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Financial Development, Industrialisation, Urbanisation and the Role of Institutions: A Comparative Analysis between India and China

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Abstract: This paper explores the impact of industrialisation and urbanisation on financial development by incorporating the role of institutional quality for India and China over the period of 1970-2013. We apply the bounds testing approach, which accommodates structural breaks, in order to test the presence of cointegration between the variables. The results show the existence of long-run dynamics between the series. Furthermore, we establish that industrialisation and urbanisation lead to financial development and that the lack of institutional quality and government size reduces financial development. Trade openness enhances Indian financial development but hinders Chinese financial development. The causality analysis depicts the bidirectional causality between urbanisation (industrialisation) and financial development for India. In the case of China, the urbanisation Granger causes financial development, and the feedback effect exists between industrialisation and financial development. Institutional quality is found to be the core factor in enhancing financial development in both countries with a feedback effect.

Key words: India, China, Financial Development, Institutions

1. Introduction

In the last three decades, both developed and developing countries have modernised their financial systems; India and China are no exception. In both countries, financial systems have become much deeper by following broad-based standard measures. The financial system in India has evolved from being constricted and undersized to becoming more open, deregulated and market-oriented after undergoing a number of policy changes. Since the 1960s, government control has increased, and allocating credit has become common in the pursuit of development

programmes. Nationalisation of the 14 largest commercial banks was initiated in 1969. The late 1980s were marked as the start of the gradual liberalisation of the financial system. In 1991, the Indian government initiated a comprehensive market-oriented program, the core of which was a phased deregulation of the financial sector, along with reforms of trade and industrial policies. The broad indicators of financial development showed an upward trend in the1990s, after the implementation of financial sector liberalisation programmes. Among the key changes were the relaxation of quantitative controls, the deregulation of the interest rate structure, the introduction of new money market instruments, and the overall reform within the banking system, money and capital markets.

Since economic liberalisation in late 1970s, China has grown more than twenty-fold in real terms, while the Indian economy has expanded 6.5 times between 1978 and 2011. Financial development opened up foreign direct investment (FDI), increased banking participation, and expanded the stock equity and the bond markets of these two countries. For example, stock market capitalisation increased from 4% to 80% of the GDP for China between 1992 and 2010; for India, it increased from 22% to 95% of the GDP. In China, the size of the banking system measured in terms of total bank credit to non-state sectors is 116% of the GDP over 2001-2007, while this figure is only 37% for India (Allen et al. 2012). Expansion of private sector financing has taken place, particularly after the reform periods.[1]

China's banking system is dominated by the four largest state-owned banks.[2] The level of non-performing loans over GDP has declined over the years after its peak during 2000-2001. The Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE) were established in 1990, which mostly remain speculative and are led by insider trading. Alternative financing channels such as informal financial intermediaries, internal financing and trade credits play a significant role through the 'Hybrid Sector', a major source of growth in China.[3] In this respect, the role of the state and listed sectors is less dominant in influencing the growth of the economy. China's inclusion in the World Trade Organization (WTO) in 2001 accelerated the integration of the economy with the rest of the world. Total investment in the real estate sector was approximately $3.12 trillion in 2007, which was the same size as the stock market (Allen et al.

[1]Didier and Schmukler (2013)
[2]The Bank of China (BOC), the People's Construction Bank of China (PCBC), the Agriculture Bank of China (ABC), and the Industrial and Commercial Bank of China (ICBC).
[3]He et al. (2014)

2012). Since 1998, the real estate market has grown significantly due to changes in housing assistance by government companies, development of an individual mortgage system, and rising rural-urban migration due to urbanisation and industrialisation. Overall, China's economic growth is fuelled by non-standard financial sectors that are dominated by trust, reputation and friendships compared to Western-style legal institutions, such as banking and non-banking financial institutions.

Sankhe et al. (2011) emphasise that the Indian urban population will be driven by the young population in the future and therefore needs to optimise the productivity and GDP potential of its cities. According to the 2011 census, the urban population increased from 286 million to 377 million between 2001 and 2011.

An increasing urban population with young workers could be a source of 'demographic dividends' in the future for India. It is therefore critical that India remove barriers in the financial and other sectors in creating growth and development for its massive urbanisation and younger population.

China is urbanising at an accelerating rate. According to the National Bureau of Statistics, the population was 1.34 billion in 2010, with 50 percent living in cities. Rapid urbanisation is a product of China's transition to a market economy. Urbanisation began in a difficult fiscal environment that worsened through the first two decades of reform. Financial mechanisms and strategies for Chinese municipalities were well managed in this environment. Despite the inauspicious start, China's spectacular economic growth performance over this period appears to provide prima facie evidence that the government has managed the urbanisation process sufficiently.

This paper raises a significant research question as to whether industrialisation and urbanisation induced financial development of these two global economic powers. In exploring this, we analyse the impact of industrialisation and urbanisation on financial development by incorporating the role of institutional quality for both economies over the period of 1970-2013.

To the best of our knowledge, there is no single study in the literature that primarily covers the dynamic linkages between these indicators in explaining financial development covering the longest available time period. In doing so, we have employed the bounds testing approach of Pesaran et al. (2001) and accommodated structural breaks in order to test the presence of cointegration between the variables for both countries. The dynamic relationships are

obtained using the variance decomposition techniques in a vector autoregressive (VAR) framework. Finally, impulse response functions are computed in order to examine the dynamic properties of the system beyond the sample period for forecasting purposes.

For both countries, we establish the existence of cointegration between the series. Furthermore, urbanisation and industrialisation lead to financial development, and the lack of institutional quality and government size reduces financial development. Trade openness increases Indian financial development but reduces Chinese financial development. The causality analysis depicts the bidirectional causality between urbanisation (industrialisation) and financial development in India. For China, the urbanisation Granger causes financial development, and the feedback effect exists between industrialisation and financial development. Institutional quality causes financial development and in return, financial development causes institutional quality. This study offers some policy implications at the aggregate level. Our findings suggest that finance is important for both countries and that financial development is integrated with trade, urbanisation and industrialisation. The role of the government and institutions are significant in this respect.

The rest of the paper is organised as follows. Section 2 provides a brief review of the literature. Section 3 describes the model, data and the proxy measures of financial development and other variables. Section 4 presents the empirical findings with a discussion. In the final section, we compare the major findings for both countries and highlight some policy implications.

2. Brief Overview of the Literature

The seminal research by Schumpeter (1911) sparked a voluminous amount of research in the finance-growth nexus. Early studies by Goldsmith (1969), McKinnon (1973), Shaw (1973), Rajan and Zingales (1998) and others have indicated financial development as the engine of long-term economic growth[4]. Urbanisation and industrialisation require access to domestic and foreign capital and a developed financial market. Having a developed financial system in an economy also helps with the saving and investment decisions of individuals and firms. Government policies and legislation that require greater information disclosure can help in making investment decisions. We relate different key indicators of our study with financial development here.

[4]Levine (2005) presents a survey of this literature; see Ogawa (2015) for a recent review.

2.1. Urbanisation, Industrialisation and Financial Development

Urbanisation is a major demographic trend for both China and India, with potentially major consequences for financial development. Over the past few decades, dramatic growth and structural changes have taken place in both economies. Massive foreign direct investment has accelerated the urbanisation of both countries. Yao-jun (2005) describes the relationship between Chinese financial development and urbanisation growth. In the Indian context, Kundu (2013) presents the urbanisation process as relating to different aspects of development, including the financial sector.

2.2. Institutions, Government and Financial Development

The workings of political institutions shape political actors' incentives to provide financial development. On the one hand, interest groups may be obstacles for financial development. Rajan and Zingales (2003) suggest that financial development may foster competition by allowing credit-constrained firms to enter the market. This may create a political constituency against financial development by incumbents. The incentives and strength of interest groups to fend off financial development will be lower with greater trade openness and access to finance.

On the other hand, following Haber et al. (2003), the government may limit financial development, regardless of the structure of the interest groups in the society. Government officials may prefer to maintain a lax financial institutional environment. Governments would be less inclined to 'play the system' to the extent that fiscal and financial management capacities are greater. Governments and international organisations should be very proactive in supporting sectors that are highly credit dependent. Demetriades and Rousseau (2011) suggest that government expenditure has a positive effect on the financial development of countries that are in the middle range of economic development, with a strong negative effect on rich countries and an insignificant effect on poor countries. The lack of government expenditure may affect poor countries due to insufficient infrastructure or property rights in an effectively functioning financial system.

On the other hand, large government size may hurt high-income countries with the crowding-out effect. Becerra et al. (2012) emphasise the role of the government in shaping the financial system. For economies with a limited capacity to tax at the state level, government officials are more inclined to abuse the system by directing resources towards their own

functioning. This may cause an increase in the cost of private capital and create a barrier to financial activities.

