

**FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH:
TIME SERIES EVIDENCE FROM PAKISTAN AND CHINA**

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This study attempts to explore the relationship between financial development and economic growth for China and Pakistan over the period 1960-2005. The bound testing (ARDL) approach to cointegration is conducted to establish the existence of a long run relationship. The study uses deposit liability ratio (DLR) and credit to private sector (CPS) as proxy to financial development. We find different results for both countries, those are, DLR and CPS both have a significant impact on the economic growth of Pakistan whereas in the case of China, CPS has an insignificant impact while DLR has an insignificant effect on growth. This result may be attributed to the inefficient allocation of Pakistan

1. INTRODUCTION

The process of economic growth, a positive change in the level of production of goods and services, is a delicate phenomenon. A countless factors, and their interaction with each other, play their role in shaping this process. Conventional economics suggests that factors of production such labor, capital and land are the main determinants of growth. The new growth theories further add that technological changes are the sources of change in the production function. With the passage of time,

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the importance of a sound financial system is also recognized². In one of the earliest studies, Schumpeter (1911) discovered that a well functioning financial system encourages technological innovation, which then results in growth. This encourages developing countries to introduce reforms in their financial sector, if it is not *functioning well*. Most developing countries have introduced financial reforms to reap the benefit, in terms of economic growth, of a well functioning financial system. As a result, over the last twenty five years, a substantial volume of research has been devoted towards analyzing the financial reforms, verifying and understanding the existence of linkages between the real and financial sector development of the economies³.

China and Pakistan also introduced financial reforms in 1978 and 1990 respectively. Both countries manage a fairly good rate of economic growth. A mentionable number of theoretical and empirical studies have explored the sources of economic growth⁴. Unfortunately, the role of financial development is not well researched in both countries despite of its importance. Importantly, even if there are some studies [*cf*, Khan et al (2005) for Pakistan and Liang and Teng (2006) for China] they do not compare the impact of reforms with other countries. The objective of the present study is to fill this gap. It compares the reform process and impact of financial reforms on economic growth for both countries and takes a longer time series, from 1960 to 2005, than other studies and additional variables as proxies for financial development.

² See Hicks (1969), Goldsmith (1969), Mckinnon (1973), Gelb (1989), Roubini and Sala-i-Martin (1992) King and Levine (1993) Esterly (1993) Gertler & Rose (1994), Khan and Sehadji (2000), Khan (2000), Pagano and Volpin (2001) Leveine , Loayza and Beck (2000) Chritodoulou and Tsinas (2004) and Khan Arshad et al (2005)

³In very broad terms Financial Sector Development means improving the whole financial sector - everything from banks, stock exchanges and insurers to credit unions, microfinance institutions and money lenders. There are many ways in which these improvements can be made. For example:1) Improving efficiency and competitiveness 2) Extending the range of financial services 3) Increasing the flow of money through the financial sector 4) Increasing private sector capital 5) Improving regulation and stability 6)Improved access to financial products and services

⁴ For example (for Pakistan see, Burney (1986), Kemal and Islam (1992), Kemal et al. (2002), Wizarat (1981 and 1989), Pasha et al. (2002), Pasha et.al. (2002) Sabir and Ahmed (2003) and Khan (2006), For China see Borensztein &Ostry (1996), Chen and Feng (2000), Chow (1993) Chow and Li (2002) Wu (2000) and Yu (1998).

The rest of the study is organized as follows. The literature review is presented in section 2. Section 3 narrates the financial sector reform in both countries. Section 4 defines the variables, explains their measurement and analyzes the data using graphs, giving descriptive statistics and correlation matrix. Section 5 discusses the econometric specification and methodological issues to test the cointegration. The main results of the paper are contained in Section 6. Finally, Section 7 contains our concluding comments and some policy implications presented by the study for the developing countries.

2. LITERATURE REVIEW

The relationship between growth rate of an economy and its financial structure is a long debated and controversial issue among the economists. Bagehot (1873) and Hicks (1969) argue that the financial system of England played a critical role in the Industrial Revolution. Schumpeter (1911) points out that a well functioning financial system encourages technological innovations by increasing funding to entrepreneurs which ultimately leads to economic growth. Similarly, many other studies (*cf* footnote 1 here) mention that the development of financial system is positively correlated with current and future economic growth, physical capital accumulation and economic productivity. On the contrary, the equally prominent researchers, Robinson (1952), Kuznets (1955) and then Friedman and Schwartz (1963) suggest that the causation goes the other way, that is, the financial system developed as a result of economic growth. Furthermore, Lucas (1988) thinks that “the importance of financial matters is badly over stressed”. Similarly, Ram (1999) mentions that there is no relationship between financial development and economic growth. Interestingly, Stern (1989) does not even mention finance in his survey of development economics, while Levine (1997) provides an excellent overview of the literature on economic growth and financial development.

Patrick (1966) clearly mentioned the “demand following” and “supply leading” role of the financial sector development. In the ‘supply leading’ role, the causality runs from financial development to economic growth and *vice versa* in the ‘demand following role’. He has also put forth a hybrid view on the subject which recognizes a two-way relationship,

with the nature of the relationship depending on the stage of economic development.

The 'supply leading' hypothesis is based on the lower cost of acquiring information and making transactions arguments that is taken from Debreu (1959) and Arrow (1964). They claim that if there is a framework with no information cost or transaction cost, then there is no need for a financial system. So, finance and financial institution become relevant in a world of positive information, transactions, and monitoring costs (Fry 1997). Additionally, financial institutions do not only provide the services at a lower cost but also offer higher returns (Diamond and Dybvig, 1983). Mckinnon and Shaw (1973) think that the financial system is important to increase savings and, consequently, investment.

The theoretical discussion that was started by Schumpeter (1911), Debreu (1959), Arrow (1964) and Patrick (1966), was empirically tested by Goldsmith (1969) in his pioneering study using the cross country data. He clearly found the relationship between the growth and the financial development. Then Mckinnon (1973) and Shaw (1973) also stated that the development of financial intermediaries cause economic growth and not *vice versa*. However, they also examined the negative effects of government intervention on the development of the financial system and economic growth. Their main proposition was that 'government restrictions on the banking system slow down the process of financial development and, consequently, reduces the economic growth'.⁵ It is, for example, argued that low or negative real interest rates discourage financial saving, thereby creating a shortage of investable funds, and reduce the efficiency of capital.

Similar conclusions regarding the role of financial development and government intervention are also attained by the endogenous growth literature, in which the services provided by financial intermediaries are explicitly modeled. These models suggest that financial intermediation has a positive effect on steady-state growth (Greenwood and Jovanovic, 1990; Bencivenga and Smith, 1991) and that government intervention in

⁵ Here the government restrictions on the banking system means that , interest rate ceiling, high reserve requirements and direct credit programmes.

the financial system has a negative effect on the growth rate (King and Levine, 1993).

The validity of the hypotheses “where enterprise leads finance follows” (Robinson, 1952, p. 86) has also been investigated and found a considerable support for example, Friedman and Schwartz (1963), Patrick (1966) Mckinnon (1988), Odedokun (1996), Deidda and Fattouh (2002), and Rioja and Valev (2004). Much of these studies, which produced the contradictory results, were based on cross-country analysis. Moreover, despite the finding of a positive relationship, the cross-country analyses have not yet settled the issue of causality.

