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Market Concentration, Governance and Macro-Financial Determinants of Bank Profitability: Comparative Analysis of Pakistan, India and China

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Abstract:

The purpose of this study is to examine impact of macro-financial and market specific variable on the profitability of banking industry in three emerging economies China, India and Pakistan in the Asian region. This study also examines the managerial behavior under concentrated market structure in respective banking industries. The sample consists of 25 commercial banks including state-owned and private banks of China, India and Pakistan. The time span addressed in this study is from 2003 to 2013. Generalized Methods of Moments (GMM) technique is applied on the data for empirical results. The finding shows that bank size is positively related with bank profitability in Pakistan but remained insignificant in China and Indian banking industries. Credit risk affect profitability positively in China but negatively in India and remain insignificant in Pakistan. Concentration is insignificantly related to profitability in Pakistan and India but significantly in China. Governance influences positively to bank profitability in all the respective economies. Macroeconomic factors such as GDP significantly affect profitability in China and Pakistan but insignificant in India. Derived results also support the existence of Expense Preference Theory in Pakistan only. Edward

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Heggestad Mingo Hypothesis of risk avoidance is not proved in this study. Regulators should make such policies that can increase profitability of banking industry under concentrated market and governance should be consider as important factor.

Key words: market concentration, governance, bank profitability, Pakistan, India, China

CHAPTER 1

INTRODUCTION

Banking industry is one of the pillars of the economy. As human requires oxygen to live similarly an economy requires a strong banking industry to make itself alive. So banking industry is a life line for trade and commerce in fact for the growth of economy (Levine, 1998).

In 1397, the idea of saving money was initially presented in medieval Florence. Medici an effective dealer family made a system of shops that permitted supporters to place cash on record and withdraw the cash in an alternate city that had a Medici agent. That is why during that time many rich families kept their money in Medici banks and travel easily without any fear of being robbed by robbers (Gauba, 2012).

Throughout the most recent two decades the keeping money area has encountered worldwide real changes in its nature. Both outer and residential variables have influenced its structure and execution (Athanasoglou, Brissimis, & Delis, 2008)

In past, when there was no concept of banks, the activities related to money and finance were controlled by money lenders and individuals. At that time lending rates were very high. There were no security of public savings and no standardization regarding loans. So as to overcome such

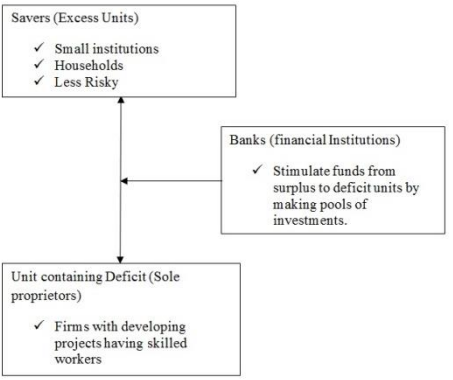
problems the organized banking sector was established, which was fully regulated by the government. Notwithstanding the expanded pattern to bank disintermediation watched in numerous nations, the part of banks remains focal in financing monetary action when all is said in done and diverse fragments of the business specifically. A sound and productive saving money part is better equipped to withstand negative stuns and help the strength of the budgetary framework. In this manner, the determinants of bank execution have pulled in light of a legitimate concern for scholarly research and of bank administration, money related markets and bank chiefs (Athanasoglou et al., 2008)

Banks plays crucial role in organizing funds and stimulating investments for productive schemes. They generally gathered funds in shape of savings from general public and finance these funds to those who need it for their projects and other purposes. The process of money circulation promotes the health of economy by making a link between those who have surplus and those who are in deficit. So banks have an importance like backbone in the body of economy.

1.1 Role of Banking System in Economy

Financial institutions (Banks) provide facilities to investors to provide funds in shape of advances in accordance with their requirements with the consideration of risk returns assign with the projects. Banks arrange pools of funds to invest these funds in different projects. In this way banking industries boost up the growth of economy.

Figure 1.1: Role of Banks



Source: Author's Formulation

It is known that even nations with advanced and overall managed budgetary establishments might not be fully protected to fiscal emergencies. Since the Asian financial crisis of 1997-1999, the importance of financial liberalization with plenty of regulations has been increasingly recognized. In early 1990s, the banking sector of Pakistan and India had faced liberalization and deregulation process. These reforms have changed the baking industries from more nationalized banks to more privatized banks by opening the doors for new private banks and also convert some nationalized banks into privatized banks to achieve the targeted economic growth.