Legal origin, legal rules and the quality of law enforcement can be a major strength of broad financial markets as suggested by La Porta et al. (1997) and Beck et al. (2002). Other factors that reflect the willingness and ability to protect individual property rights and indicators of the political environment as suggested by Barro and Lee (1994) and Bordo and Rousseau (2012), may also influence financial development. Campos et al. (2012) report that the financial system has a positive effect on economic growth in the long run. They state that political instability in Argentina may affect short run findings.

2.3. Trade Openness and Financial Development

Possible linkages between finance and trade openness open further channels through which the financial and real sectors may interact. A developed financial system may be a source of comparative advantage for industrialisation in accessing external finance, as suggested by Beck (2002). Therefore, financial development goes hand in hand with trade openness and industrialisation. On the other hand, trade openness may be associated with the emergence of new financial products in the market. Therefore, financial institutions may be engaged in risk diversification as suggested by Svaleryd and Vlachos (2002). Baltagiet al. (2009) report trade openness as a key determinant for banking sector development. A recent study by Menyah et al. (2014) establishes a unidirectional causality running from financial development to trade openness in the case of Burundi, Malawi, Niger, Senegal and Sudan. Trade openness causes financial development in Gabon only.

Despite this voluminous literature on the development of financial markets and growth, rigorous studies that link financial market development with other variables in the real sector are sparse, particularly from the developing world. Demand (viz. industrialisation, urbanisation and trade openness) and supply side factors (viz. legal, political and institutional structures) play a significant role. Most studies in the literature are based on either heterogeneous countries or a stand-alone country. In retrospect, our research is motivated by three factors. First, as discussed above, both China and India have reformed their economic and financial systems to improve the efficiency of financial institutions in achieving higher economic growth since the 1980s. We trace here the time series properties of financial development over four decades for these two

countries, which have similarities in many aspects of development. Second, we establish long-run dynamics between urbanisation, industrialisation, the role of institutions and trade openness with financial development. Third, our multivariate framework of the model with a similar time frame establishes the direction, structural break and strength of the causal link between the real and financial sectors.

3. Model and Data

It is often believed in economic theory that before carrying out any empirical exercise, an effective discussion of the theoretical setup linking the causal relationship between urbanisation, industrialisation, institutional quality and financial development in any emerging economy deserves valuable consideration from the viewpoints of wide readership and contributes to conceptual clarity. Given the absence of the theoretical discussion, the rest of the empirical analysis is assumed to be meaningless in the field of empirical literature. Therefore, we proceed to analyse the underlying theoretical issues that bind together the empirical framework for emerging economies such as India and China. Both industrialisation and urbanisation are expected to induce the financial development of an economy in the sense that growing industrialisation attracts the migration of labour to the process of production. Therefore, the increasing production process of the new emerging economy requires more financial resources to fund existing business in the form of purchasing raw materials and paying wages to labour because both capital and labour are being used as potential inputs in the expansion of industrial activities. This indicates that the development of the financial system is positively linked with the industrialisation process of an economy.

Urbanisation may positively affect economic growth and financial development in an economy. An increase in urbanisation in the search for job and living opportunities requires some amount of financial assistance from formal (e.g., banking sector) and informal (e.g., microfinance) institutions for the day-to-day survival of migrants. This further indicates that although people earn wages from their employment in industrial sectors, their wages are unable to support them beyond the subsistence level of consumption and, hence, greater financial development is necessary for industrial labour in order to accommodate their long-term investments in the housing and education sectors.

However, institutional quality plays a vital role in enhancing the financial development of an economy (Law et al. 2015). In this regard, Mishkin (2009), in a theory-based paper, argues that institutional quality is expected to play a propelling role in fostering the financial development of an economy through the globalisation channel, further indicating that globalisation is one source of financial development for developing or emerging economies. It can be seen that most developing countries are found to be poor in terms of not having well-established financial development.[5]In order to have a developed financial system, Mishkin (2009) suggests that developing countries need to open their economies to the rest of the world. This results in an improvement in the quality of domestic financial institutions and the maintenance of a strong financial infrastructure (e.g., effective property rights, effective legal systems, less corruption, higher degree of corporate governance and sound financial regulations).

Maintaining a strong financial infrastructure is ideally possible only if an economy is open to the rest of the world, particularly in finance and trade. For instance, opening domestic markets to foreign financial institutions promotes reforms to the financial system that improves its smooth functioning and channels resources to the most efficient investment avenues. Eventually, competition continues to increase between domestic and foreign financial institutions and creates logistical pressure for the governments of developing countries to initiate financial sector reform for the improvement of domestic financial institutions as well as for economic growth and development. This is because domestic financial institutions are unable to compete with foreign banking institutions because of their familiarity with advanced financial systems, best practices and well-maintained financial infrastructure. This also shows that domestic financial institutions need to account for well-developed financial infrastructure that will lead to further financial development. Following the existing literature and theoretical setup, the empirical equation is modelled as follows:

$$\ln F_t = \beta_1 + \beta_2 \ln U_t + \beta_3 \ln I_t + \beta_4 \ln S_t + \beta_5 \ln G_t + \beta_6 \ln O_t + \mu_i \qquad (1)$$

[5]Fase and Abma (2003) find that financial development is a significant factor for growth and development in Southeast Asian economies. Moreover, Hsueh et al. (2013) also recently established that financial development leads to economic growth in Asian economies. For a discussion on the significance of financial development on economic growth, see Levin (2003) and Ang (2008).

where F_t is real domestic credit to the private sector for per capita proxy for financial development;[6] U_t is the urban population measure for urbanisation; I_t is the real industrial value-added per capita proxy for industrialisation; S_t is the measure of the institutional quality index based on Corruption, Rule of Law, Bureaucratic Quality, Government Repudiation of Contracts and Risk of Expropriation; G_t is real government consumption per capita; O_t is real trade per capita; and μ_i is the normally distributed error term. We have transformed all the series into natural logarithms.

We have used annual data for an empirical analysis for the period 1970-2013. The data on real GDP (US$), real industry value added (US$), real domestic credit to the private sector, real government spending (US$), real trade (US$) and urban population are from the World Development Indicators (CD-ROM, 2014) series published by the World Bank. The data on total population are also from the same source and are used to transform the variables into per capita units. The data on institutional quality are obtained from the Freedom House.[7]

The existing applied economics literature provides numerous approaches to examining whether cointegration exists between the variables. These approaches include the Engle-Granger (1987) residual-based bivariate cointegration test, bivariate and multivariate maximum likelihood, the Johansen and Juselius (1990) approach, and the fully modified ordinary least square method(FMOLS) developed by Philips and Hansen (1990). Stock and Watson (1993) developed the dynamic ordinary least squares (OLS), i.e., leads and lags dynamics have been employed to investigate the long-run linkages between the variables. These cointegration tests are not suitable for small data sets with mixed orders of integration of the variables (Shahbaz et al. 2015). This indicates that biased empirical evidence from a financial development analysis misleads us in formulating appropriate economic policies for sustainable financial development by using industrialisation and urbanisation as economic tools. To overcome this issue, we have chosen the

[6]There are many indicators for financial development in the literature. Khan and Senhadji (2003) use the ratio of M2 money stock to GDP as a proxy for the volume of the financial sector and the level of monetization. M3 money stock, as a share of GDP, captures the volume of liquid liabilities in the financial sector. In other studies, the ratio of commercial bank assets to total assets (held by commercial and central banks) is considered a proxy for the relative importance of commercial banks within the financial sector (Rioja and Valev, 2004). Ang and McKibbin (2007) prefer the ratio of domestic credit to the private sector as a measure of financial development. This measure excludesthe credit issued by the central bank to the government. Domestic credit to the private sector allows commercial banks to allocate savings for profitable investment within an economy.

