

Measurement of Financial Development: A Fresh Approach

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Financial development can be defined as the policies, factors, and the institutions that lead to the efficient intermediation and effective financial markets. A strong financial system offers risk diversification and effective capital allocation. The greater the financial development, the higher would be the mobilization of savings and its allocation to high return projects. Financial development can be measured by a number of factors including the depth, size, access, and soundness of financial system. It can be measured by examining the performance and activities of the financial markets, banks, bond markets and financial institutions. It is observed that higher the degree of financial development in a country, the wider will be the availability of financial services. A developed financial system offers higher returns with less risk. In this paper it is attempted to collect main components of financial development including Banks, Stock markets, insurance companies and bond markets for 41 economies during the period of 1988 to 2009. The method of principal component is utilized to extract a single financial development index out of them. Principal component analysis is a modern tool of data analysis. The main aim to apply principal component to achieve a meaningful index out of complex and multidimensional elements of financial development and to re-express the data with minimum noise and maximum extract, so that a single measure of financial development can be achieved. This index can be used to assess the financial strength of an economy and can be related to growth further.

Key Words: Financial Development Index, Principal Component Analysis

1. Introduction

Financial development can be defined as the policies, factors, and the institutions that lead to the efficient intermediation and effective financial markets. A strong financial system offers risk diversification and effective capital allocation. The greater the financial development, the higher would be the mobilization of savings and its allocation to high return projects. Levine (1993) emphasized to consider the importance of financial sector in economic growth.

Financial development can be measured by a number of factors including the depth, size, access, and soundness of financial system. It can be measured by examining the performance and activities of the financial markets, banks, bond markets and financial institutions. It is observed that higher the degree of financial development in a country, the wider will be the availability of financial services. A developed financial system offers higher returns with less risk.

Antzoulatos (2008) asserted that the degree of asymmetric information reduces with the development of financial system. Developed financial systems offer specialized services and efficient operations that help to reduce information asymmetry in the market. Investors can trust

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and put more faith in the experienced forecasts of the financial intermediaries in developed financial systems. In this way the value and trust of information raises and more investments can be attracted.

A well-structured financial system is important to boost the economy, but the main question is how to measure financial development. Some of the prominent issues in the measurement of financial development are discussed in the literature. Pill and Pradhan (1995) asserted that the standard measures of financial development like the real interest rates and the ratios like broad money to GDP can lead to misleading results. These indicators overlook the financial openness of a country and also ignore the figures of public borrowings are made from domestic financial systems.

The main objective of this paper is to measure financial development. It is attempted to collect main components of financial development including Banks, Stock markets, insurance companies and bond markets. The method of principal component is utilized to extract a single financial development index out of them. Principal component analysis is a modern tool of data analysis. It is a method to extract significant information from complex data sets. It helps in revealing the concealed structures in data sets (Shlens, 2005).

The aim to apply principal component analysis in this paper is to achieve a meaningful index out of complex and multidimensional elements of financial development and to re-express the data with minimum noise and maximum extract, so that a single measure of financial development can be achieved.

2. Determinants of Financial Development

The existing literature for the measurement of financial development comprises two different groups. The first group of studies measure financial development as a result of the observed outcomes of financial development. These studies include size, access and depth of financial systems as a measure of financial development. The second group includes proxies of a country's legal, business, and political conditions as well as the stability of financial. This group actually measures financial development on the basis of the characteristics of its institutional business and political environment.

In this paper it is attempted to measure financial development on the basis of observed outcomes of financial development because the measures adopted by the second group are highly time invariant. The characteristics and observed outcomes of financial development are discussed below.

Institutional Environment

The Institutional environment of a developed financial system involves policies, regulations, laws, and supervision. Herger et al (2007) found that dysfunctional institutions are one of the main hurdles in financial development. Countries with strong institutional environment and investor's safeguard achieve high levels of financial development (La Porta et al, 1997).

The constant monitoring of the financial system with certified international audits is recommended to achieve high levels of financial development. Barth et al (2007) suggested that banks should be rated on international standards, and by international rating agencies. There are many countries that are following the Basel rule to strengthen their capital regulations. These measures can help to improve financial health of an economy.

Contract enforcement is also considered as one of the most important elements of rule of law in any country, because it provides protection to both the parties. Capital account liberalization serves in better way if the legal system of a country is strong (De la Torre et al 2008).

Capital account openness and domestic financial liberalization play a significant role in increasing the depth of the financial system. (Financial depth refers to the accessibility to money in any form, i.e. cash or assets, mutual funds, bonds, etc). It also helps to increase intermediation between investors and savers. In turn all this helps to increase the level of financial mobilization in the economy (Fitzgerad 2007).

Business Environment

The second important element of financial development is considered as the Business environment. It is important for a better financial system in terms of the availability of skilled workers, physical and technological infrastructure and the cost of doing business.

Availability of skilled workers helps to improve the quality of financial services. Outreville (1999) examined the relationship between human development index and financial development in 57 countries and found that human capital and financial development are positively correlated. The degree of training, research and development, availability of good quality management schools, as well as quality education of mathematics and science, all these are important factors for the production of skilled workers.

To measure the strength of business environment in an economy, the cost of doing business is considered as one of the significant indicator. This measure also involve the cost of starting a business, as well as costs incurred to register for the new business, and finally the time involved to close a business (Beck 2006).

Financial Stability

Financial stability can be considered as the trade-off between risks and returns. The stability and soundness of a financial system is important for measuring financial development. Financial regulations are a key element in this regard. First of all they protect against systemic risks, these risks involve the factors that have chain effects and can cause to collapse the whole financial system. e.g. the interdependencies and interlinkages in financial system. In this case failure of one entity can lead to the failure of the whole financial system or market.