These contradictory results encouraged researchers to investigate the finance-growth relationship on country specific basis. Importantly, the time series analyses provide an opportunity to study the causality pattern. Gupta (1984), by using the quarterly data, and Jung (1986), by using the annual data, discuss the causality issue. But the comprehensive study in this regards was conducted by Demetriades and Hussein (1996). They examined the causality issue from a time-series perspective using recently developed econometric techniques. They utilized cointegration tests based on both Engle and Granger (1987)’s two-step procedure and Johansen (1988)’s maximum likelihood method. Moreover, their analysis is based on 16 countries, using a comprehensive set of variables that reflect financial development. They found evidence for both causal directions. More recently, Rousseau and Vuthipadadorn (2005) confirm their finding using the data of 10 Asian countries. The present study also utilizes time series data for two Asian developing economies: China and Pakistan.

This study covers the period from 1960 to 2005 but sometimes uses a sub-sample from 1977 to 2005 depending on the availability of the data to proxy financial development. To test the finance-growth nexus hypothesis, a wide range of choices for the measurement of financial development is suggested by the literature. They consist of monetary aggregates such as M1, M2, M3 and financial liquid liability such as credits, deposits and the size of financial intermediaries as a percentage of GDP (*cf* Arestis and Demetriades 1997 for more detail). Notably, Furstenberg and Fratianni (1996) neatly outline the indicators of financial development. The present study will use two alternative

proxies, deposit liability ratio (*DLR*) and credit to private sector to GDP ratio (*CPS*).

3. REFORMS IN FINANCIAL SECTOR IN CHINA AND PAKISTAN

Recently, the literature has used the development of a stock market, along with the banking sector development, as an indicator of financial depth. But, the net flows through stock exchanges are relatively small in most of the developing countries (Rojas-Suarez and Weisbord, 1995 pp 6). Therefore, stock markets at best play a minor role; more often they resemble gambling casinos and may actually slow down growth in developing countries (Singh, 1997). Hence this study deliberately focuses on the banking sectors of the both countries.

3.1. Reforming the Banking System of China

The objective of the economic reform, according to official documents, was to establish a socialist market-oriented economy based primarily on public ownership (Zhao 1987). Reform in the banking sector was necessary to achieve this goal. The road map for financial reforms was ‘to create an efficient banking system by giving more freedom of operation and profit motives to specialized and other commercial banks’, while monetary policy was to be controlled by the central bank. The restructuring of the banking system can be summarized as follows.

In 1978, the People’s Bank of China (PBC) was formally separated from the Ministry of Finance and was granted a ministerial rank. In January 1984, the PBC became the central bank. Its commercial banking business was taken over by the newly established Industrial and Commercial Bank of China (ICBC) as well as other specialized banks. The purpose of this move was to separate the administrative functions of the banking system from its commercial functions.

As the central bank, the PBC is a government administrative organization directly led by the state council. Its main responsibility is to make macro monetary policies; control the money supply, interest rates, and exchange rate; serve as the treasury of the central government; regulate financial markets; and formulate the overall credit and loan plan.

Apart from restructuring the central bank, China adopted an evolutionary approach for the financial sector reforms (Mehran and Quintyn. 1996). By now around 30 years will have passed, the Chinese government is still pursuing a market oriented banking sector. However, China's banking sector reforms can easily be separated into three phases (He 2007). In the first phase, four state owned commercial banks were established to improve the mobilization and allocation of the resources to specific sector. These banks were China Construction Bank (CCB), the Bank of China (BOC), the Agriculture Bank of China (ABC), and the Industrial Commercial Bank of China (ICBC), where CCB, BOC and ABC were also working in the pre-1978 period. They gained operational independence in 1979.

The country's financial sector witnessed the second phase of reforms in 1990s. This phase was marked by the consolidation and austerity restructuring in the banking sector (He 2007). At that time, the banks were involved in non-banking business. This might have led to a less secure risk management system, which in turn might have led to an unstable and unsustainable banking system. Here, PBC became a pure central banking agency and began performing the regularity function. The government launched three policy banks: 1) The State Development, 2) China Import and Export Bank and 3) Agriculture Development bank. In that way, the old banks were made to concentrate on ordinary banking and less intervene in policy matters.

In recent times the country has entered into the third phase of financial sector reforms. In 2006, a major American banking corporation acquired a regional Chinese bank, together with several Chinese corporate partners. This indicates the extent to which the Chinese government is prepared to open the banking sector for reforms (He 2007).

Beside the banking sector, the government was also keen about the other financial institutions. For example, the first Investment and Trust Companies (ITC) in China, China International Trust And Investment Company (CITIC) was launched in 1979. Over the seven hundred ITC were established during the second half of 1980's. But, many of them were required to change their securities business in late 1990s, and they have thus experienced great difficulties to remain profitable. So there

was a massive decrease in the number of existing ITC's at the end of 2006. (He 2005)

Similarly, Rural Credit Cooperative (RCC) and Urban Credit Cooperative (UCC) were also expanded greatly during the 1980s. However, the RCC had been in existence before 1978. The first share holding commercial Bank, Bank of Communication, founded in 1986 is Shanghai. At the time of its existence, it was aimed to carry all sort of financial service. Minsheng Bank, the first ever in post reform era that have considerable elements of the private ownership. First Finance Companies, with the aim to providing financial services to the enterprise groups in concern and their constitute companies appeared in 1987.

The banking sector still dominated by the "big four" state-owned banks despite of a considerable expansion since late 1980s. These are lending to the state-owned firms, while the economy has increasingly shifted towards private firms (Allen et al 2005). Importantly, these banks are under increasing pressure to reduce the quantity of non-performing loans. In fact, nonperforming loans (NPL) represent a significant part of the assets of Chinese banks. According to the People's Bank of China (PBC), the NPL ratio of the big four banks stood at 16 percent in 2004, although down from 20 percent at the end of 2003

3.2.Reforming the Banking System of Pakistan

It was fully recognized, by the end of 1980s, that the prevailing macroeconomic policies repressed the financial sector of the country. Therefore, the GoP adopted a new stabilization policy to bail out the country from these intricacies and, especially, to spur the economic growth. The main objectives of these reform policies were 'to establish competitive financial institutions, competitive financial markets, governance and supervisions based institutions and monetary, credit and exchange management' (SBP 2002).

The reforms in the financial sector of Pakistan have started since 1990. The government of Pakistan (GoP), unlike its Chinese counterpart, established the financial infrastructure for supporting the macroeconomic policy during the 1947 to late 1980s. Therefore, in Pakistan, the need was to mobilize that infrastructure for the desirable outcomes. Unlike China, the real interest rate in Pakistan remained

negative for most of the duration from 1961 to 1984. The possible explanation here is that the inflation rate in Pakistan is much higher than that in China. The major tool of monetary policy was the direct allocation of credit. Commercial banks were lending to the specific sectors. Additionally, the profitability of the firm was not an important indicator for the lending decisions. In mid 1980s, the GoP put a scheme to open the non-banking financial sector for the private sector investment. Despite of that, the public sector institutions captured a major chunk of funds (SBP 2002).

The State Bank of Pakistan (SBP), the central bank of Pakistan, was responsible to implement policies for the government. The SBP designed the reform policies for both itself and the rest of the banking sector. The bank insisted on opening of new banks, restructuring and strengthening the existing banks and the non-bank financial institution. The privatization of banks was another step to enhance competition. For the capital markets point of view, the privatization of state owned enterprise and the creation of security exchange commission of Pakistan was a major step⁶.