[7]House (2013).

bounds testing approach (autoregressive distributed lag modelling) developed by Pesaran et al. (2001) to test the cointegration amid the series. We have used the unrestricted error correction (UECM) version of the bounds testing approach to cointegration, and UECM is modelled as follows:

$$\begin{aligned}\Delta \ln F_t = {} & \alpha_1 + \alpha_t T + \alpha_2 \ln F_{t-1} + \alpha_3 \ln U_{t-1} + \alpha_4 \ln I_{t-1} + \alpha_5 \ln S_{t-1} + \alpha_6 \ln G_{t-1} \\ & + \alpha_7 \ln O_{t-1} + \sum_{i=1}^{m} \beta_1 \Delta \ln F_{t-1} + \sum_{i=0}^{m} \beta_2 \Delta \ln U_{t-1} + \sum_{i=0}^{m} \beta_3 \Delta \ln I_{t-1} \\ & + \sum_{i=0}^{m} \beta_4 \Delta \ln S_{t-1} + \sum_{i=1}^{m} \beta_5 \Delta \ln G_{t-1} + \sum_{i=1}^{m} \beta_6 \Delta \ln O_{t-1} + \mu_i \end{aligned} \quad (2)$$

where, Δ is the difference terms; α_i, i =2, 3, 4, 5, 6, 7 show the long-run relationship; β_s, s =1, 2, 3, 4, 5, 6 are short-run dynamics; and μ_i is the error term. This approach tests the presence of cointegration if the variables have a mixed order of integration or the variables are integrated at the level, i.e., I(0), or at 1st difference, i.e., I(1). For this purpose, we compute the ARDL F-statistic by using the joint significance of the lagged level estimates. Using equation 2 where $\Delta \ln F_t$ (financial development) are dependent variables, the null hypothesis of no cointegration is $H_n : \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = 0$, and the alternative hypothesis of cointegration is $H_a : \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq \alpha_7 \neq 0$. The null hypothesis may be accepted if cointegration is absent. We replace the dependent variable explanatory variables to test whether cointegration is present amid the series, following Shahbaz et al. (2015). The F-statistic can also be computed by the following empirical models, i.e., $F_F(F_t / U_t, I_t, S_t, G_t, O_t)$, $F_U(U_t / F_t, I_t, S_t, G_t, O_t)$, $F_I(I_t / F_t, U_t, S_t, G_t, O_t)$, $F_S(S / F_t, U_t, I_t, G_t, O_t)$, $F_G(G_t / F_t, U_t, I_t, S_t, O_t)$ and $F_O(O_t / F_t, U_t, I_t, S_t, G_t)$. We compare our computed F-statistic with the critical bounds to decide whether cointegration exists amid the series. The upper and lower critical bounds developed by Pesaran et al. (2001) have a non-standard distribution and are not suitable for small sizes. Narayan (2005) provided critical bounds ranging from 30-80 observations at the 1%, 5% and 10% significance levels with various lag lengths. We compare our computed ARDL F-statistic with Narayan's (2005) upper and lower critical bounds. We compare our F-statistic with the lower critical bound once all the variables are integrated at the level or first difference. We can reject the hypothesis of no cointegration when our computed F-

statistic is greater than the lower critical bound or vice versa. We use the upper critical bound if all the variables are integrated at 1st difference, i.e. I(1) or I(0)/I(1). In such a case, we may conclude that cointegration is present between the variables if the upper critical bound is less than the computed F-statistic. If the computed ARDL F-statistic falls between the upper and lower critical bounds, then the decision about cointegration is questionable. Finally, we apply the CUSUM and CUSUMsq tests to verify the stability of the estimates of the bounds testing approach.[8] We investigate the direction of the causal relationship between financial development, urbanisation, industrialisation, government size, institutional quality and trade openness by applying the vector error correction (VECM) method Granger causality approach.[9]

4. Empirical Findings and Discussions

It is well known in the classical econometric literature that estimated results appear to be biased without testing the integrating properties of the variables. It is often argued that the use of stationary variables in the cointegrating equation will tend to produce spurious or meaningless results. To be free from spurious results, it is important to use the level series in the estimation of cointegration techniques, which requires the level series to be integrated in the order of the I(1) process.

To examine the integrating properties of the variables, we have employed the Ng-Perron (NP) unit root test. From Table-1, the Ng-Perron unit root test indicates that all variables (financial development, urbanisation, industrialisation, institutional quality, government size, and trade openness) are non-stationary at the levels and are also found to be stationary after first differencing for India and China. Although the Ng-Perron unit root appears to be the standard test compared to other conventional unit root tests (ADF and PP), this may produce inefficient findings due to its low explanatory power as well as not considering relevant information about structural break(s) in the series.

Insert Table1 here please

To overcome this problem, we have applied the Zevot-Andrews (ZA, 1992) unit root test. The ZA single structural break unit root test results for India and China are shown in Table2. The

[8]We also employ diagnostic tests to examine the presence of the normality of the residual term, serial correlation, ARCH, white heteroscedasticity and specification of functional form of the empirical model.
[9]Theoretical details are explained in Shahbaz et al. (2015).

results are non-stationary for both countries at the level series of financial development, urbanisation, industrialisation, institutional quality, and government size and trade openness with structural breaks. The break years for India are between 1981 and 2005, while for China, the years are between 1984 and 2005. Both countries have experienced significant economic, financial and trade reform during this period. This indicates that both India and China have improved their growth status by implementing various economic, financial and trade reforms in the areas of the financial sector, urbanisation, industrial activity, and institutional quality. Moreover, both economies reflect successful growth and reform policies through effective government spending and size expansion. From these perspectives, it is strongly argued that both economies grow at the same intensity due to the similar characteristics in the population, fertile demographic trend, and greater role by the government. Considering this scenario, the results further show that all level series are found to be stationary and significant after first differencing, indicating the potential advantage of the ZA unit root test over the NP test.

Insert Table 2 here please

The ARDL bounds testing approach is known to be sensitive to lag length selection and, therefore, we have employed the Akaike Information Criteria (AIC) to determine an appropriate lag length. The advantage of using AIC is that AIC has super power properties for small sample data compared to other traditional lag length criteria, such as the final prediction error (FPE), Schwarz information criteria (SIC), and Hannan-Quinn (HQ) information criteria (Lutkephol, 2006). We find the optimum lag length for both economies (India and China) are decided by AIC as shown in column2 of Table-3. We have also estimated ARDL-F statistics in order to show whether cointegration is present among the variables.

The results reported in column-4 of Table-3 for India show that our computed F-statistic exceeds the upper bound at the 5% level of significance when we use financial development, urbanisation and industrialisation as dependent variables. The results further reveal that our computed F-statistic surpasses the upper bound at the 1% level of significance when using institutional quality as the dependent variable. This confirms the presence of four cointegrating vectors and cointegration among the variables over the period of 1970-2013.

Insert Table 3 here please

Similarly for China, our computed F-statistic exceeds the upper bound at the 5% level of significance when we use financial development and government size as dependent variables. On the other hand, the computed F-statistic surpasses the upper bound at the 1% level of significance when we employ institutional quality and trade openness as dependent variables. These results also confirm the presence of four cointegrating vectors and, hence, cointegration between the variables for China over the period of 1970-2013.

The ARDL bounds testing model has passed the test of normality, ARCH, Reset and serial correlation. This indicates the absence of non-normality, autoregressive conditional heteroskedasticity, specification and serial correlation.

The presence of cointegration among the variables enables us to examine the impacts of urbanisation, industrialisation, institutional quality, government size and trade openness on financial development in the long run for India and China. The long run results for India and China are presented in Table-4 with the help of various long-run conventional and dynamic OLS techniques. From an empirical perspective, we find that financial development is statistically significant and positively linked with urbanisation, industrialisation, and trade openness while being statistically significant and adversely linked with institutional quality and government size at the 1% and 5% levels of significance across various models for India. Urbanisation adds financial development in the long run for India, indicating that the higher the level of urbanisation is, the greater the demand is for financial services, ultimately leading to financial development in the Indian economy.

Insert Table 4 here please

Similarly, the positive financial development effect of industrialisation is found for India, which reveals that a rise in industrial activity requires more financial capital to fund investment and thereby enables the financial sector to grow in order to mitigate the financial services of business firms in industrial activity. A similar positive long-run relationship between financial development and trade openness is also found for India, suggesting that greater trade openness has the capacity to encourage the domestic economy to attract more foreign investors in

investing their financial capital in long-term projects. In this way, the domestic financial sector in an emerging economy such as India has a higher probability of being developed due to exposure to foreign technology and managerial skills as well as access to their large inflows of financial capital. Surprisingly, we also find that neither institutional quality nor government size improves financial development for the Indian economy in the long run. This indicates that although the Indian economy has benefited from trade liberalisation, the lack of governance and quality government intervention, increasing corruption and stringent government restrictions are responsible for lower financial development in India. Government size does not improve long-run financial development in India. This indicates that the benefits of increasing the government consumption expenditure does not extend to financial development because the government expenditure being spent may benefit the elite rather than the society at large. In other words, fiscal spending by the government may have increased various branches of the banking sector in urban areas but not the rural areas as expected. Such a situation may be responsible for the adverse consequence of government size on financial development for India in the long run.

