting a given trajectory in the growth of Singapore's financial industry because of the favourable feedback that has come from these events or decisions (Pierson, 2000; Peters et al., 2005). In other words, significant historical events have greatly influenced the features and form of Singapore's financial sector.

As a final overview of the major historical occurrences that have been especially significant to Singapore's emergence as an IFC, a few individual cases are worth recalling. First, the decision to create a financial services sector was based on two historical occurrences: (1) Singapore's separation from Malaysia and emergence as a sovereign state, which led its leaders to consider expanding a financial services sector as an engine of growth; and (2) the time when Albert Winsemius was the country's economic adviser and suggested and argued for the viability of such a financial sector to Goh Keng Swee, who was then the country's finance minister. Singapore decided to become an IFC as a result of a deep desire to find sources of economic growth that did not require the natural and human resources that Singapore lacked, as well as the support of a trusted economic adviser. Second, Singapore's competitiveness in navigating financial crises such as the AFC and GFC instilled strong confidence in the state's economic and financial policymakers in Singapore's ability to withstand, manage, and recover from financial crises. This was especially true during the GFC when Singapore recovered quickly and continued on its path of strong economic and financial growth (Woo, 2016).

Singapore, as a small open economy, provides a good, if somewhat unique, example of this

transformation. Due to a lack of natural resources and indigenous entrepreneurship at the start of the 1960s industrialisation drive, the country had to rely on foreign direct investment (FDI) from multinationals in labour-intensive manufacturing industries to secure the necessary markets, technical know-how, and management expertise. Singapore's openness to trade and investment has allowed it to continuously improve its productive and technological capabilities over the years as it evolved into a high-value-added manufacturing node in the regional production networks that sprang up during the 1990s and 2000s. As a result, Singapore's industrial structure and export product mix have shifted significantly, and multinationals have expanded their operations to include R&D, logistics and distribution, fund management, and technical support. Singapore is also notable for its reliance on the free flow of capital, which is critical to its role as the Southeast Asian region's entrecote and financial centre. Singapore has consistently maintained a close connection to the world's trading and financial systems. For instance, trade openness, which is determined by the GDP ratio of exports plus imports, has consistently been high, staying well above 200 percentages and peaking at 44 percentages before the Global Financial Crisis (GFC). The ratio of foreign liabilities and assets to GDP, which measures Singapore's financial openness, increased quickly from an average of 560 percentages in the 1990s to 1,600 percentage in the 2000s as the country developed into a major international financial hub amid growing global financial integration. The nation's strong focus on international relations undoubtedly played a significant role in boosting its real per capita income, which increased from 3,905 in 1965 to 52,600 dollars in 2016 in a constant 2010 currency (Robinson, 2018).

3.2.3 Frankfurt

Brexit is likely to result in a significant rearrangement of the City of London's relationship with the EU (Dhingra et al., 2016; Moloney, 2016). Alternative international financial centres (IFCs) located in EU member states may be well-positioned to gain from Brexit while the City's loss of "pass porting" rights will limit its access to the European Single Market. By May 2017, a quarter of the UK's financial services firms, including international banks such as HSBC, Standard Chartered, and JP Morgan, were in the process of relocating thousands of employees from the City to EU member states (EY, 2017a). In contrast, those in Frankfurt, Paris, and Dublin positioned themselves as "natural beneficiaries" of Brexit and actively sought to draw major international banks and asset management companies (Lavery et al., 2017). In terms of economic geography, researchers affiliated with the "Globalisation and World Cities" (GaWC) research network have made the most significant efforts to conceptualise and empirically "map" financial centre linkages. Researchers at GaWC claim that as a result of globalisation, IFCs are

more connected, complementary, and collaborative than ever before (Beaverstock et al., 2000; Taylor et al., 2002; Taylor, 2000, 2004). In order to analyse relationships between the City of London and Frankfurt under the new European single currency, a number of GaWC scholars used this paradigm (Beaverstock et al., 2001, 2005; Faulconbridge, 2004). The growing importance of Frankfurt in the aftermath of the Euro's introduction and the location of the European Central Bank in Frankfurt, in light of London's regional dominance and its recent growth as a complement centimetre to the London market. The paper emphasises the growing speculation that resulted from the significant economic transformation and the launch of the Economic Monetary Union (EMU) and the Euro in early 1999. Although, the Frankfurt uprising challenged London's dominance as the leading IFC (Faulconbridge, 2004).

Their main contention was that there was no way to limit interactions between Frankfurt and the City to a "zero-sum" game. Frankfurt and the City of London were made complementary by functional specialisation and internal cooperation. Relations were more cooperative than competitive. This study analyses agents' post-Brexit strategic posture inside two different European IFCs: Frankfurt and Paris. There are a lot of reasons why these IFCs were selected as case studies. Frankfurt and Paris have historically been situated in the IFCs' "second tier," behind the dominating global triad of New York, London, and Tokyo (Cassis, 2006). Paris is home to the largest financial workforce in the eurozone, while Frankfurt is recognised as the second-most competitive EU financial centre behind the City (Lavery et al., 2017).

Furthermore, both Frankfurt and Paris are located within the two most powerful member states of the EU. Key EU regulatory and supervisory authorities, such as the ECB and EIOPA in Frankfurt and the European Securities and Markets Authority (ESMA) and European Banking Authority (EBA) in Paris, are also based in each city. In its March 2017 assessment of the changes brought about by Brexit, the Frankfurter Allgemeine Zeitung (FAZ) concluded that "everything remains as it was; there is no trace of a Brexit-exodus." Germany should not delude itself into believing that it can become Europe's new financial centre in a short period of time" (Hock, 2017). Actors have been measuring one other's positioning benefits and drawbacks in Frankfurt and Paris. Both promoting one's own location and disparaging other, competing IFCs have been involved in this. When arguing that Frankfurt is still a bad place to live, for instance, Valérie Pécresse, the president of the Île-de-France Regional Council, which covers Paris, asked bankers in London, "When was the last time you took your girlfriend off for a weekend in Frankfurt?" (Martin, 2017). On the other hand, Frankfurt's proponents have frequently emphasised the city's accessibility to European authorities as well as its advantages over Paris in terms of infrastructure, labour laws, and real estate pricing (Hessischer Ministerium der Finanzen, 2017a). These advantages make Frankfurt "almost predestined for the role of a

continental partner for British financial institutions.

Hubertus Väth, the head of Frankfurt Main Finance, stated a few months later that while "all of these areas (Paris, Luxembourg, etc.) will benefit from Brexit in some manner," Frankfurt is undoubtedly "in pole-position" to draw the most of those advantages (Frankfurt Main Finance, 2017). These political actors have concentrated their efforts in Frankfurt and Paris on four subsectors that are thought to be particularly vulnerable to relocation following Brexit. The first of these is the lucrative industry of clearing futures denominated in euros, which is largely controlled by a select few counterparty clearing institutions. As previously indicated, Brexit has called into doubt the City of London's ability to continue clearing these financial transactions, and the European Commission and the ECB are actively reviewing the situation. Due to this, clearing is recognised as a crucial industry where jobs and trade may transfer to the continent in both France and Germany (Deutsche Bank Research, 2016).

The second key sector identified as potential 'low-hanging fruit' is asset management. Paris is already well-positioned as Europe's second largest asset management centre after London, and Paris EUROPLACE (2016b) has stated that it is "one of the priority sectors for which Place de Paris has a strong attraction for international companies" and that the group "intends to consolidate its position." Similarly, Yves Perrier, President of the French Association of Financial Management (AFG), stated that, while he regrets the Brexit vote, it "can and should be an opportunity" for the asset management industry in Paris to capitalise (Gestion de Fortune 2016). Despite being disadvantaged by its traditionally risk-averse and already highly consolidated domestic market, Frankfurt expects to gain some ground (IMF, 2016). Already the third largest asset management market in the EU, the city expects this to be one of the great 'waves' of transfers coming to Frankfurt (Frankfurt Main Finance, 2017). Third, both IFCs have been working hard to position themselves as the ideal location for the new European Banking Authority (EBA) headquarters (Deutsche Bank Research, 2016). Frankfurt emphasised the presence of its existing regulatory authorities and the benefits of centralising these institutions. In contrast, Paris emphasised the importance of ensuring a more balanced distribution of EU financial regulatory institutions. Hollande argued in direct reference to Frankfurt when launching Paris' ultimately successful bid to host the relocated EBA that such a move would ensure "an equilibrium between the setup of regulators within the principal places of European finance, as there is no EU banking institution in Paris" (Hock, 2017). Finally, post-Brexit, FinTech has emerged as a key sector that actors within both IFCs are eager to attract. FinTech is regarded as a key growth industry in Paris, with both Paris EUROPLACE (2016a) and the Senate report (de Montgolfier, 2017) highlighting the sector as a key target.

Despite internal competition from Berlin, significant effort is being made to make Frankfurt the

"new European FinTech centre" by attracting and supporting technology start-ups through new ventures, innovation centres, and tax breaks (Helaba, 2016b). These case studies of Frankfurt and Paris show that the City of London is unlikely to relinquish its position as Europe's preeminent financial centre. 'Complementarities' between IFCs continue to be powerful, as predicted by GaWC research. Nonetheless, important reconfigurations within competing European IFCs should not be overlooked. Political agents in Frankfurt and Paris have adopted a competitive posture in order to 'capitalise' on the United Kingdom's regulatory divergence from the EU. Experimentally, this analysis identifies two broad strategic reorientations of agents in Frankfurt and Paris following the Brexit vote. First, agents within these IFCs are attempting to secure 'low-hanging fruit' from the City of London. Clearing, asset management, EU regulatory bodies, and Fintech have all been identified as vulnerable sub-sectors that politicians in Frankfurt and Paris are now attempting to attract. In order to attract external investment, rival centres have threatened to laxly enforce supervisory regimes. Second, 'hybrid' coalitions of private sector lobbyists and government agencies, such as Paris Euro place and Frankfurt Main Finance, are attempting to use Brexit as a 'bargaining chip,' leveraging the UK's exit to secure pro-finance reforms both domestically and at the EU level (Lavery et al., 2018).

3.2.4 Paris

Paris, considered the second international financial centre after London until 1914, declined more than the others after WW1. Following World War I, which caused serious financial and monetary issues, Paris went through three periods: during the 1918-1926 decade, the erratic exchange rate of the currency led to significant capital evasion; then the bright period of 1926-1931 made Paris dream of a return to the "good old days"; but the entry into the Great Depression in 1931, followed by an erratic monetary and financial policy, caused the Paris Bourse to fall until the Second World War (Quennouëlle-Corre, Laure2011).

London and Paris, the world's two leading financial centres in the nineteenth century, had very different fortunes in the twentieth. While London remained a global financial centre, Paris's influence waned. However, deregulation, internationalisation, and the introduction of the single currency have reactivated their rivalry in ways reminiscent of their pre-World War I rivalry (Cassis, Youssef, and Eric Bussière, 2005).

Paris was ranked second among the major financial centres of the pre-1914 globalising economy on the eve of World War I. Despite being unable to compete with the depth and breadth of London's money and capital markets, as well as the international ramifications of British banks, Paris attracted more foreign banks and borrowers than any other European centre at the time. However, as the century progressed, the two centres took increasingly diverging

paths. The declining role of Britain and France in the international economy, as well as the decline of the pound and franc as international currencies, hampered Paris's global ambitions for good, but did not prevent London from rising again as an international "financial phoenix" in the second half of the century (Battilossi,2008).

3.2.5 Tokyo

It's not a surprising fact that there's a race for the money to become what Jesse Poon (2003) refers to as one of the "control centres of global financial flows": an IFC. The race in Asia is wide open, as the region currently lacks "a single dominant financial hub" (Farrell et al. 2008: 15). Although Tokyo and Hong Kong have historically been the dominant players, the rise of China, has changed to the institutional structure of Tokyo's financial apparatus, consolidation in Singapore, and the addition of several other competitors, from South Korea to Labuan, have added to the mix and intensified competition. In the world cities literature, the centralised distribution of IFCs is distinguished between "world cities" and "global cities," with the latter forming a remarkably (London, New York, and Tokyo) that produces super-high order services with a global financial hinterland (Jarvis, 2011).

According to Saskia Sassen (1999), global capital market transformation is shrinking 'nationally based financial operations' and causing clustering up the value chain, resulting in a series of dominant global players. The spate of deregulation of national financial markets since the 1970s, combined with the effects of deepening globalisation, has ironically produced an asymmetrical process in which more IFCs and 'world cities' emerge, but the acute agglomeration of financial activities clusters around fewer mega-financial centres or 'global cities. According to Sassen, by the end of the last century, only 23 cities controlled 83% of the world's equities under institutional management and roughly half of global market capitalisation (around $20.9 trillion). Six or seven cities dominate the league; London, New York, and Tokyo hold one-third of the world's institutionally managed equities and account for 58% of the global foreign exchange market (Sassen, 1999).

However, the pull of centralisation through scale economies and specialisation has obvious explanatory limitations. According to this logic, there should be fewer but larger global financial centres, with regional, smaller financial centres becoming redundant. However, two opposing trends are visible: centralisation and the emergence of a small number of dominant 'global' financial centres (the 'global three' of London, New York, and Tokyo), as well as the emergence of an increasing number of smaller regional financial centres (Sassen,1999; Tschoegl, 2000; Taylor et al,. 2002). The movements of quick money rushing through Asian capitals may be the most striking indicator of how Asia's economic environment is shifting.

Japan, the second-largest economy in the world after the United States, dominated Asia's financial scene from the middle of the 1960s until the early 1990s, controlling upwards of 23% of global financial assets. Japan's significance has, however, declined in recent years. Even while Asia's financial market is still the third largest in the world behind the economies of the United States and the Eurozone, its relative importance there is practically in free fall. Japan's share of global financial assets, for instance, fell to just 12% by 2007, whereas the rest of Asia's financial market assets, now at 18.8 trillion USD, are practically on par with Japan's 19.5 trillion USD (Farrell et al. 2008). 13 Similar to this, while the rest of Asia experienced expanding financial ties, Japan's financial connections to the region and the rest of the globe stalled in intensity and depth between 1990 and 2006. Singapore, Hong Kong, and Taiwan, for example, "now have larger cross-border investments with China and other emerging economies than Japan," and while Tokyo only managed to attract four overseas stock exchange listings between 2004 and 2007, Singapore attracted 40. (Tucker 2007; Farrell et al., 2008). While Asia has seen increased financial integration, Japan, according to Farrell, has been essentially "shut out of Asia's financial integration in part reflecting the fact that Tokyo's financial might is almost entirely domestically focused; its debt markets driven by government securities and its equity markets semi-protected by onerous regulatory measures" (Farrell et al., 2008; Kawai, 2008).

Although it was the leading IFC for the majority of the twentieth century, as recognised by several scholars (Friedmann, 2006; Sylla, 2015, Cassis and Bussière 2005), Tokyo appears to have dropped out of the top three and is now considered to be trailing other leading regional IFCs (Hong Kong and Singapore), which have outperformed it in several areas such as growth, infrastructure, and communications framework. Shirai (2009) and Kawai (2009) both criticise Tokyo's inability to realise its full potential and maintain its leading position in the region, blaming it in part on declining trading volumes.

New York maintained its top spot in the index, though London has gained ground and is now only four points behind in second place. Shanghai is only one point ahead of Tokyo in third place. Hong Kong moved up one spot in the index, from sixth to fifth (GFCI 28) Morris and colleagues (2020). In the next report, Tokyo dropped from fourth to seventh place (GFCI 29). Tokyo rose from seventh to ninth place in GFCI 30 and maintained its position in GFCI 31. (Mainelli and Wardle, 2022).

3.2.6 Shanghai and Beijing

The Chinese central and local governments are enthusiastic about the development of financial centres. According to the Beijing Municipal Government's Beijing International Financial

Centre Development Strategic Plan, which was announced in May 2008, Beijing Financial Street, located within Beijing's 2nd Ring Road, was positioned as the core of Beijing's financial centre. However, the future of Shanghai appears brighter. The State Council of China issued a resolution in 2009 to transform Shanghai into an International Financial Centre capable of matching the country's economic strength and the international status of its currency, the RMB, by 2020. (Zhao, 2010). Many people are mystified by Beijing's significance in China's financial framework, owing to national capital functions such as currency policy control and the dominance of state-owned enterprises and powerful organisations. Beijing is China's most important financial centre due to its role as the country's financial policymaking centre (Zhao, 2003 & Zhao et al, 2004). The number of foreign companies and their headquarters, foreign bank branches and representative offices, foreign direct investment (FDI), stock and securities transaction turnover, deposits of financial institutions, loans of financial institutions, and employment in finance, insurance, and real estate all demonstrate Beijing's financial functions in China (Zhao et al. 2004; Wang et al. 2007). The importance of Beijing in China's overall financial development demonstrates the financial centre's strength. Despite the lack of a stock exchange, Beijing is a significant financial centre in China. In terms of total equities fund-raising, it outperformed Shanghai and Shenzhen.

As a result of the joint efforts of the federal and municipal governments, Shanghai is regarded as China's capital due to its well-developed and varied financial markets. Over the past ten years, the Shanghai Stock Exchange (SSE) has expanded incredibly quickly. Investigating the stock market in Shanghai is crucial. We can see from a comparison of the stock exchanges in Beijing, Shanghai, and Shenzhen that Shanghai came out on top in terms of the total number of listed firms, listed H-shares companies, headquarters of fund and securities companies, total stock turnover value, and other factors. Shanghai has more listed firms than Beijing does on the H-share and Chinese stock markets, but Shanghai's newly listed companies generated less money than Beijing's did since the central government aggressively pushes state-owned enterprises to list outside of China. It is impossible to compare the ranks of Shanghai's stock market with other markets because each has its own advantages. The Yangzi River Delta economic zone's enormous domestic economy is the cause of Shanghai's stock markets' extravagant riches (Xiaobin et al., 2013). Beijing and Shanghai's concurrent and complementary development as Mainland China International banks' strategies provides another example of China's global financial centres (Wójcik et al., 2019).

In GFCI 29, Beijing and Shanghai were in sixth and third position respectively. But in GFCI 30, Beijing and Shanghai increased their positions and moved up to eight and sixth positions. In the most recent GFCI 31, Beijing maintained its position of eight centrally shanghai dropped it

position from sixth to fourth respectively (Wardle & Mainelli, 2021; Mainelli, & Wardle, 2022).

Just before the reverting back of Hong Kong to China in 1997, Shaw and Lim (1994) wrote on the potential of Malaysia poising its second Federal Territory, the islands of Labuan, as a replacement to Hong Kong in the hopes of becoming a leading IFC. Skully (1995) also highlighted the potential of Labuan as Shaw and Lim did, however, he did conclude that it would require significantly more investment if it was to compete with the other IFCs.

3.2.7 Luxembourg

Few people could have predicted those 60 years later, Luxembourg would become one of the richest nations in the world from its 1950s position as an agricultural, mining, and steel manufacturing nation (Laulajainen, 2003). The creation of "stateless monies" (Hudson, 1999), and "securities capitalism, “as two significant structural changes in the global financial markets, and their interaction help with the political economy of Luxembourg's ascent (Markham, 2002; Sobel, 1972). From a perspective that integrates mutually dependent processes at the macro and micro levels, Luxembourg's emergence as an IFC began in the early 1920s. It thus linked the dynamics of emerging Euromarkets to Luxembourg's initial path creation. This entailed creating the necessary institutional infrastructures, new technologies, and skills to allow it to grow into an IFC of international significance. However, it took Luxembourg decades to steadily build its financial centre, and this was in tandem with the capacity of its supervising authorities' financial industry know-how (Wintersteller, 2013). A small group of influential individuals from both politics and finance shaped Luxembourg's financial industry and adjusted its institutions over time, a historical coincidence. The importance of agency and intentional action in the formation of Luxembourg's financial path, as well as the changing architecture of the dominant elite and its influences on Luxembourg's subsequent path alteration and continuation, is emphasised (Dörry, 2016).

To give it its full name, the Grand Duchy of Luxembourg is a tiny nation located between France, Belgium, and Germany. Luxembourg City, the nation's capital and one of the three official capitals of the EU, is also home to the European Court of Justice, the EU's top court. The nation has highly high-quality institutions, infrastructure, and labour relations. Numerous financial organisations have been drawn in by the favourable tax and regulatory environment, including some bank secrecy. In this industry, banking, money management, and insurance are the three core activities. Foreign-owned banks dominate the banking industry; they act as foreign investment vehicles for their parent corporations and have little connection to the regional economy. International banks, insurance firms, investment fund managers, and

specialty service providers are drawn to Luxembourg because of its robust legal system and emphasis on investor protection. However, Luxembourg's economy is relatively open and consequently susceptible to outside shocks (Yıldırım & Mullineux, 2015).

The correlates of international financial-centre status Luxembourg are now ranked 27th in the world according to the GFCI 31. It does well in both the investment management sub-index, where it ranks 11th, and the banking sub-index, where it ranks 12th. In the GFCI sub-index, it is ranked 15th globally in the government and regulatory sector, 16th globally in finance, and 8th globally in FinTech (Mainelli & Wardle, 2022).

3.2.8 Dubai

The Dubai International Financial Centre (DIFC) was established in 2004 and has since grown to become a world-class financial centre. The DIFC was established under the UAE Constitution to attract foreign investment and to make Dubai an international hub for commercial and financial transactions. It has its own civil and commercial laws, which are mostly based on common law. The DIFC Laws are based on the best practises of the world's major financial jurisdictions and represent the pinnacle of international financial and commercial law. East operates solely in English and on common-law principles. The Dubai International Financial Centre Authority (DIFCA) and the Dubai Financial Services Authority (DFSA) develop and administer the DIFC's laws and regulations, which are written in English. Importantly, the DIFC has its own Courts, the Dubai International Financial Centre (DIFC) Courts, which is a specialised commercial court in the Middle East that operates exclusively in English and on common-law principles. (Krishnan,2018; Carballo, 2007).

Dubai has a long history as a trading centre and is strategically located between East and West. It has a reputation for providing a stable and secure platform for businesses and financial institutions to engage with the Middle East, Africa, and South Asia's emerging markets. The Dubai International Financial Centre (DIFC) is a 110-hectare special economic zone in Dubai that was established in 2004. A common law framework, a global financial exchange, a tax-friendly structure, and an independent, internationally recognised regulator and judicial system are all features of the DIFC. In addition to wealth funds and private investors, it has drawn a sizable corporate community and currently is home to hundreds of financial institutions. Numerous international corporations, shops, cafes, restaurants, apartments, parks open to the public, hotels, and art galleries are also located there. Dubai is already a major financial hub and is now placed 17th in the GFCI 28. Dubai ranking increased from 17th to 19th in the CFCI 29 (Morris et al., 2020). It is ranked ninth for infrastructure, tenth for business climate, and eleventh for human capital. In the GFCI (28) banking sub-index, Dubai is placed eighth, while

in the professional services sub-index, it is ranked ninth (Mark, 2019). Dubai should reinvent itself because its economic development model is no longer viable. This study proposed that Dubai diversify its approach to long-term growth by developing other industries and aiming to become the Middle East's cultural gateway (Balasubranamian, 2010).

In Contrast to Balasubranamian's findings though, Horigan (2011) argues that despite having been adversely impacted by both the global recession and a severe downturn in its local property market, Dubai remains an important hub for business in the Middle East and beyond. He pointed out that during early nineties, the emirate was one of the fastest growing places on the planet. More recently since Dubai has been viewed by many as an oasis of relative stability in a region facing waves of political and social unrest. Although it is an oil producer, much of Dubai's competitiveness has actually been due to it being an entrepôt. Already there has already been some discussion of a so- called "Dubai Model" of economic development. His article critically looks at Dubai's rise as a business hub in general and one aspect in particular, the creation of a "free zone" for wholesale banking and related activities called the DIFC. An innovative feature of the DIFC is its legal status as a separate jurisdiction within Dubai. Unlike the rest of Dubai, the DIFC functions as an English common law jurisdiction. This feature has proven to be especially attractive to a wide range of foreign investors. He concludes that this unique framework and setup of the DIFC would greatly benefit the emirate and may even get replicated elsewhere as an example of a competitive model. To support Horigan's view with empirical data, during the year 2009 (right after the recession), the Dubai Financial Services Authority (DFSA), the independent financial regulator for the DIFC and my current employer, licensed 46 firms, authorised 469 individuals, registered 10 ancillary services providers and registered 10 auditors (DFSA.ae, 2009). For the last year (2009), the DFSA licensed over 80 firms, and authorised three times the authorised individuals during the year. DIFC, as a free zone financial centre, has grown many folds since its inception and has survived against the odds and performed well through the recession; it now holds over 400 licensed financial institutions from across the globe; a testament to its success over time which has enabled it to place itself as the leading IFC in the Middle East and North Africa region.

3.2.9 Abu Dhabi

Abu Dhabi has established one of the youngest IFCs, the Abu Dhabi Global Market (ADGM). It's similar in many ways to its foster brother, the DIFC. In an attempt to replicate the competitiveness that the DIFC has enjoyed over the last 13 years since its establishment, Abu Dhabi is hopeful to draw in and reproduce some of that through the creation of ADGM. ADGM was created in 2015 and has only recently started its operations in full swing; as such not much

data or research exists on this centre; though the capital emirate of UAE, Abu Dhabi, had been subjected to several scholarly articles and research. Notably, Woertz (2012) draws an interesting comparison of Abu Dhabi with its more successful and trade minded neighbour, Dubai. Interesting, the GFCI 22 report includes a detailed summary about the ADGM and its operational framework.

According to the GFCI 31 report, Abu Dhabi has risen 5 places in the global ranking to 31st as an international financial hub and has maintained its position as one of the top two centres in the Middle East and Africa region. Abu Dhabi thrives as a leading centre of excellence because of its strong connections with other IFCs and is world-renowned for its ease of doing business. Abu Dhabi is also one of the top 15 centres that respondents believe will grow in importance in the near future. As an IFC and ecosystem builder, ADGM actively supports Abu Dhabi as a global trade and business hub, serving as a link between the Middle East, Africa, and South Asia's growing economies and the rest of the world. ADGM continues to set the standard for virtual asset regulation, digital courts, and effective dispute resolution around the world (Mainelli, & Wardle, 2022).

3.2.10 Astana

Astana is Kazakhstan's capital city (it replaced Almaty) and was designed specifically for that purpose. The country also has an abundance of mineral resources. Astana is located in northern Kazakhstan on the banks of the Ishim River. Kazakhstanis are known for their friendliness and hospitality, and visitors and expatriates who live there have a great time. Astana, with a population of slightly more than one million people, is home to the Parliament House, the Supreme Court, the Ak Orda Presidential Palace, and numerous government departments and agencies. It is home to many incredible futuristic structures, hotels, and skyscrapers. The stock exchange building, for example, is one of the world's largest spherical structures. Astana's financial centre only opened in July 2018, but it has already risen to 61st place in the GFCI, a remarkable achievement for such a young centre.

Astana International Financial Centre (AIFC) has recently received three GIFA awards in the field of Islamic Finance, further solidifying its position as a developing centre. Members of the GFCI team have visited Astana several times in the last two years and have been encouraged by the AIFC's efforts to develop the centre. They have created all of the prerequisites for a financial centre and are hard at work developing a large network of international contacts. Astana has surpassed Almaty as Kazakhstan's main financial centre, and with significant investment and careful planning, it is viewed as a potential regional leader in China's Belt and Road Initiative (Mark, 2019). Astana Ranked on eighty sixth positions according to GFCI 31.

The most important tasks in economic development are attracting foreign investments into our country's economy, creating favourable conditions for them, providing legal protection, and improving the investment climate further. Worldwide financial centres are an unutilised framework of free financial zones. Universal monetary centres are an untapped era of free financial zones. Global financial centres are one of the opportunities for growth in today's global financial community. Universal money related centres are locations where banks and specialised money related education are anchored in global cash operations, credit and bank, securities, and gold operations. Universal monetary centres can be found in London, New York, Zurich, Frankfurt am Main, Luxembourg, Singapore, and other countries around the world. In particular, the World Financial Centre "Astana" began operations in the neighbouring Republic of Kazakhstan in 2018. Based on the experience of the international financial centres of Astana and Dubai, the gradual establishment of the Tashkent International Financial Centre within the Tashkent International Business Centre and the implementation of English law will take approximately five years. It will take approximately ten years for this international financial centre to become financially self-sufficient (Younas et al., 2021).

Following the collapse of the Soviet Union, Kazakhstan’s administration relocated its capital city from Almaty, its largest metropolitan city, to Astana. This move has brought about several reforms and new developmental plans, however, Sholk (2012), based on his personal experiences, holds a glim view of the administration’s ambitious expansion plans and warns that Astana’s growth may be too much too soon. Natalie and Anar (2015) critically examine the current yet ambitious development plans for Astana, along with other regional cities, and conclude that such plans are highly unlikely to prove stable given Astana forms part of the arid Central Asian steppe. As part of these rapid development plans, Astana has recently announced the establishment of its own free zone modelled IFC called the Astana International Financial Centre (AIFC). AIFC is heavily modelled on the operating model of the DIFC and is hopeful to replicate its competitiveness once it goes live in 2018.

3.2.11 Istanbul

The geographical structure of Istanbul, its positioning as a crossroads of different continents, its historical richness, its young, qualified, and cosmopolitan population, its ease of trade and tourism due to climatic and natural peculiarities, its business life and trade culture dominated by the private sectors, and its large share of the country's GDP can all be listed as advantages of Istanbul for becoming a global metropolis. According to the Fortune 500 classification of businesses operating in Turkey in terms of size, four of the ten largest firms are based in Istanbul, and seven of the ten firms with the highest sales are also based in Istanbul. The

planned IFC in Istanbul will also provide numerous benefits to existing firms in the classification. In addition, it will pave the way for economic growth by stimulating both the economy and trade (Taşdemir, 2008). Because of the strengthening regulatory and supervisory structure of the banking sector following the 2000-2001 crisis, the negative effects of the 2008 global crisis on the Turkish economy remained limited. As a result, ideas labelling the Turkish economy as a safe haven surfaced during this period. Furthermore, it was argued that a new political economy emerged as a result of the changing global political climate, and that this new setting was favourable to the Turkish economy (Coşkun, 2011).

The Turkish government prefers to invest in Istanbul rather than the capital city, Ankara, in order for it to become an IFC. This is because Istanbul is Turkey's most important city in terms of economic power, financial and service industries, and manufacturing. Other reasons include Istanbul's rich cultural and historical heritage, as well as its cosmopolitan nature. It meets the expectations of people from many different countries with its lifestyle and culture. A new central business district is being built in Atasehir-Istanbul, which will eventually house the headquarters of various financial institutions. Furthermore, as part of a strategy to promote Istanbul as an RFC, the Turkish government has decided to relocate the banking regulator and state-owned banks from the capital city to Istanbul. It is one the most historic places and holds the most strategic and unique position based on its location; it's the doorway to Central Europe; a bridge between the East and the West, the meeting point of two continents. Istanbul has the potential to become a regional financial centre; however, the city, though improving, does not yet meet the criteria of being a financial centre. The city has a long list of issues to address, from Economic Conditions to Public Services and Social Environment before its problems are solved. Until completion of all these tasks, the Istanbul International Financial Centre Project announced by the government will end up only being a much-publicised prestige project (Yıldırım & Mullineux, 2015). the potential to become a regional financial centre; however, the city, though improving, does not yet meet the criteria of being a financial centre. The city has a long list of issues to address, from Economic Conditions to Public Services and Social Environment before its problems are solved. Until completion of all these tasks, the Istanbul International Financial Centre Project announced by the government will end up only being a much-publicised prestige project.

Another interesting study on Istanbul, and its potential for becoming a global IFC, has been carried out by Tarim (2016). He recognises Istanbul's place in the global financial system has become regionally prominent as Turkey has opened up to a globalising economy since the 1980s. The current Turkish government now wants to not only entrench Istanbul's status as an attractive emerging market but also make Istanbul a globally important financial services

centre. For this, a project of reforms, initiatives and building work has recently been put in motion. Tarim contextualises this project by looking at the politics, economy and markets nexus in Turkey since the 1980s and reviews the project's progress in various domains commenting on its future by taking cues from recent political turns in the country's political leadership concerning economy and financial system. He concludes that the deterioration in political stability and certainty, coupled with the gradual reversal in global credit conditions has underpinned the slowdown and capital flight in the Turkish economy.

3.2.12 Mumbai

India has one of the world's fastest growing economies and is a significant user of international financial services. As India seeks to expand its economic and strategic activities around the world, a dedicated international financial services centre (IFSC) will provide a platform for these activities to be carried out efficiently. In 2017-18, India's service exports were approximately US$ 195 billion, while imports were approximately US$ 117 billion. The first International Financial Services Centre in India was established at GIFT City in Gujarat, one of India's fastest-growing states. Ahmedabad International Airport is only a 20-minute drive away from GIFT City. The airport connects to all major countries and has over twenty flights per day to cities such as Mumbai and Delhi (Yıldırım & Mullineux, 2015).

Mumbai is an International Financial Centre (IFC), ranking among other IFCs like New York, London, and Tokyo. IFC is in high demand locally as a result of the booming Indian economy and cross-border financial flows. This "push" promotes skill development and creates economies of scale for Mumbai-based financial companies. India has a large "mindshare" in international financial firms thanks to its high GDP growth and the performance of Indians in global finance worldwide. Mumbai clearly had a distinct advantage over Dubai, Singapore, and possibly even Shanghai in this situation. Because of its dynamic, technologically capable securities platforms in the National Stock Exchange and the Bombay Stock Exchange, Mumbai has the foundations for providing global IFC (Venkateswar, 2009).

Mohan (2007), in his article, critically analyses the Indian government's initiatives which are poised at making Mumbai an IFC. His article closely examines the High-Powered expert Committee (HPEC), formed by the government of India through its Ministry of Finance, its creation and ambitious plans to boosting Mumbai as a global IFC. He rejects the ambitious growth prospects which aim at bolstering Mumbai with 8-10% year on year growth and expose the internal and national financial turmoil in India which needs to be addressed first should such an ambition is to be followed by the government.

3.3 IFCs – past failures, current situation and future perspectives

Just like the financial crisis of the late noughties (2007/2008), Brexit has already done grave damage to London and its reputation as the leading global IFC. Before examining the relevance of Brexit further, I'd like to highlight a few factors which resulted from the last financial crisis. London and New York are the prevalent leading IFCs at present and have maintained their respective leads for almost over a century. Their dominance and influence on the global financial market has been so strong that any repercussion/impact in these two, whether favourable or negative, is felt through the entire global market. It appears as if the whole market revolves around these two; a concept that gets referred to as "the New York-London axis" (Wójcik, 2013). A prime example of this is the aftermath of this global financial crisis which impacted economies and IFCs far and wide, clearly as a consequence of the origination of this financial crisis in the 'axis' rather than in the wider global market (Wójcik, 2013).

