International Journal of Research in Social Sciences
Vol. 12 Issue 11, November 2022,
ISSN: 2249-2496 Impact Factor: 7.081
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

Measuring Financial Development of China: PCA Approach

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Abstract

This article is focused on measuring the financial development of China over the period of 24 years (1992-2015). To measure the financial development of China a financial development index (FDI) is constructed by considering some relevant financial sector variables. The variables considered for the index are broad money, domestic credit to the private sector and market capitalization. Data for the study is sourced from the World bank database. Principal component analysis (PCA) approach is applied to construct the index. The findings of the study reveal that the financial development of China has increased very rapidly over the study period.

Keywords:

Financial Development

Financial sector

PCA Approach.

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1. Introduction

Financial system is a very vital sector for any economy. The importance of this sector can be easily understood by the 2009 subprime crises as the World Trade Organisations (WTO) mentioned that one of the possible reasons for the crises was affected financial systems worldwide. This incident shows the importance of having a strong and stable financial development for an economy. It is also very important to know the progress made in financial sector so that further required actions can be taken by the policy makers. And to find out the progress made in financial sector over a period with comparison to other economies as well as past financial progress the country itself is very important. But measuring financial development of any economy is very challenging for researchers as financial sector of any economy is very vast and dynamic and different researchers have used different proxies and methods for measuring financial development of economies. Ang and Mckibbin (2007) used liquid liabilities to nominal GDP, commercial bank assets to commercial bank assets + central bank assets and domestic credit to private sector

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nominal GDP to construct financial development index of Malaysia. Khan and Qayyum (2007) used the ratio of total bank deposit liabilities to GDP, ratio of clearinghouse amount to GDP, ratio of the private credit to GDP, and ratio of the stock market capitalization to GDP to construct financial development index of Pakistan. Kar et al. (2008), constructed financial liberalization index for Turkey by using M1/Y, M1/M2, and M2/Y. All these studies have calculated the weights of the financial indicators by using the principal component method (PCM). So, in this study an attempt is made to measure the financial development of China by constructing a financial development index over the study period. This attempt is made as there are no standard financial development measures developed by the researchers as well as world organisations. Few indices are constructed but they are very broad in nature which makes them not easy to understand. An index is a statistical aggregate of a group of related variables which measures change in magnitude of those variables to measures their performance. Different indices have different methodology which are mainly expressed in terms of change from base value. In this study also, to measure financial development a group of variables are considered which contribute to financial development of a nation. The variables considered to construct the financial development index of China are domestic credit to private sector as % of GDP, market capitalization of domestic credit to private sector as % of GDP and broad money as % GDP (Rousseau and Wachtel (1998), Xu (2000), Fase and Abma (2003), Rioja and Valev (2004) Rahman (2004) Tahir (2008)). The above variables cover the overall size of the financial sector as well as the depth of banking and stock market depth respectively (Svirydzenka, 2016). Principal Component Analysis (PCA) approach is followed to obtain the weights of variables and for the purpose of construction of the index.

The rest of the study is organised in the following sections: in next section the literature review is discussed, third section of the study have detailed research methodology of the research, The result and discussion section have the results and findings of the study, The last section of the study is conclusion and policy recommendations of the study. review of literature, research methodology, result and discussions followed by findings and policy implications of the study.

2. Literature review

As per literature, Schumpeter (1911) was earliest economist who laid down the importance of finance and services of financial intermediaries in promoting innovation and growth in an economy. Some other economists also mentioned that financial sector helps in growth of an economy. But it was Goldsmith (1955) who did a systematic analysis between financial development and economic growth and found sound positive correlation between financial development and level of real per capita GDP. C. Rangarajan (1998) also highlighted the importance of financial sector in achieving the sustainable economic growth. In some recent literature also, many researchers have tried to measure the financial development and checked the impact of financial development on different spheres of the economy like economic growth, development, and trade.