Secondly financial regulations protect consumers from opportunist behaviours; this occurs when sellers try to take the benefit of their superior familiarity or knowledge and attempts to conceal information from buyer that can affect negatively on their buying behaviour.

Finally financial regulations also help to enhance the efficiency of the financial system. A highly supervised and regulated financial system may be very stable, however such a controlled system may equally hamper financial development and innovation (that help to increase returns and decrease risks). In contrast a financial system that is innovative and has high supervision and regulation can also become unbalanced and trigger credit booms causing a severe negative effect on growth. Financial soundness involves the risk related to the currency crises, systematic banking crises, and sovereign debt crises (Herring 2000).

Banks and Non-Banks

Banks are one of the very important elements of financial development. Most of the countries are still completely relying on their banking sector rather than financial markets. Banks serve as bridge between the savers and borrowers. They offer insurance to savers by providing them a portfolio of less risky liquid returns and high risky illiquid investments. In this way investors can get higher returns on their investments as they hold diversified portfolios. Banks offer full insurance to their clients by offering long term investments against liquidity risk(Levine 1997). Liquidity risk can be defined as the risk that banks may sell their assets for loss to meet the cash demand.

In strong financial systems banks offer low transaction and information costs. Credits are allocated efficiently. Efficient allocation of credit to the private sector and potential businesses leads to an increase in industrial growth and in turn boosts economic growth. The allocation of credit to potential projects enhances the innovation in the country and increases the confidence of prospective businesses.

Non-banks cannot be ignored for the measurement of financial development; these include brokers, dealers, asset managers, mortgage companies, investment banks, pension funds and insurance companies. Non-bank financial institutions do not accept the demand deposits but provide a number of financial instruments. Non-banks and banks compete in strong financial systems especially for the lending opportunities. The lending by non-banks does not affect the money supply but increases the amount of credit in market debt. Non-banks borrow at low rates for short term and lend at high rate for the long term. They roll over their short term debt for their favourable rates. They need to maintain excellent rating for their operations (Diamond and Dybvig, 1983). The competition between banks and non- banks improve the efficiencies in both. This contributes further in the development of the financial system.

Financial Markets

Financial markets are one of the most important measures of financial development. It includes four main types, bond markets, stock markets, foreign exchange, and derivatives markets. It is considered that countries with developed financial system are more focused towards the development of financial markets as compare to banks. The four types of financial markets are discussed below.

Bond markets trade is a place where investors lend money to government or some company in return for a pre-settled interest rate. Bond markets have two types i.e. primary bond market and secondary bond market. In primary markets the bonds are traded for the first time after their issuance, whereas in secondary markets the subsequent transactions of bonds are carried out.

Stock markets are a very important component of an economy. They provide a platform to buyers and sellers to meet up and trade. The investments in turn help the traders to generate more funds and expand their businesses. Stock markets are considered to be the most key source to generate funds by the companies. Liquidity is considered as the main factor which attracts the investors to invest their funds in stock markets. Liquid Stock markets enable firms to acquire much needed capital quickly (Adjasi and Biekpe 2006).

Foreign exchange market is the place where trading of currencies takes place. Usually trading in this market occurs over the counter. The relative values of currencies are also determined by this market. This market facilitates the traders to exchange certain amount of

currencies for the exchange of other currency. There are two types of exchange rate regimes; first one is called the floating exchange rate, in this case the value of currency can fluctuate with foreign exchange market. In case of floating exchange regimes the countries are enabled to adjust for the shocks. The second form is called pegged exchange rate regimes. In this case the value of currency is matched with the value of other currency and sometimes with gold as well.

Derivatives markets deals in swaps, forward contracts, options and future contracts. These instruments are derived from the other assets i.e. their values are based on some other assets. These assets can be stocks, currencies, commodities, bonds, etc. The trading is done over the counter as well as in the exchange traded derivatives market.

The measure of size, depth and access, basically reflects the output of a financial system. It measures that how large and deep is the financial system. The size and depth of the financial system reflects the size of savings and investments. Large financial systems reduce the limitation related to credit. It improves the process of savings. Efficient allocation of credit is the main feature of a developed financial system. The larger the size of banking sector the greater would be the services offered to its clients. To study the depth of financial system the proxy of liquid liabilities to GDP is employed.

Access of financial system refers to the greater availability to financial services. If a financial system offers greater accessibility to financial services that is considered as one of the important step towards financial development.

3. Existing Measures of Financial Development

This section discusses some of the main studies regarding the measurement of financial development. Researchers have used different measures and methodologies to examine the financial health of different economies.

Huang (2005) examined the main factors of financial development. A comparison of a number of countries is made to justify the different roles of various factors of financial development. The important factors of financial development are grouped into three main categories. These included institutions, policy and geography. To capture the depth of the financial system the liquid liabilities, banks overhead costs, net interest margins, are included. For the impact of stock market on financial development three main variables are included, i.e. stock market capitalization; total values traded, and turnover ratio. The data is averaged over the period of 1990-2001. Four indexes are made by using the method of principal component analysis. These indices are FD bank, FD stock, FD efficiency, and FD size. Two techniques Bayesian model averaging model (BMA) and general to specific methods are used to gauge the robustness of a selection of determinants of financial development. The findings suggested that the level of financial development is basically determined by the quality of its institutions, government policies, geographic conditions, its income level, and finally its cultural characteristics.

Antzoulatos et al (2008) studied four categories to construct financial development indices, and these include banks, financial institutions, stock market and bond market development indices. The proxies for banking sector development included deposit money bank assets to GDP, bank overhead costs, bank's concentration, bank's net interest margin, and private credit issued by domestic money bank and other financial institutions to GDP. The proxies for the development of financial institutions included life insurance premium and non-life insurance premium. The development of stock market is captured by the stock market capitalization to

GDP, stock market total value traded to GDP, and finally with turnover ratio of stock market. The proxies for the bond market development include private bond market capitalization to GDP and public bond market capitalization to GDP.