This historic and long-standing dominance and "epicentricity" of London as the leading IFC has now been put to an imminent threat and endangered by Brexit. No one is clear about what things would look like once Brexit is over, however, one thing is for sure; London will not remain the same and may lose its global significance and 'Alpha' position to New York. Not only will it get a downgrade in the table of global leaders, it will have to let go of a lot else as well; losing more than a fifth of Europe's largest 500 companies who have their headquarters in London (Campbell, 2017) is one such example; getting a huge negative impact on the GBP190bn, almost 12% of UK's GDP (Parker, 2017), that it generates for the UK could be another.

In order to support the context of damage created by Brexit on the British financial sector, Bank for International Settlements bulletin (BIS, 2022) publishes a relevant triennial survey. Since Brexit, London's position has been imperceptibly disintegrated in different business lines. London continues to be disintegrating important hub for over the counter (OTC) trading of FX and euro interest rate derivatives (IRD), according to the 2022 BIS Triennial Survey, which was released just recently. This survey is the first to be released since the United Kingdom officially left the European Union. However, it has lost market share in the euro and dollar IRD, London maintains its top spot in international banking, but its position as the euro area's banking hub has diminished.

New Financial (2021), a London-based think tank, has found that 440 financial services firms have moved to some degree part of their tasks, resources, as well as staff to monetary centres in mainland Europe because of Brexit. New Financial estimates that £900 billion in assets have been moved thus far, or approximately 10% of the UK banking system. Different European monetary focuses are drawing in various sorts of business, reflecting area specialisation (in the

same place). In any case, 'the exact ramifications of any one take-off of a monetary establishment or a gathering are dubious' (Corridor and Wojcik, 2021: 196).

However long the UK was an EU part state, UK monetary establishments had profited from passporting privileges: they could lead their European tasks from the UK without requiring extra freedom from the significant part state. Brexit resulted in a loss of passport rights; following that, campaigning for equivalence with the EU was led by city officials and Remainders as a whole. A formal EU decision stating that the UK's regulatory system is comparable to that of the EU would be required for equivalence. Rather than pass porting, proportionality is definitely not a sweeping choice, yet rather should be conceded for each area of monetary administrations independently; Because it is a privilege rather than a right, it can also be revoked without prior notice (Hall, 2021).

Whilst Brexit will have its greatest impact on London itself, the ripple effect will long get felt by most other IFCs. To put it as the least of their worries, most other IFCs have already started and made great progress in assessing the impact Brexit may have and developed draft ‘action plans’ to address the resulting adversities or even opportunities. Ireland, if any other, may be the single biggest benefactor of the Brexit once it materialises; it may be argued. Having approached 1200 multinationals to assure its position within EU (Mazars, 2017), it could be the new home to establish the headquarters for most, if not all, of the international firms already headquartered in London (and considering their potential move to another jurisdiction); a massive opportunity for Ireland to establish itself as an IFC and attract further international business. Not only Ireland, several other neighbouring IFC would massively benefit from the demise of London’s dominance. To name some of the biggest players in the financial services industry, it is interesting to note where they intend to move their headquarters to. Citigroup, Morgan Stanley and Standard Chartered have all already announced their move to Frankfurt once Brexit goes through (Bloomberg, 2017). HSBC and Societe Generale plan on moving their base to Paris, whilst Bank of America and Barclays have declared Dublin as their future headquarters. Going back to Picketty’s hypotheses and his statistically proven argument, that wealth accumulates faster than the rate of economic growth, and that this may contribute to the inequalities within nations and their resultant financial development, as further explored by Sylla (2015), it would be interesting to apply this on a few IFCs and demonstrate by way of examples.

Abu Dhabi recently launched its IFC (Abu Dhabi Global Market) in 2015 stepping along with its foster-brother’s much established IFC, the Dubai International Financial Centre (DIFC) in Dubai. Whilst it had a GDP of circa USD261bn (abudhabi.ae, 2017), its sovereign wealth fund (Abu Dhabi Investment Authority) had assets in excess of USD828bn (Swfinstitute.org, 2017)

of which up to 85% is currently invested in North America and Europe (adia.ae, 2017). Similar to Abu Dhabi, Qatar (through its sovereign wealth fund), with a GDP of USD156bn, had assets in excess of USD 320bn (Swfinstitute.org, 2017) of which it had over a third invested in EU alone (Sergie, 2017). Lack of an equivalent local economic growth, and opportunities of greater returns elsewhere, have led to both of these economies to heavily invest in other jurisdictions, leading to the maximisation of their investments and indirectly benefiting the other IFCs which get invested in (the likes of London, Paris, New York etc.). However, with the current economic climate and uncertainties (e.g., Brexit, recent US presidential elections), IFCs, such as these, have been forced to "rethink" and work around developing internally as a matter of priority. This has been one of the primary reasons and has resulted in a strategic shift of focus on their domestic economic growth and development. ADGM has been solely established with a view to attract and retain foreign investment whilst capitalising and further deepening its own capital pool in order to shift its dependence away from natural reserves (e.g., oil) to other sectors including financial markets.

Perhaps, one jurisdiction which is in greatest need of a strategic shift moving away its sole dependence from natural resources to other sectors is the Kingdom of Saudi Arabia. Having survived most of the second half of the twentieth century whilst amassing enormous wealth, the Middle East's largest oil rich economy has fared well until now. The huge decline in oil prices throughout the past few years has forced Saudi for the first time to draw on its foreign reserved and issue bonds (Brookings, 2017). Not only that, it has announced what is being termed as the largest ever IPO (Initial Public Offering) in the financial history; Saudi Aramco, the world's largest oil producer (WorldAtlas, 2017) going public in 2018 and has been valued at a staggering USD2 trillion (Reuters, 2017). Not only that, Saudi is set to establish its own IFC soon, the King Abdullah Financial District (KAFD) (KAFD, 2017), a multi- billion project which is set to rival the established IFCs in the Middle East (e.g., DIFC). This is just one example of how the world economies are addressing the growing competition, generated largely as a result of rapid globalisation, by establishing their own IFC, irrespective of whether these are being setup to target a niche financial sector, compete at a regional level, or even rival the established global IFCs. There are several other economies who have either already established or are in the process of announcing their own renditions of financial cities, IFCs, to make their mark on the financial map of the world. Another promising example is that of Casablanca, a port city and commercial hub in western Morocco. Launched in 2010 (Z/Yen Group, 2017) under the initiative of the King of Morocco, Casablanca Finance.

City (CFC) is a Pan-African financial hub poised to provide a competitive platform for international investors towards African economies. Casablanca Finance City's ecosystem is

organised to attract financial institutions, professional services providers, regional headquarters of multinational corporations, and holding companies alike. The IFC boasts overall facilitation of doing business, relaxation of exchange controls and tax incentives.

The Gujrat International finance Tec-City (GIFT) (Z/Yen Group, 2017) is another example of how some economies are aiming at offering niche services and capitalising on their market dominant positions. India is currently regarded as the leading outsourcing services provider to the financial as well as non-financial industries globally and accounted for over 55% of this market segment in 2015 (ZNet, 2017). To capitalise on its market dominance, establishing GIFT in the recent years seems a logical move by the Indian government. GIFT aims as a gateway for inbound and outbound business from India. It boasts its centre is fast emerging as a preferred destination for undertaking International Financial Services covering Banking, Insurance, Capital Market and allied services whilst catering to law firms, accounting firms and professional services firms as well. It provides very competitive cost of operation with competitive tax regime, single window clearance, relaxed Company Law provisions, International Arbitration Centre with overall facilitation of doing business. Overall, the rapidly changing dynamics of financial economics, the globalisation, unification and ease of access of financial services has caused most, if not all, international economies to rethink and strategise their financial offering in order to maximise their financial return whilst retaining their competitive edge against other IFCs.

3.4 Determinants of an IFC – characteristic attributes/factors

The literature on international financial centres typically addresses issues such as the factors that can be used to identify an international financial centre, why financial activity is spatially agglomerated, and why financial services are spatially concentrated in specific locations.

Few studies have been conducted to identify the primary determinants of a competitive global financial centre (GFC) or an IFC. According to Cheung and Yeung (2007), the macroeconomic environment and institutional quality serve as catalysts for conditioning the centralisation of multinational cooperation (MNCs) and, as a result, the establishment of IFCs based upon determinants affect GFCI ranking. With limited data, the analysis relies on a dataset of 18 OECD countries from 1998 to 2003. The authors use the ratio of foreign direct investment to GDP to calculate the size of the host economy in relation to its nominal GDP. The findings show that, in addition to macroeconomic and institutional factors, the standard of living and trade liberalisation are critical to the attractiveness of foreign financial inflows.

According to Hines (2009), these are an IFC's ability to stimulate foreign direct investment in high-tax locations, their ability to discipline financial markets in other parts of the world, their

ability to promote good governance and the benefits that flow from democratic accountability, and their ability to influence tax collections and tax competition among large countries.

Cassis (2006) attributed five key components to globalisation which are equally relevant, as determinants of competitiveness, to IFCs as well; these include: movements of people, transport facilities, communication speed, expanding trade, and transfers of capital. Kawai (2009) has identified several attributes (determinants) of an IFC which include the economic power of the host nation, competitive environment for financial intermediation, financial stability, skilled labour force's availability, presence of high- quality infrastructure, and appropriate business environment.

Fakitesi (2009) has also provided some of the characteristics of an IFC. He points out that an IFC is conducive to the conduct of international financial business profitably, easily and efficiently, that there is abundance of skilled management and intellectual talent covering business, finance and interdependent services; that it offers deep liquid and sophisticated capital markets and world competitive tax and regulatory regimes with foreign investment and offshore business flow; that it can add significant value to financial services through a workforce that can respond promptly and in an innovative manner; that it offers high-quality telecommunications and IT capacity as well as educated, multilingual workforce; all facets of financial services can be located efficiently; and that it provides a convivial and alluring environment for business.

Kayral and Karan (2012) use logistic regression. The global financial centre index (GFCI) is the dependent variable in the study, while skilled labour participation, the legal system, and property rights are the independent variables. Furthermore, skilled labour force participation is positively related to the financial development of major centres based upon results of logistic regression. Furthermore, their findings show that the legal system and property rights are the most influential factors for the state and quality of a financial centre. Model uncertainty and a subjective selection of model forms between the status of a global financial centre and its determinants are introduced by Moosa et al. (2016). The authors examine model uncertainty and test the robustness of included variables using extreme bound analysis (EBA). The authors examine 3990 models, which are equivalent to 190 estimates for each of the individual determinants, using three EBA hyper parameters: human capital index, capital access index, and economic freedom index. Two variables have been identified as "robust" to the status of an IFC: I occupancy cost and (ii) global competitive index. Encouragement of entrepreneurship and the development of a vibrant start-up ecosystem serve as the primary means of financing innovation (Nitin et al., 2017).

Porteous (1995) proposed a theoretical framework to investigate why financial activities tend to

cluster in one location rather than another. His framework highlights the critical role of information (in terms of accessibility and dependability) in influencing the location of financial activities. He focuses on the effects of two information concepts on the development of a financial centre: information hinterland and information asymmetry. The information hinterland is defined as the region in which a specific core city serves as the regional centre and provides the best access point for the profitable exploitation of valuable information flows. The effect of information asymmetry is to drive financial firms closer to an information source in order to find and interpret non-standardised information that can be used to make a profit.

A fundamental question is why financial services are still concentrated in international financial centres when technology appears to facilitate de-concentration and geographical dispersion (Faulconbridge, 2004). This question is related to the broader issue of enterprise location (where and why firms locate specific activities in specific areas), which is a key area of interest in both international business research (e.g., Porter, 2001; Nachum and Wymbs, 2005; Alsacer and Chung, 2007) and economic geography research (e.g., Krugman, 1991; Markusen, 1996; Lorenzen and Mudambi, 2013). Some academics believe that, despite growing interest in location, our current understanding of the geographic aspects of multinational enterprise behaviour is inadequate (Ricart et al., 2004; McCann, 2011).

In the age of electronic communications and electronic money, many academics contend that the economic significance of place has diminished to the point that business location is irrelevant (e.g., Ohmae, 1990, 1995a, 1995b; Cairncross, 1997; Kobrin, 1997). The converse, however, is also true, according to some, who assert that geographic proximity is still essential because not all kinds of information can be transferred over distance at constant prices (e.g., Berry et al., 1997; Short and Kim, 1999). Cantwell (2009), claims that the paradox between the apparent demise of distance, as noted by Cairncross (1997), and the resurgence of local clusters that are poles can be largely responsible for the resurgence of interest in the locational concentration or dispersion of activity.

Only a few attempts have been made, as was previously said, to scientifically investigate the factors that determine the status of an international financial centre. Cheung and Yeung (2007), note that their findings are "just a first attempt for a first-cut estimate on the factors of the competitiveness of IFC" due to data limitations and the small number of prior empirical investigations. They contend that studies on this subject are often descriptive, which is also Tey's opinion (2004).

The status of an international financial centre has generally been determined by a wide range of variables that have been categorised according to different schemes. There are, in general, five major groups of determinants, including the following: Business environment (including

political stability, regulatory environment, and macroeconomic environment); financial sector development (including trading volume and capital availability); infrastructure (including building and transportation infrastructure); human capital (including the availability of skilled labour and the standard of living); and reputational and other factors (such as attractiveness and cultural diversity). The only study that incorporates factors from each and every category, a total of 19 variables (Yildirim and Mullineux, 2015). With the exception of financial sector development, Kayral technique of moments, OLS regressions, logistic regressions, and ordinal logit estimation are some of the methodologies used in these investigations. These studies' findings highlight the significance of human capital, economic freedom, regulation, taxes, and financial market quality. He also highlights that IFCs are analysed according to their easiness to append to the markets, the features that they have in order to be counted as financial markets, financial volume of trading, professional employments, competitive power, the qualification of the labour force, the quality of living, taxation, legal context and infrastructure.

The twenty-first century has seen a dramatic increase in the GFC establishment over the last two decades. One aspect of urban research that has emerged is competition among cities. According to Buck et al. (2002), city competition for promoting themselves as attractive havens for inward investments is becoming fiercer and more popular. With enormous foreseen benefits of being a GFC, such as increased wealth and employment, city competition has gone global more than ever. Cassis (2006) and other economists agree on the importance of historical trade connections, historical financial connections, and financial development in determining the status of the GFC. According to Moosa et al. (2016), the relationship between the status of a global financial centre and its determinants is sensitive to model uncertainty and a subjective selection of model forms. The authors investigate model uncertainty and test the robustness of included variables using the extreme bound analysis (EBA). The authors look at 3990 models, which are equivalent to 190 estimates for each of the individual determinants, using three hyper parameters for the EBA: the human capital index, capital access index, and economic freedom index. It is discovered that two factors, namely I occupancy cost and (ii) global competitive index, are "robust" to the status of a GFC. The factors that determine the status of the financial centre are divided into five different categories by Eichengreen and Shah (2020). Flexibility, transactional openness, and economic stability are key factors of financial significance. The soundness of the currency, credit standing, and financial stability are included in the second group. The third category consists of the set of indicators that measure market capitalisation and financial progress. The sophistication of technology is represented by the fourth group. The third group of variables comprises factors that take the size of the government into account.

Most of these determinants that have been identified by several scholars are descriptive in

nature and very little empirical research and analysis is present which distinguishes the determinants of an IFC; an observation made by Moosa, Li & Jiang (2015), Kayral and Karan (2012), and Cheung and Yeung (2007).

International financial centres have become the most important component of the international financial system in recent years. The influence of IFC has grown in parallel with the steadily expanding range of IFC activities as the world economy has become more globalised. Currently, the activities include financial markets and servicing international finance and lending, insurance, and so on. Financial centres make a significant contribution to the country's overall economic development and growth. The establishment and evolution of financial centres is a complicated and difficult process that is based on a variety of historical, geographical, social, economic, and political factors. Financial centres don't necessarily grow in regions with favourable economic, political, and social conditions. What counts is how different forces combine or interact, together with political will and good fortune. Financial centres don't necessarily grow in regions with favourable economic, political, and social conditions. What counts is how different forces combine or interact, together with political will and good fortune (Solovjova et al., 2018). The international flow of capital is influenced by a variety of factors, the most important of which is the force of attraction of the national financial system, which involves risk assessment and investment profitability in financial markets; in other words, this force is influenced by the economy's competitiveness (Popkova, 2016).

3.4.1 Business regulations

Different studies show that higher business start-up and strict business regulations adversely affect the number of New Market entrants (Djankov, 2016, Hackelman, 2000). If the firms that newly enter a country incorporate with expenses and stringent business regulations, then it results in compounding net loss of public revenue.

Business regulation, as a major determinant, affect the financial ranking of a country on three bases; firstly, the importance of business regulation in generating confidence of private investors; secondly, it analyses the impact of business regulations on financial sector of countries; thirdly, to check the magnitude and effectiveness of business regulation estimates with the variable value of business regulation estimated by Barry (2020).

GFCI ranking directly depends upon the business regulation of a country. If a country has strict regulations then it ultimately results in losing confidence of private investors in the country. So, different Financial Institutions adopt business regulations as one of the most important determinants to check the GFCI ranking of a country. Because increased regulatory costs are faced by the private investors, these impact adversely to operate business in any country. Ease

of doing business analyses regulations that encourages efficiency, effectiveness, and support to do business in a competitive country. Business regulation measures the processes for business incorporation, getting permission, obtaining and transferring rights, access to credit and protecting the investments from investors. To check business regulations in a country, doing business can be measured by using some indicators settled by the World Bank. The indicators are; starting a business, employing workers, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, contracting with the government in forcing contracts and resolving insolvency.

The indicator of starting a business measures procedures, time, cost and capital to start a limited liability company. The indicator of dealing with construction permits measures procedures, time and cost to complete the construction of an industry. The indicator of getting electricity measures procedures, time and cost of electricity. It also measures reliability of the supply of electricity and transparency of tariff. The indicator of getting credit measures Collateral laws and credit information systems. The indicator of protection minority investors measured minority's shareholders rights in corporate governance. The indicator of paying taxes estimates the payments, time and total tax collection with tax regulations processes. The indicator of trading across borders measures time and cost bore to export of a product having comparative advantage. The indicator of resolving insolvency also measures time, cost, outcome and recovery rate for a commercial insolvency. It also measures the legal Framework for insolvency. Indicator of employing workers measures the flexibility of business regulations to provide employment. The last indicator of contracting with the government measures procedures and time to participate in the public procurement process.

3.4.2 Corporate Taxes

Diamond and Mirrlees (1971) are the first modern researchers to examine how international capital mobility affects corporate tax rates. They show that investors' income is tax-free in small countries that are open to international trade and investment. According to Gordon and Hines (2002), the reason for their outcome is that, without shifting any of the tax burdens away from domestic residents and onto foreign investors, any positive taxation distorts the economy more than other tax alternatives would (Gordon and Hines, 2002). The reason for this is that small nations lack the market power necessary to levy taxes on other nations: In the absence of such returns, investors will simply relocate their investments. Investors demand global rates of return from their investments. Consequently, higher pretext investment returns must compensate for small country taxes, which can only occur if local wages decline as a result of higher tax rates.

Therefore, taxing investment results in a decrease in local wages for smaller jurisdictions. High-tax nations are able to maintain high tax rates on domestic investment while continuing to attract significant levels of foreign investment, which contributes to the use of IFCs by foreign investors (Hines, 2006).

In addition to the statutory corporate tax rates, the rules governing depreciation allowances, inventory valuation, the taxation of capital gains, the deductibility of interest payments, pension and option compensation, and a plethora of other considerations all have an impact on corporations' tax burden. Governments have expanded their tax bases during the same time that statutory corporate tax rates have decreased. As a result, the ratio of national corporate tax revenues to GDP in OECD nations has not decreased since 1990. The proportion of corporate duty incomes to add up to burden assortments offers a different proportion of the degree to which legislatures depend on corporate charges, and here too obviously corporate expense income as a portion of all out charges among OECD nations has not fallen over the long haul, and as a matter of fact, arrived at new highs in 2003 and 2004.

A financial centre that competes internationally relies heavily on taxation to maintain a competitive business environment. The GFCI 28 survey found that lowering taxes was beneficial to businesses and emphasised the significance of tax incentives in attracting top talent and business. A 2014 study found that, regardless of corporate tax rates, complex tax systems created administrative burdens and discouraged firm entry, regardless of tax rates, over a six-year period in 118 countries. Additionally, it was discovered that a 10% reduction in tax administrative burden results in a 3% increase in the firm entry. The regulatory environment was identified as a central pillar for a competitive financial centre by respondents to the GFCI 28 questionnaire as the need for a nation to strike the right balance of regulation. These regulations may unnecessarily stifle innovation, entrepreneurship, and business migration if they are not balanced by consideration of competitiveness. Corporate duty rate has remained at 30% starting around 2001-02; In Asian jurisdictions and OECD member states, headline corporate tax rates have been falling. In Asian nations, the average headline corporate tax rate decreased from 20.2 percentages in 2000 to 17% in 2020. The average headline corporate tax rate for OECD member states dropped from 32.2% in 2000 to 23.2% in 2020.jurisdictions fell from 20.2% in 2000 to 17% in 2020. For OECD member countries, the average headline corporate tax rate fell from 32.2% in 2000 to 23.2% in 2020.

3.4.3 Corruption Perception Index

The CPI mandates that any nation's achievements up to this point, in addition to the GDP growth rate or the amount of direct investment, be made public (Németh et al., 2019). Since the

early 2000s, numerous empirical studies have examined the causes of corruption in the public sector as well as its economic and political consequences. There is a wealth of research on the relationship between corruption and development, but few studies have looked at how perceptions of corruption affect financial intermediation. The perception of corruption has an effect on bank performance and financial institutions worldwide, especially because of the following factors: Due to the worldwide prevalence of banking and financial crises, nations are more likely to suffer the destructive effects of perceptions of corruption. Second, only a few studies have looked at the financial aspects of people's perceptions of corruption. Finally, because we used CPI, we adhered to Transparency International when we decided to sample. There are typically two perspectives on how perceptions of corruption affect a nation's financial sector. The perception of corruption has a negative impact on the economy, according to the Sand the Wheel hypothesis, whereas the Grease the Wheel hypothesis asserts that corruption has a positive impact on the economy. Financial institutions are impacted by corruption in a variety of ways. The private sector places a high value on a stable economic climate. As long as they are convinced that their investments and ventures will yield a profit, investors will continue to invest. As a result, investors and consumers must regain faith in the financial markets. However, strong legal and supervisory institutions can increase bank lending by ensuring that loan agreements are fulfilled and protecting the bank from debtor default. However, banks are uncertain about the imposition and fulfilment of legal contracts, as well as the recovery of credits upon debtor default, in the event of corruption within the legal institution (Ahmad, 2013). Banks are more uncertain because of corruption; According to Weill (2011), it reduces borrowers' faith in the legal system and imposes a tax on loans. Interest rates rise, the country's risk level rises, and domestic and foreign borrowing are used to cover the rising costs caused by corruption. This process, which has a negative impact on direct and indirect investment capacity, opens the door to the country losing foreign capital (Erkal et al., 2014). The misallocation of loans caused by corruption may increase a company's likelihood of default by raising the cost of capital and reducing the efficiency with which loans are used. Banks with low asset quality are prone to crisis and will operate poorly (Son et al., 2017). A country's banking system is more likely to be at risk the more corrupt it is. Banks' risk tolerance will increase even more if corruption exists (Chen et al., 2015).

When an economy has a lot of corruption, people tend to think that key institutions of government are corrupt, which makes banks more sceptical about the court's ability to enforce the contract. This may reduce banks' incentives to lend to businesses. However, increased risk-aversion on the part of bank managers caused by uncertainty in the credit market may result in a reduction in lending, leading borrowers to resort to desperate and frequently illegal methods of

obtaining bank loans (Anaere, 2014). Corruption may play a significant role in influencing the lending behaviour of banks following the financial crisis (Toader et al., 2018). The perception of corruption causes projects to require more capital than other projects, reducing private investment quality and loan repayment ability. The issue of inadequate financing is exacerbated by the level of corruption perception (Son et al., 2017). Due to their highly hierarchical structures, developed nations may be less susceptible to perceptions of corruption.

3.4.4 Credit Market Regulations

The term "credit market" refers to the market in which businesses and governments issue debt to investors in the form of short-term commercial paper, investment-grade bonds, and junk bonds, among other types of debt. The credit market also includes debt offerings like notes and securitised obligations like mortgage-backed securities, credit default swaps (CDS), and collateralised debt obligations (CDOs). Investors and institutions can purchase bonds and other debt securities on the credit market. Governments and businesses raise capital by issuing debt securities, which take investors' money now and pay interest until they repay the principal of the debt at maturity. Because the credit market is larger than the equity market, traders look for signs of economic strength or weakness in the credit market. Bonds are issued by government agencies when they need to raise funds. In exchange for lending money to the issuer, investors purchase bonds. Investors receive interest on the bonds from the issuer. Investors return the bonds to the issuer at face value when they reach maturity. Investors may also sell bonds to other investors before they reach maturity (Hall, 2013)

Consumer debts like credit cards, mortgages, and auto loans make up parts of the credit market. It is difficult to deal with because of these aspects. They sell the bundled debts as an investment and receive payments on the debt. The security earns interest for the buyer. The buyer loses money if many borrowers’ default on their loans. Current interest rates and investor demand are two indicators of the credit market's health. The gap in interest rates between corporate bonds and treasury bonds is taken into account by analysts. It includes junk bonds and bonds with an investment grade. Corporate bonds typically have higher interest rates and a greater risk of default, whereas treasury bonds typically have the lowest default risk and the lowest interest rates. Investors are increasingly viewing corporate bonds as riskier as the spread between interest rates on those kinds of investments grows. It is doubtful that the public sector will be able to create more jobs than the private sector will be prevented from creating due to allocation inefficiencies and the relatively low volume of savings. Instead, countries with fewer restrictions are likely to have lower overall employment rates and higher unemployment rates. Long-term employment and economic growth will suffer as a result of falling savings.

However, by shifting income from depositors—primarily households—to borrowers—primarily businesses—moderate financial repression that does not result in negative real interest rates may boost investment, growth, and employment in the short term. Bank regulators must ensure that the low deposit rates translate into moderate lending rates as a prerequisite (Smith,2019).

3.4.5 Economic Freedom overall Index

Gropper et.al, (2015) found that political connections and economic freedom in states are positively correlated with economic performance. Additionally, they argue that excessive bank regulation limits economic freedom and reduces opportunities. Moreover, Blau (2017) contends that financial opportunity diminishes uncertainty, stimulate free trade promote safety to property rights that help to limits likelihood of market crashes. This suggests that banking stability and profitability should both benefit from economic freedom. Greater competition, which may result in lower inflation and a more stable macroeconomic environment, is generally expected to result from a higher degree of economic freedom. Although banks can offset this by improving their credit screening systems, increased competition in the market for loans can lower bank lending rates and also increase the likelihood of bad applicants getting access to loans, which could hurt bank profitability. His findings suggest that greater economic freedom may have a negative impact on overall bank profitability to the extent that it is linked to increased banking sector competition. The impact of changes in bank ownership on cost efficiency is influenced by financial freedom. It is argued that bank efficiency is improved when there is a foreign presence made possible by financial freedom.

3.4.6 Freedom of trade

The openness theory of financial development contends that a nation's financial sector development may be affected by its globalisation. Rajan and Zingales (2003) say that a nation's financial development can be aided by its integration in global goods (also known as trade openness) and capital markets (also known as financial openness). According to this theory, established financial interest groups in underdeveloped nations oppose financial development because it encourages competition by making it easier for new businesses to enter the market and, as a result, reduce the monopolistic rents of the established groups. Financial and trade openness reduces the power of established groups that oppose financial development and attracts foreign competition (Bui and Bui 2020).

After examining the 21 advanced economies, Bui and Bui (2019) support the idea of the "diversification-stability effect" theory. They argue that, in comparison to developing nations, advanced economies are sufficiently mature to comprehend open market operations. Because their capital markets are strong enough to provide the facility of borrowers' external financial

opportunities, developed economies rely on banks for more than just their external financial needs. Diverse investment regimes could result from these various alternative sources of financial opportunity. On the other hand, because of increased competition and volatility, trade openness may increase bank risk-taking. Banks are likely to increase average loans to make up for lower rents because of the liberalisation reforms brought about by trade openness, which increases competition and lowers the cost of bank credit.

In addition to limiting the incumbents' ability to oppose financial development, openness to trade and capital flows provides incentives for financial development. Openness theory's arguments and empirical evidence show that financial development is positively correlated with developing nations' higher levels of financial and trade openness. According to a growing body of theories, there is always an optimal level of private credit based on a country's economic situation, and lending excessively above the optimal level and in conjunction with lower credit standards only increases financial sector risks.

Increased trade openness leads to more efficient production and economic expansion, lowers consumer prices, improves resource allocation, and provides opportunities for diversification. On the other hand, critics argue that trade openness causes instability. This alternative point of view contends that a greater degree of trade openness makes the domestic economy more susceptible to business cycles on the international stage, particularly those in partner nations' economies. Higher trade openness raises the volatility of a wider range of outcome variables, including aggregate consumption, income, prices, employment, and wages in a country. This is because different nations may have different economic conditions. Bank risk-taking may decrease as a result of trade openness and opportunities for loan diversification. Bank risk-taking can be influenced in positive and negative ways by trade openness. By enhancing the selection of borrowers and providing opportunities for diversification, increased trade openness may reduce bank risk-taking. Banks can split their investments between firms that export to other countries. Borrowers involved in international trade distribute their sales across multiple markets with distinct business cycles. There is a lot of evidence at the macro level that industries that are more integrated with global goods markets benefit from international diversification and are less affected by domestic financial conditions.

The money market's velocity could increase as a result of the flow of international finance. Banks are able to select the participating borrowers with ease thanks to the swiftness of the money flow. By encouraging reforms that liberalise the domestic financial sector, such as bank privatisations, deregulation, interest rate liberalisation, or policies to develop capital markets, trade openness is anticipated to reduce the cost of bank credit. Due to the increased demand for bank financing brought about by trade openness, banks would also be able to pursue higher

collateral standards, which would increase their lending power with regard to borrower selections.

Vo and Nguyen (2021) investigated and identified the key determinants for the Asia-Pacific region. In this study, two key criteria are used to select relevant models with appropriate determinants. When all criteria and techniques are considered together, three fundamental determinants for the Asia-Pacific region are identified: international trade freedom; (ii) higher education and training; and (iii) market size. Many cities in the Asia-Pacific region's developing economies, such as Ho Chi Minh City in Vietnam and many others have emerged as major centres for financial and economic activity. Governments in those countries have worked hard to identify key factors that will ensure the competitive establishment of a global financial centre. The findings of this study also indicate that the establishment of a global financial centre necessitates an efficient tax system, a high level of governance, the digitisation of bureaucratic processes, and trade liberalisation.

These aspects are ingrained in the concept of international trade freedom. The primary requirement for designating a global financial centre is to increase human capital accumulation and promote product and service specialisation. The process of globalisation expands the scope of local and traditional financial transactions to a global scale. Capital flows and modern technologies move freely across borders. This process alters the role of the financial system, transforming it into a collective means of transmitting, generating, processing, and interpreting monetary information.

The growth of international financial centres is linked to financial liberalisation processes as well as the globalisation of international financial markets (Yam, 2004). According to the history of financial centres, several factors influence and facilitate development, such as: Geographical location; Multicultural factors (such as shared history, traditions, religion, language, mentality, tolerance, and so on); Openness of the economy to capital, labour resources, and intangible assets movement; Immigration legislation, liberal legislation, favourable tax and customs policy; Procedures for registering businesses and conducting transactions have been simplified, and low administrative costs, , low corruption level; Introduction of international standards, their application, accounting compliance, regulation, reporting, and oversight; Existence and development of infrastructure (stock exchanges, banks, insurance companies, investment funds, trust companies, and so on); Financial service costs are competitive; A diverse range of financial instruments and services (equity, bonds, derivatives, indexes, and so on); A country's macroeconomic and political stability, a certain level of welfare, and so on (Irina Solovjova et el, 2018).

3.4.7 Global Competitiveness Index

Financial institutions' adaptability and innovative performance may be harmed by excessive regulations. However, the effects of competition in the financial sector, particularly among banks, have had varying effects. Contrary to other findings that demonstrated limited effects, some theories demonstrate that competition has a positive impact. Economic liberty is necessary for economic progress and success.

The financial stability and performance of business entities are largely responsible for the efficient operation of national economies and their financial systems. As a result, the fierce competition among businesses is the primary driver of expansion and prosperity. As a result, competition can help businesses become more disciplined. To put it another way, it puts pressure on them to come up with new ideas and become more effective and efficient. As a result, customers benefit from the effective business competition as well because it leads to lower prices, better quality, and a wider selection of products. In addition, countries were compelled and assisted in one way by globalisation to increase their market competitiveness. As a result, the idea of competitive power has begun to develop gradually. It's important to note that competition is also very important in the financial industry. As a result, the efficiency of financial service production, product quality, and financial innovation in the sector are all influenced by competition. However, it has been demonstrated theoretically and empirically that the degree of competition in the financial sector determines access to financial services. This directly affects the spending power of businesses and households and, ultimately, the level of economic growth as a whole. Besides, rivalry and solidness can coincide in the monetary area. Better financial services are a result of competition, but stability is essential for the systematic trust that the entire financial sector relies upon (OECD, 2009). However, economic instability and financial crises can result from the excessive competition (Allen and Gale, 2004). As a result of the elimination of barriers, the rise in the number of non-bank financial institutions, globalisation, and advancements in technology, financial services are constantly changing. The level and type of competition in the financial markets are influenced by all of these factors, either directly or indirectly. The impact of competition on the banking industry, on the other hand, has been the subject of extensive research, but no conclusive conclusion has been reached. According to some studies, the competition encourages banks to take more risks.

The level of competition in the financial industry is influenced by the efficiency of public financial institutions, according to Yoshino and Fujita (1996). This is because these institutions have a direct impact on private financial institutions. The domestic financial sector should, however, be open to international competition, according to theory. International foreign banks with diversified asset portfolios have the potential to stabilise a crisis.

In a formal model, Perotti and Suarez (2002) demonstrated that the current and future structure of the market as well as the extent to which authorities will permit an open, contestable system in the future will influence the behaviour of banks today. In such a dynamic model, current concentration does not necessarily reduce risky lending; however, an anticipated rise in market concentration in the future may lead banks to choose safer lending right away. In general, stability and increased competition may not be incompatible.

Contrary to almost every other industry in the economy, which relies on competition to achieve its intended objectives; History demonstrates that regulation is the most essential component for functioning financial systems. Although financial systems can easily become unstable if they are not well-regulated, overregulation does hinder competition (OECD, 2011). By lowering interest rates and offering better terms for loans, for example, banking competition and low entry barriers can help improve access to finance.