Table-4 shows long-run results for China, indicating that financial development is statistically significant and positively linked with urbanisation and industrialisation at the 1% level of significance across various models. Similarly for China, financial development is also statistically significant and adversely linked with institutional quality, government size and trade openness at the 1% and 5% levels of significance across various models. We empirically conclude that both urbanisation and industrialisation improve financial development in the long run. This indicates that the greater rate of migration taking place from rural to urban areas is leading to a rise in the urban population growth in China, thereby pushing many people into urban areas where they open bank accounts in order to access financial services from the banking industry. As a result, an increasing demand for the banking industry in the urban areas of China may be responsible for financial development in the long run. Industrialisation improves financial development in the Chinese economy in the long run, reflecting that both urbanisation and industrialisation are believed to be highly correlated in the remit of economic theory. This is because increasing urbanisation induces higher industrialisation activity because industry primarily necessitates labour as an input in the process of intermediate and final production of commodities, and ultimately, commodities are demanded by the labour that is engaged in the industrial activities. Business firms in the commodity industry need more financial capital from

the banking industry in order to fund their investment activities, which are necessary for the process of production. In this way, we believe that industrialisation improves financial development for China in the long run. More interestingly, we also find that for China, trade openness, institutional quality and government size impede financial development in the long run.[10] This shows that the Chinese government needs to improve the institutional quality, create a favourable environment for exports and imports, and expand the productivity driven government size for the greater benefit of financial development in the long run.

Table-5 shows the short-run results for India and China. For India, we find that financial development is statistically and positively linked with urbanisation and industrialisation in the short run. This finding is similar to the long-run result for India. No significant relationships between financial development, institutional quality, and government size and trade openness are found in the short run for India. Similarly for China, we find that financial development is statistically significant and positively linked with industrialisation in the short run, indicating that industrialisation also adds financial development in the short run. More interestingly, we also find that institutional quality and government size hinder financial development in the short run because the relationships between financial development, institutional quality and government size are inversely related in the statistical sense. The significance of the lagged error term, i.e., ECM_{t-1}, corroborates long-run relationships between financial development and other macro variables for India and China. The estimate of the lagged error term, i.e., ECM_{t-1}, is negative and statistically significant at the 1% significance level for both economies. This indicates that short-run deviations are corrected by 39% for India and 67% for China every year towards a long-run equilibrium path. The results of the diagnostic tests are also reported in the lower segment of Table6. We find that the normality of the residual term is confirmed by the Jarque-Bera test. We also find that there is no evidence of serial correlation and that the absence of the ARCH effect is confirmed. The empirical evidence validates the absence of white noise heteroscedasticity, and the functional form of the model is well established. As far as the stability segment is concerned for empirical estimation, we have employed a short-run and long-run stability function, which is investigated by applying the cumulative sum (CUSUM) and cumulative sum of squares

[10]Most studies from China find a negative association between financial development and growth; Zhang et al. (2012) is an example of a recent survey. They report a positive association between financial development and growth with city-level data after China's accession to the World Trade Organization (WTO).

(CUSUMsq) tests for India and China, as shown in the lower segment of Table5. The results of CUSUM and CUSUMsq are also reported for both economies in Figures 1 to 4. Figures 1 to 6 ensure the stability of short-run and long-run coefficients for India and China because the CUSUM and CUSUMsqgraphs lie between the critical bounds at the 5% level of significance.

Insert Table 5 here please

Insert Figures 1 to 4here please

The results of the vector error correction model (VECM) Granger causality are presented for India and China in Table-6. We surmise that, in the long run, urbanisation, industrialisation and institutional quality Granger cause financial development for India. The unidirectional causality is found from financial development to urbanisation in the short run. In the short run, a unidirectional Granger causality runs from urbanisation and industrialisation to institutional quality, while industrialisation causes trade openness in the Granger sense. Similarly for China, we note that in the long run, industrialisation, institutional quality, government size and trade openness Granger cause financial development. We find the short-run effect of financial development on institutional quality, government size and trade openness in the Granger sense. We also note that in the short run, industrialisation Granger causes financial development, institutional quality and trade openness, indicating that a unidirectional causality runs from industrialisation to financial development, institutional quality and trade openness. Bidirectional causality between institutional causality and trade openness exists in the short run. Unidirectional causality from government size to urbanisation also exists in the short run. The bidirectional Granger causality is found between government size and trade openness for China in the short run. In the Granger sense, trade openness also causes urbanisation in the short run.

Insert Table 6 here please

We conduct the VECM analysis by analysing the direction of the causal relationship between the series in both the short and long runs. This causal technique does not provide the information that is necessary for building policy implications because it does not accommodate any innovation or negative shocks occurring into the system. In this regard, we have applied the

generalised variance decomposition approach, which provides additional information in case any potential innovations or negative shocks that occur in the system are due to changes in one variable. The results of the variance decomposition technique are presented for India and China in Tables-7 and8. The variance decomposition analysis for India, as shown in Table8, indicates that innovative shocks occur in urbanisation, industrialisation, institutional quality, government size and trade openness, which explains financial development by 19.68%, 18.99%, 1.82%, 0.30% and 27.91%, respectively, when we proceed to 15 time periods. A 31.28% of variation in financial development is primarily explained by its innovative shock of 15 time periods. From this evidence, we find that the percentage variation of financial development used as a dependent variable is largely explained by urbanisation, industrialisation and trade openness, apart from its own innovative shock, which indicates that urbanisation, industrialisation and trade openness play a vital role in the dynamics of the financial sector development in the Indian economy. This finding is consistent with the result of the long-run analysis of this study as shown in Table4. As far as the role of urbanisation is concerned in the dynamics of financial development over 15 time periods, financial development contributes to urbanisation by 35.26%. Industrialisation contributes to urbanisation by 12.26%. The innovative shocks occurring in institutional quality and government size minimally contribute to urbanisation by 0.94% and 0.27%, respectively. We also find that a shock occurring in trade openness largely contributes to urbanisation by 19.89%. Furthermore, the dynamics of both industrialisation and trade openness are contributed by the shock of financial development by 21.94% and 15.64%, respectively, followed by its innovative shocks of 39.81% and 24.57%, respectively. Apart from its shock explaining a larger variation of 58.70%, financial development minimally contributes to institutional quality by 2.56%. Moreover, financial development contributes to the dynamics of government size by 19.45%, aside from its own shock, which influences it by 20.19%.

Insert Tables-7 and 8 here please

The results of the variance decomposition analysis for China are also reported in Table8. We find that apart from its own shock explaining by 66.28% over 15 time periods, urbanisation, industrialisation, institutional quality, government size, and trade openness contribute to financial development by 23.04%, 1.17%, 2.93%, 1.00% and 5.54%, respectively. This further

indicates the greater role of urbanisation in the dynamics of financial development in China, which is also evident in the long-run analysis shown in Table-5. As far as urbanisation is concerned in the long-run dynamics of financial development, the variance decomposition analysis also indicates that financial development contributes to urbanisation in China by 44.28% despite the shock explaining the urbanisation by 54.08%. Similarly, industrialisation, institutional quality, government size, and trade openness minimally contribute to urbanisation by 0.52%, 0.21%, 0.35% and 0.54%, respectively. Financial development, urbanisation, industrialisation, government size and trade openness also contribute to institutional quality by 36.36%, 9.65%, 2.34%, 2.24% and 13.27%, respectively. We also find that financial development, urbanisation, industrialisation, institutional quality and trade openness affect the dynamics of government size by 69.69%, 23.92%, 1.08%, 0.99% and 1.13%, respectively. Finally, we find the contributions of financial development, urbanisation, industrialisation, institutional quality and government size on the dynamics of trade openness in China by 16.44%, 56.36%, 5.92%, 5.57% and 0.79%, respectively.

5. Conclusions and Policy Implications

No previous comparative study examines the empirical dimension of understanding the determinants of financial development in emerging economies such as India and China. We address this gap in the literature here.

To the best of our knowledge, this is the first study to offer an empirical examination exploring the impact of industrialisation and urbanisation on financial development by incorporating institutional quality using time series data for Indian and Chinese economies over the period of 1970-2013. In doing so, we have applied the bounds-testing approach developed by Pesaran et al. (2001) and accommodated efficient results and structural breaks in order to test the presence of long-run cointegration between the variables. The results show the existence of cointegration between the series.

Furthermore, we find that urbanisation and industrialisation lead to financial development, while institutional quality and government size cause a decline in financial development in India and China. Trade openness increases Indian financial development but decreases Chinese financial development. The causality analysis depicts the bidirectional causality of urbanisation (industrialisation) and financial development in India. For China, urbanisation Granger causes

financial development, and the feedback effect exists between industrialisation and financial development. The relationship between institutional quality and financial development is bidirectional.