Neusser (1998) employed the pension funds, investment banks, loan and saving association, life and casualty insurance and banks to measure the depth in 13 OECD countries during the period of 1970 to 1991.

Demetriades et al, (1996) employed the ratio of bank deposit liabilities to GDP to measure the financial development in sixteen countries. It is recommended that the currency in circulation should be eliminated from the broad money stock to measure the financial development, because an increase in the ratio of broad money to GDP shows the wide use of currency in circulation rather than an increase in the volume of bank stocks.

Rousseau and Wachtel (1998) studied the impact of financial development in five major industrial countries including, United States, United Kingdom, Canada, Sweden and Norway are analyzed during the period of 1870 to 1929. The proxies for financial development included assets of commercial banks, combined assets of commercial banks and saving institutions and a composite of assets of commercial banks, savings institutions, insurance companies, and pension funds.

King and Levine (1993) used the ratio of liquid liabilities to GDP to measure the size of financial intermediaries; to measure the activity, the ratio of credit to private enterprises to GDP and the ratio of assets of commercial banks to the sum of commercial banks assets plus assets of central banks are included.

The activity of stock market is also analysed in some studies to examine the impact of developed stock market on financial development and growth. Levine and Zervos (1998) studied the size of stock market and liquidity of banking development measures.

Saci and Holden (2008) measured the financial development by using the principal component analysis. To measure the development of financial intermediaries ten proxies for the financial development are included. To measure the importance of banking sector, the ratio of commercial bank assets commercial plus central bank assets, credit issued to private sector to liquid liabilities, domestic credit to the private sector to GDP, the ratio of liquid liabilities to GDP, are included. To capture the impact of stock market development, the stock market capitalization to GDP, turnover ratio, value traded ratio, number of listed companies, are examined. The ratio of broad money and narrow money is also employed to examine the structure of the financial system and its importance.

The financial development index constructed in this paper is based on same criterion of Saci and Holden (2008), but there are some apparent gaps that we have filled. First of all we have included thirteen components of financial sector. It is attempted to construct an index i.e. based on detailed components of financial sector. Saci and Holden have included only banks and stock markets to construct their financial development index while we have employed Insurance companies along with the stock markets and banks. The size, structure, activities and efficiency measures of banking sector, stock market and insurance companies are included. The details of all these variables are discussed data section.

Secondly we have utilized the most recent data sets to construct our financial development index i.e. from 1988 to 2009 with 22 annual observations, whereas the sample period of Saci and Holden is 1988 to 2001. Finally we have included 41 countries to construct our financial development index whereas Saci and Holden's financial development index is constructed on the basis of 30 countries.

The World economic forum introduced an annual financial development index in their first financial development report of 2008. The index examined the financial strength of 55 financial systems of the world on the basis of annual data from 2007-08, and is constructed on the basis of seven main pillars of financial elements. These include institutional environment, business environment, financial stability, banks, non banks, financial markets, size, depth, and access. The method of standardization is used to construct the financial development index. The variables are re-scaled from 1 to 7 where 1 is considered as least and 7 is ranked as most advantageous. The main objective behind the aggregation of all the measures of financial development is to construct a unified measure of financial development. For this purpose different components of index are weighted equally. The index is revised on annual basis by applying the same methodology. The table 1 reports the ranks, scores of financial development index 2009.

Table 1: Financial Development Report 2009 Results WEF

Country	RANK_2009	RANK_SCORE
United Kingdom	1	5.28
Australia	2	5.13
United States	3	5.12
Singapore	4	5.03
Hong Kong SAR	5	4.97
Canada	6	4.96
Switzerland	7	4.91
Netherlands	8	4.85
Japan	9	4.64
Denmark	10	4.64
France	11	4.57
Germany	12	4.54
Belgium	13	4.50
Sweden	14	4.48
Spain	15	4.40
Ireland	16	4.39
Norway	17	4.38
Austria	18	4.28
Finland	19	4.24
UAE	20	4.21
Italy	21	3.98
Malaysia	22	3.97
Korea, Rep.	23	3.91
Saudi Arabia	24	3.89
Jordan	25	3.89
China	26	3.87
Bahrain	27	3.85
Israel	28	3.69

Panama	29	3.63
Kuwait	30	3.62
Chile	31	3.60
South Africa	32	3.48
Czech Republic	33	3.48
Brazil	34	3.46
Thailand	35	3.35
Egypt	36	3.33
Slovak Republic	37	3.30
India	38	3.30
Poland	39	3.27
Russian Federation	40	3.16
Hungary	41	3.08
Peru	42	3.07
Mexico	43	3.06
Turkey	44	3.03
Vietnam	45	3.00
Colombia	46	2.94
Kazakhstan	47	2.93
Indonesia	48	2.90
Pakistan	49	2.85
Philippines	50	2.84
Argentina	51	2.77
Nigeria	52	2.72
Ukraine	53	2.71
Bangladesh	54	2.57
Venezuela	55	2.52

It can be observed from table 1 that the countries with higher score of financial development index have higher including United States of America, United Kingdom, Germany, Japan, and Canada have scored the top five positions and all these countries also have higher growth rates, Whereas countries with lower scores of financial development index (2009) show low growth rates.

In next section we discuss the main issues regarding the measurement of financial development this includes the legal and policy matters and also the impact of financial openness over financial development.

4. Measurement of Financial Development: Issues

The main issues of financial development raises some important questions i.e. why some countries have so much bigger capital markets as compare to others, e.g. why the United Kingdom and United States have huge financial markets, whereas countries like France and Germany have comparatively smaller financial markets. Why Japan and Germany have enormous banking systems as compare to the other wealthy economies? There are some significant reasons for the different levels of development in different countries.