Fatima (2004) considered liquid liabilities, domestic credit provided by the banking sector, domestic credit to the private sector to measure the financial development while examining the relationship between financial development and economic growth. Chinn M.D. et al. (2008) considered stock market capitalization, domestic credit to the private sector, capital openness index variables to reflect the financial development. Lu S.F., Yao Y. (2009) analysed financial development, effectiveness of law and economic growth of China over the period of 10 years. And proxies considered for financial development were share of credit, bank competition, share of private credit and effectiveness of legal system. Findings of study revealed that improving law alone cannot enhance total financial development of China. Burcu et al. (2009) examined the relationship between financial development and economic growth in 10 emerging countries over the period of 40 years (1968-2007). They considered liquid liabilities, Bank credit, Private sector credit as financial development variables. The results showed long-run relationship between financial development and economic growth. Dogbey J. (2010) tried to find out whether financial development is communicable or not. He used domestic credit to the private sector, private credit by the banking sector and stock market total value traded as financial development proxies. Hye Q.M.A, (2011) constructed financial development index for India and examined the relationship between financial development and economic growth. To construct the index PCA approach was used. Minija K. (2012)also checked relationship between financial development and economic growth of India. Firstly, financial development index is constructed of India by using PCA approach in pre-liberalization period and post-liberalization period. For cointegration researcher applied bounds test for cointegration, and for direction of causality pair-wise granger causality test was applied. Findings of the study revealed that the cointegration exists between the variables in post-liberalization period only. Takyi P.O., Obeng C.K (2013) investigated the determinants of financial development in Ghana from 1988 to 2010 using ARDL approach. To reflect the financial development of Ghana he used only domestic credit to private sector. Badeeb R.A., Lean H.H (2015) tried to highlight the major determinants of financial development in Yemen. And the result demonstrated trade openness, economic growth, natural resource dependence and inflation are the main determinants of financial development in Republic of Yemen.

3. Research Methodology

The present study is focused on measuring the financial development of China over the period of 1992-2015 by construction financial development index of China. The data for the study is sourced from the world bank database. And the variables used for construction of financial development index are broad money, market capitalization, domestic credit to the private sector.

3.1 Definitions of Variables Considered in Study

- **Broad Money (% of GDP)** - Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveller's checks; and other securities such as certificates of deposit and commercial paper (World bank database, 2020).
- **Market Capitalization of Listed Domestic Companies (% of GDP)** - Market capitalization (also known as market value) is the share price times the number of shares outstanding (including their several classes) for listed domestic companies. Investment funds, unit trusts, and companies whose only business goal is to hold shares of other listed companies are excluded. Data are end of year values (World bank database, 2020).
- **Domestic Credit to Private sector (% of GDP)** - Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies (World bank database, 2020).

3.2 Methodology of Financial Development Index

- Initially, the yearly data of the financial development variables is taken over the study period.
- At next step, factor scores of the variables are obtained through PCA.
- After obtaining the factor scores the scores are rescaled to the 100.
- Next, the rescaled weights are multiplied by corresponding variable value.
- And finally, the value obtained after multiplication is divided by 100.
- The obtained value is financial development value in that year.

4. Result and Discussion

This section of the study has empirical outcomes of the study. Initially, behaviour of the variables of financial development is analysed over the study period. And later, the financial development index results are presented and discussed in detail.