We establish that institutional quality and government size impede financial development in the long run. This finding is not consistent with the seminal theoretical argument of Mishkin (2009), where he argued that better institutional quality in the presence of globalisation and higher government size improves financial development in developing economies, especially in the long run. This seminal theoretical argument proposed by Mishkin lacks a potential basis existence when we tested it empirically in the Indian and Chinese economies. From this perspective, we argue that Indian and Chinese governments and policy makers need to place greater importance on improving institutional quality and maintaining an ideal government size in order to realise better financial development in the long run.

Interestingly, we also find that trade openness improves financial development in India and decreases Chinese financial development in the long run, which bears significant policy implications for China. In this sense, we argue that both policy makers and the government in China need to enhance the financial development capacity of trade openness, given the increasing size of the economy.

Unless the Chinese government improves their financial sector, it will disturb the normal functioning of the financial market because the underdeveloped financial sector will not be able to accommodate the increasing demand for financial services, which has resulted primarily from the larger population of the society. In this context, it is also believed that the reduced availability of financial services will hamper investment activity in the economy; therefore it will decrease growth and development in the Chinese economy.

Overall, in summary, it is theoretically argued by Mishkin that financial development is extremely important to the developmental aspect of any developing economy. Considering this fact, we establish here that both Indian and Chinese economies should be proactive in promoting financial development in the long run by promoting better institutional quality and effective government interventions within the economy.

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Table-1: Ng-Perron Unit Root Test

Variable	MZa	MZt	MSB	MPT
India				
$\ln F_t$	-5.48744 (2)	-1.5666	0.2854	16.3492
$\ln U_t$	-13.9607 (1)	-2.6338	0.1886	6.5743
$\ln I_t$	-3.84817 (2)	-1.2953	0.3366	22.4635
$\ln S_t$	-12.4633 (1)	-2.4887	0.1996	7.3528
$\ln G_t$	-13.4106 (1)	-2.4812	0.1850	7.3983
$\ln O_t$	-5.31936 (2)	-1.5430	0.2900	16.8206
$\Delta \ln F_t$	-19.9821 (2)**	-3.1478	0.1575	4.6393
$\Delta \ln U_t$	-37.7757 (4)*	-4.3300	0.1146	2.4985
$\Delta \ln I_t$	-47.7759 (3)*	-4.7960	0.1003	2.3616
$\Delta \ln S_t$	-29.2592 (2)*	-3.8248	0.1307	3.1146
$\Delta \ln G_t$	-29.7767 (3)*	-3.8530	0.1294	3.0916
$\Delta \ln O_t$	-18.2937 (3)**	-2.9586	0.1617	5.3761
China				
$\ln F_t$	-6.3133 (1)	-1.7591	0.2786	14.428
$\ln U_t$	-4.7118 (2)	-1.4982	0.3179	19.0960
$\ln I_t$	-7.1131 (1)	-1.8642	0.2620	12.8418
$\ln S_t$	-12.4422 (3)	-2.4933	0.2004	7.3284
$\ln G_t$	-5.1944 (2)	-1.3840	0.2664	16.6579
$\ln O_t$	-6.2232 (2)	-1.7631	0.2833	14.6421
$\Delta \ln F_t$	-20.9864 (2)**	-3.2372	0.1542	4.3543
$\Delta \ln U_t$	-26.3738 (3)*	-3.5757	0.1355	3.7807
$\Delta \ln I_t$	-32.0787 (1)*	-3.9911	0.1244	2.9184
$\Delta \ln S_t$	-24.6126 (2) *	-3.5080	0.1425	3.7025
$\Delta \ln G_t$	-18.1536 (1) *	-3.0127	0.1659	5.0199
$\Delta \ln O_t$	-31.1045 (2)*	-3.9407	0.1266	2.9459

Note: * and ** denote significance at the 1% and 5% levels, respectively. () denotes the lag length of the variables.

Table-2: ZA Unit Root Test

Variable	India		China	
	T-Statistic	Break Year	T-Statistic	Break Year
$\ln F_t$	-3.609 (2)	1989	-4.097 (1)	1984
$\ln U_t$	-2.605 (1)	2005	-4.128 (2)	2010
$\ln I_t$	-4.313 (2)	1992	-4.563 (3)	1992
$\ln S_t$	-3.728 (1)	1984	-3.526 (2)	1990
$\ln G_t$	-3.416 (1)	2005	-3.500 (1)	1987
$\ln O_t$	-3.525 (2)	1984	-3.585 (2)	1986
$\Delta \ln F_t$	-6.357 (2)*	1998	-6.221 (2) *	1987
$\Delta \ln U_t$	-5.725 (4)*	1981	-6.021 (1) *	2001
$\Delta \ln I_t$	-7.184 (3)*	1978	-5.747 (3) *	1992
$\Delta \ln S_t$	-6.998 (2)*	2004	-7.009 (2) *	1992
$\Delta \ln G_t$	-5.724 (3)*	1981	-5.925 (3) *	1989
$\Delta \ln O_t$	-7.688 (3)*	2004	-7.277 (2) *	1991

Note: * represents significance at the 1% level.

Table-3: The Results of ARDL Cointegration Test

Bounds Testing Approach to Cointegration				Diagnostic tests			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Models	Lag length	Break Year	F-statistics	χ^2_{NORMAL}	χ^2_{ARCH}	χ^2_{RESET}	χ^2_{SERIAL}
India							
$F_t = f(U_t, I_t, S_t, G_t, O_t)$	2, 1, 2, 2, 2	1989	7.511**	1.2368	[1]: 0.6508	[1]: 2.4869	[1]: 0.5943
$U_t = f(F_t, I_t, S_t, G_t, O_t)$	2, 2, 2, 1, 2	2005	6.818**	0.0871	[2]: 2.6465	[1]: 0.0159	[2]: 1.4781
$I_t = f(F_t, U_t, S_t, G_t, O_t)$	2, 1, 2, 2, 1	1992	7.637**	0.4832	[1]: 0.0023	[2]: 1.6432	[1]: 1.4690
$S_t = f(F_t, U_t, I_t, G_t, O_t)$	2, 2, 2, 2, 1	1984	8.905*	1.4089	[1]: 2.3341	[2]: 2.9027	[1]: 2.8835
$G_t = f(F_t, U_t, I_t, S_t, O_t)$	2, 1, 2, 2, 1	2005	4.427	0.6269	[1]: 0.1663	[1]: 0.0122	[1]: 3.2245
$O_t = f(U_t, I_t, S_t, G_t, O_t)$	2, 2, 2, 2, 1	1984	2.819	1.5052	[1]: 3.8692	[1]: 0.0168	[1]: 3.4223
China							
$F_t = f(U_t, I_t, S_t, G_t, O_t)$	2, 2, 2, 1, 2	1984	6.934**	0.2755	[1]: 1.4555	[1]: 1.1924	[3]: 2.0813
$U_t = f(F_t, I_t, S_t, G_t, O_t)$	2, 2, 1, 2, 2	2010	1.928	0.7868	[2]: 2.4373	[3]: 2.2084	[3]: 3.1209
$I_t = f(F_t, U_t, S_t, G_t, O_t)$	2, 2, 2, 2, 2	1992	6.022	2.2508	[1]: 3.2030	1]: 0.0019	[1]: 2.9695
$S_t = f(F_t, U_t, I_t, G_t, O_t)$	2, 1, 1, 1, 2	1990	11.666*	1.4899	[1]: 1.6082	[1]: 0.0004	[3]: 2.9719
$G_t = f(F_t, U_t, I_t, S_t, O_t)$	2, 2, 2, 1, 1	1987	6.871**	0.8971	[1]: 1.5799	[1]: 2.0732	[2]: 2.1977
$O_t = f(U_t, I_t, S_t, G_t, O_t)$	2, 2, 1, 1, 1	1986	11.751*	0.3908	[1]: 0.0009	[2]: 0.1816	[1]: 1.0366
Level of Significance	Critical values#						
	Lower bounds $I(0)$	Upper bounds $I(1)$					
1%	7.317	8.720					
5%	5.360	6.373					
10%	4.437	5.377					

Note: The asterisks * and ** denote significance at the 1 and 5 percent levels, respectively. The optimal lag length is determined by AIC. [ ] is the order of diagnostic tests. # Critical values are collected from Narayan (2005).