Legal Matters

La Porta et al, (1997) examined 49 economies and studied the investor protection rights. Quality of law enforcement and character of legal laws both are studied in this regard. It is considered that countries with weak investor protection rights have small and very narrow equity and debt markets. It is also observed that countries with French civil laws have weak investor's protections as well as least developed capital markets. In contrast the situation is different in case of countries with common laws. These countries are found with developed and big capital markets.

Private property rights are important to structure the foundation of financial development. Legal origins matters in terms of the differences in the abilities to adjust efficiently in the developing socioeconomic conditions. Countries with efficient adapting legal systems that minimize the gap between financial needs of the economy and the capabilities of the legal systems help to flourish financial development (Thorsten Beck et al, 2002).

Policy Matters

Financial policy making is one the most important issues related to financial development. De La Torre et al, (2007) studied the requirement of policy thinking for financial development. The three main areas identified to achieve strong and deep financial systems included, strong stock markets, financing of small and medium enterprises, and defined contribution of pension system. The governments are required to provide best mechanism for the provision of efficient mobilization of resources, and risk allocation. Another important responsibility of government is the implementation of sound prudential regulation including appropriate accounting procedures and supervisions. This can help a country to avoid financial crises and alleviate costs without increasing moral hazard. Government is also required to facilitate for the provision of institutional and informational environment. Finally it is suggested that to achieve high levels of financial development the governments must focus upon the flexible and shock proof exchange rates , a local strong currency to be used as a store of savings, and the a strong regulatory environment where the enforcement of contracts and operations of the contracts can flourish.

Financial globalization is unfolding in an environment where all major currencies are permitted to float freely against each other. It is recommended that flexible exchange rate regimes should be applicable to attain the benefits of financial globalization and coping with the risks and threats attached to it (Bordo, 2000).

Financial Openness and Financial Development

Financial liberalization is the capital account openness and deregulation in the domestic financial markets. There are mixed views in this regard. According to some studies financial openness helps to build up the strong financial system and to achieve higher targets of growth. On the other hand it may incur a lot of risk taking and can increase macroeconomic volatility in an economy. The results of financial liberalization in middle income and low income countries are also found quite different. Financial liberalization has helped achieve high growth rates in middle income countries whereas in case of low income countries the results are opposite. One main reason for this can be because low income countries do not have developed financial systems to allow them for a significant increase in leverage and financial flows.

Beckaert et al (2005) asserted that equity market liberalization leads to 1% increase on average in annual real economic growth. It is unlikely to have the same effects of liberalization in all countries due to the quality of institutions, comprehensiveness of reforms, legal environment, the investment conditions and the degree of financial development.

An openness index is created in 2007 by Chinn and Ito that measure the openness in capital account transactions. The index is constructed on the basis of 181 countries from 1970 to 2005. KAOPEN index is constructed based upon the International Monetary Fund AREAER (Annual Report on Exchange Arrangements and exchange Restrictions) tabulation to determine the intensity of the capital controls. AREAER presents information regarding the rules and regulation for the external account transactions in different countries. It is found that the world is moving steadily towards greater financial openness. Industrialized countries maintained high level of financial openness all over the period and steadily improved the levels since the 1970's. Both the less developed and emerging market countries have accelerated financial opening since the 1990's. It is also reported that there is great variation between the pace and patterns in the different regions for financial openness.

The Next section explains the data and statistics of our financial development index. The details of all indicators including the definitions, data range and their importance are discussed below.

5. Data

Various measures of the financial development are proposed in the literature. In this regard we have considered all the elements of financial development including banking sector, stock markets, bond markets and insurance companies. These measures are important because they represent the size, efficiency and activity measures of financial sector. The data is obtained from the International financial statistics, World Bank development indicators, and Ross Levine data set. We started the analysis with 210 countries with data range from 1960 to 2009, but due to the missing entries in the data it was not possible to include all the countries in our analysis. Considering the availability of data, 41 economies with annual observations from 1988-2009 are included for the construction of financial development index by using principal component analysis. The indicators of financial development their definitions are reported in table 2 and table 3. To measure the financial development accurately in a large number of countries, we have included thirteen very important and relevant financial indicators.

Table 2: Banking Development Indicators

Bank Indicators	Importance	Data range
Liquid liabilities to GDP	Measure the size of financial intermediaries	1960-2009
Private credit by domestic money bank to GDP	Measures the level of financial services, Distinguishes the credit issued to private or public sector	1960-2009
Private credit by deposit money banks and other financial institutions to GDP	Measures the level of financial services, It indicates the credit issued on merit and also the promotion of innovation and research and development in an economy	1960-2009
Commercial bank assets to commercial plus central bank assets	Measures the extent to which commercial banks are allocating savings in economy against the central banks	1960- 2009
Bank's concentration	Measures the banking structure, as the ratio of the three biggest banks assets to the assets of all commercial banks in the system	1987- 2009
net interest margins	Measure the efficiency of banking sector, the accounting value of the bank's net interest revenue as a share of its total assets	1987- 2009
The overhead costs	Measure the efficiency of banking sector, the accounting value of the bank's overhead costs as a share of total assets.	1987- 2009
Foreign direct investment to GDP	Measures the strength of FDI based productivity due to the technological transmission and new skills of management in the economy	1960- 2009

Source: International Monetary Fund International Financial statistics World Bank development Indicators

Table 3: Stock Market & Insurance Companies Development Indicators

Stock market Indicators	Importance	Data range
Stock market capitalization to GDP	Measures the size of stock market. It is equal to the value of listed shares divided by GDP	1976- 2009
Value traded ratio	Measures the activity of the stock market, it is equal to the total value of shares traded on a country's stock exchanges divided by GDP.	1975- 2009
Turnover ratio	Measures the efficiency of stock market, it is equal to the total value of shares traded on country's stock exchange divided by the stock market capitalization	1976- 2009
Life insurance premium	Measures the activities of financial institutions, It is equal to the life insurance premium volume as a share of GDP.	1960- 2009
Non life insurance premium	Measures the activities of financial institutions, It is equal to the non life insurance premium volume as a share of GDP.	1987- 2009