Both static and dynamic effects of competition policy affect the financial sector's growth and effectiveness. Borrowers and other financial service users' access to financial services can be impacted by the level of competition in the financial sector. Additionally, the degree of competition can have an impact on a financial system's stability, as has been widely acknowledged and recently demonstrated by the global financial crisis. Lower costs, increased efficiency of financial intermediation, increased product innovation, and improved quality are all outcomes of increased competition in the financial sector. The channels are comparable to those of other industries, despite the fact that financial services have some unique characteristics. Besanko and Thakor (1992) examined the allocation effects of lowering entry barriers in a theoretical model, taking into account the variety of financial products. Even when differentiated competition is taken into account, they discovered that equilibrium loan interest rates fall and deposit interest rates rise. Higher growth rates result from more competitive banking systems, which lower the costs of financial intermediation and, as a result, lower the cost of capital for non-financial businesses.

There will be more accessibility as a result of increased competition, lower costs, improved efficiency, and a larger and wider supply. The connections between competition and the performance of the banking system in terms of access to financing are more complicated. According to Petersen and Rajan (1995), market power in banking, for instance, may, to some extent, facilitate access to financing. Banks may be less likely to invest in relationship lending if there is too much competition. At the same time, borrowers may be less willing to enter a relationship if there isn't enough competition because hold-up issues may make them too dependent on one institution. Even in the case of relationship lending, increased access may result from increased competition.

3.4.8 High technology Exports

The simultaneous production of high-value-added goods is referred to as high-technology production; when it comes to exports of high-technology goods, developed nations, in particular, hold the global lead. As a result, countries that have adopted export-oriented growth finance their growth and development by increasing their export revenues through the production and export of goods, including high-technology goods.

There are many variables that are powerful in guaranteeing financial development and manageability. Having high-tech industries, producing goods with a high added value, and increasing exports make up a significant portion of these factors. In particular, countries with an export-oriented growth policy see high-technology efficiency as the driving force behind economic development and growth. As a result, countries' primary goals in terms of economic expansion and international competition include increasing their exports of high-technology goods.

As a result of the expansion of international trade, capital movements between nations have accelerated, accelerating the rate of technological advancement. Because of this, the desire to possess high technology has become one of the primary goals of both developed and developing nations, as this allows them to produce goods with a high added value, export these goods, and gain a competitive advantage in international markets. Exporting goods with high technology and added value is one of today's most important goals for nations.

A nation must be able to produce goods using the most cutting-edge technology in addition to its natural resources in order to escape the middle-income trap and provide a competitive advantage in international trade. In today's world, countries' competitiveness is now linked to the high-tech content of their products and services. As a result, the struggle in highly technologically advanced industries has evolved into a struggle for survival. In a world that is currently steady change and improvement with the advances in innovation, notwithstanding, guaranteeing seriousness against different nations and keeping up with the battle for presence is just conceivable by nations' versatility to this change. Furthermore, research and development (R&D) activities are the primary sources of this necessary change for survival. The new innovations and technologies that result from R&D activities have a significant impact on the economy as a whole. By bringing high-value-added products, particularly high-tech products, the innovation and technology that emerge from R&D activities contribute to the country's economic growth, capital accumulation, and exports. The majority of researchers examining differences in economic growth rates state that countries' levels of technological knowledge and R&D activity directly influence their economic growth performance. Although the technological efforts and capabilities of developed and some developing nations as a result of

R&D activities place these nations among the nations that export high-technology products, it is evident that developing nations that lack the necessary technological infrastructure and do not place a high priority on R&D are among the nations that import technology and high-technology products at higher prices. New high-tech products are purchased on international markets as a result of the technological knowledge and skills discovered as a result of the increased intensity of R&D activities.

3.4.9 Inflation

Inflation is thought to be primarily caused by a lack of money supply in every nation on the planet. It is widely held that one of the most important aspects of any economy is controlling inflation. In the recent past, inflation is one aspect of the economy that every government and nation must deal with (Brealey et al.). 2001). As, indicated by Milton (1992), "Inflation is generally and wherever a money related peculiarity". That proposition is supported by the majority of economists, whether they are monetarists or Keynesians. Milton's assertion suggests that persistent money supply growth has always been the cause of persistent inflation. He added that it isn't brought about by persevering speed development or negative development in genuine pay. It should be noted that an increase in inflation does not always indicate a failing economy; rather, it indicates that the nation has failed to take measures to mitigate its negative effects.

Inflation has a negative impact on every economy worldwide. According to economists, inflation is a condition in a nation's economy when the cost of goods and services consistently rises over time. According to Kimani & Mutuku (2013), this leads to a loss of real value in the economy's internal medium of exchange and unit of account when the general price level rises. As a result, each unit of currency buys fewer goods and services when the price level rises (Kimani & Mutuku 2013). A crucial issue is how inflation affects banks' performance. Lenders, managers, investors, and shareholders all place a high value on inflation when designing programs with the goal of increasing efficiency. Inflation can have a variety of positive and negative effects on the economy. Inflation has a positive effect on financial depth below a certain threshold, but a negative effect above that threshold.

According to Huybens and Smith (1998, 1999), a rise in inflation could initially have a negative impact on financial sector performance due to frictions in the credit market before affecting economic expansion. In fact, market frictions result in a rationing of credit, which reduces capital formation and intermediary activity. The equity market's activity and long-term economic growth are both negatively impacted by the reduction in capital investment. However, the significance of the threshold level of inflation in the connection between inflation

and financial sector performance is emphasised by Azariadis and Smith (1996). Once a certain threshold is reached, the negative impact of inflation on financial sector efficiency takes effect. Either an economy's long-term rate of real growth or its long-term level of real activity can suffer from high inflation rates. The financial sector's ability to effectively allocate resources is hindered by even predictable inflation rate increases, according to a growing body of theoretical literature. In particular, recent theories emphasise the significance of informational asymmetries in credit markets and demonstrate how inflation increases adversely affect credit market frictions, affecting the performance of the financial sector (banks and equity markets) and, as a result, long-term real activity. The endogenous nature of the informational friction is a feature shared by all of these theories. Because of this characteristic, an increase in the rate of inflation lowers the real rate of return on assets as well as on money in general. The credit market's frictions are exacerbated by the implied reduction in real returns. As inflation rises, credit rationing becomes more severe as a result of these market frictions. As a result, capital investment suffers, the financial sector makes fewer loans, resource allocation is less effective, and intermediary activity declines. Both the long-term performance of the economy and the activity in the equity market, where claims to capital ownership are traded, are negatively impacted by the reduction in capital formation.

3.4.10 Internet uses Percentage of Population

Businesses frequently employ the well-known strategy of utilising information technology to gain a competitive advantage. In the 1990s, some emerging market businesses made an effort to differentiate them by investing in Internet technology, despite operating in capital markets that were extremely volatile. The dissemination of information about a corporation's financial performance via a company's website is referred to as "internet financial reporting." According to Poon et al.,(2018) using Internet financial reporting effectively serves as a marketing strategy for a business to shareholders and investors. 2003). Internet financial reporting has at least two major effects on the economy, according to Wagenhofer (2003). First, financial information demand and supply in capital markets are affected by the Internet's impact on information processing costs. Second, there is a demand for standardisation as a result of Internet financial reporting.

The rapid development of technology over the past ten years has rapidly altered the way financial services are provided. The financial industry is rapidly innovating, from digital currencies to block chain applications. Internet finance is a methodical blend of technology, finance, and the internet. Providing customers with a clear user guide is one example of effective online advertising that has been studied by scholars from other countries to increase

the availability of online banking. Retail investors initially dominated the online lending market, but institutional investors, such as commercial banks and development banks, as well as non-financial institutions and asset management companies, are gradually entering the market as well. Deposits are the foundation for loan, investment, and other activities in commercial banks' liability business. It is impossible to deny that the growth of Internet finance has had an effect on commercial banks' deposit business. For the deposit business of commercial banks, customers have begun to transfer deposits to Internet financial management platforms in order to enjoy higher yields. As a result, commercial banks' deposit business has slightly improved as their own online wealth management products have been developed. When it comes to disseminating information among businesses in the 1990s, the Internet quickly became the preferred platform, and its use is expanding. Corporate reporting now takes place primarily on company websites. Websites, for example, have been used to distribute information about a company and its operations, present financial data to shareholders, investors, and other important parties, and provide inventors with information about the company. They have also been used to promote the corporate identity. Legislation, the financial framework, and information systems all underwent significant changes as a result of the significant rise in the number of businesses sending their financial reports via the Internet. The Internet has become increasingly important for research, particularly in the areas of financial disclosure and reporting. Internet-based reporting has also been called more influential than paper-based reporting and has proven to be more interesting and important, opening up a wider range of opportunities for in-depth investigation.

Offering unbanked individuals more opportunities to participate in the formal financial system has evolved to include using mobile phones and the Internet to provide financial services. The affordability of financial products and services has increased thanks to mobile money services. With a well-developed banking infrastructure, e-banking offers a variety of safe and convenient services, such as 24-hour banking, online deposits, bill payment, money transfers between individuals and between banks, on-time message delivery, round-the-clock call centres, and ticket purchases for trains or airplanes. E-banking works well to cut transaction costs. By eliminating the need to visit a physical bank branch, the ability to conduct financial transactions at any time and from any location using a personal computer or mobile device saves both time and money. Banks have worked to convince customers that e-banking is just as convenient and reliable as traditional banking. Numerous government departments are providing mobile services to citizens for the purpose of good governance in addition to financial inclusion. People can use their mobile phones to find any kind of government data or file complaints if there are any problems with the government. The citizens' well-being will improve as a result of

this access. In addition, the development of information and communication technology makes the market more efficient, which in turn encourages economic growth and reduces economic poverty.

The Internet has experienced significant growth over the past roughly fifteen years, as well as an increasing level of user acceptance. Information can be accessed (almost) at anytime, anywhere, and typically at a low cost, which is one of the Internet's primary features. Current information is available; the availability of data is not severely restricted; multimedia and dynamic presentations are examples of information. And there is the potential for demand and supply of information to interact. These improvements altogether affect the spread of data and on the exchanging of merchandise, including offers, and subsequently on the authoritative designs of how these exercises are performed. Additionally, they present brand-new and remarkable opportunities for financial disclosure that have an impact on all parties interested, particularly businesses, investors, auditors, and information and those who set standards are both affected by these opportunities.

3.4.11 Labour Market Regulations

In financially stable economies, finance has a significant impact on economic outcomes like productivity, employment, and income. Due to the variety of financial assets and liabilities held by each stakeholder, finance is likely to have different effects on asset-rich investors, white-collar workers, retirees, and the unbanked. Labourers of different kinds make up the biggest gathering of these partners, and money might influence them in a monetarily significant way. According to Pagano and Pica (2012), financial development may affect reallocation in two different ways—either to increase or decrease it. Companies that use finance to look for new investment opportunities can help the economy grow and increase demand for workers. However, when low-productivity businesses use finance as working capital, this may impede productive resource reallocation and delay their exits. It is unclear whether mortgage-based restrictions imposed by households have a significant impact on labour mobility.

The effects of finance on employment are largely positive but depend on the type of finance, the countries and the development context. In brief, finance-related factors that appear to stimulate employment include financial development in banking sector deregulation, positive financial shocks, and possibly removal of bankruptcy flags from individual credit ratings. Factors that may reduce employment include the effects of leveraged buyouts on acquired firms, banking crises, and negative credit shocks for firms. These diverging effects imply that finance is multifaceted and different facets can have countervailing effects on employment, which make it difficult to predict the net impacts.

Income inequality may be influenced by finance. Diverse appears to be a possible channel of financial influence on inequality. For instance, banking liberation starting during the 1970s in the US worked with admittance to capital, fuelled speculation, and helped interest for untalented work, this decreased pay imbalance. By increasing entrepreneurial activity or educational attainment among lower-income workers, access to finance may have reduced inequality.

By interfering with company investment decisions, finance contributes to the determination of unemployment. Financialisation has an opposite effect on capital accumulation, which in turn has an opposite effect on unemployment rates. Finance collaborates with work market qualities to assist with deciding joblessness. Because of the different ways credit and equity finance interact with labour institutions, they may have different effects on unemployment.

3.4.12 Legal system property rights

The theory of law and finance focuses on how legal institutions explain differences in financial development between countries. According to the first part of the law and finance theory, savers are more willing to finance businesses and financial markets thrive in nations where legal systems support private contractual arrangements, enforce private property rights, and protect investors' legal rights. On the other hand, legal systems that neither promote private contracting nor support private property rights hinder corporate finance and impede financial progress. The second section of the law and finance theory emphasises that cross-country variations in investor protection, the contracting environment, and current financial development can be explained by the various legal traditions that developed in Europe over previous centuries and spread internationally through conquest, colonisation, and imitation. More specifically, legal theories place an emphasis on two related mechanisms that influence finance through legal origin.

There are divergent opinions regarding the degree to which the legal system ought to merely support private contractual arrangements and the degree to which the legal system ought to have specific laws concerning shareholder and creditor rights within the broad view that legal institutions influence corporate finance and financial development. Coasians believe that private contracts should only be enforced by the legal system. Successful lawful establishments permit proficient and experienced monetary market members to plan a huge swath of refined private agreements to improve complex organisation issues.

Rights to the property are fundamental. If entrepreneurs anticipate not being able to keep the benefits of their investment, they will not invest. Studies conducted at the country level consistently demonstrate a link between lower aggregate investment and slower economic

growth and less secure property rights. Entrepreneurial investment may necessitate the protection of property rights. Outer Ž money could likewise matter for speculation and development; for on the off chance that bank credit isn't accessible it very well might be difficult for business visionaries to make the most of new open doors. There is evidence to suggest that investment and growth are aided by an efficient financial system. When there is a stronger legal system in general and better protection for investors in particular, external financing is available. In nations with stable property rights, businesses make more investments from outside sources.

3.4.13 Quality of Roads

As a major government function, maintaining and improving existing road networks is frequently justified as a public good investment in job creation and economic activity. The upkeep and improvement of existing roads account for the vast majority of public road expenditures. The fact that farmers use road networks to transport produce to markets, businesses use them to acquire inputs and deliver their output, and workers use them to reach their jobs motivates the modelling of road quality as an input to production. Production organisation may also be influenced by road quality. Better roads make it easier for businesses to source workers and inventory from further afield, as well as to combine capital and labour, work on plots in more remote areas, and share large equipment.

When it comes to determining the pace, direction, and location of actual economic activity, finance plays a crucial role. Through its influence on entrepreneurship and firm dynamics, innovation, and reallocation toward more efficient firms, financial development has also been shown to be a key driver of economic growth. First, spending on infrastructure is increasingly being seen as a crucial policy lever that governments can use to propel economic growth. Academics and business leaders have characterised the transportation infrastructure of rapidly expanding nations like India and China as a significant obstacle to further development. Continued urbanisation, demographic trends, and climate change necessitate an acceleration of infrastructure investment even in advanced economies. Second, the importance of financial development for economic growth has significant repercussions for development and policy models. Policymakers and nation builders can proceed with such projects with the confidence that the complements of financial markets will work themselves out if infrastructure spending can overcome the limitations of weak financial development. The convergence of regions with less developed financial markets toward regions at the frontier can then also benefit from infrastructure investment. Then again, in the event that a gauge level of monetary improvement is essential for development, the parts of such spending will be lopsided.

3.4.14 Size of Government

Because economic growth is a driver of government size, the relationship between government size and economic growth is crucial. The "government size-led economic growth view" or "supply-leading response," also known as the "Keynesian view," is the first viewpoint. This point of view asserts that the size of the government is what drives economic expansion and places importance on its size. The "growth-led government size," also known as "Wagner's Law" or the "demand-following response," is another name for this phenomenon. As per this view, the public authority is wasteful in offering types of assistance; As a result, it cannot drive economic expansion. Instead, as the government meets the growing economy's demand, it is an economic expansion that drives government expansion.

In many nations, governments have an impact on economic growth and development because they typically consume a sizable portion of society's resources. High levels of economic development have been achieved through government intervention throughout history. Where there was none, productive economic activity generated little wealth. However, even if it is necessary, government intervention is not a prerequisite for prosperity if it results in monopolisation of resource allocation and other significant economic decisions and societies do not achieve higher income levels.

3.4.15 Human Development Index

The HDI simplifies and accounts for only a portion of human development. Inequalities, poverty, human security, empowerment, and other issues are ignored. As a more comprehensive proxy for a number of important issues related to human development, inequality, gender disparity, and poverty, the HDRO provides additional composite indices.

A nation's economy is largely dependent on its financial system. the capability of the monetary framework played by HDI can be separated into five essential classes: reducing risk, allocating resources, keeping an eye on managers and exercising control over the company, generating savings, and facilitating trade are all facilitated. Financial institutions are heavily rewarded for obtaining information because they handle significant sums of money. With the huge measure of cash monetary foundations has, the typical expense to gather data is lower for them than it would be for any singular financial backer, also the time expected to get data. Financial institutions are highly specialised in determining an individual's worthiness to receive a loan, in addition to economies of scale that reduce costs. As a result, they allocate resources to select the most deserving borrowers, thereby indirectly contributing to invention and entrepreneurship. Financial markets and institutions that work well make it possible to move money from people who have too much money to people who don't. The most fundamental function of the financial

markets and institutions might be credit allocation. Through their influence on entrepreneurial endeavours, financial systems accelerate productivity in four ways, which in turn encourage economic expansion.

Studies of the relationship between the development of the financial sector and economic expansion serve as the foundation for the connection between human development and financial development. According to King & Levine (1993), a financial system could encourage economic expansion. the connection between FSD and development by utilising Gross domestic product per capita as an intermediary for development and monetary go-between resources partitioned by gross public item as monetary area improvement.

Chapter Four – Data and Research Methodology

This chapter will provide an outline of the design and methodology of the research proposal supported with research hypothesis. The chapter also explains the methodology with respect to designed model of panel regression with fixed effect and testing the correlation caused by explanatory variables.

4.1 Hypothesis

Through this study, an attempt will be made to provide a contribution to the literature by attempting to identify the factors (determinants) that determine the status of an IFC. The study adopted the hypothesis whether the selected determinants strongly influence the GFCI ranking. The study is testing the hypothesis by checking the magnitude and direction of values obtained through quantitative analysis. In order to investigate the hypothesis a longitudinal study is conducted, with multiple cross-sectional observations and analyses whereby a ranking will be modelled whilst utilising the identified determinants. The aim will be to identify the competitiveness factors which have enabled the IFCs to progress and develop over the selected time period with particular focus placed on analysing the identified determinants, and how they contribute to the success of an IFC. When modelling a ranking, the robustness of the GFCI Index ranking will be hypothesised against the identified determinants and its correlation will be tested. The hypothesis is tested by quantitative analysis of data ranging from 2007 to 2020.

4.2 Research Design

For the purposes of this study, the dependent variable would be measured by the GFCI Index; it is an approach that has already been adopted by a few others (Moosa et al, 2015; Yildirim & Mullineux, 2015) and one which is considered most relevant to the subject of this study. The latest GFCI report (202) highlighted 119 established IFCs operating globally and utilised empirical measures, in addition to qualitative analysis, when arriving at the rankings. The few empirical studies that have been conducted on this subject have utilised these measures as ‘independent variables’ and ‘control variables. The most used in any study are 24 independent variables by Moosa et al. (2015) who have provided a very helpful table listing the few other available empirical studies. The Explanatory variables categories included in the table below are A – business environment, B – financial sector development, C – infrastructure, D – human capital, and E – reputational and general factors.

A summary of Empirical Studies of IFCs is given in Table 1.

Table 1: ***Studies with maximum number of IFCs determinants***

Study	Description	Number and Type of Explanatory Variables					Important Factors
		A	B	C	D	E	
Tey (2004)	The generalised method of moments is applied to a panel data set covering 71 countries.	3		1		2	Economic size, agglomeration
Cheung and Yeung (2007)	Two alternative measures of the IFC status are used as explanatory variables. Cross-sectional regressions are used on data covering 25 OECD countries as well as Hong Kong, Shanghai and Singapore.	1	1			4	Economic freedom, number of foreign companies listed on the stock exchange
Kayral and Karan (2012)	Logistic regression is applied to 53 financial centres using the GFCI as the dependent variable.	3		2	4	2	Legal rights and human capital
Foad (2012)	Panel regression covering 63 source countries investing in over 200 foreign jurisdictions. The dependent variable is the share of an offshore financial centre investment by a particular country.	7				7	Economic freedom, corruption, regulation and taxes
Yildirim and Mullineux (2015)	The study is based on survey data of the perceptions of the status of Istanbul as an IFC. Ordinal logit estimation is applied to the survey data.	5	1	7	4	2	Economic and political stability, tax policies and financial markets

Source: Author's own Calculation A=Business environment

B=Financial sector development

C=Infrastructure

D=Human capital

E=Reputational and general factors.

As outlined above, the available literature does not provide a limited set of factors that may be used to determine the status of an IFC, more specifically, its competitiveness. Using independent variables which are actual determinants of the GFCI does not represent a problem

as most of the independent factors used in the GFCI are highly disaggregated and overlap and, more importantly, because an extensive range of these factors are used, the results are not reflective of a simple weighted average, as the GFCI utilises survey data as well (Moosa et al, 2015; Yildirim & Mullineux, 2015).

In addition to the independent variables, to make the study and some of the analysis more meaningful, 'control variables' may also be used. These would include determinants which are common and easily measurable across most of the IFCs and have been acknowledged as key determinants by other researchers as well. As evident from the table above and highlighted by Moosa et al. (2015), it is reasonable to select factors that are intuitively accepted as being important for the ability of a city to attract international financial firms, including the macroeconomic environment, institutional environment, equity market development, bond market development, access to knowledge, standard of living, business freedom, trade freedom, financial freedom, freedom from corruption and others.

4.3 Data Collection

The study is aiming to check the effects of determinants on GFIs ranking. For the said purpose, a comprehensive approach of investigating the most resourceful variables utilised by keeping in view appropriateness of research hypothesis. The data set generated from resource centres of numerous financial institutions across the world such as World Bank, IMF, World Economic forum, Transparency international, etc. The nature of data set is secondary data. The data is panel data having cross sectional (countries) values corresponding to series of years ranging from 2007 to 2020. Data is collected for 196 countries and paper used Decision tree approach to find out most relevant explanatory variables. The statistical tool is used to find coefficient values subject to quantitative Data[2]. As the methodology adopted for this research would be a predominantly 'quantitative', reliance would be placed on existing statistical data. If required, and where plausible, both qualitative as well as quantitative measures may be applied; these may include the following three main sources as a result:

4.3.1 Secondary data

The global financial centre index is considered a dependent variable in this study. Since 2007, the Z/Yen Group has calculated a global financial centre index (GFCI). The GFCI is based on two sources of data: (i) instrument variables collected from many reliable sources; and (ii) survey data collected from online questionnaires. By considering the data availability from key factors and survey method the data deals as secondary in nature. The secondary data reflects that data is not collected and generated by the author rather study uses it as a second party. The

[2] R is used for statistical computing and procedure in the dissertation.

GFCI 31 was developed using 150 key variables. But we used only 17 variables due to data availability. The data of these key variables were collected from the third party including the word bank, Fraser institute, and transparency international, Heritage Foundation and Wall Street Journal, the United Nations, the International Monetary Fund, World Economic Reform, United Nation world Urbanisation Project and Telecommunication Union.

4.4 Construction of variables and Description

4.4.1 Variable of Business Regulations

The study aims to estimate the effect of business regulations on the GFCI ranking of a country. The business regulations can be estimated by the use of ease of doing business index. Doing business depends on the principle that economic activity positively plays an important role in obeying rules settled by an economy. These rules create an environment where new firms enter with innovative ideas and start business to generate profit for the country. These productive firms can invest, expand, and create new job opportunities for the youth. Business regulations are about freedom of doing business in an efficient atmosphere. Finance places an important subjective role by promoting investment in the country under the flagship of business regulations. It is productive in generating capital for a country. Similarly, many countries adopt different regulations in order to stimulate economic growth. Business is one of the main tools in developed countries to advance economic growth and development. Previously countries adopted trick regulations and tax collection methods that limit the opportunities for business and investors to earn reasonable profit. The countries who adopt Strict tax collection procedures often reduce the inflow of foreign direct investment in the country. The reduction in the foreign direct investment restricts the growth of business in a country. Foreign investors avoid countries that use business regulations to manipulate the private sector. The best method to check the business regulations in the country is ease of doing business index. It is used by the different financial centres to check the effectiveness of a country to pave the path for private investment. Ease of doing business analysis regulations that encourages efficiency, effectiveness, and support to do business in a competitive country. Business regulation measures the processes for business incorporation, getting permission, obtaining and transferring rights, access to credit and protecting the investments from investors. To check business regulations in a country, doing business can be measured by using some indicators settled by the World Bank. The indicators are; starting a business, employing workers, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, contracting with the government in forcing contracts and resolving insolvency. The indicator of starting a business measures procedures, time, cost and

capital to start a limited liability company. The indicator of dealing with construction permits measures procedures, time and cost to complete the construction of an industry. The indicator of getting electricity measures procedures, time and cost of electricity. It also measures reliability of the supply of electricity and transparency of tariff. The indicator of getting credit measures Collateral laws and credit information systems. The indicator of protection minority investors measured minority's shareholders rights in corporate governance. The indicator of paying taxes estimates the payments, time and total tax collection with tax regulations processes. The indicator of trading across borders measures time and cost bore to export of a product having comparative advantage. The indicator of resolving insolvency also measures time, cost, outcome and recovery rate for a commercial insolvency. It also measures the legal Framework for insolvency. Indicator of employing workers measures the flexibility of business regulations to provide employment. The last indicator of contracting with the government measures procedures and time to participate in the public procurement process. The government policy for business regulation is to increase the confidence of private investors and promote the daily operations of domestic firms in order to provide an efficient business atmosphere. Doing business measured economic outcomes such as trade volumes, foreign direct investment, stock exchange capitalisation, market accessibility and private credit as a percentage of GDP Exports and imports through ports are also efficient in organisation of economic cooperation and development among high income countries and least efficient developing countries. Through trade and exchange of currencies provide an ample foreign reserve in a country. The financial situation of a country improves due to an increase in its foreign Reserves. The above mentioned indicators are used as a benchmarked to rank the countries according to their ease of doing business as given in the table 2.

Table 2: ***Ease of doing business ranking***

Ease of doing business ranking								
Rank	**Economy**	**DB score**	**Rank**	**Economy**	**DB score**	**Rank**	**Economy**	**DB score**
1	New Zealand	*86.8*	**65**	Puerto Rico (U.S.)	*70.1*	**128**	Barbados	*57.9*
2	Singapore	*86.2*	**66**	Brunei Darussalam	*70.1*	**129**	Ecuador	*57.7*
3	Hong Kong SAR, China	*85.3*	**67**	Colombia	*70.1*	**130**	St. Vincent and the Grenadines	*57.1*
4	Denmark	*85.3*	**68**	Oman	*70.0*	**131**	Nigeria	*56.9*
5	Korea, Rep.	*84.0*	**69**	Uzbekistan	*69.9*	**132**	Niger	*56.8*
6	United States	*84.0*	**70**	Vietnam	*69.8*	**133**	Honduras	*56.3*
7	Georgia	*83.7*	**71**	Jamaica	*69.7*	**134**	Guyana	*55.5*
8	United Kingdom	*83.5*	**72**	Luxembourg	*69.6*	**135**	Belize	*55.5*
9	Norway	*82.6*	**73**	Indonesia	*69.6*	**136**	Solomon Islands	*55.3*
10	Sweden	*82.0*	**74**	Costa Rica	*69.2*	**137**	Cabo Verde	*55.0*
11	Lithuania	*81.6*	**75**	Jordan	*69.0*	**138**	Mozambique	*55.0*
12	Malaysia	*81.5*	**76**	Peru	*68.7*	**139**	St. Kitts and Nevis	*54.6*

13	Mauritius	*81.5*	**77**	Qatar	*68.7*	**140**	Zimbabwe	*54.5*
14	Australia	*81.2*	**78**	Tunisia	*68.7*	**141**	Tanzania	*54.5*
15	Taiwan, China	*80.9*	**79**	Greece	*68.4*	**142**	Nicaragua	*54.4*
16	United Arab Emirates	*80.9*	**80**	Kyrgyz Republic	*67.8*	**143**	Lebanon	*54.3*
17	North Macedonia	*80.7*	**81**	Mongolia	*67.8*	**144**	Cambodia	*53.8*
18	Estonia	*80.6*	**82**	Albania	*67.7*	**145**	Palau	*53.7*
19	Latvia	*80.3*	**83**	Kuwait	*67.4*	**146**	Grenada	*53.4*
20	Finland	*80.2*	**84**	South Africa	*67.0*	**147**	Maldives	*53.3*
21	Thailand	*80.1*	**85**	Zambia	*66.9*	**148**	Mali	*52.9*
22	Germany	*79.7*	**86**	Panama	*66.6*	**149**	Benin	*52.4*
23	Canada	*79.6*	**87**	Botswana	*66.2*	**150**	Bolivia	*51.7*
24	Ireland	*79.6*	**88**	Malta	*66.1*	**151**	Burkina Faso	*51.4*
25	Kazakhstan	*79.6*	**89**	Bhutan	*66.0*	**152**	Mauritania	*51.1*
26	Iceland	*79.0*	**90**	Bosnia and Herzegovina	*65.4*	**153**	Marshall Islands	*50.9*
27	Austria	*78.7*	**91**	El Salvador	*65.3*	**154**	Lao PDR	*50.8*
28	Russian Federation	*78.2*	**92**	San Marino	*64.2*	**155**	Gambia, The	*50.3*
29	Japan	*78.0*	**93**	St. Lucia	*63.7*	**156**	Guinea	*49.4*
30	Spain	*77.9*	**94**	Nepal	*63.2*	**157**	Algeria	*48.6*
31	China	*77.9*	**95**	Philippines	*62.8*	**158**	Micronesia, Fed. Sts.	*48.1*
32	France	*76.8*	**96**	Guatemala	*62.6*	**159**	Ethiopia	*48.0*
33	Turkey	*76.8*	**97**	Togo	*62.3*	**160**	Comoros	*47.9*
34	Azerbaijan	*76.7*	**98**	Samoa	*62.1*	**161**	Madagascar	*47.7*
35	Israel	*76.7*	**99**	Sri Lanka	*61.8*	**162**	Suriname	*47.5*
36	Switzerland	*76.6*	**100**	Seychelles	*61.7*	**163**	Sierra Leone	*47.5*
37	Slovenia	*76.5*	**101**	Uruguay	*61.5*	**164**	Kiribati	*46.9*
38	Rwanda	*76.5*	**102**	Fiji	*61.5*	**165**	Myanmar	*46.8*
39	Portugal	*76.5*	**103**	Tonga	*61.4*	**166**	Burundi	*46.8*
40	Poland	*76.4*	**104**	Namibia	*61.4*	**167**	Cameroon	*46.1*
41	Czech Republic	*76.3*	**105**	Trinidad and Tobago	*61.3*	**168**	Bangladesh	*45.0*
42	Netherlands	*76.1*	**106**	Tajikistan	*61.3*	**169**	Gabon	*45.0*
43	Bahrain	*76.0*	**107**	Vanuatu	*61.1*	**170**	São Tomé and Príncipe	*45.0*
44	Serbia	*75.7*	**108**	Pakistan	*61.0*	**171**	Sudan	*44.8*
45	Slovak Republic	*75.6*	**109**	Malawi	*60.9*	**172**	Iraq	*44.7*
46	Belgium	*75.0*	**110**	Côte d'Ivoire	*60.7*	**173**	Afghanistan	*44.1*
47	Armenia	*74.5*	**111**	Dominica	*60.5*	**174**	Guinea-Bissau	*43.2*
48	Moldova	*74.4*	**112**	Djibouti	*60.5*	**175**	Liberia	*43.2*
49	Belarus	*74.3*	**113**	Antigua and Barbuda	*60.3*	**176**	Syrian Arab Republic	*42.0*
50	Montenegro	*73.8*	**114**	Egypt, Arab Rep.	*60.1*	**177**	Angola	*41.3*
51	Croatia	*73.6*	**115**	Dominican Republic	*60.0*	**178**	Equatorial Guinea	*41.1*
52	Hungary	*73.4*	**116**	Uganda	*60.0*	**179**	Haiti	*40.7*
53	Morocco	*73.4*	**117**	West Bank and Gaza	*60.0*	**180**	Congo, Rep.	*39.5*
54	Cyprus	*73.4*	**118**	Ghana	*60.0*	**181**	Timor-Leste	*39.4*
55	Romania	*73.3*	**119**	Bahamas, The	*59.9*	**182**	Chad	*36.9*
56	Kenya	*73.2*	**120**	Papua New Guinea	*59.8*	**183**	Congo, Dem. Rep.	*36.2*
57	Kosovo	*73.2*	**121**	Eswatini	*59.5*	**184**	Central African Republic	*35.6*
58	Italy	*72.9*	**122**	Lesotho	*59.4*	**185**	South Sudan	*34.6*
59	Chile	*72.6*	**123**	Senegal	*59.3*	**186**	Libya	*32.7*
60	Mexico	*72.4*	**124**	Brazil	*59.1*	**187**	Yemen, Rep.	*31.8*
61	Bulgaria	*72.0*	**125**	Paraguay	*59.1*	**188**	Venezuela, RB	*30.2*
62	Saudi Arabia	*71.6*	**126**	Argentina	*59.0*	**189**	Eritrea	*21.6*
63	India	*71.0*	**127**	Iran, Islamic Rep.	*58.5*	**190**	Somalia	*20.0*

64	Ukraine	*70.2*						

Source: Doing Business database

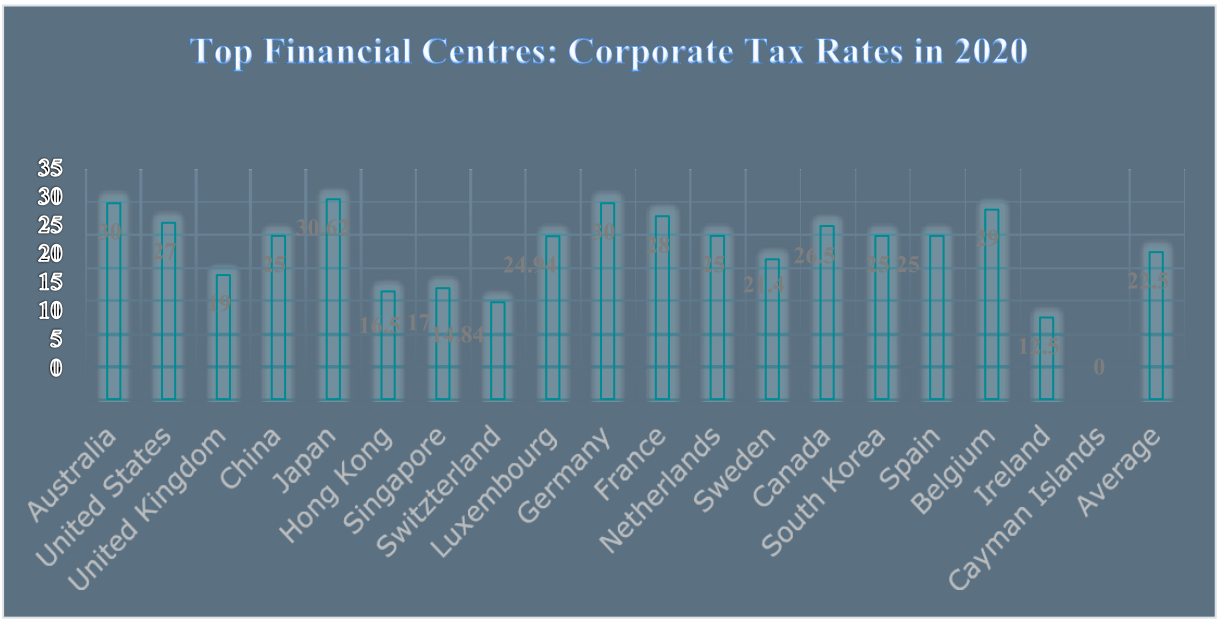
4.4.2 Variable of Corporate Taxes

A corporation's profits are subject to a tax known as a corporate tax. As a means of generating revenue, the government collects corporate taxes. After deducting expenses, taxable income is used to calculate taxes. Business owners may benefit more from paying corporate taxes than from paying additional individual income taxes. The sum of tax bases and tax rates measure the corporate taxes. Both the definitions of tax bases and the tax rates are decided by governments. The data for both the variables are available at the dataset of various international organisations. For the purpose of study, the data is collected from World Bank and IMF. Countries' corporate tax rates vary widely and some are regarded as tax havens due to their low rates. The effective corporate tax rate, or the rate a corporation actually pays, is typically lower than the statutory rate because various deductions, government subsidies, and tax loopholes can reduce corporate taxes; before any deductions, the stated rate.