Banking system in creating nations have been demonstrated to show fundamentally and diligently bigger intermediation spreads on normal than those in created nations (Hanson & Rocha, 1986).

1.2 Background of Banking Industries:

Before the introduction of reforms in Asia most of the countries were facing the problem of high ratio of non-performing loans in their banking industries such in China (Tan & Floros, 2012). Their Profitability reached to the lower line due to this problem.

1.2.1 China

After 1949 year of establishment of Peoples Republic of China, all the companies previously working in China were transferred from private to nationalized sector in 1950. Only one bank (People's bank of China) controlled budgetary system in China Between 1950 to 1978 and almost all operations were handled by this bank in China. This bank served as central as well as commercial bank at that time. But in between 1978 and 1984 new government owned banks were established and separate central bank was formed. In this era due to some reforms in financial system real GDP of China grew by 10% and country moved from more agricultural to industrial state and poverty level also declined. After the first reform wave in 1978 to 1984, a second wave was introduced by allowing new entries as a competitors in banking industry after 1984 to 1994. On that time some other deficiencies were still present that comprised of lack of proper regulations for banking industry. But overall during reform periods from past, Chinese banking industry have kept its way towards improving, enjoying favorable conditions and improving the economic growth.

In the start of 1994, China enjoyed another economically boom season. This era of economic boom extend its financial system with the help of deregulation process in their banking industry. In this time span legal requirements were formed for opening a new bank and set the standards for operations in banking system.

In 1998-99, a phase of Asian financial crisis due to which almost all countries were affected badly with respect to their economy. China enjoyed comparatively favorable conditions at that time because of its inelastic parameters on withdrawal of foreign capital from banks. This situation took China ahead from many other countries in Asia with respect to their banking industries.

The inclusion of China in World Trade Organization (WTO) was another big achievement in 2001. This inclusion had taken some serious developments such as foreign banks could do business with Chinese public in foreign currency and local currency. Similarly foreign banks can also deal with all Chinese clients. Besides all of these achievements, non-performing loans were the major headache for Chinese banking industry, this was because of many banks were trying to expand businesses and their credit policies were not stringent enough as well as influence of government on state owned banks. At that time China government were going to restructure its banking industry.

In China the profitability of banking sector is still not in comparable with the developed countries because of the above discussed problems. Chinese banking system have low net interest margins as well as less operating income as compared to the developed European countries and Pre-provision profits are also very much high but net profit reduced to lesser in number only because of NPLs and write offs (García-Herrero, Gavilá, & Santabárbara, 2009). China has also faced structural reforms in shape of plural banking industry from mono by separating some major banks from central bank of China which were specialized in Agriculture, Foreign Trade and business, Financing business and Construction and Investment and other major reform was partial privatization of banking sector and modernization of banking sector in the recent past. In recent years China Banking Regulatory Commission (CBRC) and China Insurance Regulatory Commission (CIRC) started work together. The main aim of this collaboration was to boost up the financial system performance. In 2004, state council decided that the Bank of China and the China Construction Bank would start the experiment of conversion of the shareholding system whose task was to establish the standardized corporate governance and an internal system of

rights and responsibilities in accordance with the requirements for modern commercial banks; to restructure the financial system, speed up the disposal of non-performing assets and strengthen minimum capital requirement to build up first-class modern financial enterprise.

China introduced Asset Management Company(AMCs) to purchase NPLs made by the banking industry, So that NPLs could remove from balance sheets of the banks. PBCs and Government of China were on the back of AMCs. Banking assets have been increasing trend in China mainly due to reforms. In recent years this ratio has been increased from 202% to 257%.

1.2.2 Pakistan

Before the establishment of highly regulated banking system in Pakistan, there were only few banks working with not much branches and not with highly developed technology. In 1948, central bank was established to monitor banking operations and expansion of banking industries. Before 1972, banking industry of Pakistan were not working at great pace and not proved itself as a helping hand to boost up economic growth.

In 1972, reforms were introduced to improve banking services. The reforms were comprises of making the banks more receptive to the prerequisites of development financial system. The focus of these reforms were on the equally and fairly disbursement of advances, enhancing the soundness, productivity of the banks, and securing more prominent social responsibility of the managing an account framework overall. Despite of these reforms even banking industry radically improve the savings but failed to disburse loans fairly. Rural areas were totally ignored for the loan sanction purposes.