Source International Monetary Fund International Financial statistics World Bank development Indicators

Bank Indicators

To measure the size of the financial intermediaries, the ratio of liquid liabilities to GDP (M3 to GDP) is employed (e.g. Goldsmith 1969, Levine 1993, and Wachtel 2000). The ratio of liquid liabilities to GDP is also called the depth as it captures the overall size of the financial sector as a percentage of GDP (Beck et al. 1999). This ratio is an indicator of the liquidity provision in the economy. The only weakness of this indicator is that it does not show the savings allocation so the activities of financial intermediaries might not be captured accurately.

Two additional measures of the activities of financial intermediaries are included as it is observed that the size of financial intermediaries does not reflect the activities of financial intermediaries. The first one is the ratio of private credit by deposit money banks to GDP (Levine and Zervos 1998) and the second one is the ratio of credit issued to private sector by deposit money banks and other financial institutions to GDP (Levine 1993, Beck 1999). These measures distinguish the credit issued by money banks or financial institutions other than the central banks. These are also found helpful in finding the difference between the credits issued to the private sector opposite to the public sector. It indicates the credit issued on merit and also the promotion of innovation and research and development in an economy. The higher values of this ratio are recommended and refer to the low transaction and information costs and the higher level of financial intermediation and financial development.

The expansion of financial sector is an important aspect of financial development that is measured by including the ratio of commercial bank assets to commercial plus central bank assets (Levine 1996; Rioja and Velve, 2002). This ratio measures the extent to which commercial banks are allocating savings in economy against the central banks. Commercial banks are expected to be more efficient and effective in allocating the savings in productive and profitable projects as compare to central banks. Commercial banks are likely to monitor the management, and increase the savings mobilization in the economy than the central banks. The higher values of this ratio are recommended for the expansion of financial sector and financial development.

An important aspect of the banking sector is its structure. Bank's concentration is included to measure the banking structure. This measure is used to present the concentration of commercial banks. It can be defined as the ratio of the three biggest banks assets to the assets of all commercial banks in the system. A high value of this ratio shows increased concentration in commercial banking that shows lack of competitive pressure which is necessary to attract the savings and process them effectively to the investors.

The efficiency of banking sector cannot be denied to measure financial development. The main function of the financial intermediaries is to serve as a bridge between the savers and investors. In this regard two ratios are included and these are net interest margins and the overhead costs. Net interest margins are defined as the accounting value of the bank's net interest revenue as a share of its total assets. The second ratio i.e. the overhead costs can be defined as the accounting value of the bank's overhead costs as a share of total assets. Large overhead costs reflect cost inefficiency (Levine et al., 2007). They are also associated with small banks that do not have substantial income from fee-based activities and/or operate in a restrictive environment (Demirguc-Kunt et al., 2004). The Net Interest Margin equals the difference between bank interest income and interest expenses, divided by total assets. A lower value of overhead costs and net interest margin is frequently interpreted as indicating greater competition and efficiency (Huang, 2005).

Yao (2006) asserted that foreign direct investment is important because it helps to increase the total level of investments in the economy. Foreign direct investment cannot be ignored especially in the case of developing countries, because foreign direct investments play a significant role in the economic growth of these economies. It boosts the level of productivity due to the technological transmission and new skills of management in the host economy.

Stock Market Indicators

To capture accurate and maximum effects of stock market over financial development three main indicators are included. These indicators are the size, activities, and efficiency of stock markets. The size of the stock market can be measured by using the ratio of "stock market capitalization as percentage of GDP". It can be defined as the value of listed shares divided by GDP.

The activity of the stock market is measured by using the "ratio of stock market value traded as a percentage of GDP". Value traded ratio equals the total value of shares traded on a country's stock exchanges divided by GDP (the value of listed shares on the country's exchanges). It measures the trading relative to the size of the economy.

The efficiency of stock markets is measured by using the "stock market turnover ratio", Turnover ratio equals to the total value of shares traded on country's stock exchange divided by the stock market capitalization. It is basically the value of listed shares traded on country's stock exchange. The turnover ratio measures trading relative to the size of the market. It also exhibits substantial cross-country variability. The turnover ratio may differ from the value traded ratio because a small, liquid market will have high turnover ratio but a small value traded ratio. This measure try to find the liquidity on a macroeconomic scale; the objective is to find the degree to which agents can cheaply, quickly, and confidently trade ownership claims of a large percentage of the economy's productive technologies.

Insurance Companies Indicators

The contribution of insurance companies in financial development is captured by including two of its activity ratios and these are; "life insurance premium" and "non-life insurance premium". The first ratio is important because of the life insurance sector with respect to the economy. It is defined as the life insurance premium volume as a share of GDP. The second ratio is defined as the non-life insurance premium volume as a share of GDP.

6. Methodology and Results

Principal Component Analysis

The main objective of principal component analysis is to decrease the dimensionality in data. It is a technique that attempts to retain all the variation available in data even dealing with large set of variables. It transforms the data into new variables i.e. the principal components and they not correlated. The maximum variation of the original variables is contained in first few principal components. (Jolliffe, 2002).

Principal component analysis is normally applied as a method of variable reduction or for the detection of structure of relationship among the included variables. The information available in a group of variables is summarized by a number of mutually independent principal components. Each principal is basically the weighted average of the underlying variables. The

first principal component always has the maximum variance for any of the combination. If more than one principal component is generated they are uncorrelated. In this instance first principal components are employed as an aggregate measure of financial development. The main strength for the construction of financial development index by using the method of principal component analysis is that the weights of the index are based upon the inner correlation of all the individual measures. We have constructed the new components of financial development for 41 countries, because for most of the developing countries the complete data is not available.