The first level of taxes imposed on business income is only represented by corporate taxes; Governments also tax business income at other stages of income transfer, such as when income is bequeathed, when firms pay dividends to individual shareholders, when owners of firms use profits for personal expenses that are subject to excise and value-added taxation, and so on. IFCs indirectly increase the revenue potential of all of these other taxes by taxing business income so lightly in the form of corporate tax.

The top 20 financial centres of the world have corporate tax rates in the 2020 as visualised in the following figure.

Figure 1*: Top Financial centres Corporate Tax Rates 2020*.



Source: AFTCAG Report (2021)

Through increased net-of-tax retained earnings, a corporate tax cut generates a mechanical cash injection for the business that has the potential to positively impact business activity beyond capital investments. Younger and smaller businesses, which may frequently face liquidity constraints and have fewer opportunities to acquire other types of funding but still have available business opportunities to utilise, may particularly benefit from these additional cash resources. Also, most small businesses are run by their main owners, who also work for the company and are closely involved in making decisions. This means that changes in corporate-level tax incentives could affect the owners' efforts and incentives. To encourage firm-level investments and economic activity, many developed nations have lowered their corporate tax rates over the past decade. For instance, the United States reduced its corporate tax rate from 35% to 21% in 2017. Numerous nations have also implemented a variety of additional investment stimuli, including more favourable deduction and depreciation rules. As a result of these changes, business activity has increased and new investments have been encouraged as the cost of capital has decreased. So, the study adopts corporate tax as an efficient and positive determinant that impact financial situation of global financial centres.

4.4.3 Variable of Corruption Perception Index

Corruption in the public sector has an impact on economic and financial outcomes like GDP growth, the cost of government funding, and foreign direct investment. Because of the serious risks, it poses to political, economic, and social life, corruption has become a frequent target for international organisations, national governments, nongovernmental organisations, and other organisations. This interest stems from the fact that economic and social corruption has a wide range of negative effects. The most significant of these effects have been observed in economic expansion and investment. In recent years, corruption has become a variable that cannot be directly measured; a few associations have given debasement files across many nations in light of overviews to survey the degree of defilement subjectively. Establishments and associations, for example, Financial Insight Unit, Political Venture Administrations Inc., Political and Monetary Consultancy, World Bank, Value Waterhouse Coopers, World Financial Discussion, and Straightforwardness Global distribute research on the apparent degree of debasement. One of the most eminent records is the corruption perception index (CPI) distributed by Straightforwardness Global. In terms of measuring perceptions of corruption, Transparency International's Corruption Perception Index is without a doubt the most successful product. The CPI is measured on a scale from 100 (very clean) to 0 (highly corrupt)" based on the situation of the country. Knowing the factors that influence this relationship may assist central

authorities in determining ways to reduce corruption, which is why it is important to analyse the impact of corruption perception on financial institutions. Corruption is successfully prevented by hierarchical structures, which have little discretion. Less created nations may stay away from corruptive practices in the face of the extreme administrative investigation. The study includes Corruption Perception Index as an important determinant who directly impact the attitude of investment from foreign countries and availability of finance for generation of revenue in the country. Similarly, CPI directly effects loan repayment ability of a country. If a country has legacy in repaying the loans to financial institutions that it will create mistrust among financial institutions for that particular country. So, study adopts it to check it effect on GFCI ranking.

4.4.4 Variable of Credit Market Regulations

Businesses and governments receive a significant amount of capital from credit markets. Equity markets are smaller than credit markets. The variable is constructed by international consortium group by measuring the deposit based financing. .

Financial intermediation will typically be hindered by anti-competitive credit market regulations, which will decrease investment, output, employment, and unemployment. Particularly, financial intermediation remains underdeveloped due to a relatively small number of banks, so the banking sector will attract fewer savings if private or foreign banks are prohibited from doing business in the domestic credit market. As a result, the economy's credit supply will decrease. Furthermore, there won't be a lot of pressure on incumbent banks to compete, so there won't be a lot of difference between deposit and lending rates. Due to the high lending rates, the investment will be relatively low, economic growth will be slow, employment will be low, and unemployment will be high. The realisation of private investment projects and, as a result, the creation of jobs in the private sector are thwarted by government restrictions on the amount of credit granted to the private sector. Also, savings won't be put in places where they could get the most money back. Furthermore, banks will be unable to provide deposit rates that are as appealing as they otherwise would have been due to the prohibition of profitable loans to the private sector. As a result, the economy's savings volume will also be relatively low.

An increase in credit supply, improved financial intermediation, lower spreads between deposit and lending rates, and a more effective capital allocation will result from the opening of the credit market to private and foreign banks, the removal of restrictions on the volume of private sector credit, and the elimination of interest rate controls. This boosts employment and economic growth over the long term; unemployment rates fall. However, there are two caveats. First, the removal of ceilings on interest rates might result in a short-term rise in lending rates,

which would dampen investment and employment for some time. Second, the substitution of capital for labour may occur if the deregulation of the credit market reduces businesses' capital costs.

4.4.5 Variable of Economic Freedom Overall Index

The degree to which a nation's institutions and policies support economic freedom is measured by the Economic Freedom of the World. The foundations of monetary opportunity are private decision, trading, opportunity to enter market and compete, and security of the individual and exclusive property. Five broad categories are used to measure economic freedom. 1) Government size; Economic freedom is diminished as individual choice is replaced by government decision-making as government spending, taxation, and government-controlled businesses rise. 2) Property Rights and the Legal System; A fundamental component of civil society and economic freedom is the safeguarding of individuals and the property they have earned. Indeed, it is the most significant government function. 3) Reliable Money; The value of legitimately earned wages and savings decreases as inflation rises. Therefore, sound money is necessary to safeguard property rights. It becomes difficult for individuals to plan for the future and effectively utilise economic freedom when inflation is both high and volatile.(4) Freedom to Trade Internationally Regulation: Governments not only use a variety of tools to limit the right to exchange internationally, but they may also impose onerous regulations that limit the right to exchange, gain credit, hire or work for whom you wish, or freely operate your business. (Regulation) Freedom to exchange—in its broadest sense, buying, selling, making contracts, and so on—is essential to economic freedom. 5) Gender equality in legal rights; includes a correction for gender disparity to account for the fact that women are not legally granted the same level of economic freedom as men in many countries. Bank profitability and financial availability can both benefit from economic freedom. By allowing new domestic and foreign entrants into the economy, economic freedom can improve banking profits by increasing efficiency and allowing for a wider range of products. Banks will be able to lend more to foreign businesses and financial institutions as a result of economic freedom because there will likely be more firms competing in the economy. This will ensure that bank loan portfolios are more diverse and that the banking system receives a better risk-return trade-off. Businesses will likely benefit from a more favourable operating environment and stronger economic growth as a result of increased economic freedom, which will likely improve banking performance in terms of profitability and stability. Additionally, countries with greater economic freedom typically have higher real income levels, which in turn increase the need for banking services. The banking industry as a whole will benefit from increased efficiency because increased

profitability and lower bankruptcy risk follow. Uncertain are the effects on bank performance of a decline in economic freedom, which has the potential to significantly raise the costs of borrowing for a government. It could improve the sector's profitability by increasing its net interest margin, or it could raise the risk and costs for corporate borrowers and lower the profitability and stability of the banking sector by increasing non-performing loans. In conclusion, greater economic freedom may undermine banking performance in some ways, but the effects of greater economic freedom on profitability are likely to be positive in terms of stability as well as profitability. Increased competition and easier entry into the industry could hurt banks' average profitability. Other financial intermediaries, such as hedge funds, shadow banks, and private equity, which compete for bank deposits, may also face increased competition from increased economic freedom. Businesses receive funds from these financial intermediaries, which can also lower bank profitability. It has been observed that banks tend to lend more to less creditworthy businesses than they would in a private sector-controlled banking system in developing nations due to greater state control over lending decisions. This ultimately hurts banks' performance. Therefore, the impact of economic liberty on bank stability and profitability is primarily a financial issue.

4.4.6 Variable of Freedom of Trade

The availability of efficient and dependable financing is essential to a significant portion of global trade. This indicates that financial institutions like banks and other financial institutions play a crucial part in making trade-driven growth and development possible everywhere in the world. The study adopts the variable of freedom of trade which is constructed by WTO depends upon non-tariff barrier in exports and imports of a country. The study uses the data from dataset of Word Trade Organisation.

While in a serious climate, the banks expand more credits by relaxing the credit guidelines which brings about more unfortunate credit quality credits on bank monetary records. In a similar vein, trade openness boosts product market competition by bringing in more effective industrial firms from abroad. On the one hand, domestic businesses experience a decrease in profits and cash holdings as a result of the entry of foreign businesses; on the other hand, domestic businesses experience an increase in the need to invest more as a result of external opportunities and the requirement to defend domestic markets from superior foreign technologies. Because of the fierce competition between domestic and international businesses, banks may lose credibility when making investment decisions. Due to the fierce competition between domestic and international businesses, the borrower has the opportunity to borrow from international sources in addition to domestic banks. When everything else is the same,

banks lose the ability to choose the right borrowers to lend to, which increases bank risk-taking. In industries and sectors that rely on financing from outside sources, the connection between financial development and trade openness has a competitive advantage. If a nation's comparative advantage is determined by its level of financial development, reforming the finance sector may have an impact on the trade balance. On the other hand, the degree of financial development may influence how trade reforms affect the level and structure of the trade balance. The demand for financing from outside sources and, as a result, financial depth in the trading nations will be affected by trade openness. In particular, faster financial development should be linked to increased openness in wealthy nations. On the other hand, countries with low incomes are more likely to import goods that require a lot of money, which slows down the growth of their own financial systems. With the assistance of trade openness, institutions play a significant role in the performance of financial markets. For instance, governments that are in a state of instability are unable to genuinely commit to policies that have the potential to promote savings, entrepreneurial activity, and the operation of financial markets. In addition, political instability will probably result in reckless macroeconomic policy, which will impede the growth of financial infrastructure.

Based upon different views from various theories, it evidences that trade openness or flow of trade at international level directly impacts the global financial institutions. The study by considering the importance of trade openness selected as a major determinant that affect the global financial flow and responsible for the diversification of finance. In addition to it, GFCI 31 also supports the statement by considering it the most efficient in promoting trade and flowing of finance.

4.4.7 Variable of Global Competitiveness Index

The highly comprehensive Global Competitiveness Index (GCI) measures the microeconomic and macroeconomic bases of national competitiveness. A nation's level of productivity is determined by a collection of institutions, policies, and other factors that constitute competitiveness. Because it forces businesses to be more creative, effective, and efficient, competition is essential to the smooth operation of all economic sectors. The outcomes demonstrate superior performance and achievement of the desired outcome when there is appropriate competition. As a result, productive businesses are the engines of economic expansion. Competition, on the other hand, is more difficult to implement in the financial sector than in other economic sectors. The Global Competitiveness Index integrates the macroeconomic and the micro/business aspects of competitiveness into a single index. The GCI divides a nation into three distinct stages: factor-driven, efficiency-driven, and innovation-

driven, all of which indicate an increasing degree of economic complexity. Twelve competitiveness pillars make up the index. Institutions, appropriate infrastructure, a stable macroeconomic framework, good health, primary education, higher education, efficient labour markets, developed financial markets, ability to harness existing technology, domestic and international market size, production of new and different goods using the most advanced production processes, innovation.

For efficient distribution and production, competition in the financial industry is crucial. The concentration of financial systems does not drive competition, which differs between nations. However, perfect competition is impossible in the financial industry. Prudential regulations, for example, mandate capital requirements, licensing, and appropriate guidelines from the management team for banks. The level of competition is directly impacted by each of these factors. Additionally, the financial industry has a tendency to become oligopolistic due to its high fixed costs. The degree of access to financial services can be influenced by the quality of the information and the size and structure of the financial system. Consolidation of financial systems may result in a greater distance, reducing lending to opaque businesses like small and medium-sized businesses. However, factors that counteract consolidation can be technological advancements and improved data. There are other problems with the theory. As financial institutions invest in technology and relationships, some researchers have pointed out that competition is partially endogenous. The theory has also demonstrated that technological advancements that reduce financial service providers' production or distribution costs do not necessarily result in increased or improved access to finance. Technological advancements, information accessibility, and the dynamic pattern of entry and exit often have ambiguous effects on competition, stability, and efficiency in models.

It's also hard to tell how stability and competition relate. The significance of franchise value for banks in maintaining incentives for prudent behaviour has been emphasised by numerous academics and especially policymakers. As a result, banking regulators have had to carefully balance entry and exit. For instance, licensing is sometimes used as a prudential policy without taking into account how it will affect competition. However, this has frequently been a static view.

4.4.8 Variable of High Technology Exports

Countries' international competitiveness is determined by their capacity to use and transform knowledge into new ideas. As a result, numerous nations are attempting to integrate their national economies with the global economy and open them to foreign competition. Within this scope, countries' ability to innovate and their capacity to export these innovations are closely

linked to economic growth, development, and the creation of employment opportunities. The nations need to create, make creation for expanding their cutthroat power, and market the said creation abroad. With their high added value, high-technology exports are thought to be one factor in recent growth. The capacity of a nation to produce and export high-tech goods is crucial to its growing competitiveness on international markets. As a result, the countries' economic growth and development depend heavily on the export of high-technology goods. The data on volume of high tech exports are modelled and calculated as a function of foreign demand and of price competitiveness. It also depends upon per capita income.

There are a number of reasons why looking into the connection between manufacturing trade and financial development is interesting. First, if we discover that the structure of the trade balance is influenced by the level of financial development, this highlights the significance of financial sector development for economic development beyond its positive impact on growth and raises the importance of financial sector reforms on the agendas of policymakers. Second, examining the connections between the structure of international trade and financial development has implications for the theory of international trade. Trade flows are predicted by the Heckscher-Ohlin model using an economy's labour, land, and physical capital endowments. International trade flows are explained by technological differences between nations, according to the Ricardian model. Financial services can be interpreted as part of the production technology or as determining the level of physical capital in the economy. This paper investigates theoretically and empirically whether cross-country variance in the level of financial development helps predict trade flows.

Financial development and international trade may be linked in a variety of ways. It focuses on the ability of the financial sector to divert savings to the private sector, thereby assisting in the alleviation of liquidity issues, as the second focus. The economy is able to specialise and benefit from economies of scale because of this. As a result, industries with high scale economies should benefit from economies with a more developed financial system and higher levels of external financing. However, this link may also be driven by demand, resulting in more developed financial systems in economies with higher export shares in scale economies. There may be a final third factor; Policies that are distorted by the government might keep the economy relatively closed while also hindering the growth of the financial sector.

When transferring savings to business owners, financial intermediaries incur search costs. Financial development is depicted as a decrease in search costs and an increase in the economy's use of external financing. The relative level of financial intermediation determines the inter-sectorial specialisation and, consequently, the structure of the trade flows because financial development shifts producers' incentives toward the good with increasing returns to

scale. With increasing returns to scale, economies with a more developed financial system results in net exports of the good. On the basis of high technology exports effectiveness on financial position of a country, the study adopts it as an important determinant in statistical measurement.

4.4.9 Variable of Inflation

Inflation is characterised "as the rate at which cost by and large increments". Any nation would prefer to avoid inflation, and high inflation is regarded as one of a nation's primary macroeconomic challenges. The study takes it as an important determinant to affect GFCI ranking. The variable of inflation is constructed by using Consumer Price Index (CPI). The ABS collects prices for thousands of items and divides them into 11 groups and 87 categories (or expenditure classes) for the purpose of calculating the CPI. The ABS aggregates the price changes for each item from the previous quarter to determine the inflation rate for the CPI basket every quarter.

In general, macroeconomic theory suggests that sustained economic growth requires the development of the financial sector in conjunction with low inflation. The financial sector's improved performance through its process of financial intermediation between investors and savers, lenders and borrowers, and directing available funds to the best investments results in the desired economic growth. In most cases, financial development boosts economic expansion. In contrast, inflation is one of the main obstacles that hinder economic expansion and the financial sector.

Macroeconomic stability is distorted and long-term economic growth is hampered by inflation. Additionally, capital accumulation and investment suffer as a result of inflation, as does income distribution. Long-term economic expansion is positively impacted by financial development. Through the formation of physical capital and economic growth, which is currently influenced by inflation, financial development appears to reduce either poverty or income inequality.

Inflation has an impact on portfolio allocations as a result of low returns on capital, resulting in improvements in investment activities. The economic growth process is accelerated by this situation. People are forced to substitute purchased transactions services for money balances when inflation rates rise, which not only increases the supply of financial services but also encourages financial growth. The financial sectors improved performance through its process of financial intermediation between savers and investors, lenders and borrowers, and optimal investments with the funds at their disposal results in the desired stable economic growth. Most economists believe that some people and the overall performance of the economy are harmed by high inflation rates. In general, achieving sustained and stable economic growth necessitates

a low inflation rate and expansion of the financial sector. As a result, in order to encourage sustained and stable economic growth, the primary objectives of policymakers are to maintain a low inflation rate and improve the performance of the financial sector.

4.4.10 Variable of Internet Uses Percentage of Population

The indicator is derived by dividing the number of Internet users by total population and multiplying by 100. The Unit of Measurement is number of users per 100 populations. A sign that Internet technology is being utilised to a greater extent is the rising number of websites. Over the past two decades, the Internet's use as a global communication medium has grown rapidly. Because it is cost-effective, dynamic, and constantly adaptable in the global world, more businesses are utilising websites as an effective medium of communication. As a result, corporate information like financial reports is frequently presented via the Internet, which has evolved into a powerful medium. The way a business provides information to shareholders, clients, suppliers, and other customers has changed as a result of the rapid development of information, communication, and technology (ICT) via the Internet.

4.4.11 Variable of Labour Market Regulations

The variable is constructed through the Rigidity of Employment Index which further depends upon three sub-indicators. These are; the difficulty of the Hiring Index, The rigidity of the Hours Index, and the difficulty of the redundancy index. The goal of labour market regulation ought to be to protect workers while simultaneously improving the operation of the labour market. Employment is regulated by governments to safeguard workers and boost efficiency in the labour market. Regulating the labour market is crucial for providing workers and employers with rights and certainty in their employment relationships. Work regulation and business security regulation give a system to the working, adaptability and nature of the work market.

In order to jointly determine labour outcomes, institutions of the labour market and finance may interact. During cyclical fluctuations, highly leveraged businesses exhibit greater employment volatility, and leverage increases a company's bargaining power in labour negotiations. Bank liberation might mix affect work contingent on the condition of bank guidelines and work markets. Utilised buyouts will more often than not those obtained firms' work development as they seek after-work efficiency gains. Short-termism among corporate managers may be fuelled by the shareholder value movement, which has the potential to divert funds away from firm capital accumulation toward the financial markets, obstruct productive investment, and increase unemployment. The monetary area adds to the rising focus close to the highest point of the pay conveyance. Increased labour reallocation is linked to finance, which can either help or hinder productivity growth.

4.4.12 Variable of Legal System Property Rights

An evaluation of individuals' capacity to accumulate private property protected by clear laws that are fully enforced by the state is the property rights component. It estimates how much a country's regulations safeguard private property freedoms and how much its administration implements those regulations. It measures the degree to which a nation's government enforces its laws and protects private property rights. Legal verification and guarantee systems, fair legal rules, and formal compensation mechanisms are all documented in the index. The theoretical and legal ownership of resources and their potential uses are outlined by property rights. Individuals, businesses, and governments can all own these resources, which can be either tangible or intangible. Private property rights, or the rights of private individuals to accumulate, hold, delegate, rent, or sell their property, are typically utilised by individuals in many nations, including the United States. Property is gotten by regulations that are plainly characterised and upheld by the state. The terms "ownership" and "benefits" that come with holding the property are defined by these laws. The term "property" encompasses a wide range of things, but the laws that apply to specific types of property vary from jurisdiction to jurisdiction. Most of the time, a single person or a small group of people own property. By using copyrights and patents to protect them, property ownership rights can be extended.

Rights to the property are fundamental: If entrepreneurs anticipate not being able to keep the benefits of their investment, they will not invest. Studies conducted at the country level consistently demonstrate a link between lower aggregate investment and slower economic growth and less secure property rights. Entrepreneurial investment may necessitate the protection of property rights. Outer Ž money could likewise matter for speculation and development; for on the off chance that bank credit isn't accessible it very well might be difficult for business visionaries to make the most of new open doors. There is evidence to suggest that investment and growth are aided by an efficient financial system. When there is a stronger legal system in general and better protection for investors in particular, external financing is available. In nations with stable property rights, businesses make more investments from outside sources.

4.4.13 Variable of Quality of Roads

The variable of quality of roads is constructed through collecting data on the transportation infrastructure and financial spending. Pavement roughness in terms of the International Roughness Index (IRI) plays crucial role in determining the riding quality of road and links networks for transportation.

4.4.14 Variable of Size of Government

Spending, revenue, and employment is all ways to measure the size of a government. However, the most frequently used indicator is the expenditure measure. This use is gotten from the national accounts. Spending by the general government shows how big each country's government is to support finance for development. The national accounts provide the information for this expense. The sum of all government expenditures is frequently used to indicate the size of the government. The less the public authority spends, the more modest its size and the more the public authority spend in total terms, the bigger its size. The study uses the variable through getting the data from the dataset of international organisations.

4.4.15 Variable of Sound Money

Money is sound if its value stays the same, and as a result, it can serve as a medium of exchange, a unit of account, and a value store. Sound money fosters social harmony and cohesion by fostering security and trust. An aggregate of money growth (money supply growth minus real GDP growth), standard deviation of inflation (GDP deflator), CPI inflation in most recent year, and freedom to hold foreign currency in bank accounts are the indicators of the sound money index. The index is measured on a scale of 0 (worst) to 10 (best).

4.4.16 Variable of Percentage of Urban Population

Individuals living in urban areas as a percentage of total population are called percentage urban population. This variable is important because if there is large number of people dwelling in urban surroundings than it is easy for them to access financial markets. As a result, financial accessibility promotes trends of investment with promotion of employment and overall standard of living.

4.4.17 Variable of Human Development Index

A summary measure of average achievement in key aspects of human development is the Human Development Index (HDI). A long and solid life, being educated and have a respectable way of life are the three indicators of HDI. The HDI is constructed through these indicators by using geometric mean of the normalised indices for each of these three dimensions. Life expectancy at birth is used to measure the health aspect, and the education aspect is measured by the mean number of years spent in school for adults 25 and older and the expected number of years spent in school for children entering kindergarten. The gross national income per capita is used to measure the standard of living. The logarithm of income is used in the HDI to show how income becomes less important as GNI rises. The geometric mean is used to combine the scores for the three HDI dimension indices into a composite index. The HDI can be used to ask

how two countries with the same level of gross national income per capita can end up with different outcomes for human development. These contrasts may stoke discussion regarding the priorities of government policy.

4.4.18 Variable of GFCI ranking

The study uses GFCI ranking as a dependent variable. The variable is being generated by the Z/Yen group since 2007 and has based their results, and the subsequent ranking of IFCs, using multiple factors (including both empirical and descriptive). The index is calculated on the basis of two sources of data: key factors (statistical/empirical data) and financial centre assessments (survey data). The survey data is obtained from financial centre assessment, based on responses to an on-going online questionnaire completed by international financial services professionals. Respondents are asked to rate the centres with which they are familiar and to answer a number of questions relating to their perceptions of competitiveness. The GFCI Index uses key factors as important determinants of GFCI ranking. It categorises these key factors (or empirical determinants) across five broad categories of competitiveness which including the following: business environment (such as political stability, regulatory environment and macroeconomic environment); financial sector development (such as the volume of trading and availability of capital); infrastructure (such as building and transport infrastructure); human capital (such as the availability of skilled personnel and the quality of life); and Reputational and other factors (such as attractiveness and cultural diversity).

It generates the key factors from known sources which include large and established international organisations, like of World Bank, IMF, United Nations, CIA, the Bank for International Settlements, the Economist, World Economic Forum, Mercer, UBS, Henley Partners, UN Office of Drugs and Crime, Institute of Economics and Peace, Boston Consulting Group, Legatum Institute, the World Federation of Stock Exchange, PwC, Forbes, Lloyd's, OECD, and the Fraser Institute just to name a few. The global financial centres are then ranked on this basis.

4.5 Methodology

4.5.1 Decision Tree Approach

A non-parametric supervised learning algorithm known as a decision tree is used in both classification and regression tasks (Maimon, 2010). It has a progressive, tree structure, which comprises of a root node, branches, interior hubs, and leaf nodes (Maimon et.al, 2014). The decision tree calculation has a place in the group of regulated learning Algorithms. The decision tree algorithm, in contrast to other supervised learning algorithms, can effectively be used to

solve regression and classification problems. Using a Decision Tree, a training model that can use simple decision rules inferred from previous data (training data) to predict the class or value of the target variable is created. When attempting to predict a record's class label using Decision Trees, we begin at the tree's base. We think about the upsides of the root trait with the record's quality. We jump to the next node by following the branch that corresponds to that value based on comparison (Gupta et.al, 2017).

Decision trees utilise various algorithms to choose to partition a node into at least two sub-nodes. The homogeneity of the resulting sub-nodes is enhanced when sub-nodes are created. To put it another way, we can say that the node becomes purer as the target variable increases. The decision tree selects the split that produces the most homogeneous sub-nodes after splitting the nodes on all of the variables that are accessible (Alsagheer, 2017). The advantages of using a decision tree are especially beneficial for tasks related to knowledge discovery and data mining. Decision trees are simpler to comprehend and utilise due to their visual and Boolean logic. A decision tree's hierarchical structure also makes it simple to determine which characteristics are crucial. It can handle a variety of data types, such as discrete or continuous values, and thresholds can be used to convert continuous values into categorical values.

There are many similar shrinking techniques such as Least Absolute Shrinkage and Selection Operator (LASSO) to find the most appropriate variables. The LASSO method is different from Decision Tree method on the basis of mathematical intuition as well as number of performing various functions in data analysis. The Decision Tree approach has advantages over the Lasso and other similar techniques. The Lasso model deals with simple, sparse models which have fewer parameters, whereas Decision tree method allows number of parameters. Similarly, LASSO method helps to eliminate any required data whereas Decision Tree approach is most affective in case of missing values. So, Decision tree approach is efficient, reliable and useful to obtain required results due to the complexities of missing values in the study's dataset and shrinking of over 100 variables to obtain 17 most appropriate variables.

In order to find the most suitable explanatory variables, study undergoes three steps of decision making. In the first step, study identified 109 variables additional to GFCI ranking variables. The significance of the selected variables reflected that all these variables have not been used in the GFCI ranking. In the second step, number of variables curtailed to 40 by keeping in view their significant impact. Only those variables were selected which resulted in the same or a greater number of observations derived through our model. In the third step, by using Decision tree approach, study selected 17 variables which are significant to the GFCIs.

Given in Appendix 2 (Part 1), the diagram shows root nodes splitting in to sub nodes to obtain the most appropriate variables for data analysis. The method used in this model is Anova which

means probability should be finding. This means study is going to try to predict a number value. In the diagram, initially there are root nodes (Number values are corresponding to variables) that show a higher percentage to not be selected as appropriate variables. So, by using decision tree intuition, root nodes (Initial Variables) are further splitting into sub nodes. And it is clear from the diagram that with splitting the percentage of chances to not select the concerned variables decreases. In the same way, study finally obtains the 17 most appropriate variables for data analysis. In the appendix 2 (part 2), R-squared are increasing with the increase of splitting nodes whereas X relative error decrease with the increase of splitting. And for the study concern, X relative error is important to consider. Notice the x-error (cross validation error) gets better with each split. That is something study aims to look out for. If that number starts to creep up as the splits increase, that is a sign that it may want to prune some of the branches.

4.5.2 Regression analysis of panel data

Panel data regression analysis is a type of data structure. When the same cross sectional units (City or financial centres) are observed at different times, and we observe multiple cross sectional units, we have a panel data structure. The panel data has both the cross sectional and time series dimensions. In other words, panel data is information gathered from these cities that have been observed repeatedly over time (Zulfikar & STP, 2019). In the case of T time periods (t = 1, 2... T) And N people (i = 1, 2... N), the total observation units for panel data will be N x T. The panel data used by the dissertation is a balanced panel which means same sum of unit time for each individual.

4.5.3 Panel Data Regression Model for estimation

There are three possible methods for estimating the regression model using panel data, among others:

4.5.3.1Pooled least square Model

As a first step, we estimate a pooled regression which does not take into account that there could be unobserved difference among the financial centres. Because time and individual dimensions are not considered in this model, it is assumed that the behaviour of corporate data is consistent across cities. To estimate the panel data model, this method uses the Ordinary Least Squares (OLS) approach or the least squares technique. For i = 1, 2... N and t = 1, 2… T, the following regression model is estimated:

$$y_{it} = \alpha + \beta' X_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots (1)$$

In the above equation, α shows the intercept and β shows the coefficients being estimated.

Whereas the € Shows the error term. Y represents dependent variable and X represents explanatory variables includes in the model. The mathematical equation also reflects error term that shows the effect on dependent variable caused by excluded variables. Where i is the number of cross-sectional units (cities) and T is the number of time periods. This model can generate i x T equations, which are equal to T equations of cross-section and as many i equations of continuous-time or time series.

4.5.3.2 Fixed Effect Model (FE)

A fixed effects model is a statistical model in which the parameters of the model are fixed or non-random quantities (Koutsoyiannis). We use the model to assume some characteristics (e.g., GFCI ranking is improving) are constant over some variables (e.g., Business regulations, HDI). We can use the fixed-effect model to avoid the biases of omitted variables. The fixed-effects model controls for all time-invariant differences between the individuals. It is so the estimated coefficients of the fixed-effects models cannot be biased because of omitted time-invariant characteristics. The fixed effects model panel data regression equation is as follows:

$$y_{it} = \alpha_i + \beta' X_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots (2)$$

- ***y_i*** is the response variable (GFCI Ranking) for unit *i*. It is a column vector of size *[T x 1]*.
- ***X_i*** is the regression variables matrix of size *[T x k]*.
- ***β_i*** is the coefficients matrix of size *[k x 1]* containing the **population value** of the coefficients for the *k* regression variables in ***X_i***.
- ***ϵ_i*** is a column vector of size *[T x 1]* containing the error terms, one error for each of the *T* time periods.

4.5.3.3 Random Effect Model (RE)

The random-effects model allows data inferences based on the assumption of normal distribution. The random-effects model assumes that the individual-specific effects are uncorrelated with the independent variables of the model. In random effects models, individual specific effects are captured by a composite error term which assumes that individual intercepts are taken from a random distribution of possible intercepts. The random component of the error term υ_i captures the individual-specific effects. The fixed effects model is based upon the assumption that the unobservable effects are correlated with the independent variables of the model. This correlation causes the omitted variables biases and becomes the reason for the covariance term to be non-zero, which will in turn cause the bias to be proportional to an

absolute value of this covariance. To counter this bias, the Fixed Effects model takes the approach of introducing a unit-specific bias term υ_i into the regression equation. The panel data regression equation for the random effects model is as follows:

$$y_{it} = \alpha_i + \beta' X_{it} + \upsilon_i + \varepsilon_{it} \ldots\ldots\ldots\ldots (3)$$

For i = 1, 2... N and t = 1, 2, , T. Y represent dependent variable and X represents explanatory variables includes in the model. The mathematical equation also reflects error term that shows the effect on dependent variable caused by excluded variables. Where; i = the number of individuals or cross-section T is the number of time intervals. $\boldsymbol{\upsilon_i + \varepsilon_{it}}$ = the composite effect of individual specific effect.

Several tests can be performed to select the most appropriate model, such as Breusch -Pagan LM test, Hausman Test and Pasran CD test (Zulfikar & STp, 2019). In analysing the numerical ratings of international financial centres published by the financial consultancy Z/Yen in March 2020, our analysis follows Eichengreen (2020). These rankings combine data on more than 100 statistical indicators of physical infrastructure and business environment with responses to an online questionnaire soliciting financial professionals' opinions on the competitiveness of various financial centres. These numerical measurements are provided by external sources, such as the World Bank, The Economist Intelligence Unit, the OECD, and the UN. The key factors were combined with 74,982 financial centre assessments provided by 11,934 GFCI online questionnaire respondents. In our statistical analysis observations were used starting in 2007 and ending in 2020. Since a growing number of financial centres receive Z/Yen ratings or missing values in data over time the result is an unbalanced panel. Our study begins with the same set of variables as in Eichengreen (2020) Study. These variables include Fraser Institute indices of the stability and stringency of the legal, regulatory, commercial, and monetary environments; additional indices of social and market conditions, such as Transparency International's corruption index, the Heritage Foundation's index of economic freedom, and the World Economic Forum's Global Competitiveness Index; and direct measures of country characteristics, such as corporate tax rates, urbanisation, and population growth. We added variables from previous research, such as the Capital Access Index, energy usage, occupancy cost, and regulation.