During this time period, SBP adopted an easy monetary policy and tried to achieve two objectives. First, it tried to lessen the cost of domestic loans and secondly, it wanted to expand the credit to the private sector. The interest rate dropped down on National Saving Scheme from 13 percent to 4 percent during 1997 to 2005⁷. The weighted average lending rate was decreased from 14.6 percent to 8.4 percent during 1996 to 2005. Weighted average deposit rate were also decreased from 8 percent to 4.5 percent during the same period. The decrease in lending rate is an indicator of a little improvement in the profitability of the firms. However, the spread between the lending rate and the deposit rate was still high, as much as 3.9 percent in 2001 and 6.6 percent in 1999⁸. Additionally, the real interest rate became negative due to the high inflation. Moreover, the high lending rate became a source of increase in

⁶ The lack of space does not permit us to discuss the reform in detail. It will be very fruitful for the reader to study the SBP (2002) and Janjua (2003) history of SBP to understand the events and process of the reforms in Pakistan.

⁷ There are schemes under National Saving Scheme and carry the different rates. Here we take the rate on the savings accounts. For details see (SBP 2005)

⁸ This decline in the deposit rate could be a source of decrease in national savings (khan 2003).

cost of borrowing and decline in investment. The economy faced a low savings rate and consumption rate due to the low deposit rate. This, in turn, became a source of high debt to GDP ratio and ultimately lower economic growth.

4. DATA AND VARIABLE CONSTRUCTION

Following the standard practice, (e.g. Gelb 1989; Roubini and Sala-i-Martin 1992; King and Levine 1993, Demetriades and Hussein 1996, Luintel and Khan 1999 and Levine et al, 2000) we take natural logarithm of *per capita* GDP as an indicator of Economic Growth that is denoted by Y^9 . More specifically, follow Demetriades and Hussein (1996) by taking *per capita* GDP in domestic currency. The real *per capita* GDP is measured as a ratio of real GDP to total population. The Real GDP is measured as nominal GDP divided by GDP deflator (2000=100).

As mentioned above we deliberately dropped the stock market analysis due to minor role of stock market in developing countries (Singh, 1997). Gelb (1989), World Bank (1989) and King and Levine (1993) use broad money (M2) ratio to nominal GDP for financial depth. In principle, the increase in ratio means the increase in financial depth. But, in developing countries, M2 contains a large portion of currency. Here the rise of M2 will refer to monetization instead of financial depth (Demetriades and Hussein 1996). So the amount which is out from the banking system, that is currency, should be extracted from the broad money. So, the ratio of deposit liabilities to nominal GDP (*DLR*) is more relevant variable here. However, it is possible that credit to private sector remain stagnant, even if the deposits are increasing. The government can increase the private saving by the increase of the reserve requirement. The supply of credit to private sector is important for the quality and quantity of investment (Demetriades and Hussein 1996). So, the ratio of credit to private sector to nominal GDP (*CPS*) is our second variable of financial depth. *CPS* is not directly available for China, so we take the ratio of domestic credit to GDP (*BSC*) to proxy to *CPS*. The purpose of using two variables is to check the sensitivity of

⁹ Real GDP per capita figure is superior to total real GDP figure, because some of the errors inherent in the estimation of the level of GDP and of population tend to be offsetting (Heston, 1994)

our analysis. As Aziz and Duenwald (2002) state that the empirical results are sensitive to the measure of financial development. Both financial variables are transformed into the natural logarithm for the usual statistical reasons. So, LD and LC are the natural log of DLR and CPS .

Besides measure of financial development and economic growth, our study use the other information to control other factors associated with either economic growth or financial development. In this regard, real interest rate, capital stock and trade ratio are used. The real interest rate R is the deposit rate minus the inflation rates, while the trade ratio TR is the total value of exports and imports as share of nominal GDP. The capital series ' K ' is constructed from the investment flows. We use the perpetual inventory method (Khan 2006). However, we use two different rates of geometric decay for two different countries. Researchers used 4 percent for Pakistan (Khan 2006) and 5 percent for China (Perkins 1988 and Wang and Yao 2003). Like GDP, the capital series is also converted into real terms that 2000=100.

For comparison purpose, we utilize international data sources. World development Indicator is used for the real variables like GDP, Gross Fixed Capital Formation and trade. While International Financial Statistics 2007 (IFS) is used for the financial variables: like broad money, deposits, and credit to private sectors.

4.1. Chart Analysis

The apparent objective of this section is to show how financial sector has developed in both countries after the reforms period. The study utilizes four ratios to pursue the mentioned objective. These are ratio to currency in circulation to GDP (CC), ratio to M2 to GDP (MGDP), ratio to deposit liabilities to GDP (DLR) and domestic credit by the banking sector to GDP (BSC).

M2 to GDP ratio (MGDP) is one of the measures that are used for the financial deepening. As evident from Figure: 2 the MGDP was, on average, 30 percent from 1960 to 1977 in China. Importantly, it was stagnant if we ignore the cyclical fluctuations. It was 32 percent in the start of financial sector reforms and reached to 164 percent till the end of

2005. That means, there is five and a half times bigger than 1978. While CC ratio was about 6 percent, on average, in the pre reform era and reached to 13 percent at the end of 2005 in China (Figure 1). That is the highest one amongst the world. However, in Pakistan, CC ratio dropped significantly. M2 ratio remained volatile within an increasing band in the post reform era that is from 1990 (Figure 1 and Figure 2). But CC ratio is still more than 10 percent of the GDP.

What does that imply? The higher CC shows that the people of China and Pakistan are tend to using cash in their payment and there are not many financial services and instruments available, specially for the payment. While the trend of M2 is same the implication is different. M2 consists of CC and other services like deposit, travelers cheques etc. The increase in M2 implies that the financial sector is getting stronger and stronger.

Here again the level and growth rate of M2 China is much higher than Pakistan. Importantly, the speed of M2 is much higher than CC ratio in China. And, in the case of Pakistan, it is much fluctuating in an increasing band. Thus, so far, it can be safely concluded that the financial sector reform has done a good job in both countries.

Let's put it another way. Two other ratios are displayed in Figure 3 and Figure 4 that is DLR and BSC¹⁰. Traditionally, both of the ratios are also used as a proxy to measure the depth of financial sector. Here again, both of the ratios have grown steadily. The DLR was at 30 percent in 1978 but end up with 138 percent in 2005, while the BSC was 50 percent in the 1978 and 115 percent in 2005. DLR indicates that how the people of China are willing to supply their assets to financial institutions, while the BSC shows how the institutions are efficient to supply these funds to economy. These ever increasing ratios are showing that the financial intermediation through borrowing and lending had played a meaningful role in post 1978 era.

In Pakistan, BSC and DLR increased marginally. DLR decreased significantly due to the sharp decrease in nominal interest rates after 1999 to 2001. But after then it is still rising despite the negative real

¹⁰ As mentioned above the CPS is not available and we proxy BSC to BSC.

interest rate. BSC and CPS also decreased in that era despite the very low or even negative interest rates. The main reason was the excess liquidity, in the economy, after 9/11 event. But except this time period the Pakistani financial sector has done a good a job to mobilize the resources.

4.2.Descriptive and Contemporaneous Correlation Analysis

Before switching on the formal econometric analysis, to show long-run relationship between financial development and growth, the study takes a view of simple data sets of both countries. We use annual data from 1960 to 2005. Different studies, for example Campbell and Perron (1991), Hakkio and Rush (1991), are evident that the span of data is more important than the number of observations. That is, there is no gain in the time series, especially in VAR framework by switching from low frequency to high frequency data. So, it is not advisable to switch over quarterly or monthly data to increase the number of observations.

We take the five years averages of growth rate of GDP and the major indicators of financial development (Table 1) for the comparison of both countries. It is evident from the table that China showed a consistent growth in GDP and indicators of financial developments. So it seems, for the time being, that there is a clear and positive link between the financial development and economic growth.