Jackson (2005) asserted that principal components analysis is the technique of the data analysis to obtain linear transformation of a group correlated variables till the achievement of certain optimal conditions, the most important of which is the achievement of uncorrelated transformed variables. Those transformed variables are called principal components.

First of all principal component analysis is applied all together on four categories of financial development i.e. banks, stock market indicators, bond market indicators, and insurance companies. The results could not be obtained for all the countries due to the issue of missing values in the data sets. To deal with this issue accurately we applied principal component analysis on each group of financial indicators individually. We found the results for only 27 countries when PCA is applied on all four categories. After that We applied PCA on all the individual groups to see that which variables have more missing entries and causing problem to achieve results for more countries. The PCA results for individual groups are quite different and are as follows; PCA bank results for 58 countries, PCA Stock market results for 50 countries, PCA bond market results for only 27 countries and PCA insurance companies results for 53 countries. It is observed that bond market indicators are having the maximum number of missing entries and reduces the number of countries drastically. Finally PCA is applied again on all financial indicators together except "bond market indicators" and we have achieved the principal components for 41 countries, the index is named as KOREAN Index. It is attempted to include only those countries to construct this index that have atleast 70% of observations available in data set. Every effort is made to include the maximum number of relevant variables should be included so that the significant index can be achieved. KOREAN index retain maximum variation and information available in variables because it is based upon the method of Principal component analysis.

Descriptive statistics

In this section we discuss the descriptive stats of KOREAN index reported in table table 4 and make a comparison between Korean index and the ranking of financial development index of 2009 reported in table 1. It is observed that top five countries with highest mean values of KOREAN index include Switzerland, Japan, United Kingdom, Netherlands and United States. If we make a comparison between financial development index of 2009 reported in table table 1 with our KOREAN index reported in table 4 so very similar results are found. We have found almost the similar countries at top and bottom position. There are some main differences between KOREAN index and FDI-09 (financial development index 2009). First of all KOREAN index is based upon annual observations for 22 years from 1988 to 2009, whereas the FDI-09 is constructed every year since 2008 and only one year observations are included to construct it. Secondly we have employed the method of Principal component analysis to construct KOREAN whereas FDI-09 is based the method of standardization. The overview of these countries (World Fact Book 2010) is discussed below.

Switzerland stands at the top position in KOREAN index with highest score and maximum value for the index. The economy of Switzerland is based on highly developed financial services and the manufacturing industry. The contribution of services sector to Swiss economy is 71.2%. It is the major part of GDP. The GDP per capita is \$42900, whereas the real GDP is \$522.4 billion and the growth rate is 2.7%. The inflation rate is considerably low that is 0.7%. Germany, US, France and Netherlands are its main import partners. The financial crisis of 2007 had also affected the Swiss economy but their government has taken prompt actions for that e.g. the Swiss National Bank introduced a zero interest rate policy to give a boost to its economy and the appreciation of franc can be prevented.

United Kingdom and United States also stand among top five strong financial systems in KOREAN index. United Kingdom has very strong financial system and trading economy. UK offers vast financial services that contribute to a greater proportion to its GDP. After recovering from 1992's financial crisis the economy of UK has managed to expand significantly. However the recent financial crisis of 2007 has hit its economy really badly causing decline in home prices and increase in economic slowdown. The government of United Kingdom have taken considerable measures to stabilize their financial system. It is planned to cut down the budget deficit through austerity plans in next five years from 10% to 1%. The real GDP growth rate of UK is 3%. According to KOREAN index UK stands third highest out of 41 countries.

United States is the most powerful economy in world with GDP per capita of \$47400. It has Real GDP of \$14.62 trillion, with GDP growth rate of 2.7%. 76.7% of its GDP is composed of services sector. United States has strong financial system. The global financial crisis affected the markets of US in 2008. To stabilize in this situation the government of US introduced a \$700 billion programme i.e. TARP (Troubled Asset Relief Programmes) and government use funds from this programme to purchase equity in some of the banks of US. Now if we consider the statistics of KOREAN index so United States stands fifth in place during the period of 1988 to 2009 among 41 countries. It is observed that financial structure of US is more market base rather than bank based.

Overall the KOREAN Index reflects very significant results as the countries in bottom ten include Venezuela, Argentina, Brazil, Kenya, Hungary, Indonesia, Poland, Peru, Pakistan and Turkey. These countries also report low growth economies according to World Fact book. So we consider our KOREAN index is a composite index that portrays a significant picture of financial strength in these 41 economies.