4.5.4 Model Baseline Econometric Equation

In this research study, Panel Regression with 17 predicator variables and an outcome variable is used. The study econometric model is;

$$GFCI = \beta_1 + \beta_1 BR + \beta_2 CTR + \beta_3 CoPI + \beta_4 CMR + \beta_5 EFI + \beta_6 FT + \beta_7 GCI + \beta_8 TX +$$

$\beta_9 CPI + \beta_{10} INT + \beta_{11} LMR + \beta_{12} LP + \beta_{13} QR + \beta_{14} GS + \beta_{15} SM + \beta_{16} UPOP + \beta_{17} HDI + \varepsilon_0$ …… (4)

Where;

GFCI= GFCI rating

BR= Business Regulations

CTR= Corporate Tax Rates

CoPI= Corruption Perception Index

CMR= Credit Market Regulations

EFI= Economic Freedom Overall Index

FT=Freedom to Trade Internationally

GCI= Global Competitiveness Index

TX= High Technology Exports

CPI= Consumer Price Index measure as for Inflation

INT= Internet uses Percentage of population

LMR= Labour Market Regulations

LP= Legal System Property Rights

QR= Quality of Roads

GS= Size of Government

SM= Sound Money

UPOP= Percentage of Urban Population

HDI= Human Development Index

According to Baltagi et al (2012), cross-sectional dependence is a problem in Macro Panel with long time series. Cross-sectional dependence (also called contemporaneous correlation) can lead to Bias in Tests Results. The interaction between cross-sectional units (within-group variation) is referred to as cross-sectional dependence (Baltagi et al,. 2012). Several estimators, including popular spatial methods, have been proposed to deal with cross-sectional dependence (Pesaran, 2006, Kapetanios, Pesaran and Yamagata, 2011; Bai, 2009). In order to check the cross-sectional dependence, we used the Breusch -Pagan LM test of Independence and the Pasran CD test. However, before imposing any model, it is advisable to test for the presence of cross-sectional dependence. Cross-sectional dependence, like serial correlation in time series, causes efficiency loss for least squares and invalidates conventional t-tests and F-tests that use standard variance-covariance estimators. In some cases, it may result in inconsistent estimators (Lee, 2002; Andrews, 2005). The Wooldridge test was used in our analysis to test the serial correlation. Our study utilised a one-way ANOVA analysis of each variable, with time as the

factor variable, meaning that between-group variation refers to variation over time, whereas within-group variation refers to cross-section variation.

4.5.5 Variables Description and Sources

Table 3: ***Variable Descriptions and Source***

Variable	Description	Source
GFCI Index	An index jointly published by the Z/Yen group and the China Development Institute ranking international financial centres based on a questionnaire and indices from international organisations including the World Bank, IMF, and OECD. The index runs from 0 to 1,000	Z/Yen Group
Business Regulation	An aggregate of administrative requirements, bureaucracy costs, extra payments/bribes/favouritism, licensing restrictions, and cost of tax compliance. The index runs from 0 (worst) to 10 (best)	Fraser Institute
Corporate Tax Rate	The effective tax rate on corporate earnings	KPMG
Corruption perceptions Index	Transparency International's corruption perception index ranks countries by the degree to which corruption is perceived to exist among public officials and politicians. The index runs from 0 to 100, with lower values indicating higher levels of corruption	Transparency International
Credit market regulation	An aggregate of ownership of banks (percentage of bank deposits held in privately owned banks), private sector credit (the extent to which government borrowing crowds out private borrowing) and interest-rate controls/negative real interest rates The index runs from 0 (worst) to 10 (best)	Fraser Institute
Economic Freedom Index	An aggregate of 10 dimensions of economic freedom: business freedom, trade freedom,	Heritage Foundation and Wall Street

	fiscal freedom, government size, monetary freedom, investment freedom, financial freedom, property rights, freedom from corruption and labour freedom The index runs from 0 to 100	Journal
Freedom to trade internationally	An aggregate of tariffs (revenue from trade taxes as a percentage of trade, average tariff rate, standard deviation of tariff rates, non-tariff trade barriers, compliance costs of importing and exporting, black-market exchange rates premier, and controls of the movement of capital and people. The index runs from 0 (worst) to10 (best)	Fraser Institute
Global competitiveness Index	An indicator of the microeconomic and macroeconomic foundations of national competitiveness. The index runs from 1 (worst) to 7 (best)	World Economic Forum
High-tech exports	Products with high R&D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments and electrical machinery, as a percentage of manufactured exports	United Nations, Comrade database
Inflation	Percentage change in the consumer prices	International Monetary Fund
Internet usage	Internet users per 100 residents	International Telecommunication Union, ICT Development Report and World Bank
Labour market regulation	An aggregate of minimum wages, hiring and firing regulations, centralised collective bargaining, hours regulation, mandated cost of worker dismissal and conscription. The index is measured on a scale of 0 to 10	Fraser Institute

Legal system and property rights	An aggregate of judicial independence, impartial courts, protection of property rights, military interference in the rule of law and politics, integrity of the legal system, legal enforcement of contracts, regulatory restrictions on the sale of real property, reliability of police and business costs of crime. The index is measured on a scale of 0 to 10	Fraser Institute
Quality of road network	An index of the degree to which national ground transport network offers efficient transportation. The index is measured on a scale of 1 (worst) to 7 (best)	World Economic Forum
Size of government	An aggregate of government consumption to total consumption, transfers and subsidies to GDP, government enterprises and investment to total investment, and top marginal tax rate. The index is measured on a scale of 0 (worst) to 10 (best)	Fraser Institute
Sound money	An aggregate of money growth (money supply growth minus real GDP growth), standard deviation of inflation (GDP deflator), CPI inflation in most recent year, and freedom to hold foreign currency in bank accounts. The index is measured on a scale of 0 (worst) to 10 (best)	Fraser Institute
Urban population	Individuals living in urban areas as a percentage of total population	World Bank and United Nations World Urbanisation Project
Human Development Index	A composite index measuring average achievement in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living.	UN Development Programme

Source: Author’s own research

Chapter Five – Results Analysis and Discussion

This research study is based on longitudinal data covering the time period from 2007 to 2020 by collecting data from numerous financial institutions. The study takes data for 196 countries (outlined in Chapter 6). The GFCI ranking of countries according to report 33 is included in the Appendix. The data have cross-sectional values of countries with 17 determinants which are significant in the GFCI ranking System. In order to normalise the results of the model, the primary condition of homoscedasticity, non-auto correlation, and stationarity of the data are fulfilled by applying Wooldridge's test, Augmented Dicky fuller test, and Breusch -pagan test as shown in table 5.1.

Serial correlation tests apply to macro-Panels with long time series. The problem of serial correlation does not exist in the macro panel. The null hypothesis of the Wooldridge test for serial correlation is that there is no serial correlation. In our results, the probability value (P value) is less than 0.05 (5% confidence level), representing the serial correlation problem. The results of the Augmented Dicky fuller showed that our Panel data is stationary. In the case of the Besuch Pagan test, the probability value (p-value) is less than 0.05 which rejects the null hypothesis of Homoscedasticity and represents that in our data the issue of heteroskedasticity exists.

In order to solve the problem of serial correlation heteroskedasticity, we utilised the sandwich estimator. After completing all the primary conditions for the panel regression method, the study applied two tests to determine whether a fixed or random effect model will be appropriate for our analysis. Basically, there are two main approaches used in the panel regression model. One is fixed and one is a random effect model. To select the most appropriate approach there are several tests that can be used. But in our study, we utilised two tests, the first one is Breusch- Pagan LM test and the other is Pasaran CD test. The probability value by both tests is less than 0.05 which shows that the fixed effect model can appropriately be used to estimate panel data. Therefore, on the basis of these test results, we applied a fixed effect model of panel regression.

Testing Scheme	*Null Hypothesis*	*Alternative Hypothesis*	*Tests*	*Estimates*	*Values*	*Decision*	*Remarks*
Cross Sectional Dependency Tests	Residuals across entities are not correlated	Residuals across entities are correlated	**Breusch Pagan LM Test**	Chisq	2885.3	If P<0.05, then dependency exists	**No cross sectional dependency**
				DF	1513		
				P-Value	0.00000000000000022		
			Pesaran CD Test	Z-value	1.25555	If P<0.05, then dependency exists	**No cross sectional dependency**
				P-value	0.2093		
Serial Correlation Test	There is not a serial correlation.	There is a serial correlation.	**Wooldridge's Test**	F-value	722.61	If P<0.05, then serial correlation exists	**Evidence of serial correlation existence**
				DF 1	1		
				DF 2	429		
				P-value	0.00000000000000022		
Stationary Test	The series has a unit root (non-stationary)	The series has not a unit root (stationary)	**Dickey-Fuller Test**	DF	-10.341	If P<0.05, then no unit root present	**Stationary of data**
				Lag order	2		
				P-value	0.01		
Heteroskedasticity Test	There is homoscedasticity	There is no homoscedasticity	**Breusch Pagan Test**	BF	233.48	If P<0.05, then there is Heteroskedasticity	**Detection of Heteroskedasticity**
				DF	73		
				P-value	0.00000000000000022		
Fixed Effect	OLS is better than fixed	OLS is not better than fixed	**F test for Time effect**	F-value	18.954	If P<0.05, then fixed effect model is better	**Adopt fixed effect model**
				DF 1	10		
				DF 2	460		
				P-value	0.00000000000000022		

Table 4: Statistical Significance testing techniques for data analysis

Source: Author's own calculations

The paper employs a large number of multidimensional indicators that are widely regarded as good representatives of explanatory variables known as determinants of a GFCI ranking in our model. These fundamentals are based on research from Kayral and Karan (2012), Moosa et al. (2016), and Eichengreen and Shah (2020). Our study followed the approach for grouping the determinants which were applied by Eichengreen and Shah (2020). The results for the Panel Regression Fixed effect are shown in Table 5 below.

Table 5*: GFCI determinants: Panel regressions (dependent variable is the Global Financial Centre Institutions Ranking)*

Independent Variable (GFCI determinants)	Panel(year fixed effect)	**T-value**	**P[3] r (>|t|)**
Business regulations	-10.813[4]*** (5.049)[5]	-2.14	0.03*
Corporate tax rates	1.566*** (0.396)	3.95	0.00***
Corruption Perceptions Index	0.421 (0.391)	1.32	0.19
Credit market regulations	3.253*** (1.008)	3.23	0.001**
Economic Freedom overall Index	1.601*** (0.484)	3.30	0.001**
Freedom to trade Internationally	20.253*** (3.674)	5.51	0.00***
Global competitiveness Index	83.498*** (12.297)	6.79	0.00***
High Technology Exports	0.0001*** (0.000039)	4.29	0.00***
Inflation	1.523 (1.901)	0.80	0.42
Internet users Percentage of population	0.716*** (0.206)	3.47	0.00***
Labour market regulations	-0.573 (0.681)	-0.84	0.40
legal system property rights	-19.883*** (5.087)	-3.91	0.00***
Quality of Roads	0.056 (1.636)	0.03	0.97
Size of Government	16.240*** (3.140)	5.17	0.00***
Sound money	1.121 (4.448)	0.25	0.80
Percentage urban Population	0.024 (0.129)	0.19	0.85
Human Development Index	-317.529*** (38.220)	-8.30	0.00***
R2 Adjusted R2 F Statistic	0.52 0.51 29.048*** (df = 17; 460) *Note: p<0.1;* ***p<0.05;*** p<0.01		

Source: Author's own calculations

[3] Significance of variable a 1%, 5%, 10%
[4] Estimated Significant Variable
[5] Standard Deviation

In their research analysis, Eichengreen and Shah (2020) classified the determinants of financial centre status into five categories. Our study used the same method for categorising the determinants. According to Eichengreen, financial significance is influenced by factors such as flexibility, transactional transparency, and economic stability. The second group includes monetary soundness, credit rating, and financial stability. The third group includes a set of variables that capture the level of financial development and the market capitalisation value. The fourth category represents technological sophistication. The final group of variables accounts for the size of the government.

The first group of the study includes business regulation, labour market regulation, overall economic freedom, and freedom to trade internationally, urban population percentage, Human Development Index (HDI), quality of roads, and inflation as the determinants of economic stability. The second group includes money soundness as a determinant of financial stability. The third group includes a set of variables; legal system property rights, credit market regulations and corruption perception index. The fourth group includes internet users' percentage of the population and high technology export which represents technological sophistication. The fifth and final group includes the size of the government.

By comparing the values estimated by the study of Eichengreen and Shah (2020), all the coefficient values of variables have the same magnitude as according with Eichengreen estimates except corruption perception index and credit market. The economic stability determinants suggest that business regulation, labour market regulation, economic freedom, international trade freedom, urban population percentage, HDI (human development Index), road quality, and inflation have the corresponding effect on GFCI ranking as given in Table 5. It reflects the same functional relations of variables suggested and estimated by Eichengreen and Shah (2020). Similarly, the estimated values of sound money reflect a positive effect of financial stability on GFCI ranking and have the same magnitude given by Eichengreen's study. The third cluster of the study that measures financial development has a negative impact on the GFCI ranking due to perceived corruption in the country. But if governments have some legal authority to secure property rights, then it causes a positive impact on GFCI for a country. Another study confirmed that the size of the government made a positive and significant contribution to the establishment of a GFC (Vo and Nguyen, 2021).The fourth and fifth groups indicate a positive effect on the ranking system represented by technological sophistication and government size. The host country's technological sophistication, particularly its electronic information and communications capacity, clearly matters. Where internet usage is higher, financial centres are rated higher. Financial centres are also rated higher when they are located in countries where high-tech products account for a relatively large share of manufactured

exports, consistent with a role in the economy's overall technological sophistication. Finally, there is some evidence that financial centres are located in countries with larger governments (Eichengreen and Shah (2020).

The coefficient of determination between the two studies also indicates a positive effect on GFCI ranking given to explained variation by explanatory variables. In table 2, the value of the adjusted R square is 0.51 which describes the 51 percentage explained variation caused by predictor variables or the determinants of GFCI ranking on the response variable which is GFCI ranking. The remaining variation which is 49 percentages is unexplained variation due to other factors and this effect is captured by error term. The F statistic value in table 5, is 29.048 representing the overall model significance. This value shows that all the variables used in this study as a determinant of GFCI ranking have a strong significant impact on GFCI ranking.

It is concluded that all the variables positively affect the GFCI ranking except business regulation, legal system property rights and Human Development index. The study suggests that by minimising the hurdles created by business regulation laws, labour market regulation procedures and legalised process of property rights, the GFCI ranking will improve for the countries. It will help to pave the path of financial stability and creation of wealth. Similarly, by providing better health and education facilities, the Human development Index will help positively to improve the GFCI ranking of countries. The next chapter 6 will explain the clustering scheme and clustering interpretation will be given in chapter 7.

5.1 Descriptive Statistics

The mean or median shows the central tendency. It shows the standard measure of the centre of the data distribution. In the table, the mean value of each variable shows the centre of data distribution corresponding to each variable. The standard deviation shows the dispersion of data from the estimated regression line. The Ptcl (25) shows the 1st quartile and PtcI (75) shows the 3rd quartile of the data. The 1st quartile shows the 25% of data points when the data arrange in the increasing order. Similarly, the 3rd quartile shows the 75% of data points when the data arrange in the increasing order. The minimum value shows the lowest range of data and maximum shows the maximum value of the data.

Table 6: Descriptive Statistics of data

Independent Variable (GFCI determinants)	N	**Mean**	St.Dev	**Min**	Ptcl (25)	Ptcl (75)	Max
Business regulations	620	7.3	1.1	3.7	6.6	8.2	786
Corporate tax rates	597	25.1	8.3	0.0	20.0	30.0	39.5

Corruption Perceptions Index	747	58.0	20.7	21.0	38.0	77.0	95.0
Credit market regulations	620	8.7	1.1	3.7	8.1	9.6	10.0
Economic Freedom overall Index	770	68.1	9.4	30.0	63.0	74.0	90.0
Freedom to trade Internationally	620	7.8	0.9	3.1	7.2	8.4	9.6
Global competitiveness Index	561	4.7	0.5	3.4	4.3	5.2	5.9
High Technology Exports	688	39150.0	86974.7	0.0	726.0	33808.0	731890.6
Inflation	752	2.9	4.1	-30.2	1.0	3.8	53.5
Internet users Percentage of population	760	65.9	24.9	3.9	50.3	85.2	99.7
Labour market regulations	620	6.5	1.2	3.8	5.4	7.6	8.9
legal system property rights	624	6.3	1.3	3.9	5.1	7.7	8.5
Quality of Roads	737	4.7	1.2	1.9	3.8	5.7	6.7
Size of Government	622	6.5	1.2	1.9	5.7	7.3	9.5
Sound money	620	9.0	0.9	4.8	8.6	9.6	9.9
Percentage urban Population	801	75.0	16.8	14.3	63.0	86.5	100
Human Development Index	770	0.8	0.1	0.6	0.8	0.9	1.0
GFCI ranking	801	618.2	67.1	374	582	663.8	786

Source: Author's own calculations

Chapter Six – Establishing a Ranking System

The paper aims at finding out future perspectives by interpreting results in order to establishing a ranking system for GFCIs by grouping them in clusters. Several possible analysis tools and techniques could be employed for this study; however, Cluster method is adopted for establishing a ranking system based on similar shared characteristics of IFCs6. The objective is to group the countries in the clusters base upon similar shared characteristics. This is possible by adopting criteria of developing centroid for each cluster against each determinant for number of observations (Years). As a result, each cluster will include all those countries that are experiencing similar characteristics throughout the range of observations (years). The study full fill this criterion by including K POD means clustering and Elbow method to obtain twofold objectives; Firstly, to obtain missing entries and getting centroid value (mean Value), Second, to choose optimal number of clusters to grouping the countries. The study uses same 17 determinants as discussed above to conduct parametric analysis that are of endogenous nature.

6.1 Clustering Method

The purpose is to arrange the IFCs of countries in the groups based on similar shared characteristics. The study achieves this objective by introducing an appropriate clustering methodology named as K-POD clustering method. The using of this method is important to deal with the complexities of missing data in the dataset. In order to select this clustering methodology, study undergoes three steps of intuition. This includes Deletion method of clustering, Imputation method of clustering and Method of augmented deletion. All these methodologies are not sufficient to provide reliable results due to data complexities associated with missing values in a data set. So, as a result, study uses the K-Pod Means clustering method. Moreover, data analysis is assisting by using Elbow method of clustering in order to choose optimal number of groups (clusters). It aims to arrange the countries into groups based on their similar shared characteristics by using Centroid values. The study utilises this systematic clustering approach and cluster the countries into five groups (Clusters) according to similar shared characteristics.

Starting with clustering that is a broad set of technique to find subgroups (Clusters) of observations from given data matrix. In addition, observations of similar nature place in the same group.. A direct measurement of data Matrix is not possible due to reason of data supervision and because of not having a response variable. It seeks to find relation between number of observations without trained by a response variable. So, clustering allows identifying

[6] Appropriate statistical programme R is used to carry out the analysis.

the observations that are alike and categorise them. On the basis of this principle, study adopts clustering approach with an advantage to achieve the objective of the study. Firstly, clustering allows study to achieve its objective by providing intuition and placing the countries in the same cluster based upon similar shared characteristics generated as a result of selected determinants. . Secondly, it will help the study to interpret the mean results (Centroid Values of determinants) to make decision about the clusters based upon their characteristics.

The clustering approach is highly efficient and productive to categorise the countries into clusters. Clustering analysis represents the most important tasks of data analysis by perform essential role to uncover groups in unlabelled data. Additionally, this approach is also affected in clustering the countries on the basis of effectiveness of financial centres caused by determinants. The cluster approach also signifies the results by adopting greater scalability which helps to estimate significant results even the data has long range of values and years.

Clustering can be categorised into two types depends upon the nature of data and study objectives. If one value from the available data belongs to just one cluster, then it is referred as a hard clustering. In contrast, if the output provided has the ability of likelihood probability by which a value from a data set belonging to each of the pre-defined number of clusters; it is referred as soft clustering. Similarly, if every value has ability to be a part of cluster, it refers as complete clustering, in contrast to partial clustering which is clustering of a data set not belong to well defined groups.

The clustering itself is a heuristic method as there is no single clustering method that works universally in all contexts. As explained above, there are different clustering techniques to deal with different types of data. In order to approach the most reliable and significant clustering approach, the study undergoes the exploratory data analysis so that countries with same characteristics place in similar groups (Clusters) as adopted by Kaufman and Rousseeuw (1990).

The study uses dataset that is of partial nature because of missing values. A partially observed dataset completed by the process of deleting or averaging the missing values (Wastaff and Laidler, 2005). There are different approaches to deal with missing data in the partial observed dataset. But no one is authentic and reliable in the estimation of clustering approach. To reconcile the reality of missing values from dataset and in order to develop clustering methods with complete data, various techniques are available known as deletion, imputation and augmented deletion. Besides these techniques-means Clustering of missing data and its most advanced form K-POD means clustering of missing data is also tremendously used in this type of clustering. . Among these approaches, the most efficient, reliable, consistent and productive approach is K-POD means clustering approach to give accurate estimation even in the case of

missing values equal to fifty percentage in the partial observed dataset (Chi et.al, 2016).

Began with Deletion method of clustering, it removes all the variables containing missing entries in the dataset through the operation of subtraction. The method is appropriate in the case missing entries of few variables. But if the dataset has number of years and numerous variables, deletion is not advisable due to substantial fraction of variables get affected and missing leads to inappropriate estimation. In contrast, Imputation completes the missing entries by the operation of addition. It usually adopts plausible estimates of values to fill the missing entries. It requires joint distribution of the missing patterns and the data. This method of clustering has few assumptions. It relies on certainty of the distributional assumptions present in patterns of missing data. It depends upon external validation which is a laborious and uncertain because error modelling cannot be determined. Computationally, it is expensive pre-processing step and based upon distributional assumptions. This method is effective in measuring clustering when primary purpose is of clustering the observation rather than estimating the values for missing entries. In the method of augmented deletion, soft clustering technique is used in augmenting k-means clustering. In this form of clustering, missing data is filling with weighted penalties results in tuning parameter consisting of a partial measure of dissimilarity between the observations. It based upon relative importance of the variable in the clustering of observations. These clustering methods are time consuming, having erroneous imputations and dilemma of wasted data. Moreover, these techniques require various assumptions, tuning parameters, additional information and alternative clustering strategies, thus our study uses some alternative method to deal with complexities and nature associated with missing values of data set. For the nature of data and objectives of the study, partial clustering and soft clustering are useful tools to organise countries in clusters. Thus, K-Pod Means clustering of missing data is used by the study for final clustering purpose by adopting Elbow method.

K-POD clustering is a novel method of K-means clustering on partially observed data by employing Majorisation-Minimisation (MM) algorithm (Lange et al., 2000). The method has advantage on other clustering techniques by identify a clustering accorded with the observed data to find unobserved (missing) data.

In order to develop the K-POD algorithm for the study, the research work done by Chi et.al (2016) is used as a base paper for data analysis through developing of missing values in the dataset. K-POD means of clustering uses the observed data and formulates it to find unobserved entries (missing values)by retaining all information in the data through means algorithm. The mathematical intuition works behind it is given in the section 6.2 and 6.3. It is also unique in avoiding distributional assumptions associated with missing patterns of dataset. K-POD approach is actually the advance form of K-means clustering and distinguishes itself on the

basis of simplicity, reliability and overall effectiveness even in the case of large percentage of missing entries. Moreover, it is free of any assumptions and tuning maximising algorithm. In order to analyse the difference between K-POD clustering and other clustering approaches, state-of-the-art method over observed data has a significant role. The imputation clustering approaches work efficiently by identifying plausible values for the missing data of variable. In contrast, K-POD performs clustering based upon given observed entries to find unobserved entries(missing values) . The mechanism performs by K-POD clustering is actually to minimize the sum of the squared differences between the data values and perform clustering over the observed entries. So, by focusing upon difference over the observed data, K-POD does not require accurate imputations.

In pros of the K-POD clustering method, it is helpful in completion of matrix by filling the missing values with a descent algorithm framework. It works accurately and efficiently without including any probabilistic imputation methods. It based upon Majorisation-Minimisation (MM) approach (Lange et al., 2000) by producing accurate clustering regardless of large percentages of overall missing values within limited time. K-POD -means clustering method handle the missing data in a similar and efficient way without alter the nature of dataset. So, the study applies K-POD means clustering along with Elbow method to make clusters and placing countries in same clusters based upon similar sharing characteristics generated by determinants that are responsible to affect the GFCI ranking of the countries.

6.2 K-POD Means Clustering Method Intuition

The K-POD method depends upon K-means algorithm that works to find missing values by the advancement of cluster design over the observed entries. The missing value in a dataset increases the Euclidean distance between the centroid values of observation. So, the study begins with illustration of the intuition behind the K-POD method..

The MM framework is the building block of this approach. The basic strategy behind an MM algorithm is to convert a hard optimisation problem into a sequence of simpler one (Chi et.al. 2016). The MM algorithm is an iterative optimisation method that works to find maxima or minima by exploiting the convexity of a function (Lange et al., 2000). It depends on whether the desired iterative optimisation is a minimisation or maximisation. It arranges the values in the maxima or minima by considering the cluster centroid. It assesses the variability in each cluster. It means the higher the value, the maxima distance from the centroid value. Similarly, the lower the value, the minimum distance from the centroid value (mean value).

The K POD method estimates cluster centroids based on assigning the value into particular cluster. The assigning of observations to cluster has an underlying assumption; that each row in

a data matrix should be a noisy realisation of a cluster centroid (Chi et al., 2016). The basic intuition behind the K-POD is estimating the missing entries in the matrix suppose Y by using K-means to cluster. The study develops the data matrix with missing values named as Y consists of partially observed data (Data having missing values). Each observation or row of matrix is a noisy instance of cluster centroid that is designed by the study through the utilising of k means clustering framework. Now in the next step, the study place observations in the relevant cluster based upon maxima and minima around the centroid and then estimate the missing entries of cluster in the matrix Y with the corresponding entries from this relevant cluster centroid[7]. Once after completing the data matrix for one cluster, the study uses K- means clustering to find remaining observations to assign them other clusters. If after this, cluster assignments along with centroids change, then design new cluster by finding the centroid value and estimate missing data entries in matrix Y for cluster 2. In this way, the process of intuition continues until to assign all the observations into optimal clusters of 5. This procedure is formulated to minimise the objective function of missing data by adopting MM algorithm.. By allowing the observations to be included as noisy instantiation of a cluster centroid, K-POD combines MM framework with these instantiations in order to improve the objective function. So, this is the basic intuition behind the model. Mathematically intuition is given in section 6.3.

6.3 Mathematical Intuition of K-POD Clustering[8]

The K-POD clustering is based on MM algorithm and K means of finding missing data. Similarly, it is based on minimisation principle to reduce the sum of square of residuals in order to operate according with centroid centre. Before processing to final output, K means to cluster and MM algorithm is required to be understood for efficient understanding of this technique. For the said purpose, the study is aiming to fellow intuition developed by Chi et al., (2016).

The study started with the intuition of K means clustering to find missing values. Given a data matrix consisted of number of observations (n) and features (p) can be written as;

$$Y \in R^{n \times p} \quad \ldots\ldots\ldots\ldots (5)$$

Now in the next step number of clusters K created and assigns n observations to the clusters. Let we assume that C = {C1, C2……..Ck} represents the clusters with partition based upon observations n. It must be necessary condition that clusters should be adjoining, and one cluster must have number of observations which are not the part of other clusters. The reason behind it is required institution to place similar countries or observations in one cluster. Now, in order to find centroid of the clusters it is necessary to denote a matrix having observed values.

[7] The study finds this intuition through Machine language R.

[8] Read Chi et.al., (2016) for extensive information about the working mechanism of K POD means clustering approach

Thus, the required matrix can be written as;

$$B \in Rk \times P \ldots\ldots\ldots\ldots (6)$$

Here, observations should be related with centroid associated with the ith partition Ci. The fundamental and necessary requirement for the K-means problem is that: the partition and centroid values should minimise the sum of squared residuals. The formula to measure and minimise sum of square of residual can be written as:

$$min_{C,B} \ \sum_{i=1}^{k} \ \sum_{j \epsilon C_i} \ ||Y_i - b_i||2_2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

In the above equation y_j is the jth row of Y and this is an NP-hard problem which need greedy alternating minimisation algorithm by using Liyod's method (Hartigan and Wong, 1979). By employing a matrix completion formulation used in the incomplete k-means problems of missing data makes the majorisation-minimisation (MM) solution readily apparent and expressed in the form of following equation:

$$min_{A \in H,B} \ ||P_\omega Y - P_\omega (AB_i)||2_F \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

By using equation 1, the study aims to solve equation 2 by factorisation of AB of matrix Y data. The purpose of factorisation is that it helps to minimise sum of squared of residuals over the observed entries. So, by this method a simple MM algorithm developed for solving the minimisation through equation 2.The strategy behind MM algorithm is that it helps to convert optimisation problem complex in nature into a sequence of simple one. This conversion generates a descent algorithm by exactly convert majorisation into minimisation. Because MM algorithm that is base of K-POD should fulfil one principle. This principle requires minimisation of objective function by firstly majorising the objective function by the combination of tangency condition and the domination condition. It iterates that MM generate a descent algorithm by downhill the objective function.

In a summary, K-POD algorithm begin with data matrix having observed data Y and then use method of MM framework with K-means missing data to fill the unobserved entries in Y by assigning observations into the cluster group by the using of centroid centre.

6.4 K-POD Clustering Method Pros

In contrast to other methods of clustering, K-POD differs from state-of-the art probabilistic methods of imputation and it does not require setting assumptions for missing patterns. Similarly, it based upon MM algorithm as compared to imputation, deletion and augmented imputation methods. The quality of the imputed data is not concerned and clustering results agree with the observed data. It works by initialisation the Data matrix A and B with repetition until convergence of the K-means algorithm. It works by update the unobserved portion of Y

with the corresponding entries in AB by performing K-means clustering on the updated set of Y to obtain new centroids and clusters. This repeating continues until A and B updated by using new clustering after each new centroid and cluster. The K POD algorithm can be found in the *Kpodclustr* package for R and is available on CRAN, where R is a statistical tool to perform estimation by operationalization the data to obtain requires results. The use of k-POD is also effective due to problem associated with large dataset having numerous missing values. At lower level of missing data, all cluster methods perform efficiently to give significant results such as imputations on MCAR, MAR, and NMAR scenarios. But with increase of missing data, all these approaches fail to complete missing values. In contrast, K-POD produces the most accurate results.

6.5 Effectiveness of k-pod Clustering Method

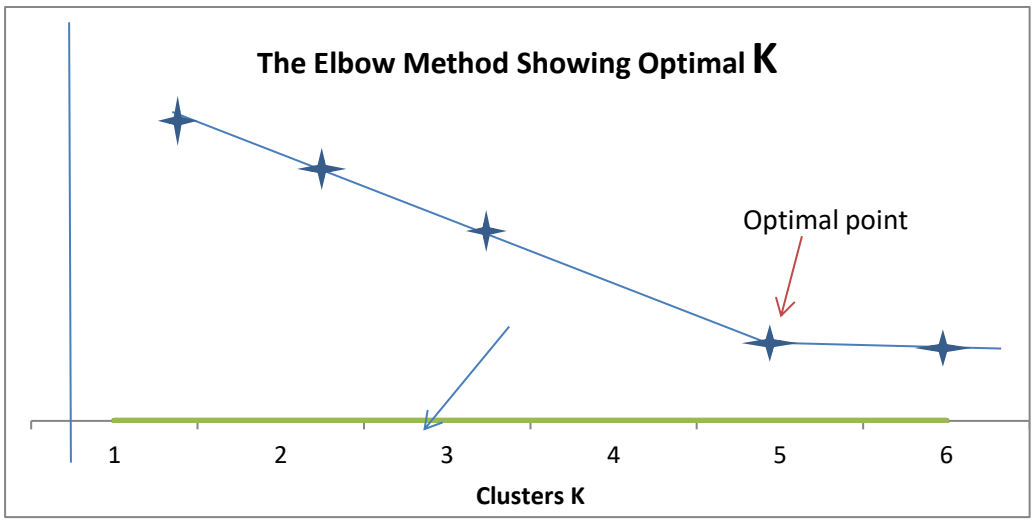
K-POD method is a reliable, effective, efficient, and fast framework to clustering missing data (Brick and Kalton, 1996). It is alternative to deletion and imputation method of clustering by focusing upon observed data. It is effective due to its two way process; majorisation and minimisation. In the first step, majorisation performs by centroid estimates and copy relevant entries from K-means step into the missing entries of data matrix. In the second step, minimisation performs by running k-means in order to minimise sum of square of residuals (Aloise et.al, 2009). It performs fast even number of missing values is higher, by reducing the expensive computational costs required to obtain reasonable imputations. The identification of clustering through observed values by using k-POD based upon two key facts. First, it seeks to develop optimal rank by cluster decomposition of the data matrix. Second, formulation of missing data version by naturally reduce sum of square errors that minimise with the k-means algorithm. It is effective as a Meta algorithm built around the k-means algorithm by producing superior results of clustering.

6.6 Elbow Method for Optimal Value of k

In order to find clusters, single intuition of k-means is not effective. An approach which determines optimal number of clusters is also necessary. In order to integrate the requirement of study results and analysis, an approach of clustering utilise by author with its integration to k-means clustering framework. An initial requirement for any unsupervised algorithm or observed values is to determine the optimal number of clusters into which the data of a matrix may be clustered. The Elbow method is one of the most popular methods to find optimal value of k, where k is referred as clusters. We can demonstrate elbow method by using k-means clustering which is basic intuition behind K-POD framework. Elbow method is graphical demonstration of data by choosing optimal value of k at the elbow interference of linear graph. Similarly,

elbow method also needs steps of Distortion and Inertia where distortion calculated as the average of the squared distances from centroid assignments and inertia calculated as sum of squares distances of samples from their nearby cluster centres. For distortion, Euclidean distance metric is useful and for inertia value of K measured in the given range. The working principle behind Elbow method is that we have to select the value of k (number of clusters) at the Elbow. It is the point after which the distortion or inertia eventually decrease in a linear fashion and we get optimal number of k=1, 2, 3….N.

Figure 2*: Optimal K value by Elbow Method*



Source: Author's own calculations6.7 Integration of k-means Clustering Method and Elbow Method

The combined illustration of Elbow method and method of K-means are helpful to determine the value of K. In figure 2, it is clear that linear graph eventually decreases initially and after approaching K=3, it becomes decrease steadily. It shows decreasing trend in the linear curve in order to find the elbow where k is optimal. The point where distortion become start to decrease is the ideal cluster (K) as in the above figure k=3. So, here graphically it is visualised that number of clusters are equal to 3 which is an optimal cluster. In the same way, study finds optimal clusters k=5.

The integration of the Elbow method and K-Means clustering can be determined by taking initially step to find the number of clusters or optimal point on linear curve by drawing graph with K on X-axis and Distortion on Y-axis. The Elbow method is expressed by sum of square error by using following equation:

$$SSE = \sum_{K=1}^{k} \quad \sum_{x_i \epsilon S_k} \quad ||X_i - C_k||2_2 \ldots\ldots\ldots\ldots (9)$$

Where K= number of clusters formed, Ci= the ith cluster, X = the data present in each cluster.