On the other hand, for Pakistan, the financial development indicators showed a countable positive performance since the reforms period from 1990s. However, the growth of GDP is not stable, but decreased in the 1990s. The possible explanation may be that the political instability and investment environment hindered the growth. With the change of government many of the investors withdrew their investment. The withdrawal of investors who had built their fortunes on the basis of concessions, privileges, connections, tax evasion and loan defaults, has created a vacuum for the time being. The government could have filled in this gap, but its own public finances are structurally weak (State Bank of Pakistan 2000). The government was trying to reduce its budget deficit, which was touching 8.7 percent in 1991, on the cost of cutting the expenditure-specially the development expenditures.

Importantly, when we calculate the correlation between *LD* and growth rate of *per capita* GDP (*GYP*), *LC* and *GYP* and *LM* (natural log of M2 to GDP ratio) and *GYP*, the first two produced a negative signs [with small magnitudes and significant at 5 %]. But, when we calculate the partial correlation by controlling the impact of fiscal deficit, political instability and other economic factor, these turned to be positive, though the magnitude was small (Table 2.1). So, here, an evidence is that there a positive relation between financial development and growth.

The contemporaneous correlations between, *Y* and the level of *LM*, *LD* and *LC* are quite high and significant in both countries (Table 2). While the correlation between all growth indicators, mentioned by King and Levine (1993), *GYP*, growth rate of real *per capita* capital (*GK*), and growth rate of real investment (*GRIN*) are negative or of low positive values with some exception in both countries. This phenomenon, similar to those findings in other studies (e.g. Liunte and Khan 1999). This suggests that the relationship between financial development and economic growth in China and Pakistan is a long - run one.

5. ECONOMETRIC METHODOLOGY

Our hypothesis is that the growth rate of GDP is dependent on the financial development along with other variables like capital stock, interest rate and international trade. Therefore, the dependent variable is *Y* in 'country' over the period of 1960-2005. Here the main independent variable of interest is financial development. If we can measure *Y*'s dependence on financial development then we must find that the coefficient estimate for the interaction dependence and financial development is positive and significant.

Theoretical models suggest that financial development affect the economic growth via two channels. First, financial development increases the saving and in turns the more resources for the financing investment. Second, the efficient allocation of the savings, ultimately, flourish the productivity of the savings and investment. The second channel is strongly emphasized by Mckinon and Shaw (1973). Mckinon and Shaw (1973) also pointed out that the government policies that force the financial institution to pay low interest rate reduce the incentive to save. Reduced savings, ultimately, result in lower investment and

economic growth. So, a positive real interest rate enhances the financial depth and promotes growth ultimately. King and Levine (1993) also suggest a positive relationship among growth, interest and financial depth.

Some important studies, e.g, Beck (2002), Beck and Levine (2004) and Odedokun (1996) include export or international trade and Capital as a factor on finance growth nexus. Importantly, the significant contribution of international trade to China growth is an unquestionable factor to growth. To model our hypothesis we follow the Christopoulos and Tsionas (2004), the relationship between growth and financial development is specified as:

$$Y_t = \alpha_0 + \alpha_1 FD_t + \alpha_2 K_t + \alpha_3 R_t + \alpha_4 TR_t + u_t \quad (1)$$

Where Y is natural log of real *per capita* GDP, FD is a proxy to financial development. FD is further divided into LD and LC . K is natural log of real *per capita* capital, R is real deposit rate and TR is total trade to GDP ratio.

5.1. ARDL Modeling Approach

It is suggested by the time series literature that spurious results are likely to arise when variables are specified in the level or non-stationary form. So, to overcome this problem, the use of stationary or differenced variable is required. However, the use of differenced variable removes the long - run information from the data set. It provides only the partial information or short - run information. To avoid such a problem, econometrician suggests, one must test to determine whether long - run relationship exist among the variables in the model or not.

A number of techniques are available to test the existence of the long - run equilibrium relationship-cointegration- among the time series variables. The most widely used techniques include the residual based Engel-Granger (1987) test and maximum likelihood based Johansen (1988, 1991) and Johansen and Juselius (1990) tests.

However, these techniques have some major drawbacks. For example, cointegration necessitates, by definition, that two variables be integrated in the same order as in Engel-Granger (1987) technique (Enders 2004).

Similarly, Mah (2000) mentioned that the cointegration technique of Engel and Granger (1987), Johansen(1988) and Johansen and Juselius (1990) are not reliable for studies that have the small sample size. Importantly, Kremers *et al* (1992) provide empirical evidence that, in the case of small sample size, no cointegration can be established among the variables if they are integrated order I(1). Additionally, Hakkio and Rush (1991) prove that the increasing number of observation by using the quarterly and monthly data will not improve the robustness of the result in the cointegration analysis. The results can be improved only by increasing the length of the time period to an appropriate level.

To avoid these problems, we use a relatively new technique. The technique is popularized by Pesaran and Pesaran (1997), Pesaran and Smith (1998), Pesaran and Shin (1999) and Pesaran *et al* (2001). This methodology is named as Autoregressive Distributed Lag model (ARDL), which is based on general to specific modeling technique (*cf* Charemza and Deadman 1992). The ARDL has several advantages to the other techniques of cointegration. One of the main advantages of this technique is that it can be applied irrespectively of whether the variable is I(0) , I(1) or fractionally cointegrated (Pesaran and Pesaran 1997). The other is that the model takes sufficient number of lags to capture the data generating process in general to specific modeling framework (Lauranceson and Chai2003). Furthermore, the error correction model (ECM) can be derived from ARDL through a simple linear transformation (Banerjee *et al* 1993). ECM integrates short - run adjustments with long - run equilibrium without losing long run information. Moreover, small sample properties of ARDL approach are far superior to that of the Johansen and Juselius's cointegration technique (Pesaran and Shin 1999).

So keeping in view, we also use the all above mentioned points in ARDL approach for cointegration analysis and the resulting ECM. ARDL framework of equation (1) is as follows:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^p \delta_i \Delta Y_{t-i} + \sum_{i=1}^p \phi_i \Delta FD_{t-i} + \sum_{i=1}^p \varpi_i \Delta K_{t-i} + \sum_{i=1}^p \gamma_i \Delta R_{t-i} + \sum_{i=1}^p \theta_i \Delta TR_{t-i} + \lambda_1 Y_{t-1} + \lambda_2 FD_{t-1} + \lambda_3 K_{t-1} + \lambda_4 R_{t-1} + \lambda_5 TR_{t-1} + U_t \quad (2)$$

where β_0 is drift component and U_t white noise. Furthermore, the terms with summation signs represent the error correction dynamics. While the second part of the equation with λ_i corresponds to long - run relationship.

The ARDL model testing procedure starts with bound test. The first step in the ARDL bounds test approach is to estimate equation (2) by ordinary least square (OLS) method. The F-test is conducted to test the existing of long - run relationship among the variables.

The null hypothesis in the equation is $H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = 0$. This means the non existence of long - run relationship. While the alternative is $H_1 : \lambda_1 \neq 0, \lambda_2 \neq 0, \lambda_3 \neq 0, \lambda_4 \neq 0, \lambda_5 \neq 0$

The calculated F-statistics value is compared with two sets of critical values given by the Pesaran *et al* (2001). One set assumes that all variables are I (0) and other assumes they are I (1). If the calculated F-State exceeds the upper critical value, then null hypothesis of no cointegration would be rejected irrespectively of whether the variable is I(0) or I(1). If it is below the lower value then the null hypothesis of no conitegeration can not be rejected. If it falls, inside the critical value band, the test is inconclusive. At this stage of estimation process, the researchers may have to carry out the unit root tests on variables entered into the model (Pesaran and Pesaran 1997).