Table-4: Long Run Analysis

Dependent variable = $\ln F_t$				
India				
Variable	OLS	FMOLS	DOLS	CCR
Constant	-8.7591*	-9.1835*	-11.8133*	-9.0662*
$\ln U_t$	3.5227*	3.7146*	4.5281*	3.5897**
$\ln I_t$	0.8380***	0.9353***	0.3975**	1.0059**
$\ln S_t$	-0.3736*	-0.4953*	-0.4576**	-0.4862*
$\ln G_t$	-0.7673**	-0.9171*	-0.2246*	-0.8966*
$\ln O_t$	0.3420***	0.3416*	0.1849**	0.3124**
R^2	0.9745	0.9861	0.9976	0.9862
China				
Variables	Coefficient	Coefficient	Coefficient	Coefficient
Constant	-4.0910*	-4.0717*	-4.1949*	-3.7678*
$\ln U_t$	3.1839*	3.5272*	2.0990*	3.3737*
$\ln I_t$	0.6540*	0.6743*	0.5057**	0.70816*
$\ln S_t$	-0.6489**	-0.9622**	-0.5278**	-0.9695*
$\ln G_t$	-0.0604*	-0.0359**	-0.0860*	-0.0138*
$\ln O_t$	-0.3700*	-0.4794**	-0.0865*	-0.5098*
R^2	0.9973	0.9967	0.9953	0.9965

Note: * and ** show significance at the 1% and 5% levels, respectively.

Table-5: Short Run Analysis

Dependent Variable = $\Delta \ln F_t$				
Variables	India		China	
	Coefficient	T-statistic	Coefficient	T-statistic
Constant	-0.0692***	-1.9009	0.2411**	2.6248
$\Delta \ln U_t$	8.6787*	2.9619	-3.2434	-1.3429
$\Delta \ln I_t$	0.6616**	2.4977	0.3194**	2.0282
$\Delta \ln S_t$	-0.0070	0.1420	-0.3309**	-2.0160
$\Delta \ln G_t$	0.2911	1.2568	-0.5546*	-3.0445
$\Delta \ln O_t$	0.1079	0.9964	-0.0060	-0.0524
ECM_{t-1}	-0.3907*	-4.6072	-0.6783*	-5.1927
R^2	0.5058		0.5478	
F-statistic	5.4601*		5.4514*	
D. W	1.8808		1.6772	
Short Run Diagnostic Tests				
Test	F-statistic	Prob. value	F-statistic	Prob. value
$\chi^2 NORMAL$	1.2777	0.5278	0.2026	0.9036
$\chi^2 SERIAL$	0.7959	0.4605	1.6827	0.2062
$\chi^2 ARCH$	0.4997	0.4841	2.7552	0.1702
$\chi^2 WHITE$	1.0201	0.4301	0.3645	0.7003
$\chi^2 REMSAY$	1.2599	0.2703	0.1339	0.7173
CUSUM	Stable		Stable	
CUSUMsq	Stable		Stable	

Note: * and ** show significance at the 1% and 5% levels, respectively.

Table-6: The VECM Granger Causality Analysis for India and China

Dependent Variable	Direction of Causality[11]						
	Short Run						Long Run
	$\Delta \ln F_{t-1}$	$\Delta \ln U_{t-1}$	$\Delta \ln I_{t-1}$	$\Delta \ln S_{t-1}$	$\Delta \ln G_{t-1}$	$\Delta \ln O_{t-1}$	ECT_{t-1}
India							
$\Delta \ln F_{t-1}$	….	3.9603** [0.0308]	1.0817 [0.3532]	0.6357 [0.5373]	0.2588 [0.7728]	0.3229 [0.6855]	-0.4071* [-4.0329]
$\Delta \ln U_{t-1}$	1.7472 [0.1941]	….	1.0348 [0.3695]	3.2554** [0.0547]	1.3222 [0.2839]	0.1357 [0.8737]	-0.0280* [-2.8855]
$\Delta \ln I_{t-1}$	0.6362 [0.5373]	0.7589 [0.4787]	….	2.5761*** [0.0953]	0.5867 [0.5633]	4.2520** [0.0253]	-0.4125** [-2.5261]
$\Delta \ln S_{t-1}$	0.0034 [0.9966]	0.1258 [0.8823]	0.4130 [0.6659]	….	1.3006 [0.2692]	0.0655 [0.9367]	-0.7253* [-2.8353]
$\Delta \ln G_{t-1}$	1.8661 [0.1741]	1.4853 [0.2415]	0.1032 [0.9022]	1.8585 [0.1753]	….	0.2753 [0.7614]	….
$\Delta \ln O_{t-1}$	0.3554 [0.6838]	0.2014 [0.8188]	1.6556 [0.2098]	1.0324 [0.3698]	0.1934 [0.8253]	….	….
China							
	$\Delta \ln F_{t-1}$	$\Delta \ln U_{t-1}$	$\Delta \ln I_{t-1}$	$\Delta \ln S_{t-1}$	$\Delta \ln G_{t-1}$	$\Delta \ln O_{t-1}$	ECT_{t-1}
$\Delta \ln F_{t-1}$	…	0.0431 [0.9579]	2.3259 [0.1319]	14.8855* [0.0000]	13.0747* [0.0000]	10.1233* [0.0016]	-0.1083* [-7.4538]
$\Delta \ln U_{t-1}$	0.1741 [0.8417]	…	1.7488 [0.2056]	13.1691* [0.0004]	3.8341** [0.0436]	0.5680 [0.5776]	…
$\Delta \ln I_{t-1}$	3.5191*** [0.0588]	0.5461 [0.5903]	…	2.7497*** [0.0961]	1.3018 [0.3011]	10.9672* [0.0012]	-0.4385* [-3.7097]
$\Delta \ln S_{t-1}$	1.3396 [0.2915]	0.4779 [0.6292]	1.7672 [0.2046]	…	0.3441 [0.7143]	2.6414*** [0.1040]	-0.8388** [2.3665]
$\Delta \ln G_{t-1}$	1.4620 [0.2630]	4.3751** [0.0319]	0.0631 [0.9391]	10.6832* [0.0013]	…	4.3070** [0.0333]	-0.3037** [-2.9253]
$\Delta \ln O_{t-1}$	1.5037 [0.2540]	10.9290* [0.0004]	23.8285* [0.0000]	24.1801* [0.0000]	4.0536** [0.0391]	…	-0.6217* [-3.8828]

Note: *, ** and *** show significance at the 1, 5 and 10 percent levels, respectively; [] indicates the respective t-statistic.

[11]The results are similar once we used civil liberty ($\ln C_t$) and political rights ($\ln P_t$) as indicators of democracy for both countries. The results are available upon request from the authors.

Table-7: Variance Decomposition Analysis for India

Variance Decomposition of $\ln F_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	93.0506	2.0250	0.2554	0.0205	0.5009	4.1472
3	77.5708	5.6759	1.0655	1.1673	0.9186	13.6016
4	64.4554	9.0775	1.7854	2.7076	1.0909	20.8830
5	56.2321	11.8371	1.8407	2.7221	1.0635	26.3043
6	51.2166	13.9123	1.5272	2.2676	0.9311	30.1450
7	47.7765	15.4355	1.7146	1.9929	0.7965	32.2837
8	44.9119	16.5658	2.9472	1.8711	0.6834	33.0203
9	42.2467	17.4148	5.0804	1.8085	0.5925	32.8568
10	39.7696	18.0657	7.6439	1.7695	0.5212	32.2298
11	37.5466	18.5777	10.2532	1.7465	0.4635	31.4122
12	35.6064	18.9829	12.7217	1.7399	0.4144	30.5345
13	33.9374	19.2952	14.9970	1.7512	0.3720	29.6469
14	32.5095	19.5247	17.0820	1.7794	0.3357	28.7685
15	31.2881	19.6845	18.9901	1.8202	0.3056	27.9114
Variance Decomposition of $\ln U_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	3.0637	96.9362	0.0000	0.0000	0.0000	0.0000
2	9.6655	86.6899	0.8350	0.0921	0.1581	2.5590
3	16.9602	78.0963	1.0856	0.0638	0.0718	3.7219
4	24.2357	69.5911	0.7940	0.3599	0.2474	4.7716
5	30.8719	61.4211	0.5107	0.6756	0.6254	5.8950
6	36.0089	54.4072	0.6278	0.8176	0.9097	7.2285
7	39.3288	48.7531	1.2132	0.8369	0.9924	8.8753
8	41.0043	44.3277	2.1554	0.8073	0.9302	10.7747
9	41.4247	40.9222	3.3232	0.7708	0.8058	12.7530
10	41.0062	38.3142	4.6316	0.7472	0.6726	14.6278
11	40.0958	36.2960	6.0389	0.7454	0.5544	16.2692
12	38.9407	34.6972	7.5248	0.7677	0.4574	17.6119
13	37.6976	33.3928	9.0724	0.8117	0.3804	18.6449
14	36.4566	32.2988	10.6602	0.8720	0.3198	19.3923
15	35.2655	31.3615	12.2612	0.9428	0.2721	19.8966
Variance Decomposition of $\ln I_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	3.2065	9.9230	86.8704	0.0000	0.0000	0.0000
2	20.7419	6.9799	61.9294	5.4952	0.0983	4.7550
3	26.9219	7.4174	52.6948	5.4742	0.1154	7.3760
4	27.3881	9.6981	48.6272	4.1479	0.0982	10.0403