In 1974, a phase of nationalization was introduced in the history of Pakistan, banking industry was also influenced by this process when all private sector banks were transferred to

state owned banks. On that time government formed a council for Pakistan banking industry to monitor the state owned banks. Although at that time span banking industry showed obvious growth but a problem of bad loans were increased very sharply. This is because of priority lending to some selected sectors in the industry and mainly to the politicians, due to many reasons a larger portion of advances were written off as bad debts and causing some serious problems for banking industry of Pakistan.

When non-performing loans were appeared as a major hurdle for the growth of banking industry, in 1991 the act of Nationalization was amended by the government and banks were faced privatization process. Not only many of the banks were newly opened after this amendment but some state owned banks were converted into privatized banks as well.

After privatization, some revolution changes were pushed through. Administrative forces of State Bank of Pakistan were restored by means of changes to the State Bank of Pakistan Act (1956) Ordinance of Banking companies (1962). Hence, bank supervision, corporate administration and interior controls were fortified generously. In this regard legal obstacles and delays in improvement of non-performing loans were streamlined in 2001. Moreover, the extent of prudential structure set up in 1989 was improved, permitting banks to wander into previously undiscovered business fragments (Khalabat, 2011).

In Pakistan, banking business has an increasing trend after the introduction of reforms on different levels. Total assets to GDP ratio increased from 49.1% in 1997 to 55.6% in 2005 which ultimately shows the efficiency of Pakistani banks. Equity market also grew in result of financial reforms from 10.3% to 37.1% of GDP in 2006. The reduction of Non-performing loans were also happened in post reform period even Government of Pakistan was passed the regulation to

recover finances in 2001. This ordinance filled the gap in reducing the value of non-performing advances. Liberalization in 1997 and 1998, removal of caps and floor from interest rate of deposits and advances has helped banks to increase their profits. Overall total earnings of banks increased to 85% in post reform period as compared to before reform period. Cost of intermediation also increased after successful implementation of reforms (Ali, Akhtar, & Ahmed, 2011)

1.2.3 India

Banking industry has a large history in India whether it is public or private banking. In 18th century, more advanced banking have been introduced. In 19th century more than two presidency banks were formed in India, in the same era banking industry have developed by introducing private banking and entering foreign banks in India.

In 1935, a central bank (Reserve Bank of India) was introduced with regulatory powers to control banking industry's operations. In the same year previously formed presidency banks were converted into State bank of India. State bank of India were also given some powers to control banking industry. Before 1970s, almost 31% Indian banking industry was comprises of state-owned banks(Cole & Duflo, 2004).

An era of Nationalization was introduced in late 1969s in which government shift the privatized banks towards public banks with the help of some conditions regarding share of deposits and number of branches. At that time government felt need to do this because private banks did not do as good as economic growth need to improve. The lending policy was so stringent and banks mainly focused on industrial side for sanctioning loans and ignored the agriculture as well as SME sectors, which caused under lending problem. So government introduced nationalization process and control almost 84% of banking industry under its supervision(Cole & Duflo, 2004).

In 1969 the banking purpose in India was not to maximize the monetary profit but social returns. In the last stages of 1950s the banking system in India was considerably liberalize but in 1960s Government of India started to increase its control on banking system of India by imposing floor and ceiling limits on deposits and lending respectively as well as high level of capital reserve. Financial repression has a great impact on the financial development and growth of economy (Demetriades & Luintel, 1996).

Under lending problem in India is one of the reasons that many companies could not earn more profit unless otherwise they were lent by banks. From 1980 in India the trend was starting to change from Nationalized to Privatized because private banks issued shares in general public. Many cases of corruption were also founded in previous era which leads to shelter confidence on state-owned banks in India. That is why trend have changed from public to privatization. In the period of 1980s efficiency of private banks were increased sharply as compared to public banks and growth as well. Many foreign banks entered in India after the reforms introduced in 1991.

Ministry of Finance formed a committee named as Naraismham committee in 1991 to find out how could banking industry be strong and more efficient. In 1998 committee finalized its recommendations and presented to the Ministry of Finance. Their recommendations were mainly consist of capital adequacy requirement should manage according to market and credit risk, nonperforming loans should be reduced, banks which are weak should be closed or inject with more capital and arrangements should be made regarding bad loans recovery.

History of Indian banking sector shows that banking sector faced intermediation cost at very high level due to corruption (Cole & Duflo, 2004). In recent past Indian banking enjoyed healthy competitive environment with the inclusion of

more private banks and foreign banks. In India total banking assets as per GDP have increasing trend from 93% to 98% in the recent years.