In order to choose optimal lag length for each variable, the ARDL method estimates $(p+1)^k$ number of regressions. Where p is the maximum number of lags and k is the number of variable in the equation. The model can be selected on the basis Schawrtz-Bayesian Criteria (SBC) and Akaike's Information Criteria (AIC). The SBC is known as parsimonious model, as selecting the smallest possible lag length, while AIC is known for selecting maximum relevant lag length.

In the second step, the researchers estimate the long - run relationship using the selected ARDL model through AIC or SBC. When the long - run relationship exists among the variables, then there is an error

correction representation. So, the following error correction model is estimated in the third step.

$$\Delta Y_t = \beta_0 + \sum_{i=1}^p \delta_i \Delta Y_{t-i} + \sum_{i=1}^p \phi_i \Delta FD_{t-i} + \sum_{i=1}^p \varpi_i \Delta K_{t-i} + \sum_{i=1}^p \gamma_i \Delta R_{t-i} + \sum_{i=1}^p \theta_i \Delta TR_{t-i} + \alpha ECM_{t-1} + U_t$$

3

The error correction model result indicates the speed of adjustment back to long - run equilibrium after a short - run shock.

To ensure the fitness of the model, the diagnostic and stability tests are also conducted, the diagnostic test examine the serial correlation, functional form, normality and heteroscedasticity associated with selected model. Pesaran and Pesaran (1997) suggest using Brown *et al* (1975) stability test. This technique is also known as cumulative (CUSUM) and cumulative sum of squares (CUSUMSQ). The CUSUM and CUSUMSQ statistics are updated recursively and plotted against the breaks points. If the plots of CUSUM and CUSUMSQ statistics stay within the critical bounds of 5 percent level of significance, the null hypothesis of all coefficients is the given regression are stable can not be rejected.

6. EMPIRICAL RESULTS

The study is focusing on the examination of long - run relationship-cointegration- of financial development and economic growth. For this purpose of cointegration test, we use the ARDL technique, which requires the following key steps. 1) We have to check stationarity to avoid the spurious relationship. 2) Establish the long - run relationship among the variables through F-statistics. 3) Then find the long - run and short - run coefficients. 4) Lastly, the model's stability will be checked through Brown *et al* (1975) technique of CUSUM and CUSUMSQ.

6.1. Unit Root Test

ARDL framework depends on the time series characteristics of the data sets. So, initially we have to investigate the order of integration. This is to ensure that the variables are not I (2) stationary to avoid spurious results. As Ouattara (2004) argues that, in the presence of I(2) variables

the computed F -statistics provided by Pasaran *et al* (2001) are not valid. Because the bound test is based on the assumption that the variables are $I(0)$ or $I(1)$. Therefore, the implementation of unit root tests in the ARDL procedure might still be necessary in order to ensure that none of the variables is $I(2)$ or beyond.

We apply ADF test of stationary hypothesis for all series under consideration. It is evident from the test statistics that Y , K , TR , LC and LD are both level non stationary and trend non-stationary. While the R for the both countries is level stationary (see Table 3). The ambiguities in the order of integration of the series give a support to the use of ARDL bounds approach rather than one of the alternative Co-integration tests.

6.2. Cointegration Test

Now we have established that non of the selected series is $I(2)$ or beyond, we can test for the presence of the long - run relationship (cointegration). To carry out the bound tests, we have to estimate the equation (2) through OLS procedure and compute the F statistics for the joint significance of lagged levels of variables. The computed F statistics for each order of lags are given in Table (4). It is evident from the table that computed F -values are much higher than the above critical bounds values for both countries for each proxy of financial development. So, there is a strong evidence of long - run relationship among the variables of equation (1).

6.3. Long - Run and Short - Run Results of ARDL Model

We estimate four different models to compare Pakistan and China, two for each country. In each model for one country, we consider the alternative measure of financial depth. As Aziz and Duenwald (2002) mentioned that the empirical results are sensitive to the measure of financial depth used. We want to check the sensitivity of the measure of financial depth, especially in the case of China. We take credit by banking sector as a proxy of credit to private sector because of non-availability of the data on credit to private sector.

In this step we estimate the equation (2) following the ARDL methodology. The total number of regression estimated $(2+1)^5 = 243$. Both AIC and SBC, the lag selection criteria, are used for the selection of ARDL order. The SBC based models are selected here as these have the lower prediction error than the AIC in all cases. ARDL models of order (1,0,1,0,0) and (1,1,0,1,2) are selected, respectively, for Pakistan and China¹¹.

The long - run results for Pakistan are presented in Table 5. The LC is 0.1811 and statistically significant which implies that 1 percent increase in LC will lead to 0.18 percent increase in the real per capita GDP in the long run. Similarly, the K is 0.7565 and statistically significant, which implies that 1 percent increase in real *per capita* capital will lead to 0.76 percent increase in the real *per capita* GDP. The coefficient of K is the elasticity as Y and K are measured in the logarithm form. A less than unity coefficient of K shows decreasing return to scale that is consistent with neoclassical model. The sign of TR is positive, according to priori expectation, but not significant. And the coefficient of R is also not significant.

For China, as mentioned above, the reliable data for credit to private sector is not available. So, we use banking sector credit as proxy for LC . Here, the sign of LC is negative and insignificant, which means increase in financial depth is not important for the rise in economic growth. While the coefficients for the real *per capita* capital K and overall trade TR are highly significant. The coefficient of TR reflects that China's economic growth is attributed to international trade. Apparently, our hypothesis that the growth depends on financial development is rejected in the case of China. Here this study follows the growth literature of China, that is, the growth of China is highly attributed to the growth in capital and trade. However, we let our discussion on the results for a while.

The short run results in Table 6 show that ΔLC is also significant for Pakistan and insignificant for china, while TR is significant at 10 percent level of significance for china. The coefficient ECM_{t-1} is correct and

¹¹ ARDL model of order (1,0,1,0,0) and (1,1,0,1,2) represent the optimal lag selected on the bases of SBC criteria.

significant in sign for both countries. However, it's fairly large in the case of Pakistan, that 0.6943. This implies a speedy adjustment process. Nearly 70 percent of the disequilibria in GDP growth of the previous year's shock adjust back to the long - run equilibrium in the current year. R^2 indicates that it is a relatively good fit. ECM_{t-1} is relatively smaller than Pakistan and shows a relatively slow adjustment process from the deviation of long run in the case of China.

To check the sensitivity of our result and argument of Aziz and Duenwald (2002), we take LD as a measure of financial depth instead of credit to private sector. ARDL models of order (1,0,2,2,0) and (1,0,2,0,0) are selected, respectively, for Pakistan and China. The results are not much changed for Pakistan but the magnitude of LD is larger than the LC . It shows a 30 percent increase in the real *per capita* GDP as a result of one percent increase of deposits. In this case the sign of R becomes positive, according to the priori expectation but insignificant.

But the coefficient of LD for China becomes positive and significant at 10 percent level of significant. This implies that 1 percent increase in deposit will a cause of 0.4 percent increase in real *per capita* GDP. The sign of R is also change here, become positive from negative, but remain insignificant. But LD becomes insignificant in the short - run in the case of china. The ECM_{t-1} coefficient for Pakistan is showing a fairly speedy adjustment in the long - run, while China is showing a slow one.

All the models pass through diagnostic and stability tests. The diagnostic tests are serial correlation, functional form specification, normality and heteroscedasticity. The results of all diagnostic tests for all models are presented in the panel "b" of Table 5 to Table 8.