5	26.1932	12.3914	45.2801	3.3432	0.1674	12.6245
6	25.0122	14.6372	42.5811	2.8526	0.1938	14.7229
7	24.1836	16.1970	40.7334	2.6429	0.1736	16.0693
8	23.6257	17.1895	39.7057	2.6189	0.1563	16.7038
9	23.2203	17.8099	39.3034	2.6511	0.1486	16.8665
10	22.9018	18.2128	39.2669	2.6814	0.1427	16.7942
11	22.6424	18.5035	39.3839	2.6944	0.1363	16.6393
12	22.4257	18.7456	39.5313	2.6899	0.1298	16.4774
13	22.2404	18.9685	39.6578	2.6743	0.1242	16.3346
14	22.0809	19.1792	39.7518	2.6554	0.1198	16.2126
15	21.9454	19.3754	39.8187	2.6388	0.1168	16.1046
Variance Decomposition of $\ln S_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	0.1065	0.1845	4.5534	95.1554	0.0000	0.0000
2	0.1562	0.2065	15.3918	84.2407	0.0002	0.0044
3	0.1381	0.8989	23.8027	74.1565	0.5274	0.4761
4	0.3051	1.6558	26.4497	69.4007	1.3600	0.8283
5	0.4958	1.8881	26.9687	68.0901	1.5049	1.0521
6	0.6581	1.8723	26.8702	67.5724	1.5200	1.5067
7	0.8696	1.9625	26.4860	66.6234	1.6822	2.3760
8	1.1292	2.2255	25.9898	65.3549	1.8426	3.4577
9	1.3794	2.5898	25.5326	64.0972	1.9333	4.4673
10	1.6007	2.9680	25.1951	62.9878	1.9650	5.2830
11	1.8078	3.3032	25.0093	62.0205	1.9609	5.8980
12	2.0131	3.5780	24.9831	61.1410	1.9403	6.3441
13	2.2148	3.8005	25.1055	60.3024	1.9144	6.6621
14	2.4027	3.9863	25.3445	59.4880	1.8877	6.8905
15	2.5676	4.1479	25.6555	58.7078	1.8620	7.0589
Variance Decomposition of $\ln G_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	4.64566	7.0406	0.2922	7.5466	80.4746	0.0000
2	9.61974	10.9278	0.2996	6.2937	71.3015	1.5574
3	11.1976	11.8592	1.7900	5.2649	68.2928	1.5951
4	12.8023	10.9738	5.2743	4.9644	63.9007	2.0843
5	14.0433	10.7785	8.8797	4.4861	57.3599	4.4522
6	14.4573	12.4755	10.9975	3.9114	50.3993	7.75879
7	14.5074	15.1678	11.8616	3.4069	44.2312	10.8248
8	14.6877	17.7340	12.3005	3.0611	39.1863	13.0303
9	15.1459	19.6725	12.8351	2.8924	35.1161	14.3376
10	15.8383	20.9272	13.6670	2.8517	31.7401	14.9754
11	16.6597	21.6395	14.7988	2.8631	28.8295	15.2091
12	17.4995	22.0058	16.1126	2.8682	26.2596	15.2541
13	18.2713	22.1973	17.4544	2.8430	23.9797	15.2541
14	18.9270	22.3257	18.7066	2.7906	21.9669	15.2829

15	19.4556	22.4446	19.8167	2.7247	20.1982	15.3600
Variance Decomposition of $\ln O_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	1.3538	7.8212	11.2688	1.5049	0.6986	77.3524
2	11.7119	10.7532	15.2436	0.6865	0.6827	60.9219
3	13.3719	14.8242	18.4688	0.6079	1.2491	51.4778
4	13.3098	17.8326	20.5847	0.8080	1.4681	45.9965
5	13.4914	19.6895	22.4420	1.0201	1.3580	41.9988
6	13.7969	20.7286	24.3663	1.2431	1.1682	38.6967
7	14.1273	21.1777	26.3464	1.4805	0.9977	35.8702
8	14.4559	21.2523	28.2917	1.7003	0.8697	33.4299
9	14.7511	21.1427	30.1036	1.8747	0.7777	31.3499
10	14.9937	20.9794	31.7055	1.9981	0.7093	29.6137
11	15.1834	20.8319	33.0611	2.0803	0.6559	28.1871
12	15.3305	20.7266	34.1740	2.1355	0.6131	27.0202
13	15.4480	20.6653	35.0736	2.1752	0.5782	26.0594
14	15.5484	20.6396	35.7985	2.2068	0.5498	25.2565
15	15.6415	20.6389	36.3851	2.2343	0.5266	24.5732

Table-8: Variance Decomposition Analysis for China

Variance Decomposition of $\ln F_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	97.6330	0.3515	0.0618	1.2495	0.6649	0.0390
3	93.8862	1.8566	0.3574	1.1919	0.7789	1.9287
4	85.0543	4.2109	1.1243	2.2684	0.9554	6.3865
5	80.9285	5.3093	1.4035	3.4071	1.1552	7.7961
6	80.2755	5.3534	1.3988	3.7046	1.2630	8.0044
7	80.0239	5.4784	1.4162	3.7995	1.2690	8.0127
8	79.2222	6.2553	1.4311	3.9022	1.2560	7.9330
9	77.6203	7.9863	1.4147	3.9814	1.2287	7.7684
10	75.2378	10.7512	1.3761	3.9317	1.1852	7.5176
11	72.5052	14.0821	1.3281	3.7786	1.1362	7.1694
12	70.0134	17.2660	1.2829	3.5787	1.0962	6.7626
13	68.1437	19.8514	1.2466	3.3585	1.0645	6.335
14	66.9567	21.7382	1.2153	3.1374	1.0346	5.9174
15	66.2862	23.0491	1.1793	2.9386	1.0047	5.5417
Variance Decomposition of $\ln U_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	3.28927	96.7107	0.0000	0.0000	0.0000	0.0000
2	4.1902	91.2633	0.2024	0.7700	0.0278	3.5460
3	7.6376	88.2449	0.3219	0.2972	0.0141	3.4840
4	10.9135	85.7274	0.4708	0.1631	0.0803	2.6446
5	14.9302	82.3515	0.5720	0.1050	0.1776	1.8636
6	19.7804	77.8224	0.6656	0.0742	0.2562	1.4008
7	24.9102	72.8645	0.7384	0.0562	0.3040	1.1264
8	29.4177	68.5039	0.7630	0.0451	0.3320	0.9380
9	32.9366	65.1398	0.7396	0.0443	0.3449	0.7944
10	35.6109	62.5912	0.6940	0.0616	0.3473	0.6947
11	37.7498	60.5319	0.6472	0.0912	0.3458	0.6338
12	39.6013	58.7235	0.6069	0.1232	0.3455	0.5993
13	41.2944	57.0512	0.5738	0.1537	0.3477	0.5788
14	42.8610	55.4955	0.5459	0.1827	0.3514	0.5631
15	44.2813	54.0829	0.5212	0.2107	0.3549	0.5487
Variance Decomposition of $\ln I_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	0.2602	9.4745	90.2651	0.0000	0.0000	0.0000
2	6.9101	7.3235	75.3002	7.2898	3.1758	0.0004
3	4.9449	7.1472	55.4363	30.1874	2.2822	0.0017
4	5.9561	12.3178	39.4690	39.5510	2.3113	0.3945
5	7.3046	23.7843	30.5165	35.9061	2.1544	0.3337
6	6.0154	34.4081	25.0314	31.0836	1.7500	1.7113