Table 4: Descriptive Statistics for KOREAN INDEX

COUNTRY	Mean	Max	Min.	Std. Dev.	Obs.
Argentina	-3.086	-2.500	-3.964	0.389	19
Australia	1.149	2.719	0.142	0.687	15
Austria	0.911	1.689	0.571	0.318	19
Belgium	1.003	2.874	-0.813	1.115	19
Brazil	-3.007	-2.357	-4.146	0.513	16
Canada	1.807	3.943	0.319	1.180	21
Chile	-1.216	0.854	-2.656	0.922	22
Colombia	-2.473	-1.404	-3.039	0.475	19
Czech Rep	-0.569	-0.056	-1.058	0.256	15
Denmark	0.708	4.670	-1.096	1.869	21
Egypt	-1.690	-0.913	-2.631	0.494	20
Finland	1.083	2.784	0.080	0.849	20
France	1.274	3.168	0.254	0.865	19
Germany	1.515	2.339	0.593	0.558	19
Greece	-1.280	0.890	-2.348	1.194	18
Hungary	-2.143	-0.951	-3.312	0.793	18
India	-1.109	1.595	-2.470	1.135	18
Indonesia	-2.130	-1.036	-2.704	0.501	18
Israel	0.443	1.432	-0.359	0.636	17
Italy	0.056	3.664	-1.315	1.340	21
Japan	3.790	4.920	2.724	0.644	21
Kenya	-2.354	-2.077	-2.596	0.167	15
Korea, Rep.	2.158	4.434	0.609	1.170	19
Malaysia	2.320	3.362	1.691	0.535	15
Morocco	-1.099	0.264	-1.939	0.610	15
Netherlands	3.018	6.090	1.514	1.314	17
Norway	0.043	0.511	-0.276	0.236	15
Pakistan	-1.847	-0.718	-2.656	0.676	15
Peru	-2.724	-1.624	-3.949	0.569	18
Philippines	-1.995	-1.259	-2.673	0.428	19
Poland	-1.850	-0.261	-2.804	0.744	18
Portugal	0.668	2.949	-1.186	1.323	19
S.Africa	2.052	4.102	0.482	0.949	17
Spain	1.681	6.380	-0.466	2.051	18
Switzerland	5.073	8.479	2.707	1.565	19
Thailand	0.643	1.643	-0.865	0.634	22
Tunisia	-1.013	-0.838	-1.283	0.151	18
Turkey	-2.789	-1.322	-4.388	0.776	22
UK	3.424	6.897	2.091	1.314	18
USA	2.552	5.235	0.870	1.261	18
Venezuela	-3.737	-2.060	-5.090	0.928	19

Results

Principal component analysis is the method that models the structure of the variance for the set of variables. We have utilized the principal component analysis to generate a single measure of financial development i.e. KOREAN index. It is aimed to construct a new index on the basis of the main elements of financial development. Principal components are achieved by computing the eigen value of the variance matrix. The first principal component for a given set of variable is the unit length linear combination of these variables and it has the maximum variance. After that all the other principal components actually maximizes the variance between the unit length combination and these are orthogonal to the preceding components. (Johnson and Wichtern 1992). After the first principal component each principal component is a linear combination of total variables that captures different aspect of the data. (Huang2005).

The results for the proportion of variance explained by the principal components and their accumulated values are reported in table table 5. It is mentioned earlier that due to the missing values in data principal component analysis is applied over 41 countries. We have selected the 13 financial development variables for the principal component analysis. It is observed that the first principal component has explained the maximum variation for all the countries. It is considered that cumulative proportion of the variance given by the first three principal components is 62.8\% whereas the first four principal components contain 70\% of the variation. Each of the component from 5 to 13 after that explain less than 7\% of variation. Therefore they are considered as relatively unimportant considering that useful information is captured by the first four principal components.

The positive coefficients for the first principal component PC1 in table table 5 means that it represent the overall measure for financial development. Most of the bank development indicators report positive values even in PC2 that represent more banking sector development. The maximum weight is for Bank concentration in third principal component PC3, it suggests that there is a strong influence of this variable in this component. Stock market turnover ratio contains the maximum positive weight in PC4, it is an efficiency measure of stock markets. Whereas "Deposit Money Bank Assets to (Deposit Money + Central) Bank Assets" show the largest negative weights in PC4 i.e. the efficiency measure of banks.

As mentioned earlier we have also constructed the individual indexes on the basis of banks, stock markets and insurance companies of 41 countries. Higher weights for some variables reflect the structure of the principal component, e.g. if in some country there are positive values for the bank indicators and negative for the stock market indicator for first principal component (PC1), it means that the financial development in that particular country is due to the banking sector development (Saci, 2008). It is observed that for almost all the countries have shown an increasing and upward trend in financial development. It means that it is accepted globally that financial development is an important aspect for the strength of an economy. Some countries are targeting more on their banking sector to improve, whereas others are found more concerned about the development of their financial markets.

Palley (2007) asserts that modern financial system attains more importance as compare to the economic policies and outcomes. It promotes the importance of financial sector over the real sector. It also transfers the savings and income from real sector to the financial sector.

In table table 6 the correlation between indicators of financial development, GDP per capita and first four principal components are studied. It can be seen that all of the financial development indicators and GDP per capita are positively correlated with KOREAN index i.e. PC1 in table table 6.

Table 5: Principal Components Analysis

Sample: 1988 2009

Included observations: 751

Eigenvalues: (Sum = 13, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	5.456	3.949	0.420	5.456	0.420
2	1.508	0.308	0.116	6.964	0.536
3	1.200	0.264	0.092	8.164	0.628
4	0.936	0.014	0.072	9.100	0.700
5	0.922	0.102	0.071	10.022	0.771
6	0.821	0.213	0.063	10.842	0.834
7	0.608	0.110	0.047	11.450	0.881
8	0.498	0.091	0.038	11.948	0.919
9	0.407	0.139	0.031	12.355	0.950
10	0.269	0.064	0.021	12.624	0.971
11	0.204	0.106	0.016	12.828	0.987
12	0.098	0.024	0.008	12.926	0.994
13	0.074	---	0.006	13.000	1.000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7	PC 8	PC 9	PC 10	PC 11	PC 12	PC 13
BC	0.036	0.173	0.574	0.421	-0.606	0.013	0.258	0.068	0.029	0.106	0.062	0.018	0.083
BO	0.197	0.540	-0.273	0.293	0.061	-0.027	-0.318	-0.126	-0.138	0.597	0.095	-0.012	-0.056
BA	0.240	0.038	0.212	-0.298	-0.024	0.664	-0.338	0.465	0.007	0.060	0.165	-0.035	0.055
IM	0.276	0.465	-0.072	0.248	0.040	0.155	-0.127	-0.138	-0.032	-0.736	-0.191	0.019	0.013
FI	0.033	-0.071	0.539	0.333	0.753	0.060	0.040	-0.068	0.065	0.092	-0.032	-0.029	0.024
LI	0.324	-0.128	0.112	-0.109	-0.131	-0.130	-0.306	-0.381	0.718	0.016	0.109	-0.221	-0.068
LL	0.322	0.226	-0.116	-0.116	0.184	-0.267	0.429	0.265	0.147	-0.096	0.617	0.045	0.213
NL	0.312	-0.135	0.178	-0.259	-0.051	0.162	0.113	-0.618	-0.495	0.005	0.285	0.159	-0.101
CR2	0.393	-0.018	-0.012	-0.194	0.002	-0.052	0.164	-0.040	-0.041	0.193	-0.543	-0.042	0.664
CR1	0.378	0.106	0.047	-0.182	0.031	-0.061	0.351	0.200	0.045	0.118	-0.378	-0.026	-0.695
SC	0.305	-0.262	0.122	0.106	-0.044	-0.452	-0.437	0.266	-0.148	-0.075	-0.019	0.562	-0.033
ST	0.189	-0.361	-0.397	0.430	-0.018	0.446	0.254	-0.051	0.253	0.081	0.010	0.392	-0.008
SV	0.306	-0.399	-0.150	0.340	-0.053	-0.081	-0.060	0.163	-0.320	-0.078	0.100	-0.670	-0.035