To check the stability, we apply CUSUM and CUSUMQ techniques. Figure 5 to Figure 12 show that both statistics CUSUM and CUSUMSQ are within the critical bonds, indicating that all coefficient in ARDL error correction model are stable.

7. DISCUSSION

A major chunk of the literature on growth suggests that the development of financial sector should lead towards economic growth. Usually

financial services work through the efficient resource mobilization and credit expansion to raise level of investment and efficient capital allocation. Keeping this argument in mind, we tested the hypothesis for Pakistan and China by using the resource mobilization (*LD*) and credit expansion (*LC*) channel.

By comparing the mean value of *LC* and *LD* of both countries, we find that China is superior to Pakistan (Table 1). Yet a higher level of credit has not caused economic growth in China, but has worked reasonably in Pakistan both in short - run and along - run. Furthermore, higher level of deposits has caused economic growth for both Pakistan and China. This suggests that the hypothesis “finances leads to growth” can not be rejected in both countries. The insignificant impact of credit expansion on growth in China could be attributed to an inefficient and unproductive allocation of resources in China.

As mentioned earlier the Chinese banking sector is concentrated in the four largest state owned banks (SOBs) which allocate a lion's share of credit to the state owned enterprise under the government's management. These banks are doing the 'banking' with significantly different objectives than the private commercial banks in the market economy (Liang and Teng 2006). The government of China uses the credit to achieve regional equality (Park and Shert 2001). Most importantly, it is well-known that the Chinese banking sector is running with high non-performing loans (NPLs) showing that there is a misallocation of credit. Allen *et al* (2005) reported that NPLs within the SOBs are 12.6 percent of total loans and 15.2 percent of total GDP, which is significantly higher than in other countries. For example, the NPLs of all banks in Pakistan are only 3.1 percent to net loans (State Bank of Pakistan 2005). This suggests that the major chunk of the credit is not issued for the productive use in China. However, it should be noted that the NPLs are continuously decreasing since 2003, which is an encouraging sign for the future of the Chinese financial sector (He 2007).

Importantly, we are using the total bank lending as a proxy for private sector credit sector in China, while for Pakistan the data on private sector credit is directly used. Aziz and Duenwald (2002) also showed the insignificant relationship among total bank lending and economic growth, but found positive and significant evidence when they used the

non-state credit as a proxy of credit to private sector. Also they believe that there might be different outcomes if credit to the private sector is utilized as a proxy for financial development instead of using total bank lending.

As mentioned above, the positive coefficient of R implies that it might capture indirectly the productivity effect on growth. In the case of Pakistan, there is a negative coefficient of interest rate, which is insignificant, yet contrary to the repressionist school of McKinnon (1973) and Shaw (1973). They propose that R is positively correlated with savings in developing countries because the positive substitution effect dominates the negative income effect. But, for Pakistan, most of the times (32 out of 45 years) the real interest rate remains negative. In this case the negative income effect dominates. On the other hand, the results of China follow the repression theory.

It is also evident from Table 2, that the contemporaneous correlation between R and LD is negative and very low in the case of China and Pakistan respectively. Moreover, R remained stagnant in the case of China and fluctuated, mostly, on the negative side in the case of Pakistan. This suggests that there are fewer or riskier investment opportunities other than banks deposits. Therefore, people prefer to keep their savings in the deposit instead of any other instrument.

8. CONCLUSION

The objective of this study is to compare the reforms in the financial sector and their impact on financial development and economic growth in China and Pakistan. It presented a brief history of financial reforms of both countries and has shown that both have achieved considerable reform in their respective financial sectors. Thus empirically tested the hypothesis “financial development leads to growth” under the ARDL framework by using the deposit liability ratio and credit to private sector as the indicators of financial development. The study finds that a positive and significant relationship between financial development and economic growth exists in the case of Pakistan. But in the case of China, the analysis show a positive and significant relationship for deposit liability ratio and a positive, yet insignificant, relationship with credit to private sector. Keeping the history of Chinese banking sector in view, it

is interpreted that the credit allocation of the Chinese SOBs is not very efficient. Furthermore, the NPLs have prevented financial development from contributing to the economic growth. However, it should be noted that we don't use a good proxy for financial development in the case of China due the lack of data on credit to private sector.

The empirical investigation of this study suggests some interesting policy implication for both countries as well as for developing countries, in general. As concluded, the financial sector reforms have increased markedly the financial depth in China and Pakistan. Therefore, a sound financial sector is important for both countries. If China carries on with the same unproductive loan expansion, then the growth of Chinese economy will be hampered. Hence, it is vital that further institutional reforms are brought into effect for more efficient allocation resources. The same is true for Pakistan. A way of increasing competition and creating profitable banks would open up the banking sector to international competition.

The moderate increase in deposit liability ratio in Pakistan suggests that the government of a developing country had better maintain a liberal and positive real interest rate to enhance savings and investment. The non-financial factors, of growth, like capital (significant in both cases) and trade (significant is the case of China) also reinforce the argument of more liberal rate of interest.

Importantly, the increase in deposits with low and negative interest suggests that there is a need for other financial instruments and a more developed stock market. Hence, developing countries had better diversify their investment opportunities.