In the next step, randomly selected cluster's centre point from the available objects as much as

the number of clusters K, then find next i-cluster centroid by the following formula:
Where K= number of clusters formed, Ci= the ith cluster, X = the data present in each cluster.
In the next step, randomly selected cluster's centre point from the available objects as much as the number of clusters K, then find next i-cluster centroid by the following formula;

$$v = \frac{\sum_{i=1}^{n} x_i}{n} \text{ ; i=1, 2, 3,……, n……} \quad (10)$$

In the next step, for measuring distance of observation from the centroid, The Euclidian Distance must be used as:

$$d(x,y) = \left||x-y|\right| = \sqrt{\sum_{K=1}^{k} (x_i - y_i)^2} \; ; i = 1,2,3,\ldots\ldots,n \ldots\ldots\ldots\ldots \quad (11)$$

The observation should be placed in the nearest centroid and iteration performed with K-means that must be measured the proximity distance to the cluster's central point. By using following equation, determine the position of new centroid:

$$J = \sum_{i=1}^{n} \sum_{l=1}^{k} a_{ic} \; D\,(x_i, C_1)^2 \ldots\ldots\ldots\ldots \quad (12)$$

So, in the above way optimal point K identify by using Elbow method with its integration to K-means clustering. K –means method is the simplest and most adopted clustering method based upon algorithm. It has ability to group large amount of missing data with relatively fast and efficiently. Elbow method with its integration to K-means provides the study with suitable significant estimates.

Chapter Seven – Cluster Analysis

7.1 Clustering results interpretation

The study takes 17 determinants that are highly effective in GFCI ranking of a country. The objective of the study is to find a ranking method similar to GFCI ranking for grouping the countries in the same cluster based on similarities caused by the determinants. In order to support this hypothesis of the study, a systematic clustering technique is used for grouping the countries. The study clustering results are interpreted by initiating K-POD algorithm which begins with data matrix Y having observed data. It interprets as placing the number of values of determinants along with regressed values in a matrix dataset having observed and unobserved values. The unobserved values or missing values are interpreted to include in the matrix dataset by employing the MM framework. Then assigning observations to missing values into the cluster by using centroid values.. It works on minimising sum of squared errors. The graph to reflect percentage of missing values is given in Appendix 3.

7.2 Data preparation

The study uses R statistical tool to measure the clustering results. To perform a cluster analysis in R, study adopted the steps that generally involve; placing the observations into the rows of matrix says Y and variables into the columns, by identified the missing values in the dataset, and by adopting standardised variables which mean they are of scaled nature.

In addition, during the step of identifying missing values in order to make them adjusted, study found that dataset has a large number of missing values. Due to this reason, normal clustering techniques are not useful instruments and provide spurious results. In order to tackle the situation, study adopts the advanced clustering approach known as *K-POD means algorithm clustering approach* that is basically an extension of *K-mean algorithm clustering approach* as described in the previous section. This approach has significant and efficient results in measuring the clustering means when there is a large number of missing values by applying majorisation-minimisation (MM) algorithm. It is also affected in the reason that in contrast to imputation and deletion method of clustering, it provides robust results that support BLUE property of estimates (Best, linear, unbiased estimates).

7.3 Clustering Distance Measures

The grouping of observations in the clusters requires some computing methods to find the distance or similarity between each set of observations. It is a critical step in clustering that defines how the similarities in the two observations (x, y) are calculated and how it will shape the clusters. So, the study uses Euclidean distance method to measure the distance that

represents with centroid value. The basic intuition of the method is discussed in the previous section.

7. 4 Interpretation of K-POD means clustering

The cluster centroid in the following tables measures the variability of the observations within each cluster. It is the average distance of observations from centroid values. In general, a cluster with a smaller average distance is more compact. Whereas a cluster that has a larger average distance is less compact. Clusters with higher values reflect greater variability of the observations within the cluster. The maximum distance from observations to the cluster centroid is a measure of the variability of the observations within each cluster. It is interpreted as if there is a higher maximum value, especially in relation to the average distance, indicating an observation in the cluster lies farther from the cluster centroid. Similarly, minimum distance from observations is interpreted as an observation that lies nearer from the cluster centroid. In the middle of a cluster, there is a centroid vector that contains one number for each variable, where each number is the mean of a variable for the observations in that cluster. It is interpreted as the multi-dimensional average of the cluster. The cluster centroid as a general measure of cluster location helps to interpret each cluster. Each centroid is seen as representing the average observation within a cluster across all the variables in the analysis. The distances between cluster centroids measure how far apart the centroids of the clusters in the final partition are from one another.

7.5 K-POD algorithm Clustering approach for Study

As K-POD clustering based on K-means algorithm in which each cluster is represented by its centre (Centroid). Centroid is corresponding to mean of points assigned to the cluster. It classifies to reduce the error by putting observations in same groups that have intra-class similarity. It based upon the principle of minimising cluster variation that is also known as total within cluster variation or total within cluster sum of square.

In order to develop the clusters, study runs *Kpodcluster package* in the *R.* So, by applying the K-POD clustering method and allowing alteration up to 35, initially 20 clusters get by the study due to large number of years and variables. The study also verified the clusters by performing Principal component analysis (PCA) and cross check it with standard pairwise scatter plots. It is advantageous to set number of clusters (K) before staring the algorithm to get visual assessment that tells us where true delineations occur or do not occur.

For the sake of study objective, 20 clusters are not equally significant. In order to obtain optimal clusters, study adopts Elbow method based on the principle of minimising sum of square of residuals or error. By applying basic intuition of Elbow method in the R, study

obtains 5 optimal clusters. Each cluster has number of observations that have similar characteristics. In the estimations of study, years are adopted as an observation values. The study finds centroid values by applying k-pod Clustering technique and maximum and minimum values of determinants through mathematical intuition. In table 7, there are 14 countries in cluster 1 assigned on the base of similar shared characteristics. The number of years or observations ranges from 2007 to 2009. It means during this time period; these 14 countries have similar characteristics of determinants that affected their GFCI ranking. The Table 7 shows the years and countries specific to given data in the cluster 1.

Table 7*: Cluster 1 Observations and Countries*

Cluster 1: Data for Years as observations and number of countries			
Country	**Years as observation**	**Country**	**Years as observation**
Australia	2008, 2010 2011 to 2019	Spain	2007 to 2011 2018,2019
Brazil	2008 to 2017	United Kingdom	2007 to 2019
Canada	2007 to 2019	Total Countries=14 Range of Years= 2007 -2019	
China	2007		
France	2007 to 2019		
Germany	2007 to 2019		
India	2007 to 2019		
Indonesia	2012,2016,2017,2018,2019		
Italy	2007 to 2019		
Japan	2007 to 2018		
Russia	2008, 2010 to 2014, 2017 to 2019		
South Korea	2007 to 2019		

Source: Author's own calculation

In table 8, the determinant of Business Regulations has 8.67 value of maximum and 3.71 value of minimum with centroid value of 7.04. It means 7.04 is a reference centroid value and all the observations are selected around it on the basis of maximum and minimum value. The determinant of corporate tax respective to selected countries in cluster 1 has centroid value of 32.04 with maximum value of 39.54 and minimum value of 25. It means 32.04 is a reference centroid value and all the observations are selected around it on the basis of maximum and minimum value. The determinant of Corruption perception Index has centroid value of 61.34 with maximum 89 and minimum 21 values. So, here 61.34 is reference category to accumulate values with in maximum and minimum range. The determinant of credit market regulations has 8.42 as a centroid value with maximum 10 and minimum 4.97 values. The Economic Freedom Overall Index has central value of 67.77 with maximum 83 and minimum 50 values. The same intuition is performed for all the other determinants and placing the countries in Cluster 1 on the basis of shared similar characteristics in identifying the effectiveness of determinants on GFCI ranking of their respective countries during the range of years mentioned in Table 7. Moreover, the average distance (centroid value) for HDI determinant (0.85) is lower than other centroid values of determinants. It shows that this determinant has less variability to affect GFCI ranking for these 14 countries. The determinant of High Tech Exports has much variability to affect GFCI ranking for these countries. The table 8 shows the centroid, maximum, and minimum values for all the determinants of countries in cluster 1.

Table 8*: Cluster 1 Maximum, Minimum and Centroid Values*

Cluster 1			
Determinants	Maximum	Minimum	Centroid
Business regulations	8.67	3.71	7.19
Corporate tax rates	39.54	25	32.04
Corruption Perceptions Index	89	21	61.34
Credit market regulations	10	4.97	8.42
Economic Freedom overall Index	83	50	67.77
Freedom to trade Internationally	8.95	5.13	7.77

Global competitiveness Index	5.65	4.08	4.96
High Technology Exports	342610	4488	69880.95
Inflation	14.1	-1.4	2.81
Internet users Percentage of population	96.16	3.95	68.57
Labour market regulations	8.54	3.84	6.801
legal system property rights	8.13	4.52	6.90
Quality of Roads	6.72	2.34	4.93
Size of Government	8.69	4.55	6.53
Sound money	9.89	6.42	9.19
Percent urban Population	91.62	29.91	74.88
Human Development Index	0.939	0.558	0.85

Source: Author's Own Calculations

Cluster 2 develops through K-POD means clustering consists of 2 countries with data observations ranging from 2007 to 2012 given in the table 9. It reflects that during the observations of 2007 to 2012, these two countries determinants have similar shared characteristics to affect the GFCI ranking of their respective countries.

Table 9*: Cluster 2 Observations and Countries*

Cluster 2: Data for Years as observations and number of countries		
Country	**Years as observation**	
China	2008-2011	**Total countries=02** **Range of Years=2007-2012**
United Kingdom	2007 -2012	

Source: Author's own calculation

The basic mathematical intuition of clustering behind the selection of these countries is as same as utilised during grouping the countries in the cluster 1. In the table 10, the determinants have centroid value with the observations ranges between maximum and minimum values. The

determinant of business regulations has centroid value of 5.48 with maxima of 5.84 and minima of 5.18. Similarly, all other determinants have their corresponding centroid and maxima-minima values. Similar to cluster 1, determinant of HDI has less variability and determinant of High Tech Exports has much variability to affect the GFCI ranking for these countries.

Table 10: ***Clusters 2 Maximum, Minimum and Centroid Values***

Cluster 2			
Determinants	Maximum	Minimum	Centroid
Business regulations	5.84	5.18	5.48
Corporate tax rates	25	25	25
Corruption Perceptions Index	73	35	57.6
Credit market regulations	7.08	6.73	6.83
Economic Freedom overall Index	81	51	68.4
Freedom to trade Internationally	6.31	6.22	6.28
Global competitiveness Index	4.90	4.70	4.79
High Technology Exports	540194.7	154108.5	292124.7
Inflation	5.9	-0.7	2.72
Internet users Percentage of population	75	22.6	56.02
Labour market regulations	5.66	4.82	5.39
legal system property rights	5.62	5.32	5.46
Quality of Roads	6.2	4.06	5.22
Size of Government	4.85	4.49	4.64
Sound money	8.37	7.89	7.99
Percent urban Population	81.12	46.54	67.83
Human Development Index	0.92	0.68	0.82

Source: Author's own calculations

The cluster 3 consists of only one country with number of observations ranging from 2014 to 2018 given in the table 11. The cluster 3 reflects a unique phenomenon. During the period of

2014 to 2018, China's growth increases more than that of any other country in the world. It demonstrates the fact that during these observations, China's financial system was highly concentrated to provide loans, finance, domestic and international investment to uplift economic standard of the country. It is also supported by the theory of economic development that if a country invested its financial resources through banking or loans management system for the purpose of development than it ultimately improves the financial position of the country. The study thus, by using the clustering approach finds this unique intuition. The study shows that during this period, all the determinants are more effective upon GFCI ranking of China than that of any other country. This was basically due to the friendly setup of China to become more financial productive in apexing the GFCI status of the country.

Table 11*: Cluster 3 Observations and Countries*

Cluster 3: Data for Years as observations and number of countries		
Country	**Years as observation**	
China	2014-2018	**Total countries=01 Range of Years=2014-2018**

Source: Author's own calculations

The cluster 3 has same method to adopt a centroid value and include the values within maximum and minimum range given in the table 12. The centroid value of business regulations is 6.29 and it is highly concentrated with values within range 6.63 to 6.29. Similarly, all the other determinants take centroid value and concentrated the values within their maximum and minimum value range. This is the basic intuition of statistically measuring countries effectiveness of GFCI ranking.

Table 12*: Cluster 3 Maximum, Minimum and Centroid Values*

Cluster 3			
Determinants	Maximum	Minimum	Centroid
Business regulations	6.63	6.03	6.29
Corporate tax rates	25	25	25
Corruption Perceptions Index	41	36	38.6
Credit market regulations	7.26	7.13	7.16
Economic Freedom overall Index	58	52	54.6

Freedom to trade Internationally	6.52	6.29	6.40
Global competitiveness Index	5.00	4.89	4.93
High Technology Exports	731890	594551	657348
Inflation	2.1	1.4	1.8
Internet users Percentage of population	54.3	47.9	51.43
Labour market regulations	5.60	5.53	5.55
legal system property rights	5.07	4.93	5.99
Quality of Roads	4.8	4.6	4.66
Size of Government	5.20	4.85	5.04
Sound money	8.54	8.19	8.11
Per cent urban Population	59.15	54.26	56.72
Human Development Index	0.758	0.735	0.74

Source: Author's own Calculations

Cluster 4 has some unique patterns having larger number of countries as compared to other clusters given in the table 13. There is highly concentrated data in the cluster 4 with maximum number of countries corresponding to observations (years). For convenience and better representation of data, the study arranges the results into numerous categories based upon observations. In cluster 4, there are 14 categories based upon range of observations (Years).

Table 13: Cluster 4 Observations and Countries

Years	*Cluster 4*: Data for years as observations and number of countries	Number of Countries
2007-2020	Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bhutan, Bosnia and Herzegovina, Botswana, Brunei, Bulgaria, Burkina Faso, Myanmar, Burundi, Cambodia, Cameron, Cape Verde, Central African Republic, Chad, Chile, Colombia, Comoros, Costa Rica, Croatia, Cuba, Cyprus, Czech Republic, Democratic of Congo, Denmark, Djibouti, Dominica Republican, Ecuador, Egypt, Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, Gabon Gambia, Georgia, Ghana, Greece, Guatemala, Guinea, Guinea Biscay, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, Iran, Iraq, Ireland, Israel, Ivory Coast, Jamaica, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Macao, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mexico, Mongolia, Montenegro, Morocco,	155

	Mozambique, Namibia, Nepal, Netherlands, New Caledonia, New Zealand, Nicaragua, Niger, Nigeria, North Korea, Norway, Oman, Pakistan, Palestine, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Puerto Rico, Qatar, Republic of Congo, Romania, Rwanda, Saint Lucia, Saint Vincent and The Grenadines, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syria, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkiya, Turkmenistan, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe	
2007-2019	Andorra, Antigua and Barbuda, Aruba, Bermuda, Dominica, Grenada, Kiribati, Palau, Seychelles, Tuvalu,	10
2007-2018	Liechtenstein, Micronesia, Monaco, San Marino,	4
2007-2017	Faroe Island,	1
2012-2017	Spain	1
2013-2015	Indonesia	1
2007-2011	Indonesia	1
2020	Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Israel, Italy, Japan, Russia, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Islands, Somalia, South Africa, South Korea, Spain, United Kingdom, United Sates of America(USA)	23
2019	United Sates of America(USA), Japan, Brazil, China	4
2018	Brazil	1
2016	Brazil, Russia,	2
2015	Russia	1
2009	Australia, Russia	1
2007	Australia, Russia	2

Source: Author's own Calculations

The cluster 4 results reflect the phenomenon that the characteristics of selected determinants are

similar across the cluster along their respective observations for their corresponding countries. For example, by considering the observations range from 2007 to 2020, the numbers of countries are 155 that have had similar in terms of 17 determinants to affect GFCI ranking of their respective countries. It shows that during these observations, all the determinants positively affect the ranking as visualised from the magnitude of maximum and minimum values centrifugal around central value. So, here study suggests this new ranking procedure in which one can arrange the countries in the same cluster having similar financial characteristics that are friendly across the countries along the observations. Moreover, study also suggests that by applying K-POD clustering, it is innovative to segregate effects of determinants on financial ranking of a country into various observational categories such as observation range 2007 to 2020, 2007 to 2019, etc. This intuition provides an easy way to ranking the countries by placing the countries in the same fashion mentioned in table 13 by considering similar shred characteristics. It means the countries that have same financial system characteristics during a specific observational range should be place in same cluster across same time period. For example, in the table, the observations are from 2007 to 2020 and have 155 countries in the cluster. It means these 155 countries have similar financial trends in these years and place in cluster 4 corresponding to observational range 2007 to 2020. Similarly for the observations ranging 2007 to 2019, there are 10 countries that have same financial characteristics across the years and placed in cluster 4 under category ranging from 2007 to 2019. The study adopted same intuition for all the other determinants given in the table 14.

Statistical results of cluster 4 are also based upon centroid value around which the data of each determinant concentrate within the range of maximum and minimum value. For example, centroid value of business regulations 6.50 reflects that during the range of observations, it performs as a mean value. The values of business regulation determinant of countries included in cluster 4 are highly concentrated around it. This is the intuition for clustering the countries in the cluster 4 based upon determinants effectiveness to affect financial ranking of countries. The table shows centroid values with maximum and minimum value for all the determinants.

Table 14*: Cluster 4 Maximum, Minimum and Centroid Values*

Cluster 4			
Determinants	Maximum	Minimum	Centroid
Business regulations	9.40	2.48	6.50
Corporate tax rates	55	0	24.52
Corruption Perceptions Index	95	8	40.78
Credit market regulations	10	2.67	8.36
Economic Freedom overall Index	90	1	59.77
Freedom to trade Internationally	9.56	1.83	7.11
Global competitiveness Index	5.86	2.58	4.15
High Technology Exports	330094	0	6725.34
Inflation	255	-60.5	5.21
Internet users Percentage of population	99.7	0	39.97
Labour market regulations	9.73	2.45	6.43
legal system property rights	8.48	2.23	5.25
Quality of Roads	6.66	1.32	3.88
Size of Government	9.51	0.11	6.62
Sound money	9.92	0	8.11
Percentage urban Population	100	9.86	57.02
Human Development Index	0.95	0.30	0.68

Source: Author's own Calculation

Cluster 5 has two developed countries that show during this range of years the effectiveness of determinants on financial remain the same given in the table 15. K-POD clustering by applying basic intuition placed the countries in the cluster 5. The determinants have centroid values with maximum and minimum range.

Table 15*: Cluster 5 Observations and Countries*

Cluster 5: Data for Years as observations and number of countries		
Country	**Data for Years**	**Total countries=02**

China	2012,2013	
United States of America	2013-2018	

Author's own Calculations

Table 16: Cluster 5 Maximum, Minimum and Centroid Value

Cluster 5			
Determinants	Maximum	Minimum	Centroid
Business regulations	6.06	5.79	5.93
Corporate tax rates	25	25	25
Corruption Perceptions Index	76	39	65.25
Credit market regulations	7.21	7.19	7.20
Economic Freedom overall Index	76	51	69.63
Freedom to trade Internationally	6.36	6.30	6.33
Global competitiveness Index	4.84	4.83	4.83
High Technology Exports	655996	156366	283703
Inflation	2.6	0.1	1.78
Internet users Percentage of population	88.5	42.3	71.04
Labour market regulations	5.63	5.58	5.61
legal system property rights	5.28	5.00	5.14
Quality of Roads	5.9	4.41	5.40
Size of Government	5.04	4.96	5.00
Sound money	8.26	8.03	8.15
Percent urban Population	82.26	51.76	74.43
Human Development Index	0.92	0.719	0.

7.6 Analysis of Mean Values of Clusters

The table 17 shows the mean values (Centroid values) of clusters against each determinant. The study aims to find the differences among the clusters as it is statistical significant to study the clusters. There are 5 clusters selected through *Elbow method of optimal cluster selection* and 17 determinants that have significance impact on the GFCI ranking of countries. Here, the study adopted hypothesis to check the significance of clusters.

H_0: There is no significance difference between clusters

H_1: There is Significance difference in the clusters

In order to investigate whether there is any significance difference between the clusters, the study adopts the method of cross checking the mean/average values of each determinant against each cluster. If, there exist any clear difference in the mean value of cluster as compared to other clusters, then it is referred as statistical significant cluster. As a result, study adopts alternative hypothesis and reject null hypothesis. If study finds by investigating the mean values that there is no significance difference between clusters than the study adopts null hypothesis and reject alternative hypothesis.

Table 17*: Mean values of Clusters*

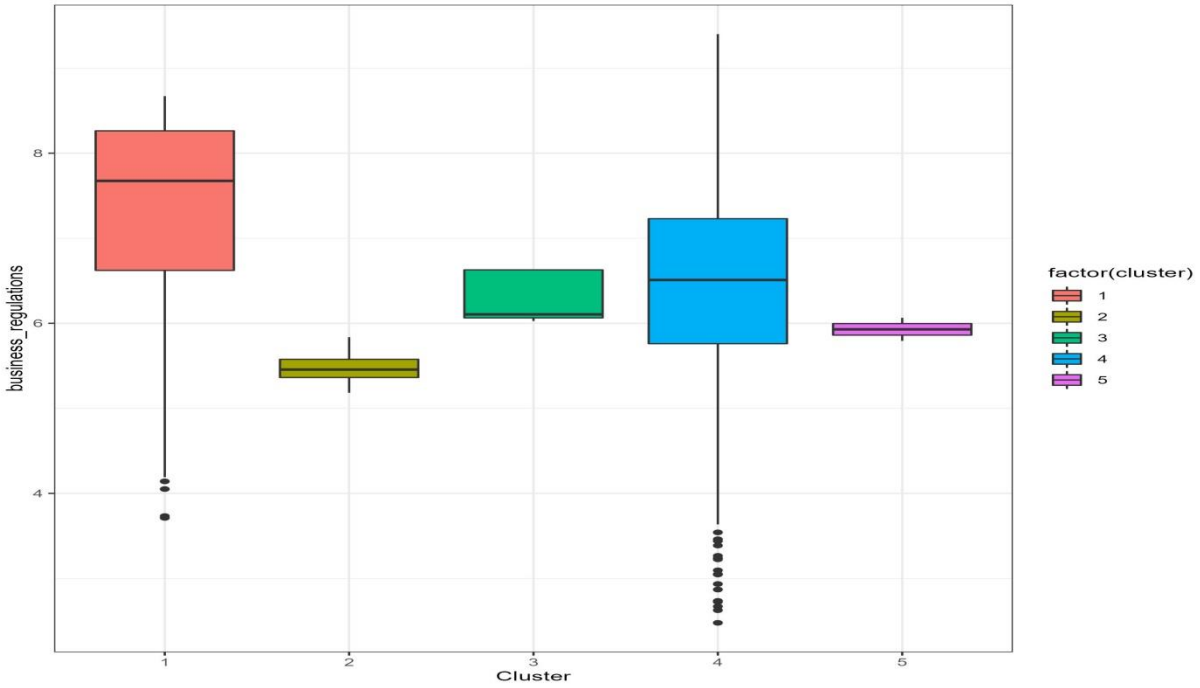
Variables / Clusters	**Means/Average of Clusters**				
	1	***2***	***3***	***4***	***5***
Business regulations	*7.19*	*5.48*	*6.29*	*6.50*	*5.93*
Corporate tax rates	*32.04*	*25*	*25*	*24.52*	*25*
Corruption Perceptions Index	*61.34*	*57.6*	*38.6*	*40.78*	*65.25*
Credit market regulations	*8.42*	*6.83*	*7.16*	*8.36*	*7.20*
Economic Freedom overall Index	*67.77*	*68.4*	*54.6*	*59.77*	*69.63*
Freedom to trade Internationally	*7.77*	*6.28*	*6.40*	*7.11*	*6.33*
Global competitiveness Index	*4.96*	*4.79*	*4.93*	*4.15*	*4.83*
High Technology Exports	*69881*	*292125*	*657348*	*6725*	*283701*
Inflation	*2.81*	*2.72*	*1.8*	*5.21*	*1.78*
Internet users Percentage of population	*68.57*	*56.02*	*51.43*	*39.97*	*71.04*
Labour market regulations	*6.80*	*5.39*	*5.55*	*6.43*	*5.61*
legal system property rights	*6.90*	*5.46*	*4.99*	*5.25*	*5.14*
Quality of Roads	*4.93*	*5.22*	*4.66*	*3.88*	*5.40*
Size of Government	*6.53*	*4.64*	*5.04*	*6.62*	*5.00*
Sound money	*9.19*	*7.99*	*8.37*	*8.12*	*8.15*
Percent urban Population	*74.88*	*67.83*	*56.72*	*57.02*	*74.43*
Human Development Index	*0.85*	*0.82*	*0.75*	*0.68*	*0.87*

Source: Authors own Calculations

The variable of business regulations has mean value of 7.19, 5.48, 6.29, 6.50, and 5.93 for cluster 1, 2, 3, 4, and 5 respectively given in the figure 3. The mean values suggests that there is significant difference between the clusters mean values and so this variable is statistical

significant to affect the GFCI ranking of the countries as shown by the Boxplot. Here, the study accepts alternative hypothesis and reject null hypothesis. Moreover, the average distance for the determinant of Business Regulations from the centroid is lower for cluster 2 and higher for cluster 1. It indicates that Cluster 2 has least variability and cluster 1 has most variability to affect GFCI ranking due to determinant of Business regulations. The average distance for the determinant of corporate taxes from the centroid is lower for cluster 4 and higher for cluster 1. It indicates that cluster 4 has least variability and cluster 1 has most variability to affect GFCI ranking due to determinant of corporate taxes. Similarly, all other determinants show the variability by their distance from the centroid that help to classify which cluster has least variability and which has most variability.

Figure 3*: Mean Values of Clusters for Variable Business Regulations*



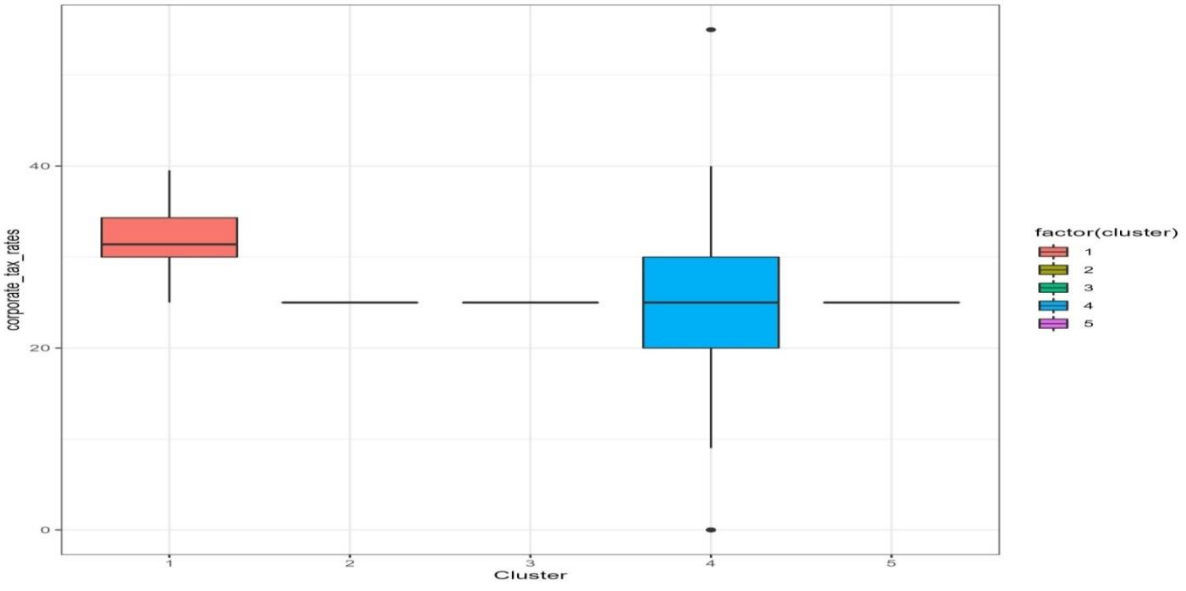
Source: Authors own Calculation

The cluster 1 has the largest mean value of 7.19 and cluster 2 has the smallest mean value of 5.48. It means cluster 1 has better business regulations as compared to other clusters. This suggests that the reforms for business betterment adopted by the countries of cluster 1 during the mentioned range of years are suitable to generate efficient financial support to uplift the business revenues and growth. As a result, business regulations created boom in capturing the investment and directly affects the GFCI ranking of the countries. Moreover, it also indicates that characteristics of variable of business regulations remain the same for the countries in the cluster 1 and so placed in the same cluster. It supports the study alternative method to GFCI ranking in the same fashion as described in the section of Cluster results analysis. As compared to Cluster 1, Cluster 2 has the smallest value of 5.48 which suggests that countries of this

cluster have least effectiveness on the GFCI ranking due to business regulations. This may be due to the inefficiency of these countries to generate investment capturing reforms and exaggeration of revenues for financial requirements. As a result, GFCI ranking of the countries of Cluster 2 is least effective from business regulations.

The variable of corporate taxes has mean values 32.04, 25, 25, 24.52 and 25 for Cluster 1, 2, 3, 4, and 5 respectively. It is clear from the values that there is no statistical significance difference between the mean values as describes in the Boxplot. Only the cluster 1 and Cluster 2 have significant difference from the other clusters. So here we reject alternative hypothesis and accept the null hypothesis. It is interpreted as there are no difference among the average values of clusters and so the variable is not statistically significant to affect the GFCI ranking of the countries. These insignificant results may be due to errors in collecting data and estimations. Moreover, Cluster 1 has the value of 32.04 which is higher among the clusters. It suggests that during these years, corporate taxes in the countries of Cluster 1 are low. It promotes the confidence in the corporations to exercise their business matters and increase the revenues to support financial stability of the country. It also suggests the corporate taxes are significantly low to encourage further investment and revenue generation to affect the GFCI ranking of the countries. In contrast, cluster 4 has least effect on the GFCI ranking of the countries during the observational range. It means the government reforms to reduce the corporate taxes are not efficient to build the confidence of investors for investment. As a result, financial institutions become lag behind in obtaining resourceful investment to generate revenues. Whereas the effect of corporate taxes on GFCI ranking of the countries remains same for Cluster 2, 3, and 5 as given in the figure 4.

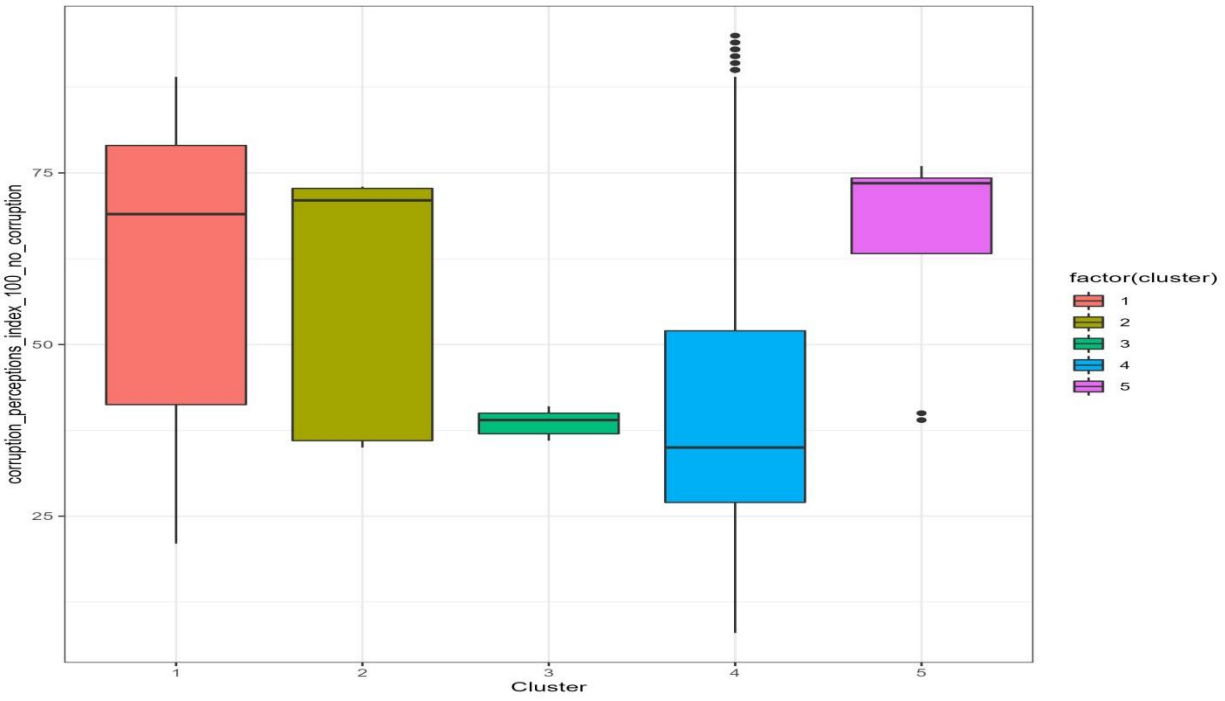
Figure 4*: Mean Values of Clusters for Variable Corporate Tax Rate*



Source: Author's own Calculation

The variable of Corruption Perception Index has mean values 61.34, 57.6, 38.6, 40.78, and 65.25 for Cluster 1, 2, 3, 4, and 5 respectively. The mean values indicate a clear difference and this variable is statistical significant in affect the GFCI ranking of the countries. As the average values have significant difference so the study adopts alternative hypothesis and rejects null hypothesis. Moreover, Cluster 5 has the highest value of 65.25 with Cluster 3 as having the least mean value of 38.6. Cluster 5 has two highly developed countries; China and USA with observational range 2012 to 2013 and 2013 to 2018 respectively. The estimates suggest that the variable of corruption perception index is highly effective to GFCI ranking of countries of Cluster 5. As both countries are developed and have strong legal proceedings and laws against corruption. Due to which corruption index is much low as compared to other regions of the world. By means of better monitoring, law enforcing agencies and proper penal proceedings, it become possible for the countries of Cluster 5 to reduce corruption and promote financial regularity. If country promotes financial regulation by discouraging corruption, then it leads towards financial stability and development of financial institutions to better deliver at the grass root level. So, the countries of Cluster 5 have significant effect on their GFCI ranking due to variable of corruption perception index. In contrast, Cluster 3 has the least mean value that suggests GFCI ranking of these countries is least effective from corruption perception index. It means there is inefficiency to uplift financial accuracy and stability of the countries. Moreover, Cluster 1 has significantly affected from this variable in comparison with Cluster 2 and 4 as given in 5.