4.1 Behaviour of the variables

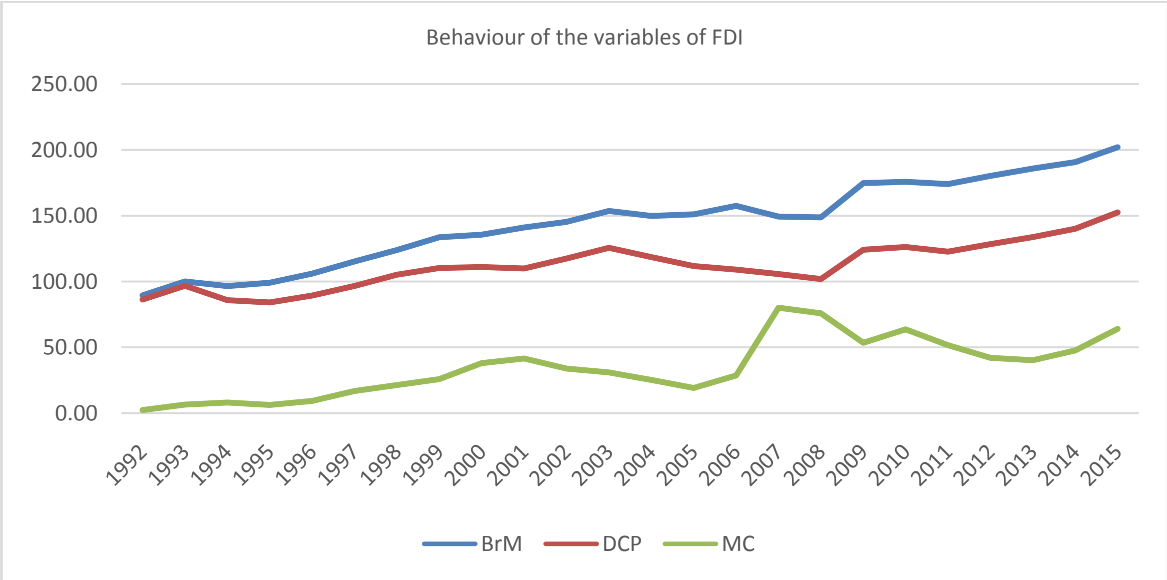

Figure 1

Figure 1 shows the trend and pattern of financial development index variables of China. In figure 1 BrM, DCP and MC denotes broad money (% of GDP), domestic credit to the private sector (% of GDP) and market capitalization respectively. In figure, the broad money and domestic credit to private sector of China have an increasing trend except for a little bit fluctuation around 2006. In 1992 broad money was 89.46 % of GDP and attained a height of 202.06% of GDP in 2015. Domestic credit to private sector follows same pattern as of the broad money. In 1992, Domestic credit to private sector was 86.37% percent of GDP and at the end of the study period, it was 152.55%. This increase in DCP is witnessed because a lot of investment projects are going in China for the last 3 decades and entry of some foreign banks into the market (Allen & Qian et al. 2014). Market capitalization also has a fluctuating trend during the study period. In China Stock exchange came into existence in 1991 and since its establishment growth has been uneven and irregular. In 1992, it was 2.4% of GDP and at the end of study period, it becomes 64.14 %. The highest and lowest market capitalization was 2.4% in 1992 and 80.14 % in 2007. China's stock market scale and importance are not comparable with China's banking sector as it is noteffective as the banking sector in allocating resources in the economy due to its speculative nature insider trading in the equity market (Allen & Qian et al. 2014).

4.2 Financial Development Index of China.

Table 4.1: Factor Scores of Variables	
Variables	Factor Scores
Broad Money (% of GDP)	36
DCP (% of GDP)	34
MC (% of GDP)	30
Authors' Computation with E-Views 10.	

Table 4.1 has the weights of variables of financial development index of China. Based on eigenvalues the first component is explaining the 84.72%. Results of PCA, which clearly indicates that the first principal component explain the variations of the dependent variable better than any other linear combination of explanatory variables. In this case, first component is the best measure of financial development. So, to construct the financial development index, weights of variables given by first eigenvectors are considered. After rescaling the individual contributions to 100 are presented in Table 4.1. These weights are used for weighting the variables to construct financial development index of China.

Table 4.2: Financial Development Index of China.			
Year	FDI (China)	Year	FDI (China)
1992	62.29	2004	101.85
1993	70.93	2005	98.17
1994	66.37	2006	102.42
1995	66.16	2007	113.75
1996	71.35	2008	110.95
1997	79.43	2009	121.22
1998	86.78	2010	125.34
1999	93.40	2011	119.89
2000	98.02	2012	121.21
2001	100.70	2013	124.50
2002	102.45	2014	130.64
2003	107.29	2015	143.85
Authors' Computation with MS Excel 2016.			

Figure 2

In Table 4.2 and Figure 2 is presentation of financial development index of China in tabular and graph form respectively. Based on the figure, it is clearly visible that the financial development of China has increased rapidly over the study period except few small downward fluctuations around 2004, 2008 and 2011. The China has made very good improvement in the financial system after its reforms and this improvement is mainly in case of the banking sector as compared to the stock market. According to the financial development index, the financial development of China was 62.29 in 1992 but it reached to 143.85 in 2015. In between it faced bit downwards fluctuations because of its fluctuations in stock market and global financial crises.

Table 4.3: Descriptive Statistics of Financial Development Index of China.	
	FDI (China)
Mean	100.79
Median	102.13
Maximum	143.85
Minimum	62.29
Std. Dev.	22.62
Skewness	-0.16
Observations	24

In Table 4.3 descriptive statistics of the financial development index of China are presented to understand the general behaviour of the financial development index over the study period. The mean and median value of financial development index is 100.79 and 102.13 respectively over the study period. The maximum and minimum value of the financial development index is 143.85 and 62.29 respectively over the study period. The standard deviation of the index is 22.62. And the skewness of index is -0.16.

5. Conclusion, Findings and Policy Implications

In this study, an attempt was made to construct the financial development index of China over 24 years from 1992- 2015. The index was constructed by using the PCA approach. But prior to index construction the behaviour of variables of index was also analysed. Among financial development variables market capitalization of China has a very fluctuating trend as compared to the DCP and BrM. DCP and BrM has a very rapid increasing trend with just one downward fluctuation in between over the study period. Results of index reveal that that financial development of China has increased with few downward fluctuations over the study period. To have a better financial development the China should focus more on stock market stabilization with better long-term reforms in financial sector. A better financial development can reap many direct and indirect benefits to the different spheres of Chinese economy. As many researchers have mentioned in their study findings that financial development is very vital in economic growth and development of an economy.

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