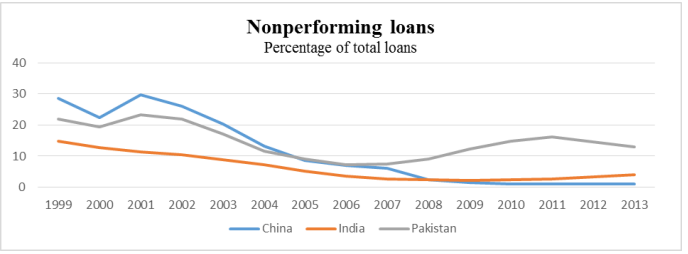
A complete banking sector reform with the aim of conversion of banks into market working and money-making organizations was started by the Chinese Government in 1997 (García-Herrero et al., 2009). Due to the inclusion of these reforms some major nationalized banks of china transform to privatization. Besides all of these reforms, there are also some other factors which affect the banking industry; these include those factors which can be controllable by the banks and others which cannot be controlled(Demirgüç-Kunt & Huizinga, 1999). Chinese banking sector deposits increased year by year after reforms being introduced which were almost 20 percent of GDP in 2008 which was more than 17 and 16 percent in 2007 and 2006 respectively (Tan & Floros, 2012).

Ali et al. (2011) are the one who offered study on different other factors which affects the banking industry in Pakistan and conclude that not only bank's internal factors affect profitability of banking industry but also some external factors which includes market specific as well as macroeconomic variables that also affect the performance of banks (Raza, Jawaid, & Shafqat, 2013). Market structure has keen importance in the performance of banking industry (Al-Karasneh & Fatheldin, 2005), either the industry is concentrated or competitive. Different theories support these two behaviors such as efficient market hypothesis and structure conduct performance hypothesis.Bhatti and Hussain (2010) offered research regarding to the concentration and competition and explained that concentration (monopoly) could be a profitable situation as compared to competitive environment.

Pakistan, India and China all these three countries have faced almost same problems in their banking system before 1990's but with the help of reforms in banking sector during

late 1990's and inclusion of more private banks as compared to state owned banks the profitability of the banking sector in all these three countries increased. This thing requires some statistical analysis in the literature. That is why these countries are to be selected for this research.

Figure 1.2: NPLs Ratio in Respective Countries



Source: WDI

1.3 Problem Statement:

In the Asian region most of the banking industries are making arrangements since last two decades to get rid of a problem of low asset quality. Banking industries are moving from more concentrated to competitive market structure in recent years by the inclusion of new private and foreign banks. A broad study is demanded for examining the impact of asset quality on profitability of banks after the inclusion of remedial measures for nonperforming loans and how much market structure contributes in the profitability of banking industry in different countries under different economic conditions. In different banking industries the behavior of management towards profitability is very important either management is risk averse or not. This element also needs consideration. That is why, this study also examine the behavior of banking industry management in different countries

1.4 Objectives of the Study:

In this study relationship of bank profitability with respect to various factors comprising of industry structure, macro-financial and governance of the economy is examined. The need here is to investigate the determinants of international bank profitability, how these determinants affect the performance of banking industry in various conditions under different rules and regulations and under different market structures. (Gilchrist, 2012) explained in his work that it is very necessary to conduct a research on international level by adding some other countries. The main objectives of the study are given below:

- ✓ To test if profitability of banking industries show same trend with respect to different Macro Financial variables.
- ✓ To test if banking industries of different countries show same behavior under concentrated market structure.
- ✓ To test if how much governance plays role in determining the profitability of banking industry.
- ✓ To make recommendations on the basis of empirical findings of this thesis.

1.5 Significance of the Study:

Study on banking industry is most imperative from perspective of managerial and administrative view. From the managerial perspective it is vital to examine the determinants connected with accomplishment to make sense of the activities that can boost up the execution of banks. Controllers of banks are occupied with assurance alongside soundness of the saving money framework and they are ensuring the confidence of general public. What is more the principle point of this study is to analyze that how well financial reforms have increased the efficiency and performance of the banking industries in the recent past.

The division of this study is such that it comprises of six chapters. Second chapter analyzes the previous studies related to the determinants of bank profitability and managerial behavior. Third chapter describes the theoretical framework and summary of hypothesis. Fourth chapter describes the methodology and data used in this study for empirical analysis. Fifth chapter reveals the results and findings of our study. Sixth chapter consists of conclusions, recommendations and future research.