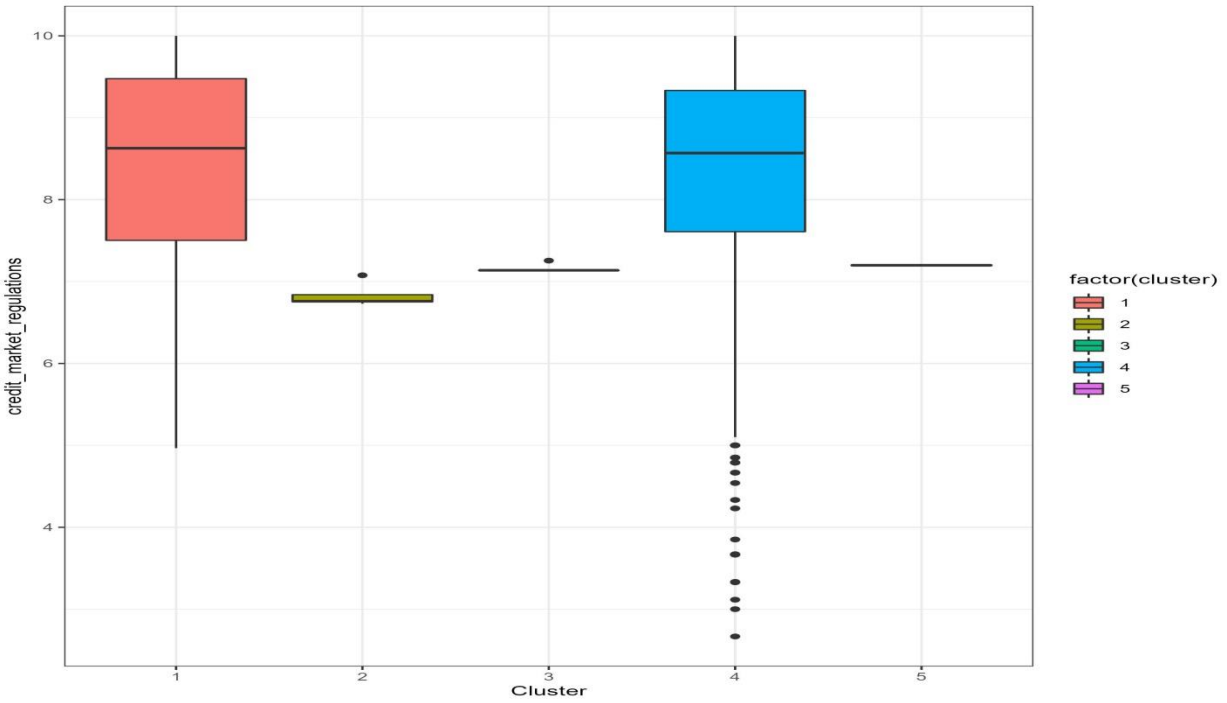
Figure 5*: Mean Values of Clusters for Variable Corruption Perception Index*



Source: Author's own Calculation

The variable of Credit market regulations has mean value of 8.42, 6.83, 7.16, 8.36, and 7.20 for cluster 1, 2, 3, 4, and 5 respectively. The mean values suggests that there is significant difference between the clusters mean values and so this variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot. Here, the study accepts alternative hypothesis and reject null hypothesis. Moreover, the cluster 1 has the largest mean value of 8.42 and cluster 2 has the smallest mean value of 6.83. It means cluster 1 has better business regulations as compared to other clusters. This suggests that the reforms for credit market loans and disbursement adopted by the countries of cluster 1 during the mentioned range of years are suitable to generate efficient financial support to uplift the business revenues and growth. As a result, credit market regulations created suitable atmosphere for the borrower to borrow and directly affects the GFCI ranking of the countries. Moreover, it also indicates that characteristics of variable of credit market regulations remain the same for the countries in the cluster 1 and so placed in the same cluster. It also means that credit market in these countries is efficiently lending loans to the borrowers with suitable implementation of interest. Moreover, it is also visualised that lending by banks promotes circulation of finance across the country. By utilising the finance, investors adopt behaviour of investment to generate revenue and promote economic stability. As compared to Cluster 1, Cluster 2 has the smallest value of 6.83which suggests that countries of this cluster have least effectiveness on the GFCI ranking due to credit market regulations as given in figure 6. As a result, GFCI ranking of the countries of Cluster 2 is least effective from credit market regulations.

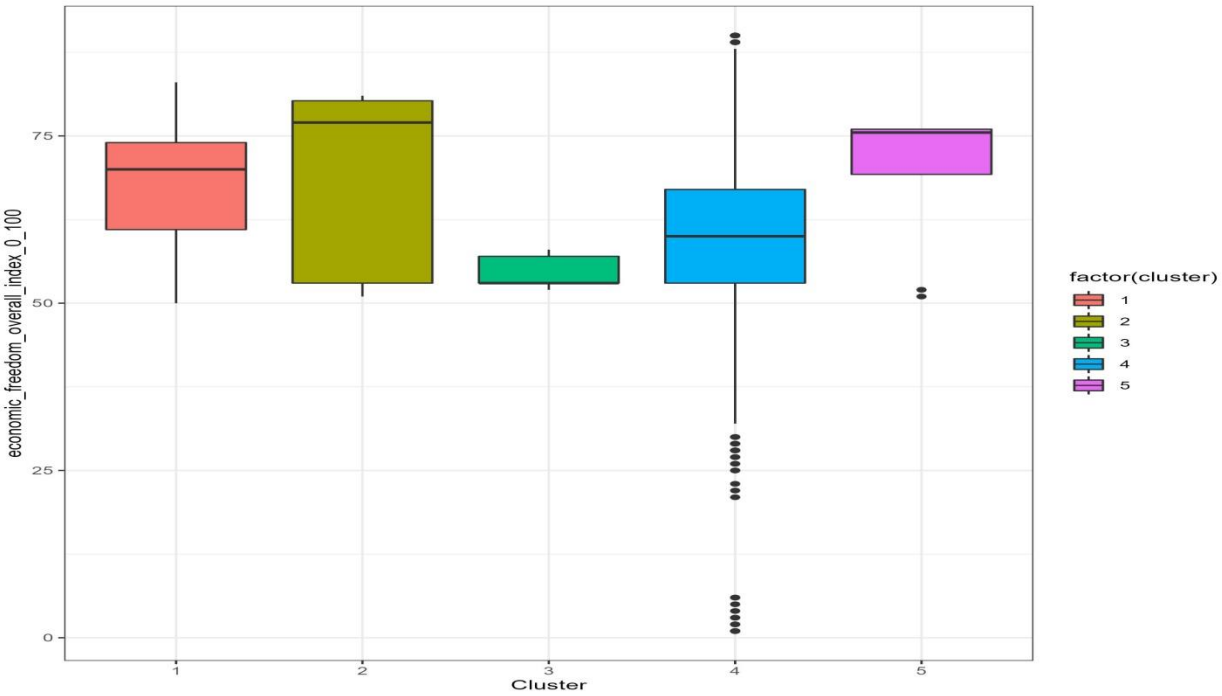
Figure 6*: Mean Values of Clusters for Variable Credit Market Regulations*



Source: Author's own Calculations

The variable of Economic freedom has mean value of 67.77, 68.4, 54.6, 59.77, and 69.63 for cluster 1, 2, 3, 4, and 5 respectively. The mean values suggests that there is significant difference between the clusters mean values and so this variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot. Here, the study accepts alternative hypothesis and reject null hypothesis. Moreover, the cluster 5 has the largest mean value of 69.63 and cluster 3 has the smallest mean value of 54.6. It means cluster 5 has better access to economic freedom as compared to other clusters. It means that people of countries of Cluster 5 have freedom to fundamental rights with control on their labour and property. They are enjoying free society, free association to work, production, consumption, and investment. There is proper role of law, efficiency in regulation of government affairs and open access to markets. Resultantly, these countries encourage the foreign investment and improve their growth rate. When a country experience high growth rate, it indicates a better financial situation of country. So, the countries of cluster 5 have significant effect on GFCI ranking due to economic freedom. Economic freedom of these countries is positively correlates with GFCI ranking. As compared to Cluster 1, Cluster 3 has the smallest value of 54.6 which suggests that countries of this cluster have least effectiveness on the GFCI ranking due to inefficiency in accessing the economic freedom as given in figure 7. As a result, GFCI ranking of the countries of Cluster 2 is least effective from economic freedom.

Figure 7*: Mean Values of Clusters for Variable Economic Freedom Index*

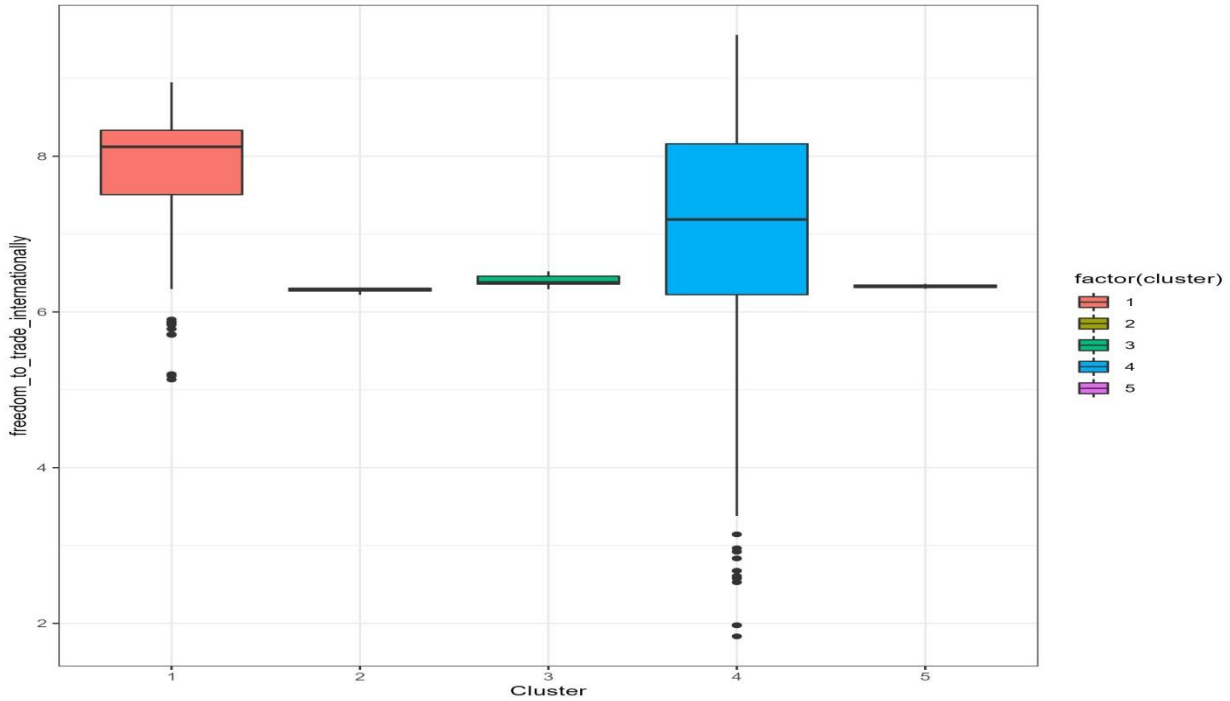


Source: Author's own Calculation

The variable of freedom of trade has mean value of 7.77, 6.28, 6.40, 7.11, and 6.33 for cluster 1, 2, 3, 4, and 5 respectively. The mean values suggests that there is barely significant

difference between the clusters mean values and so this variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot. Here, the study accepts alternative hypothesis and reject null hypothesis. Moreover, the cluster 1 has the largest mean value of 7.77 and cluster 2 has the smallest mean value of 6.28. It means countries of cluster 1 has better access to trade freedom as compared to other clusters. It suggests that people of countries of Cluster 1 have traits of trade openness that brings economic benefits and positively affect their GFCI ranking. It means these countries have better exports diversification that results in the improving of financial situation. Moreover, these countries efficiently generate finance through technological advancements, skills penetration in the youth, increasing of labour and total factor productively, and ultimately the economic growth and development. The cluster 1 is highly concentrated with the benefits of trade openness with movement of resources from idle state to productive state. As compared to Cluster 1, Cluster 2 has the smallest value of 6.28 which suggests that countries of this cluster have least effectiveness on the GFCI ranking due to inefficiency in accessing the trade freedom as given in the figure in 8. As a result, GFCI ranking of the countries of Cluster 2 is least effective or negatively effects from economic freedom.

Figure 8*: Mean Values of Clusters for Variable Freedom of Trade*

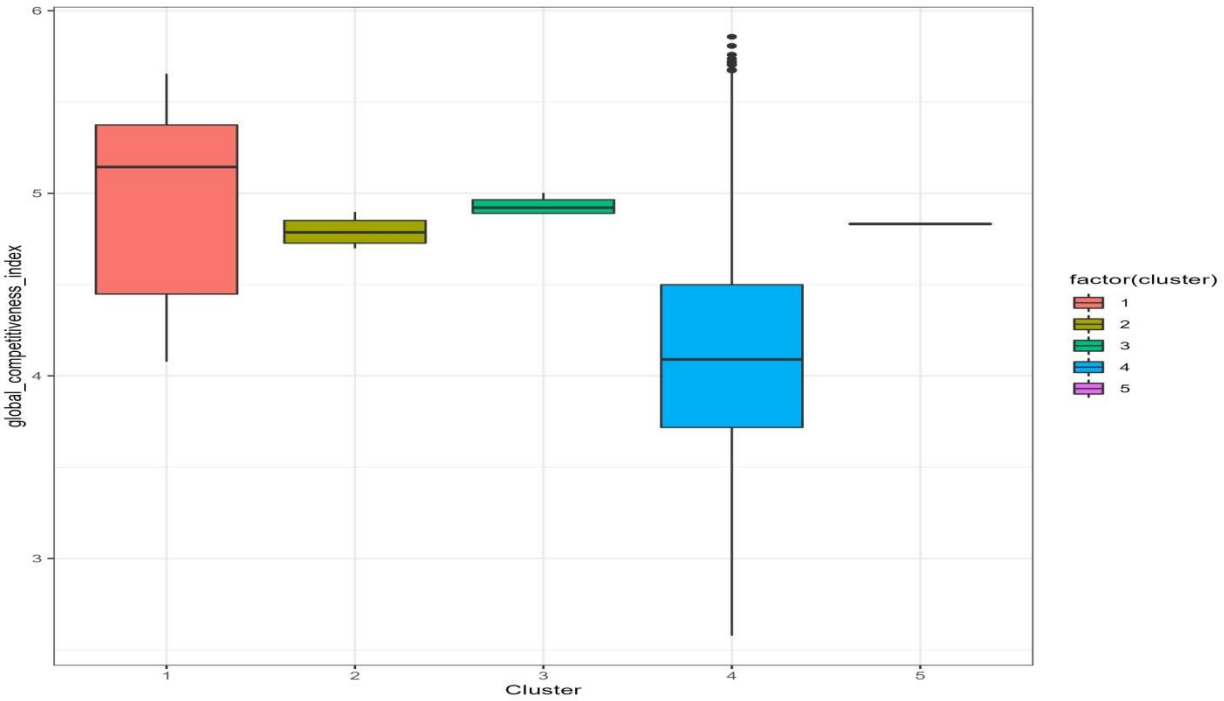


Source: Author's own Calculations

The variable of global competitiveness has mean value of 4.96, 4.79, 4.93, 4.15, and 4.83 for cluster 1, 2, 3, 4, and 5 respectively. The mean values suggest that there is barely significant difference between the clusters mean values. This variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot. Here, the study accepts alternative

hypothesis and reject null hypothesis. The cluster 1 has the highest mean value of 4.96 and cluster 4 has the smallest mean value of 4.15. It means countries of cluster 1 have potential to compete globally and so most effective in generating revenue through exports. It suggests countries of cluster 1 have an ability to supply high quality goods and services at low costs that results in better satisfactory results. The business of these countries is influenced by competitiveness. It results in higher quality of financial reports that makes companies more competitiveness and motivates the investors to put money in the business. Hence, a projection of financial growth apex and the country financial availability increase. As compared to Cluster 1, Cluster 4 has the smallest value of 4.15 which suggests that countries of this cluster have least effectiveness on the GFCI ranking due to inefficiency in competing the world by providing goods at low cost as given in figure 9. As a result, GFCI ranking of the countries of Cluster 4 is least effective from global competitiveness.

Figure 9*: Mean Values of Clusters for Variable Global Competitiveness*

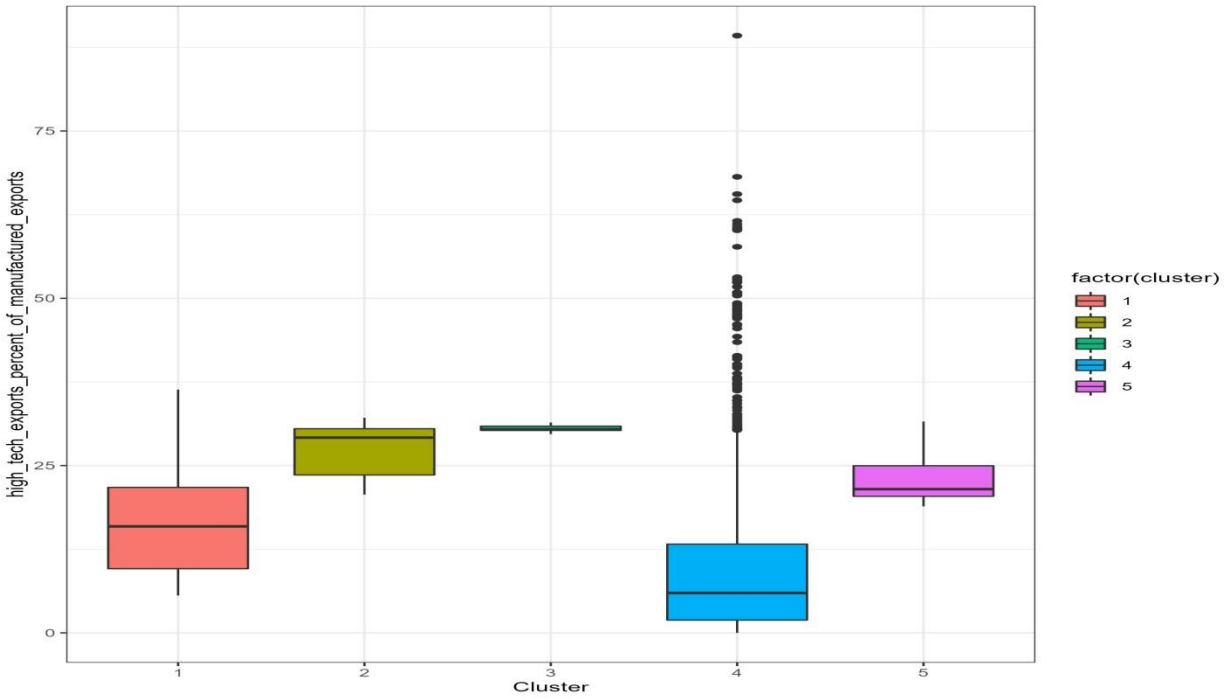


Source: Author's own Calculation

The variable of High technology exports has mean value of 69881, 292125, 657348, 6725, and 283703 for cluster 1, 2, 3, 4, and 5 respectively. The mean values suggest that there is significant difference between the clusters mean values. This variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot. Here, the study accepts alternative hypothesis and reject null hypothesis. The cluster 3 has the highest mean value of 657348and cluster 4 has the smallest mean value of 6725. It means country of cluster 3 has potential to export technological innovate products. It suggests that there is technological advancement in the country that results in the production of advance technology. As any

country exports high technological base products, then it generates finance in the form of revenue for the country. Cluster 3 has only one country that is China corresponding to data range of 2014-1018. The mean value of the cluster suggests that during these period high technological exports of China was highly effective in its GFCI ranking. The financial institutions generated revenue and promoted investment in the technology based industries. As compared to Cluster 3, Cluster 4 has the smallest mean value of 6725 which suggests that countries of this cluster have least effectiveness on the GFCI ranking due to inefficiency in exporting high technology base products. As a result, GFCI ranking of the countries of Cluster 4 is least effective from variable of high technology exports as given in the figure 10.

Figure 10*: Mean Values of Clusters for Variable High Technology Exports*

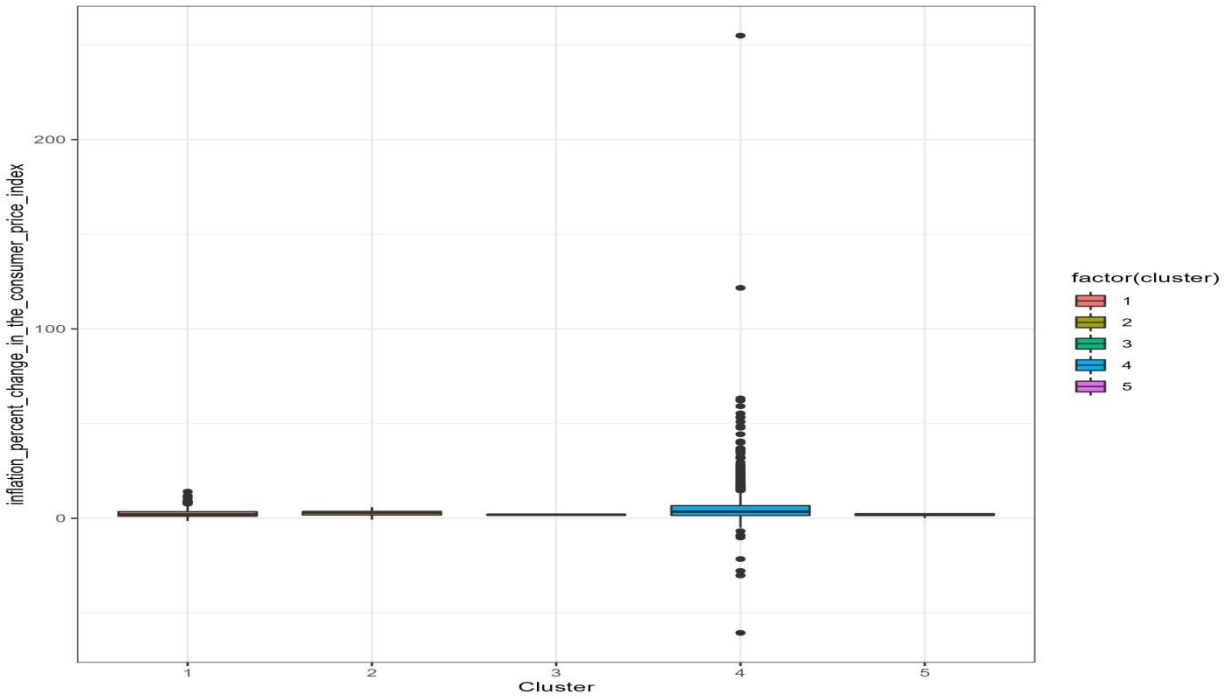


Source: Author's own Calculation

The variable of inflation has mean value of 2.81, 2.72, 1.8, 5.21, and 1.78 for cluster 1, 2, 3, 4, and 5 respectively. The mean values suggest that there is barely a significant difference between the clusters mean values. This variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot based upon difference in mean values. Here, the study accepts alternative hypothesis and reject null hypothesis. The cluster 4 has the highest mean value of 5.21 and cluster 5 has the smallest mean value of 1.78. It means countries of cluster 4 have high inflation effectiveness on the GFCI ranking as compared to other clusters. It suggests that during the observational range, the rate of increase in prices over the given period of time was high. As a result, it reduced the purchasing power of money reflected in general increase of goods prices. It led to reduce the prices of financial assets results in the increasing of interest rate. So, cluster 4 reflects GFCI ranking of countries highly affected from inflation

results in depressing economic activities. As compared to Cluster 4, Cluster 5 has the smallest mean value of 1.78 which suggests that countries of this cluster have least effectiveness on the GFCI ranking due to better inflation rate. As a result, GFCI ranking of the countries of Cluster 5 is least in effect from the variable of inflation as given in figure 11.

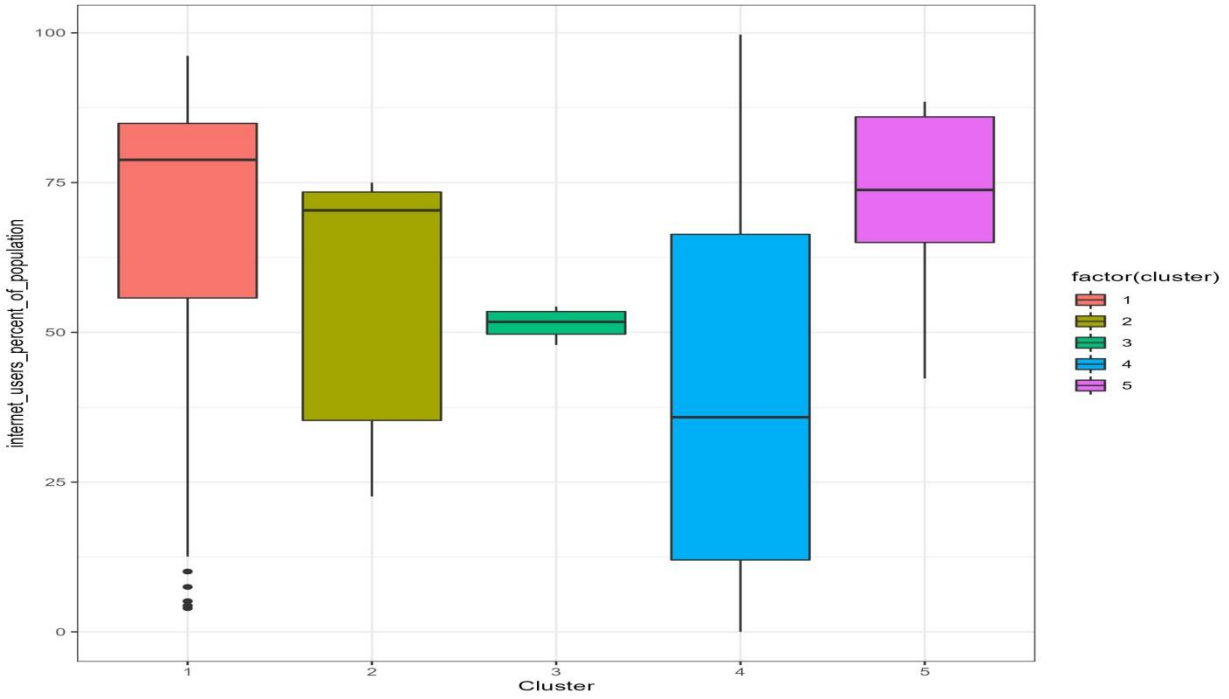
Figure 11*: Mean Values of Clusters for Variable Inflation*



Source: Author's own Calculations

The variable of internet uses percentage of population has mean value of 68.57, 56.02, 51.43, 39.97, and 71.04 for cluster 1, 2, 3, 4, and 5 respectively. The mean values suggest that there is barely a significant difference between the clusters mean values. This variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot based upon difference in mean values. Here, the study accepts alternative hypothesis and reject null hypothesis. The cluster 5 has the highest mean value of 71.04 and cluster 4 has the smallest mean value of 39.97. It means countries of cluster 5 have better access to internet for financial markets operations. It suggests that internet offers them a platform for collaboration marketing campaigns and services among financial markets. As a result, collaboration provides them a chance to network with other companies across the globe and multiply their reach. So, it helps them to generate finance through financial markets results in better revenues and profits. The GFCI ranking of the countries of cluster 5 have positively affect from internet uses as to help out financial activities across the world. In contrast, Cluster 4 among other clusters has the smallest mean value of 1.78 which suggests that countries of this cluster have least access to internet uses for operating financial markets. So, the variable of Internet uses is least effective to affect GFCI ranking of countries in cluster 4 as given in the figure 12.

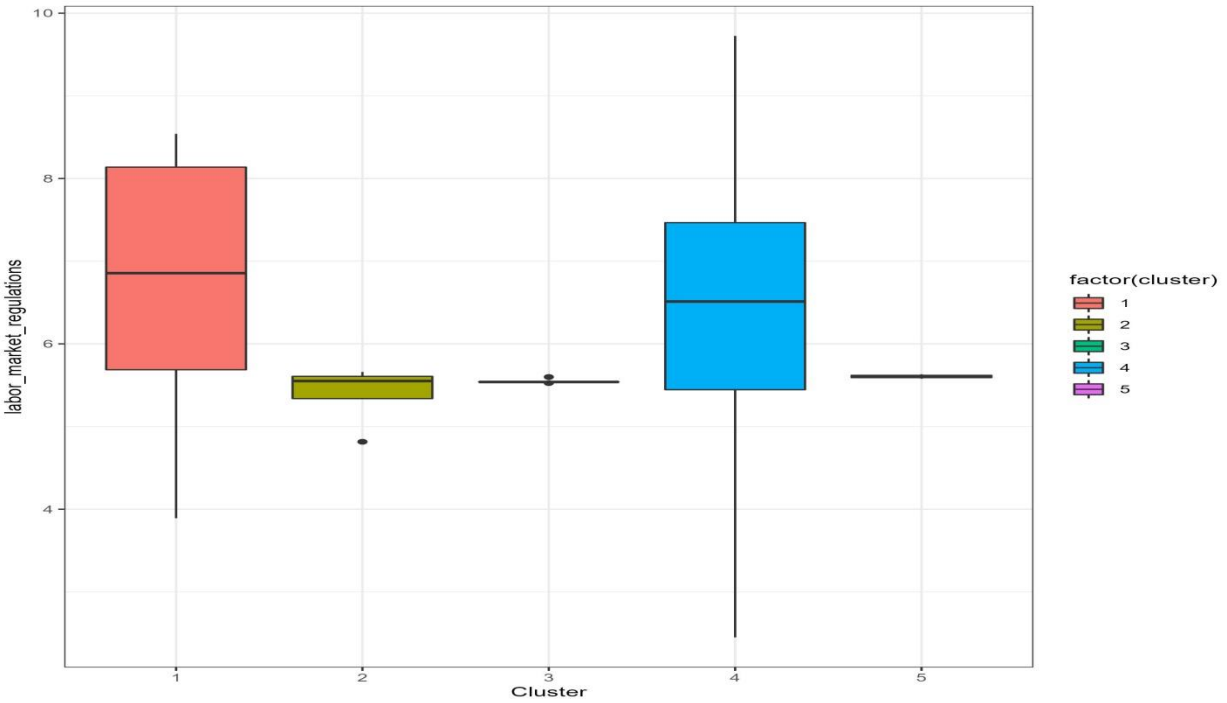
Figure 12*: Mean Values of Clusters for Variable Internet Uses Percentage of Population*



Source: Author's own Calculations

The variable of labour market regulations has mean value of 6.80, 5.39, 5.55, 6.43, and 5.61 for cluster 1, 2, 3, 4, and 5 respectively. The mean values suggest that there is difference between the clusters mean values. This variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot based upon difference in mean values. Here, the study accepts alternative hypothesis and reject null hypothesis. The cluster 1 has the highest mean value of 6.80 and cluster 2 has the smallest mean value of 5.40. It means countries of cluster 1 have better labour market regulations for the financial market operations. It suggests that governments regulate employment to protect workers in order to improve labour market efficiency. It is also visualised from the perspective of labour market that legislation adopted as a tool to provide wages and employment protection. Financial stability is directly associates with labour market regulations. Availability of finance helps to improve resource allocation and efficiency to facilitate productivity enhancing reallocation of labour. The GFCI rankings of the countries of cluster 1 have positively affect from labour market regulations as to carry out financial activities across the world. In contrast, Cluster 2 among other clusters has the smallest mean value of 5.40 which suggests that countries of this cluster have least capability to manage labour market regulations for operating financial markets. So, the variable of labour market regulations is least effective to affect GFCI ranking of countries in cluster 2 as given in figure 13.

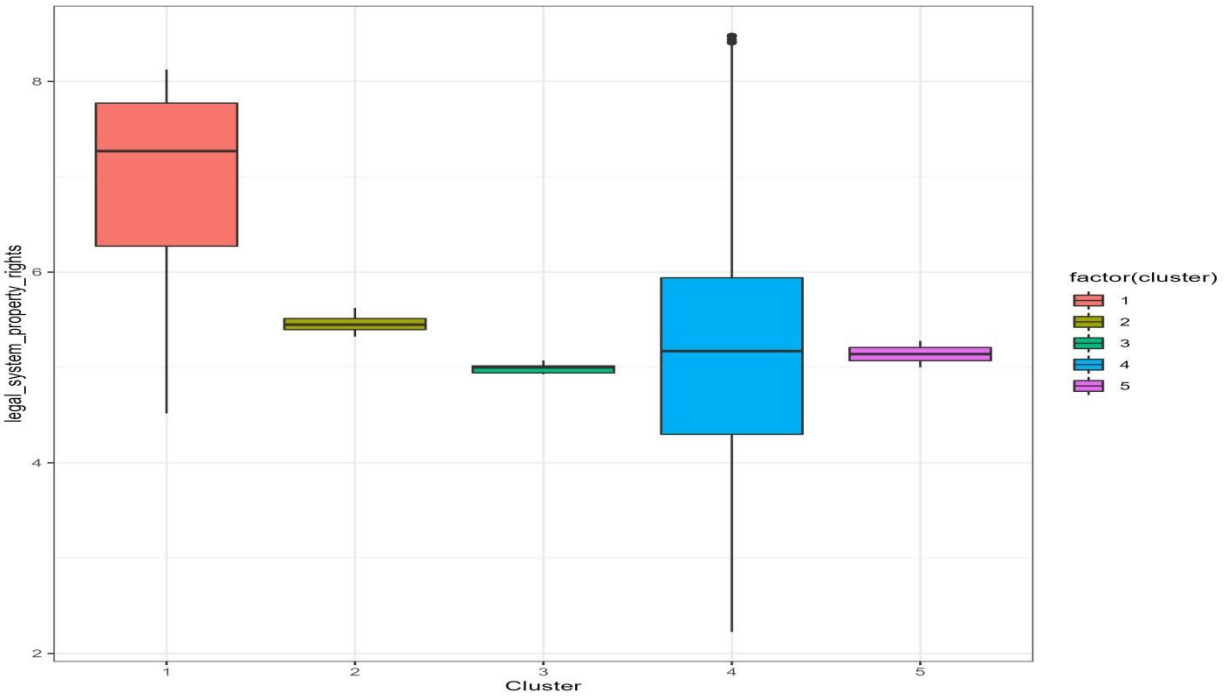
Figure 13*: Mean Values of Clusters for Variable Labour Market Regulations*



Source: Author's own Calculation

The variable of Legal system property rights has mean value of 6.90, 5.46, 4.99, 5.25, and 5.14 for cluster 1, 2, 3, 4, and 5 respectively. The mean values suggest that there is significant difference between the clusters mean values. This variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot based upon difference in mean values. Here, the study accepts alternative hypothesis and reject null hypothesis. The cluster 1 has the highest mean value of 6.90 and cluster 3 has the least mean value of 4.99. It means countries of cluster 1 have better management for legal property rights to regulate financial markets operations. It suggests that cluster 1 countries have better investment and growth as compared to other clusters. It means governments have legislations to secure property rights necessary for entrepreneurial investments. If bank credit is available for the entrepreneurs, then it creates new opportunities for well-functioning financial system as given in figure 14. As a result, well-functioning financial systems contribute to investment and growth. Thus, the GFCI rankings of the countries of cluster 1 have positively affect from legal system property rights as to carry out financial activities across the world. In contrast, Cluster 3 among other clusters has the smallest mean value of 4.99 which suggests that countries of this cluster have least capability to manage legal property rights for the operation of financial markets.