7	9.3275	39.4249	20.6308	26.1338	1.8051	2.6776
8	23.9053	36.5012	15.9457	19.6786	1.9042	2.0647
9	38.9597	30.9079	12.1982	14.4720	1.7942	1.6677
10	47.5356	27.5767	10.029	11.7042	1.6420	1.5118
11	51.2949	26.3626	8.9681	10.486	1.5268	1.3609
12	52.7133	26.0374	8.4876	9.9745	1.4514	1.3355
13	53.4277	25.8793	8.1864	9.6557	1.4004	1.4502
14	54.2833	25.5856	7.8768	9.3213	1.3658	1.5670
15	55.5110	25.0701	7.5443	8.9405	1.3436	1.5902
Variance Decomposition of $\ln S_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	1.0713	0.1435	0.2293	98.5557	0.0000	0.0000
2	3.6544	0.1381	2.7521	83.1941	4.2506	6.0104
3	5.8012	0.1526	2.7877	75.6779	3.4793	12.1011
4	5.0046	1.5254	2.5429	66.5206	3.0995	21.3068
5	11.3038	3.8133	2.1885	59.0916	3.0481	20.5544
6	24.5428	4.8313	1.9146	48.9851	2.7487	16.9773
7	32.8515	5.3472	1.6795	42.7329	2.5399	14.8488
8	35.2371	6.1199	1.7145	40.4552	2.4357	14.0373
9	35.1154	6.9699	2.0723	39.5761	2.3666	13.8994
10	34.7449	7.6600	2.3703	38.9335	2.3190	13.9721
11	34.7629	8.1967	2.4461	38.3162	2.2928	13.9850
12	35.2417	8.6365	2.4143	37.6054	2.2850	13.8168
13	35.8926	9.0182	2.3683	36.8859	2.2741	13.5606
14	36.3028	9.3594	2.3380	36.3728	2.2552	13.3716
15	36.3646	9.6568	2.3406	36.1188	2.2406	13.2783
Variance Decomposition of $\ln G_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	76.5801	0.3328	0.1094	4.4061	18.571	0.0000
2	87.1292	0.2032	0.4697	2.1926	9.6597	0.3453
3	90.6193	0.1850	0.3081	1.3477	6.5647	0.9748
4	91.8510	0.3494	0.2529	1.5376	5.1734	0.8355
5	91.3270	1.4137	0.3251	1.4771	4.7009	0.7559
6	89.0636	3.7744	0.5166	1.3530	4.3658	0.9264
7	86.0554	6.8715	0.6814	1.2694	4.0955	1.0265
8	82.8465	10.1672	0.7888	1.2226	3.8888	1.0859
9	79.5918	13.4766	0.8740	1.1795	3.7244	1.1534
10	76.5729	16.5474	0.9534	1.1350	3.5837	1.2074
11	74.1114	19.0878	1.0181	1.0962	3.4656	1.2206
12	72.3048	20.9954	1.0606	1.0628	3.3683	1.2078
13	71.0594	22.3509	1.0828	1.0346	3.2858	1.1862
14	70.2324	23.2890	1.0899	1.0114	3.2151	1.1619
15	69.6967	23.9280	1.0867	0.9939	3.1560	1.1384

Variance Decomposition of $\ln O_t$						
Period	$\ln F_t$	$\ln U_t$	$\ln I_t$	$\ln S_t$	$\ln G_t$	$\ln O_t$
1	5.1562	17.5708	14.2105	21.0391	0.0473	41.9758
2	2.8029	30.2811	14.5553	15.3470	1.3555	35.6578
3	2.7822	40.6358	12.182	12.0909	1.2010	31.1075
4	3.8971	48.3236	9.8071	9.8943	1.0042	27.0733
5	3.7204	55.5218	8.1995	8.2907	0.8733	23.3941
6	3.3238	60.4349	7.3182	7.4630	0.7924	20.6675
7	4.4743	62.0097	6.9200	6.9212	0.8363	18.8382
8	7.9543	60.7269	6.6946	6.4351	0.8724	17.3163
9	11.9477	58.5155	6.4612	6.0275	0.8579	16.1899
10	14.3621	57.2569	6.2485	5.7664	0.8317	15.5342
11	15.2103	56.9603	6.1254	5.6625	0.8155	15.2257
12	15.4185	56.9189	6.0732	5.6567	0.8082	15.1241
13	15.5541	56.8603	6.0317	5.6579	0.8021	15.0936
14	15.8687	56.6978	5.9806	5.6294	0.7967	15.0264
15	16.4497	56.3685	5.9246	5.5766	0.7946	14.8858

Figure-1: CUSUM for India

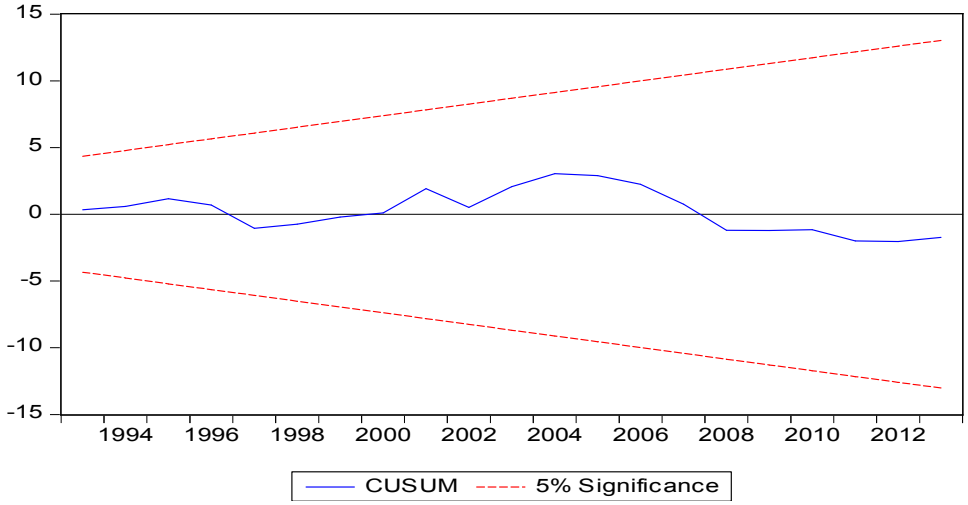

Figure-2: CUSUMsq for India

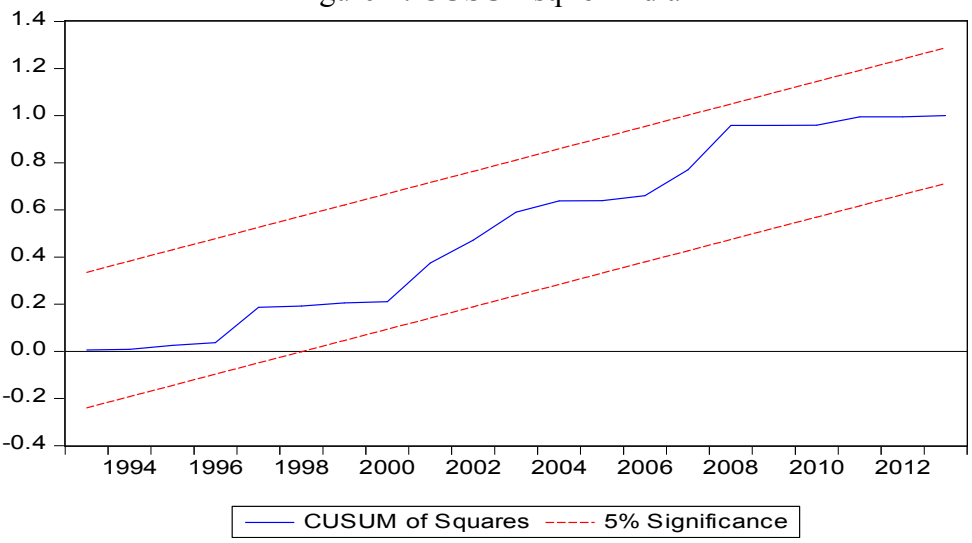

Figure-3: CUSUM for China

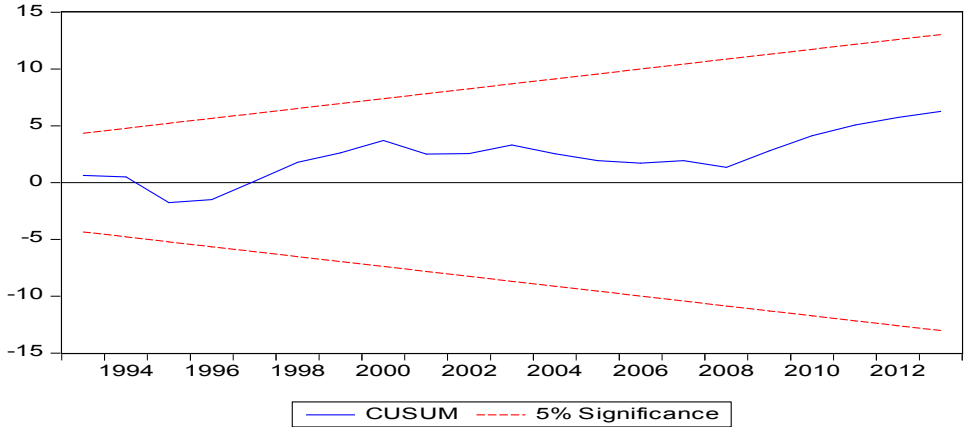

Figure-4: CUSUMsq for China