APPENDIX

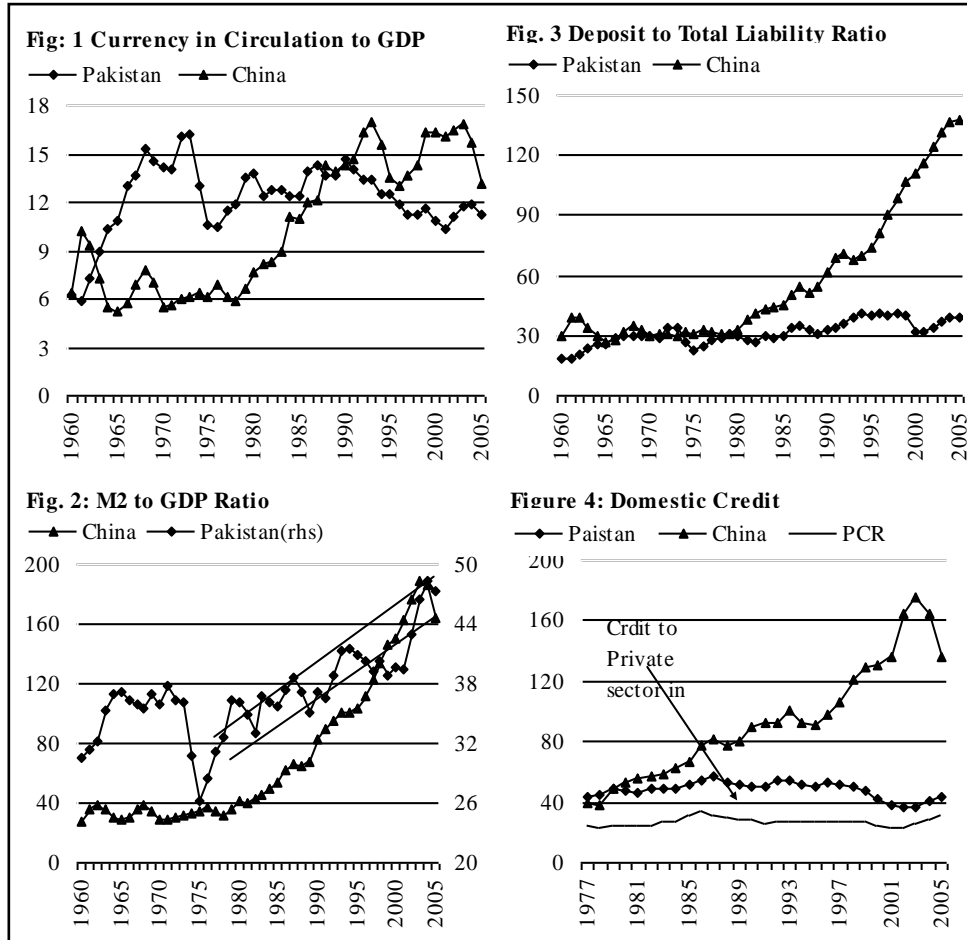


Table 1	GYP		MGDP		DLR		CPS	
	Pakistan	China	Pakistan	China	Pakistan	China	Pakistan	China
1961-65	3.023	0.248	0.346	0.336	0.227	0.336	0.190	NA
1966-70	2.766	4.576	0.361	0.335	0.293	0.314	0.258	NA
1971-75	0.597	3.572	0.334	0.318	0.292	0.308	0.235	NA
1976-80	2.638	4.720	0.330	0.361	0.284	0.318	0.237	0.517
1981-85	3.687	9.406	0.353	0.467	0.290	0.425	0.269	0.602
1986-90	3.129	5.650	0.371	0.686	0.331	0.546	0.303	0.796
1991-95	2.205	10.165	0.398	0.980	0.381	0.702	0.269	0.906
1996-00	0.370	7.096	0.396	1.328	0.388	0.977	0.268	1.117
2001*-05	3.008	7.714	0.449	1.753	0.360	1.293	0.260	1.313

Table :2 Descriptive Statistics Panel a:

	Pakistan					Correlation		
	Mean	Median	Maximum	Minimum	Std. Dev.	LM	LD	LC
<i>Y</i>	9.841	9.850	10.400	9.300	0.326	0.714	0.837	0.599
<i>K</i>	10.371	10.369	11.008	9.471	0.439	0.711	0.860	0.628
<i>GYP</i>	2.378	2.300	10.000	-2.700	2.452	0.062	0.076	0.114
<i>GKP</i>	3.496	3.547	9.812	-0.688	2.177	-0.234	0.560	-0.388
<i>GRINT</i>	6.323	4.587	43.318	-14.626	10.667	-0.422	0.587	-0.618
<i>R</i>	-2.639	-2.068	4.446	-26.035	5.559	0.428	0.220	0.252
<i>TR</i>	0.245	0.249	0.312	0.113	0.045			
<i>CPS</i>	0.251	0.257	0.335	0.112	0.044			
<i>MGDP</i>	0.370	0.367	0.484	0.262	0.044			
<i>DLR</i>	0.313	0.306	0.414	0.180	0.060			

	China							
	Mean	Median	Maximum	Minimum	Std. Dev.	LM	LD	LC
<i>Y</i>	7.657	7.450	9.200	6.400	0.855	0.966	0.953	0.970
<i>K</i>	8.537	8.341	10.347	7.508	0.894	0.979	0.973	0.964
<i>GYP</i>	5.902	7.600	16.600	-26.400	7.415	0.203	0.168	-0.004
<i>GKP</i>	6.486	6.320	12.428	-2.916	3.878	0.075	0.073	0.072
<i>GRINT</i>	10.829	10.746	72.949	-62.844	21.243	0.040	0.011	0.221
<i>R</i>	1.313	2.793	11.360	-13.120	4.652	-0.272	0.251	-0.007
<i>TR</i>	0.218	0.150	0.610	0.050	0.159			
<i>BSC</i>	0.888	0.882	1.471	0.505	0.289			
<i>MGDP</i>	0.719	0.442	1.885	0.271	0.499			
<i>DLR</i>	0.573	0.425	1.380	0.270	0.337			

Table:2.1 Partial Correlation Coefficient for Pakistan

	Controlling for Fiscal Deficit, Inflation, Political Instability¹² and Human Capital		
	LM	LD	LC
<i>GYP</i>	0.327	0.158	0.373
<i>GKP</i>	0.571	0.281	0.464
<i>GRINT</i>	0.719	0.435	0.584

¹² Here we use a dummy variable. 1 for military regime (stability) 0 otherwise.

Table 3: Unit Root Tests

	Pakistan		China			Pakistan		China	
	ADF	<i>k</i>	ADF	<i>k</i>		ADF	<i>k</i>	ADF	<i>k</i>
<i>Y</i>	-0.40	0	1.43	0	ΔY	-3.05**	2	-6.94***	0
<i>K</i>	-0.94	2	-2.21	2	ΔK	-3.94**	2	-5.21***	1
<i>LM</i>	-1.89	1	0.90	2	ΔLM	-5.34***	0	-4.73***	0
<i>LD</i>	-2.43	2	1.66	2	ΔLD	-5.83***	1	-6.03***	1
<i>LC</i>	1.38	0			$\Delta LPCR$	-4.33***	1		
<i>R</i>	-3.84**	1	-5.06**	1					
<i>LTR</i>	-2.44	2	1.78	0	ΔLTR	-7.59***	0	-5.53***	0

** = 5 percent significant

***= 1 percent significant

Table No: 4 Bounds Tests for the Existence of a Long Run Relationship

Country	F-statistic			1 % Critical bounds	
	LBCR	LPCR	LD		
Pakistan	8.349	7.112	13.325	3.74	5.06
China	7.137	NA	8.926	3.74	5.06

source of Critical values: Pesaran et al(2001)

Table No 5 ARDL Estimate Long Run

Dependent Variable: *Y*

Regressor	Pakistan		China	
	Sample from 1960 to 2005		Sample from 1977 to 2005	
	Coefficient	t-Values	Coefficient	t-Values
<i>LC</i>	0.1811	2.1854**	-0.5304	-1.4552
<i>K</i>	0.7565	12.6897***	0.8464	6.8625***
<i>R</i>	-0.0023	-1.2456	0.0059	0.8806
<i>TR</i>	0.0022	0.4997	0.5545	2.7903***
<i>Intercept</i>	1.2950	2.6298***	1.0953	2.3456***

Diagnostic Test Statistics

Serial Correlation $\chi^2(1)$	0.1760	Serial Correlation $\chi^2(1)$	0.1728
Functional Form $\chi^2(1)$	1.1540	Functional Form $\chi^2(1)$	1.048
Normality $\chi^2(1)$	1.6619	Normality $\chi^2(1)$	1.1729
Heteroscedaticity $\chi^2(1)$	0.0874	Heteroscedaticity $\chi^2(1)$	0.16674

Note: ARDL (1,0,1,0,0) selected on the basis of SBC for Pakistan and ARDL (1,1,0,1,2) selected on the basis of SBC for China.

** = 5 percent significant

***= 1 percent significant

Table No 6 ARDL Model ECM Results

Dependent Variable: ΔY				
	Pakistan		China	
	Sample from 1960 to 2005		Sample from 1977 to 2005	
Regressor	Coefficient	t-Values	Coefficient	t-Values
ΔLC	0.1258	2.2787**	0.1159	0.6690
ΔK	1.7684	2.9538***	0.4711	2.7749***
ΔR	-0.0016	-1.2149	-0.0039	-1.5262
ΔTR	0.0015	0.5137	0.1765	1.7496*
$\Delta TR1$	NA	NA	0.1547	1.8393*
Δ Intercept	0.9916	2.3460**	0.6096	2.8156***
$ecm(-1)$	-0.6943	-4.3268***	-0.5566	-2.5580***
Diagnostic Test Statistics				
R-Squared	0.7565		R-Squared	0.55066
R-bar- Squared	0.6876		R-bar- Squared	0.31277
F (5, 38)	6.2162		F (6, 20)	3.4722
SER	0.0388		SER	0.0218
RSS	0.0557		RSS	0.032286
DW	1.9888		DW	2.1086

Note: ARDL (1,0,1,0,0) selected on the basis of SBC for Pakistan and ARDL (1,1,0,1,2) selected on the basis of SBC for China.