Correlation of BC BO BA IM FI LI LL NL CR2 CR1 SC ST SV

Note: Com = Component

PC= Principal Component

BC: Bank Concentration

BO: Bank Overhead Costs to Total Assets

BA: Deposit Money Bank Assets to (Deposit Money + Central) Bank Assets

IM: Net Interest Margin

FI: Foreign Direct Investments Net Inflow to GDP

LI: Life Insurance Premium to GDP

LL: Liquid liabilities to GDP

NL: Non- Life Insurance Premium to GDP

SC: Stock Market Capitalization to GDP

ST: Stock Market Turnover ratio to GDP

SV: Stock Market Total value Traded to GDP

CR2: Private Credit By Deposit Money Banks and Other Financial Institutions to GDP

CR1: Private Credit By Deposit Money Banks to GDP

Table 6: Correlation between indicators of Financial Development and PC1-PC4

	PC1	PC2	PC3	PC4
BA	0.547	0.013	0.239	-0.309
BC	0.059	0.195	0.639	0.387
BO	0.425	0.649	-0.318	0.269
CR1	0.877	0.104	0.051	-0.193
CR2	0.914	-0.061	-0.016	-0.199
FI	0.076	-0.089	0.592	0.325
IM	0.636	0.557	-0.079	0.238
LI	0.760	-0.185	0.122	-0.125
LL	0.736	0.258	-0.133	-0.124
NL	0.722	-0.196	0.201	-0.251
SC	0.713	-0.339	0.132	0.109
ST	0.437	-0.473	-0.443	0.410
SV	0.716	-0.520	-0.169	0.328
GD	0.720	-0.035	0.090	-0.116

PC1-PC4:	First Four Principal Components
BA:	Deposit Money Bank Assets to (Deposit Money + Central) Bank Assets
BC:	Bank Concentration
BO:	Bank Overhead Costs to Total Assets;
CR2:	Private Credit By Deposit Money Banks and Other Financial Institutions to GDP
CR1:	Private Credit By Deposit Money Banks to GDP
FI:	Foreign Direct Investments Net Inflow to GDP
IM:	Net Interest Margin
LI:	Life Insurance Premium to GDP
LL:	Liquid liabilities to GDP
NL:	Non-Life Insurance Premium to GDP
SC:	Stock Market Capitalization to GDP
ST:	Stock Market Turnover ratio to GDP
SV:	Stock Market Total value Traded to GDP
GD:	GDP per capita (constant 2000 US\$)

7. Conclusion

Financial development refers to the policies, factors, and the institutions that lead to the efficient intermediation and effective financial markets. It is attempted to measure financial development by utilizing thirteen variables of financial development. These proxies are from three different groups of financial system i.e. banking sector, stock market, and financial institutions. It is observed that for almost all the countries have shown an increasing and upward trend in financial their sectors. Some countries are found more focused towards their banking sector, whereas others are found more concerned about the development of financial markets.

Financial development can be measured by a number of factors including the depth, size, access, and soundness of financial system. It can be measured by examining the performance and

activities of the financial markets, banks, bond markets and financial institutions. It is observed that higher the degree of financial development in a country, the wider will be the availability of financial services. A developed financial system offers higher returns with less risk.

Financial stability can be considered as the trade-off between risks and returns. The stability and soundness of financial system is important for measuring the financial development. Financial regulations are key element in this regard. Financial soundness involves the risk related to the currency crises, systemic crises, and sovereign debt crises (Herring 2000).

A composite index KOREAN is constructed in this chapter by employing the method of principal component analysis. Principal component analysis models the structure of variance for the set of variables. It generates a single variable by combining the useful information available from a set of variables. It retains the maximum variation available in data. We have utilized the principal component analysis to construct KOREAN index. The index is based upon the 13 variables from banks, stock markets and insurance companies. The countries including Switzerland, United Kingdom, and United States appear in top 5 strongest financial economies according to KOREAN index. Overall the KOREAN Index reflects very significant results as the countries in bottom ten include Venezuela, Argentina, Brazil, Kenya, Hungary, Indonesia, Poland, Peru, Pakistan and Turkey. These countries also report low growth economies according to World Fact book 2010. So we consider our KOREAN index is a composite index that portrays a significant picture of financial development in 41 economies.

Based on the very recent financial crises, it is confusing whether shifting the savings from real sector to the financial sector are in the benefit of the economies or it can lead them to failure? Whether too much modernization in financial system leads to development or it can also become a reason for the collapse of developed financial systems? Should more importance be given to the financial sector over real sector?

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