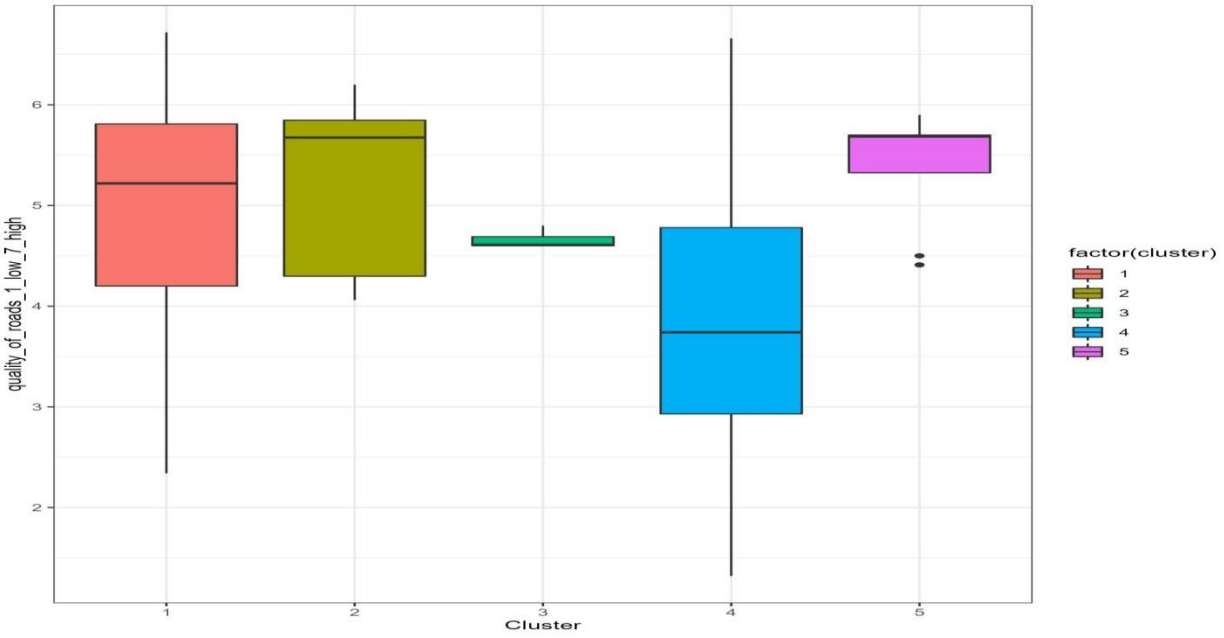
Figure 14*: Mean Values of Clusters for Variable Legal System Property Rights*



Source: Author's own Calculation

The variable of quality of roads has mean value of 4.93, 5.22, 4.66, 3.88, and 5.40 for cluster 1, 2, 3, 4, and 5 respectively as given in figure 15. The mean values suggest that there is difference between the clusters mean values. This variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot based upon difference in mean values.

Figure 15*: Mean Values of Clusters for Variable Quality of Roads*



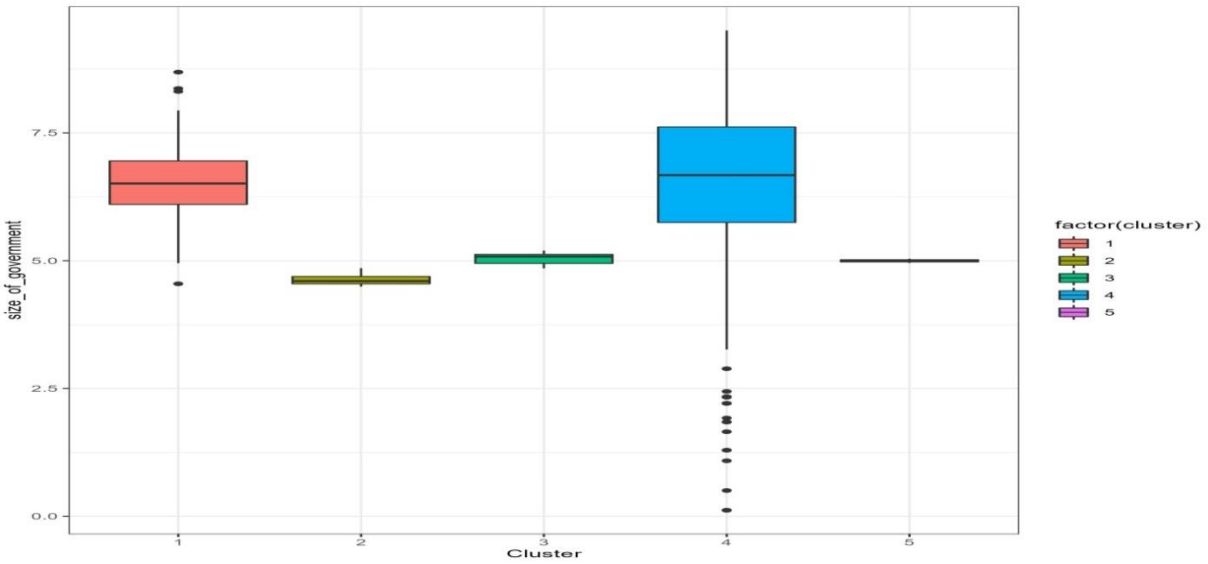
Source: Author's own Calculation

Here, the study accepts alternative hypothesis and reject null hypothesis. The cluster 5 has the

highest mean value of 5.40 and cluster 4 has the least mean value of 3.88. It means countries of cluster 5 have well established roads to pave the path of trade easy and faster. It suggests that these countries have better access to financial markets and brings economic and social benefits by minimising social costs. The countries have potential to capture the infrastructure investments with regulations to subsidies public transit. These as a result stimulate economic responses in terms of the trade and shape the ultimate development outcomes for the financial sector of the country. In contrast, Cluster 4 among other clusters has the smallest mean value of 3.88 which suggests that countries of this cluster have least access to roads for the sake of trade and operations of financial markets.

The variable of size of government has mean value of 6.53, 4.64, 5.04, 6.62, and 4.99 for cluster 1, 2, 3, 4, and 5 respectively as given in the figure 16. The mean values suggest that there is difference between the clusters mean values. This variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot based upon difference in mean values.

Figure 16*: Mean Values of Clusters for Variable Government Size*

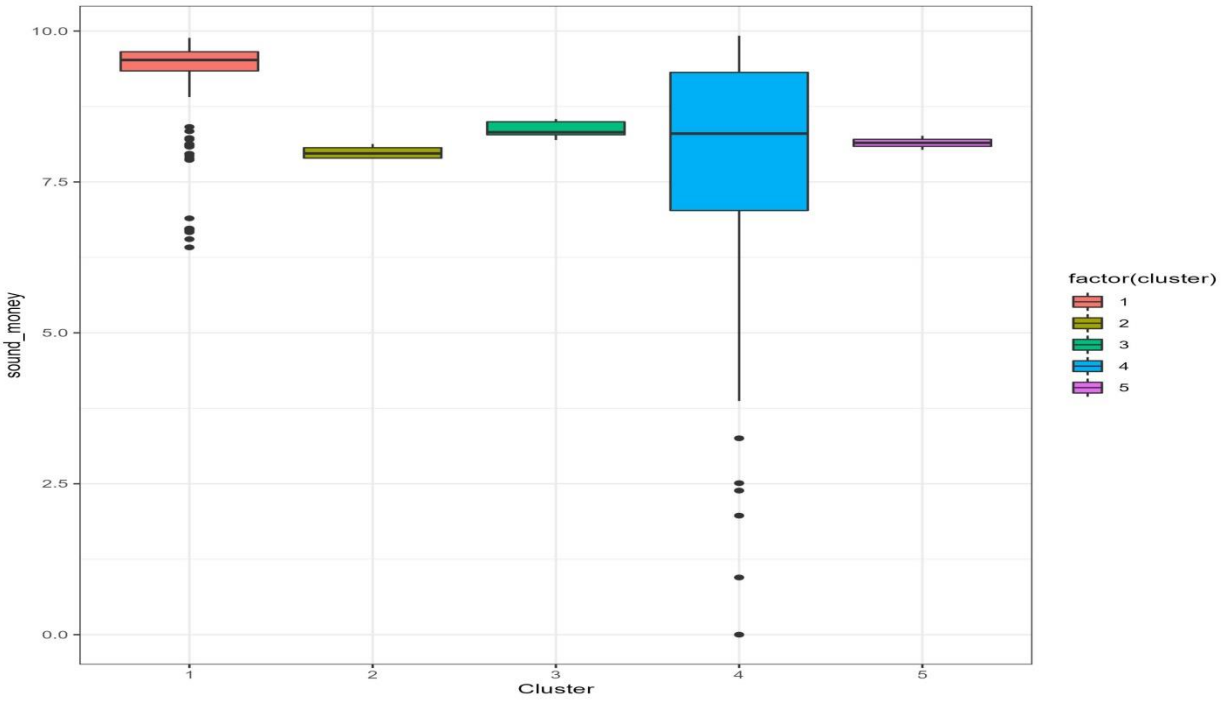


Source: Author's own Calculation

Here, the study accepts alternative hypothesis and reject null hypothesis. The cluster 4 has the highest mean value of 6.62 and cluster 2 has the least mean value of 4.64. It means countries of cluster 4 have diversification in carrying out government activities through better budget size and improving of living standards. It suggests that this cluster has financial depth to improve the size of bank loans, activities of financial institutions and financial markets standardisation. These as a result stimulate economic growth to shape the ultimate development outcomes for the financial sector of the country. In contrast, Cluster 2 among other clusters has the smallest mean value of 4.64 which suggests that countries of this cluster have least capabilities to

improve government operations for enhancing financial markets operations as given in the figure 17.

Figure 17: ***Mean Values of Clusters for Variable Sound Money***



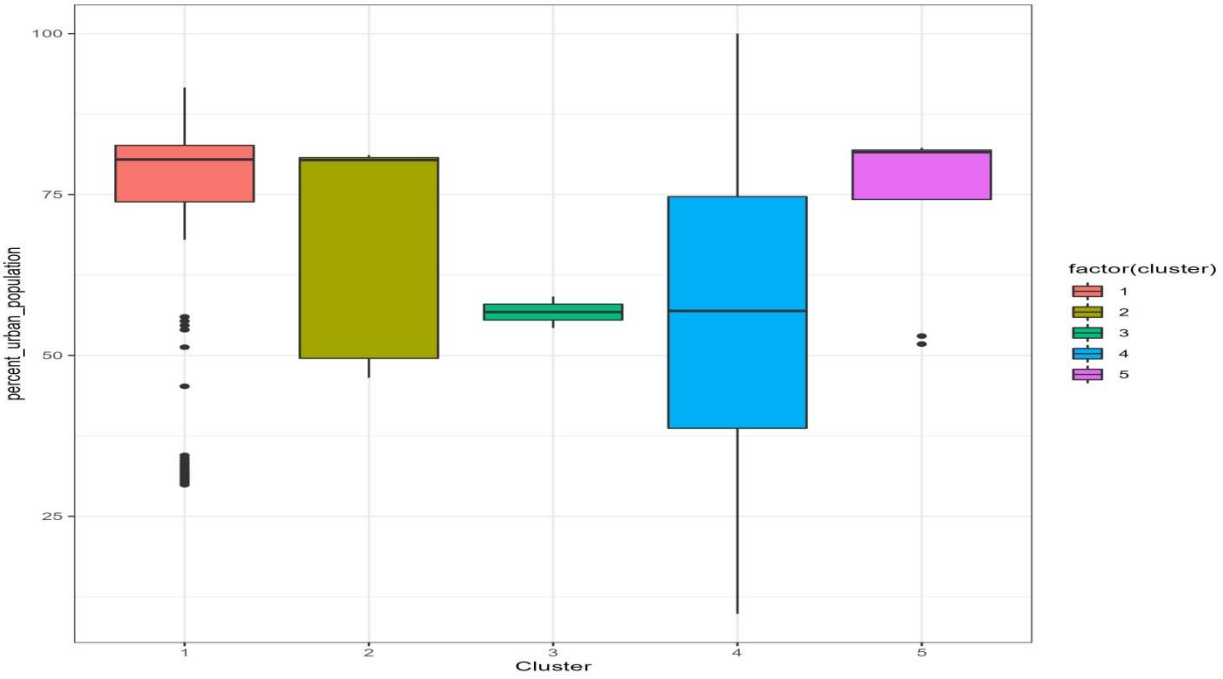
Source: Author's own Calculation

The variable of sound money has mean value of 9.19, 7.99, 8.37, 8.11, and 8.15 for cluster 1, 2, 3, 4, and 5 respectively. The mean values suggest that there is difference between the clusters mean values. This variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot based upon difference in mean values. Here, the study accepts alternative hypothesis and reject null hypothesis. The cluster 1 has the highest mean value of 9.19 and cluster 2 has the least mean value of 7.99. It means countries of cluster 1 have money where change in the general price level does not affect the relative prices of goods, services and assets. In contrast, Cluster 2 among other clusters has the smallest mean value which suggests that countries of this cluster have least effectiveness in maintain sound money for the access to roads for the sake of trade and operations of financial markets.

The Variable Percentage of urban population has cluster 1 as the highest mean value of 74.88 with cluster 3 having the least mean value of 56.72. The variable has significant different results for all the clusters because there are different mean values for each cluster. So, the study adopts alternative hypothesis and rejects null hypothesis. The mean value of cluster 1 suggests that due to majority of population dwelling in the urban have better access to financial facilities and markets. The people can easily get loans from bank or engage themselves in social economic welfare projects to uplift the financial position of country. So, countries of cluster 1

are more effective from this variable that affects their GFCI ranking as given in the figure 18.

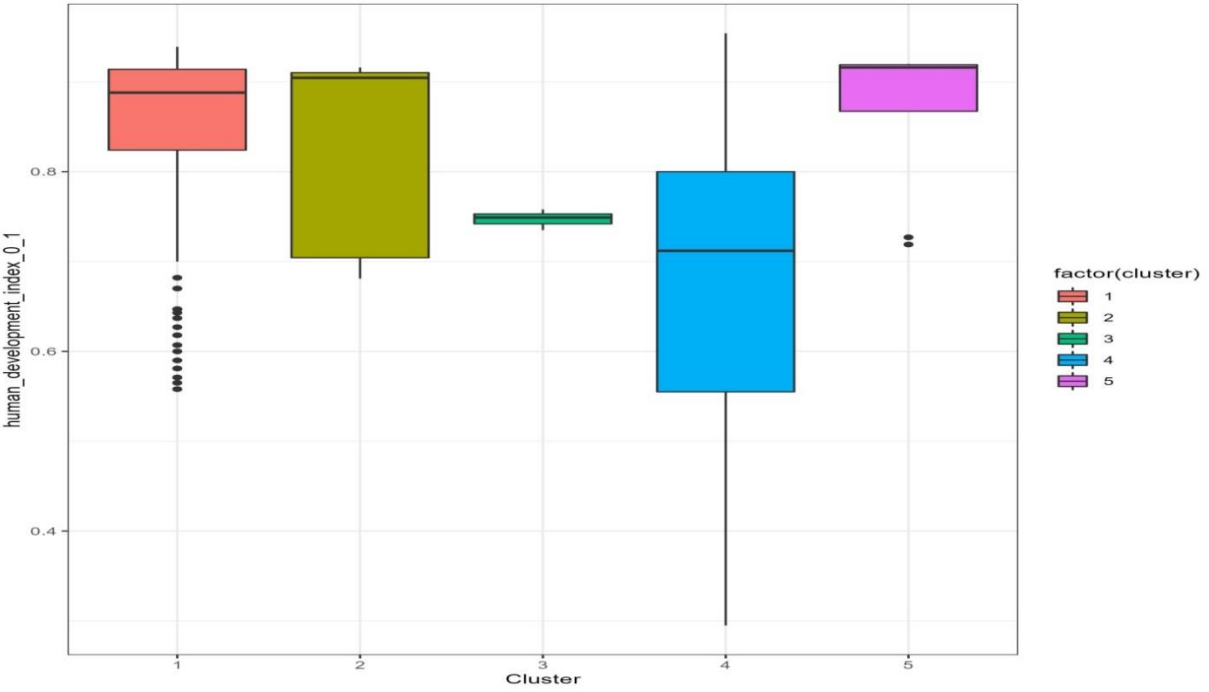
Figure 18: ***Mean Values of Clusters for Variable percentage of urban population***



Source: Author's own Calculation

The variable of Human Development Index has mean value of 0.85, 0.82, 0.75, 0.68, and 0.87 for cluster 1, 2, 3, 4, and 5 respectively. The mean values suggest that there is difference between the clusters mean values. This variable is statistical significant to affect the GFCI ranking of the countries as shown by the Boxplot based upon difference in mean values.

Figure 19*: Mean Values of Clusters for Variable percentage of urban population*



Source: Author's own Calculation

Here, the study accepts alternative hypothesis and reject null hypothesis. The cluster 5 has the highest mean value of 0.87 and cluster 4 has the least mean value of 0.68. It means countries of cluster 1 have better spending on education, health and age longevity which are indicators of HDI. It means cluster 5 that consist of USA and China are highly productive to promote human development through investment and better access to finance. Both the countries are developed with major economic development through technological advancement. So, for cluster 5 GFCI ranking is directly and positively correlates with Human development Index. In contrast, Cluster 4 among other clusters has the least mean value which suggests that countries of this cluster have less expanding on accessing of finance by population to invest in the education, health and age longevity related initiatives.

Conclusion

The purpose of conducting the study is to identify the most relevant determinants that significantly affect the GFCI ranking of the countries across the world. Through this paper, an attempt has been made to conduct an empirical study of the determinants responsible for the competitiveness of an IFC based on the GFCI ranking. To facilitate this study, extensive data has been collected for over 195 IFCs (unique financial jurisdictions) originating from 238 key factors (determinants) over a period of fourteen years (2007 till 2020). In addition to revisiting some of the existing empirical studies on this subject, this paper attempts to further build on the existing empirical research and analyses the impact of unique key factors on the GFCI ranking through the application of a panel regression. From extensive set of variables, the study adopts 17 most relevant determinants by using a Decision Tree approach[9]. The study adopts Business Regulations, Corporate Tax, Corruption Perception Index, Credit market Regulations, Economic Freedom overall Index, Freedom to Trade, Global Competitiveness, High Technology Exports, Inflation, Internet uses as percentage of Population, Labour Market Regulations, Legal System Property Rights, Quality of Roads, Size of Government, Sound Money, Urban Population, and Human Development Index (HDI). The results of the Panel regression shows that all the variables positively impact the GFCI ranking except business regulations, labour market regulation, legal system property rights and HDI.

The study also suggests a new ranking scheme to rank the IFCs according to their functions. The study utilises the data and proposed K-POD clustering by using majorisation-minimisation (MM) algorithm to rank the countries in the clusters named as cluster 1, cluster 2, cluster 3, cluster 4, and cluster 5. The study initially selects 2 to 20 clusters but adopts 5 optimal clusters by using the Elbow method of clustering. By applying K-POD clustering, a systematic clustering technique is used for grouping the countries in the same cluster on the basis of similarities. Similarly, the countries having differential effect on GFCI ranking are placed in different clusters. It is evident from the clustering results that GFCI ranking change with the change of effectiveness of factors across the world. The study suggests that by minimising the hurdles created by business regulation laws, labour market regulation procedures and legalised process of property rights, the GFCI ranking will improve for the countries. Similarly, by providing better health and education facilities, the Human development Index will positively affect the GFCI ranking.

The mean results of clustering approach suggest that cluster 1 has better business regulations to

[9] The Decision Tree (Regression) is given in the Appendix 2

support business whereas other clusters are performing at average level to set business friendly regulations. The corporate tax rates are significant in the cluster 1 in contrast to other clusters. It suggests that cluster 1 has incentive to minimise corporation taxes to capture further investment and promote financial stability and development. Cluster 5 has better corruption control system that motivates investors to invest and generate financial stability in the financial markets. Cluster 1 has efficient credit market regulations as compared to other clusters which reflect financial markets stability. Similarly, Cluster 1 lead the other clusters to affect GFCI ranking in the following determinants; percentage of urban population, Sound money, Legal system property rights, labour market regulations and global competitiveness. Cluster 2 lead the other clusters to affect GFCI ranking of the countries in the following determinant; Freedom of Trade. Cluster 3 lead the other clusters to affect GFCI ranking of the countries in the following determinant; High technology Exports. Cluster 4 lead the other clusters to affect GFCI ranking of the countries in the following determinant; Size of government and Inflation. Cluster 5 has significant effect on GFCI ranking in the following determinants; Human Development Index, Quality of Roads, Internet uses percentage of population and Economic Freedom.

The study collects data from reliable international organisations with well-organised rating data on GFCI from Z/Yen biannual report. The data has limitations of missing values due to collection of datasets for numerous variables. Moreover, unavailability of data for various years also restricted the estimation which is overcome by adopting K-Pod Clustering intuition. The other clustering techniques can also be used depending on the nature of work. The current research has various foreseen ideas for expanding it throughout the global financial sectors. The financial leverage and unavailability of financial sources in the developing countries can be accommodated by implanting the current research. Financial managers can adopt the techniques and methodology established by this research to sustain better financial analysis. Ease of doing business measures with global competition in generating financial sources across high ranked GFCI countries can negate global financial issues under the flagship of this study.

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Appendix 1

GFCI 33 Ranking

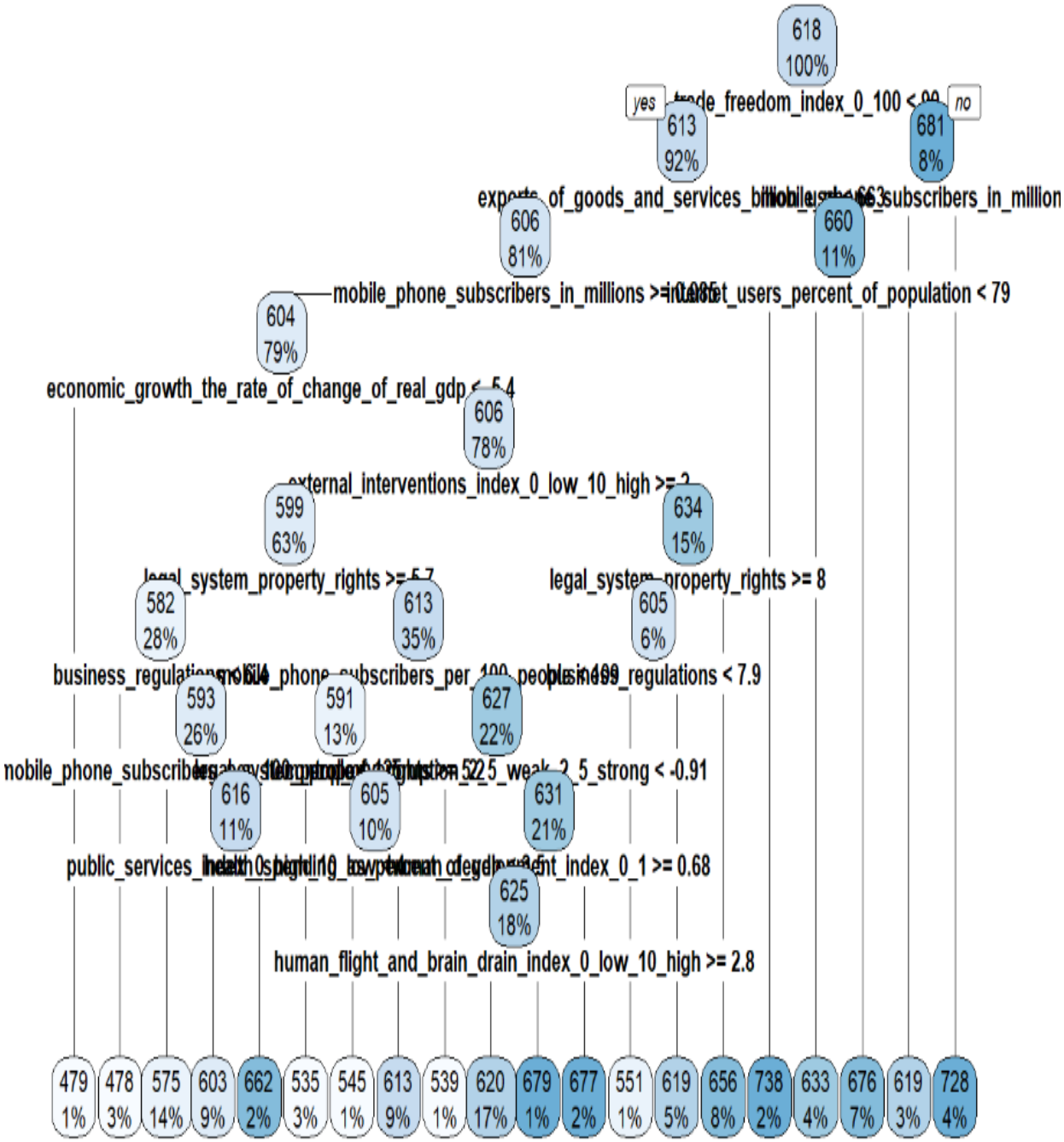
GFCI 33		
Centre	**FinTech Rank**	**FinTech Rating**
New York	1	728
San Francisco	2	701
London	3	696
Shenzhen	4	695
Los Angeles	5	694
Boston	6	693
Chicago	7	692
Shanghai	8	691
Singapore	9	690
Washington DC	10	687
Beijing	11	686
Seoul	12	685
Atlanta	13	684
Hong Kong	14	683
Sydney	15	682
Guangzhou	16	681
Chengdu	17	680
Qingdao	18	679
Paris	19	677
Busan	20	676
Munich	21	675
Amsterdam	22	673
Frankfurt	23	672
Melbourne	24	670
Minneapolis/St Paul	25	669
Berlin	26	668
Toronto	27	667
Copenhagen	28	665
Tokyo	29	663
Dubai	30	662
Hamburg	31	661
Milan	32	660
San Diego	33	659
Vancouver	34	658
Stockholm	35	657
Edinburgh	36	656
Stuttgart	37	655
Madrid	38	654
Oslo	39	653
Dalian	40	652
Montreal	41	651
Osaka	42	650
Zurich	43	649

Tianjin	44	648
Rome	45	647
Calgary	46	646
Geneva	47	645
Abu Dhabi	48	644
Luxembourg	49	643
Brussels	50	642
Helsinki	51	641
Tel Aviv	52	640
Kuala Lumpur	53	639
Vienna	54	638
Hangzhou	55	635
New Delhi	55	635
Dublin	57	634
Wuhan	58	632
Xi'an	59	631
Lisbon	60	630
Mumbai	61	629
Nanjing	62	628
Johannesburg	63	627
Istanbul	64	626
GIFT City-Gujarat	65	625
Cape Town	66	624
Bangkok	67	623
Warsaw	68	622
Santiago	69	621
Lugano	70	620
Mexico City	71	619
Riyadh	72	618
Moscow	73	617
Jakarta	74	616
Prague	75	615
Athens	76	614
Manila	77	613
Doha	78	612
Rio de Janeiro	79	611
Budapest	80	610
Sao Paulo	81	609
Astana	82	608
Buenos Aires	83	606
Sofia	84	605
St Petersburg	85	604
Bogota	86	603
Casablanca	87	602
Almaty	88	600
Lagos	89	599
Taipei	90	598
Tallinn	91	597

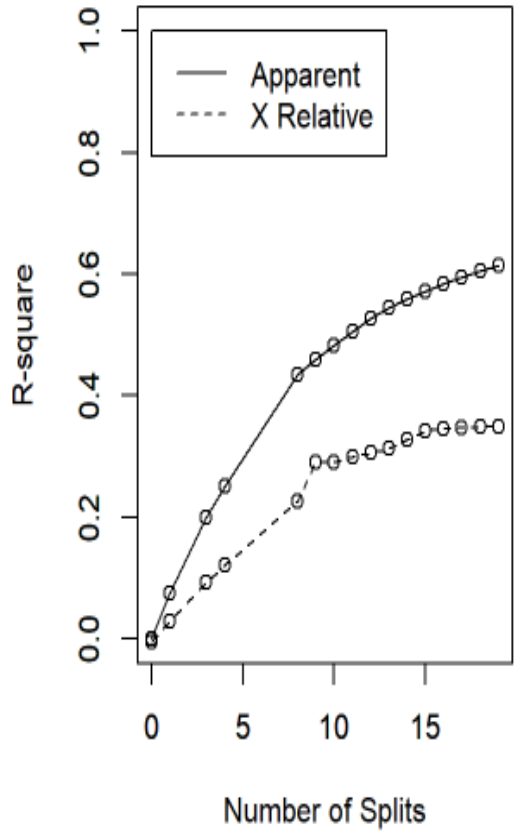
Nairobi	92	596
Kuwait City	93	595
Vilnius	94	594
Bahrain	95	593
Cyprus	96	592
Riga	97	591
Malta	98	586
Panama	99	584
Ho Chi Minh City	100	582
Mauritius	101	581
Tehran	102	578
Kigali	103	576
Baku	104	572
Liechtenstein	105	565
Guernsey	106	561
Jersey	107	560
Monaco	108	554
Isle of Man	109	552
Gibraltar	110	547
Cayman Islands	111	544
Bermuda	112	543
British Virgin Islands	113	539
Bahamas	114	517

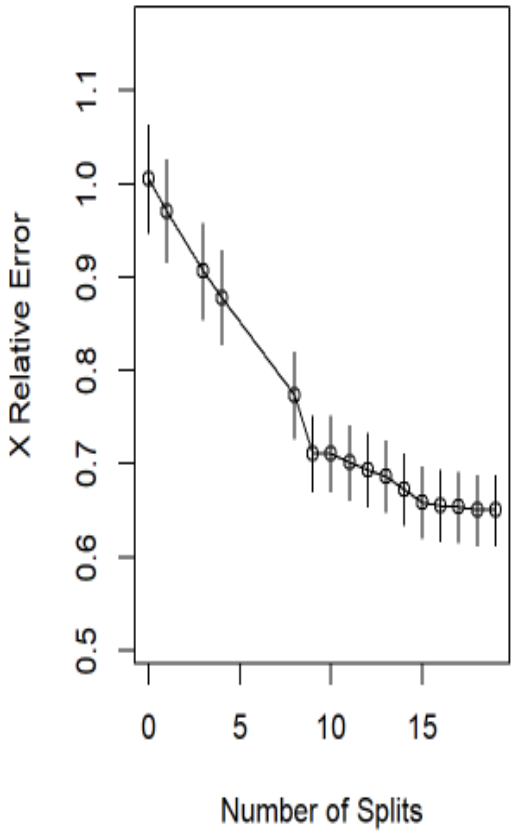
Appendix 2

Part 1: Decision Tree (Regression)



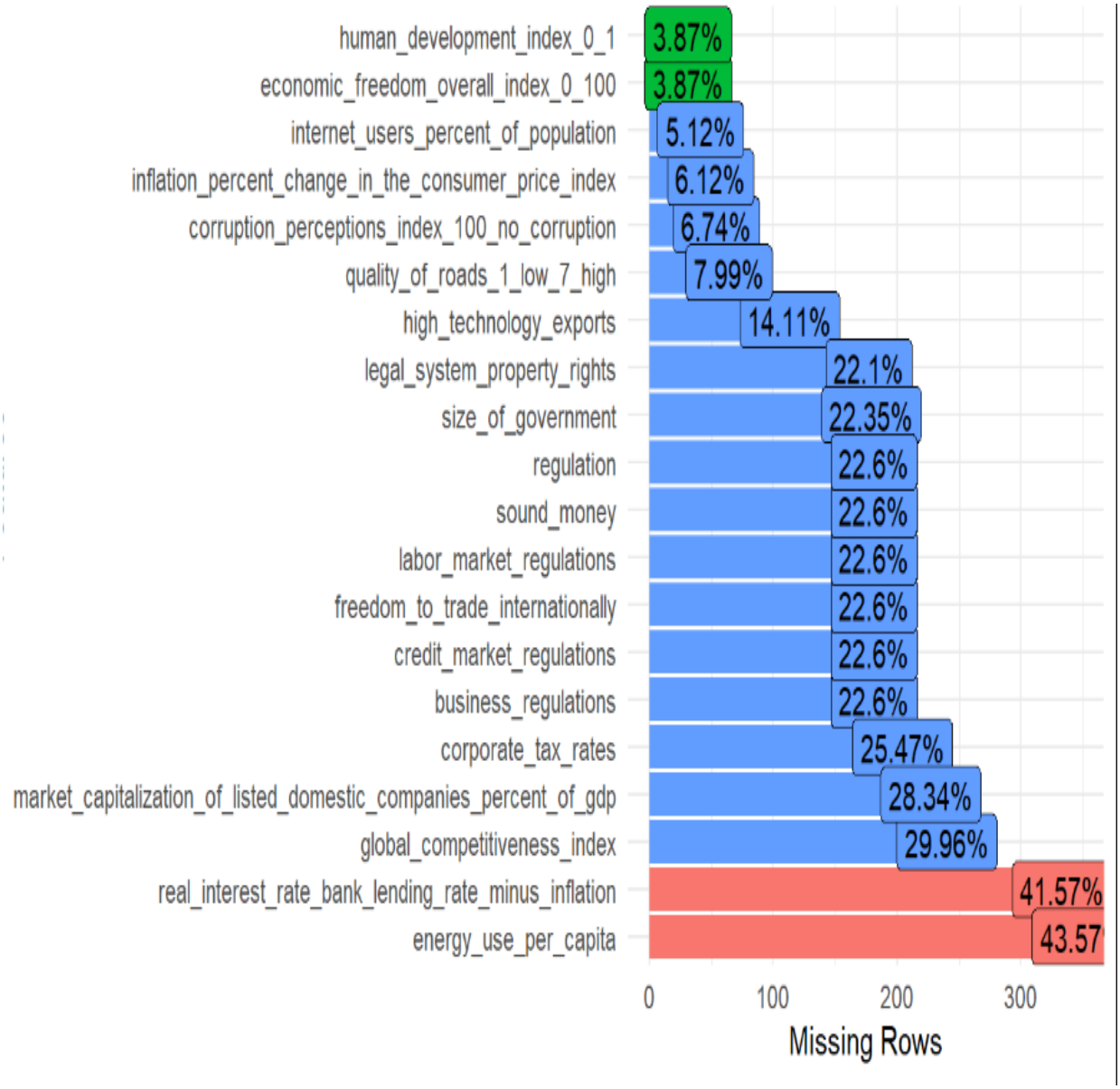
Part 2: Decision Tree (Regression): Diagram for Number of splits, R square and X relative error





Appendix 3

Percentage of missing values



Red=Bad, Blue=Ok, Green=Good