For Pakistan

$$ecm = Y - .18114 * LPCR - .75653 * KP + .0023265 * R - .0021631 * TR - 1.2950$$

$$ecm = LRP GDP + .53041 * LBCR - .84641 * LKP - .0059281 * R - .55451 * LTR - 1.095$$

* = 10 percent significant

** = 5 percent significant

*** = 1 percent significant

Table No 7 ARDL Estimate Long Run

		Pakistan		China	
Dependent Variable: Y					
Regressors	Coefficient	t-Values	Coefficient	t-Values	
<i>LD</i>	0.30443	2.4535***	0.4174	1.7401*	
<i>K</i>	0.37421	8.5970***	0.7832	2.1419**	
<i>R</i>	0.0025	0.9329	0.0353	1.0073	
<i>TR</i>	0.0192	0.1963	0.1918	2.5566***	
Intercept	3.0721*	8.8696***	5.0423	2.7896***	
Diagnostic Test Statistics					
Serial Correlation $\chi^2(1)$		0.0557	Serial Correlation $\chi^2(1)$		0.1968
Functional Form $\chi^2(1)$		0.4303	Functional Form $\chi^2(1)$		1.6300
Normality $\chi^2(1)$		0.87563	Normality $\chi^2(1)$		1.4612
Heteroscedaticity $\chi^2(1)$		0.0060	Heteroscedaticity $\chi^2(1)$		0.01265

Note: ARDL (1,0,2,2,0) selected on the basis of AIC for Pakistan and ARDL (1,0,2,0,0) selected on the basis of SBC for China.

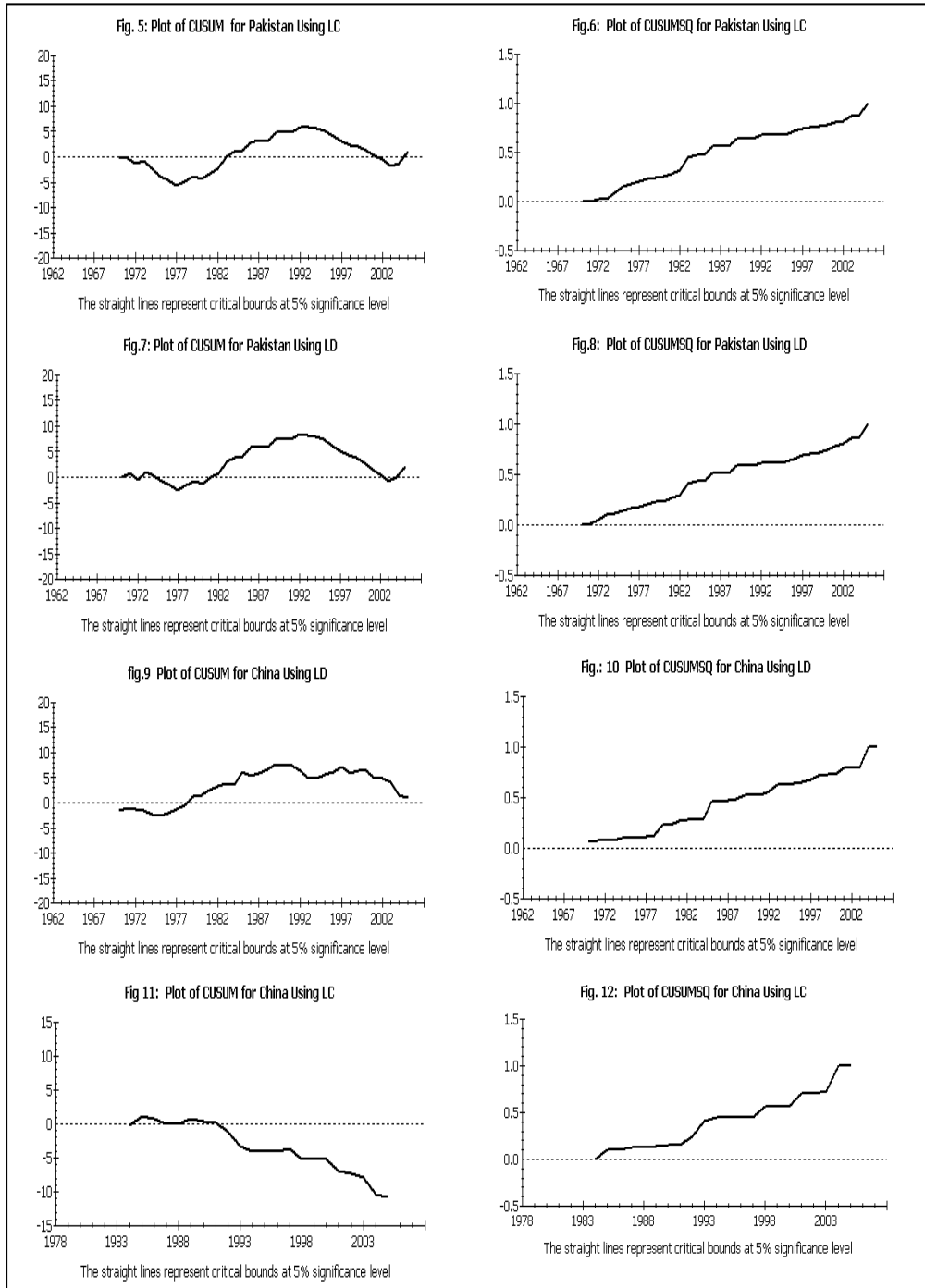
* = 10 percent significant

** = 5 percent significant

***= 1 percent significant

Table No 8 ARDL Model ECM Results

Dependent Variable: ΔY				
	Pakistan		China	
	From 1960 to 2005		From 1960 to 2005	
Regressor	Coefficient	t-Values	Coefficient	t-Values
<i>ΔLD</i>	0.1890	2.4934***	-0.1049	0.1158
<i>ΔK</i>	2.7343	2.9766***	-3.3538	2.7749***
<i>ΔKI</i>	-1.1532	-1.386	-3.2783	-4.3291***
<i>ΔR</i>	-0.0045	-0.2827	-0.0040	-1.8211**
<i>ΔRI</i>	-0.0030	-2.0611**	NA	NA
<i>ΔTR</i>	0.0119	0.1990	-0.0011	-0.5500
<i>Δ Intercept</i>	1.9077	3.8078***	-0.6289	-1.9498**
<i>ecm(-1)</i>	-0.6210	-4.2780***	-0.1247	-2.2074**
Diagnostic Test Statistics				
R-Squared	0.4990		R-Squared	0.5773
R-bar-Squared	0.3664		R-bar-Squared	0.49511
F (7, 36)	4.8372		F (6, 37)	8.1945
SER	0.0389		SER	0.045623
RSS	0.0514		RSS	0.074933
DW	1.9527		DW	2.0585
Note: ARDL (1,0,2,2,0) selected on the basis of SBC for Pakistan and ARDL (1,0,2,0,0) selected on the basis of SBC for China.				
For Pakistan				
ecm = Y - .30433*LD - .37421*K - .0025353*R - .019183*TR - 3.0721				
For China				
ecm = Y - .4174*LD - 0.7832*K - .035300*R - .0.1918*TR - 5.0423				
** = 5 percent significant				
***= 1 percent significant				



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