CHAPTER 2

LITERATURE REVIEW

In the literary works, bank efficiency, ordinarily measured by the return on equity and return on assets is typically communicated as a capacity of banks controllable and uncontrollable factors. Bank's controllable determinants are components that are predominantly impacted by a bank's administration choices and arrangement destinations. Such types of determinants are the level of liquidity, provisioning arrangement, capital ampleness, liabilities administration and bank size. But on the other side of the picture, the determinants causes impact from outside the bank's management arrangements, both industry-related and macroeconomic, are variables that reflect the investment and legitimate environment where the credit foundation works.

Christofides and Tapon (1979) conduct a research by using Linter's price setting model and suggest that there exists a relationship between concentration and the profitability of big firms and explained that in concentrated market design firms having stable demand with respect to the changing price have more inherited power and that firms can obviously increases their prices and earn more profits in concentrated markets.

Smirlock (1985) examined no significant association between concentration and profitability of banking industry in seven states comes under the authority of Kansas Federal Reserve Bank. These seven states comprises of Colorado, Kansas, Missouri, Nebraska, New Mexico, Oklahoma and Wyoming. The data comprised of 2,700 unit states banks and time span consist of 1973 to 1978. Market share, concentration, market deposits and market growth were used as independent variables in the study. The author found that concentration is unable to explain bank profitability instead market share which have positive significant impact on bank profitability. Author argued that concentration is not a sign of collusive behavior and firms always earn monopoly returns but it shows efficiency of banks.

Firms having more advanced technologies more efficient management can enhance their profitability, it does not mean that concentration have positive impact on profitability but its management efficiency and resources, (Berger, 1995) in his study on the banking industry of U.S from 1983 to 1989. The purpose of their research was to examine the relationship between capital to asset ratio (CAR) and profitability. The results were showed that there was a positive relationship between capital to earnings, and granger cause relationship also existed. This means that higher capital leads to higher earnings for banks and higher earnings will leads to higher capital for banks. He explained that it is abnormal that higher capital leads to higher earnings, but only way is the advantage of less bankruptcy cost. He explained that some type of mergers merge only because of monopolistic behavior thus sets the prices which are less favorable for the general public, this type of behavior supports the structure conduct performance hypothesis and some type of mergers merge with each other only to improve the efficiency and provide support for the efficiency hypothesis.

Guru, Staunton, and Balashanmugam (2002), conduct research on the banking industry of Malaysia. For this purpose they have used 13 years bank level data and apply profitability model. The profitability measures used here were ROA and ROE. This study concluded that loans to deposit ratio as a proxy for liquidity have negative relationship with profitability which proved that commercials banks should not over commit the loans because it would increase the riskiness of asset side of banks and proved to be very harmful for banks. Size of the banking industry has highly significant positive relation with profitability of banks. Some other bank related variable such as asset quality and capital both of these variables were highly significant but asset quality has positive sign and capital has negative. These results showed the importance of asset quality.

Hassan and Bashir (2003) have conducted a research on Islamic banking by capturing the Islamic banks of 21 countries in all over the world having 43 Islamic banks. They have used three measures of performance which were net non-interest margin, roa and roe. They found that equity to assets ratio have positive and significant relationship with the nim. But have negative association with return on equity and showing even no correspondence with return on assets. Their results showed that overhead expenses are positively related with net non-interest margin but on the other hand with two other performance measures roa and roe overhead has no significant relation. As similar as previous finding total liabilities to total assets ratio has also positive association with nim but no any power full impact on return on assets and return on equity. GDP has also same results with nim but no impact on other two mentioned performance measures of banking industry.

Goddard, Molyneux, and Wilson (2004) in their research evidenced that there is negative association exist between equity to asset ratio and growth. For his study the author captured some European countries such as France, Germany,

Italy, Spain and UK. The time period from 1992 to 1998 and total banks were 583. Dynamic panel regression which was based on reduced form of equation. Their studies made confirmation .of a reverse relationship between a bank's capital-holdings degree and its development. A high capital-possessions degree consequently has all the earmarks of being connected with a moderately careful development strategy. Furthermore banks that can't distinguish regions into which to grow will regularly have a tendency to collect more capital. In their studies the authors found out two more results regarding macroeconomic and market structure conditions. They found that concentration has positive relation with the profitability and support for SCP hypothesis, similarly GDP also has positive significant impact on the growth of the banking sector. Liquidity as well negatively related with the growth. But size has no any considerable impact on growth of banking industry.

Al-Karasneh and Fatheldin (2005) have conducted research on the banking system of GCC countries include UAE, Saudi Arabia and Kuwait using bank level data from 1999 to 2002 and applying econometric techniques OLS, parametric and non-parametric found that concentration have positive and significant impact on the banks profitability because higher concentration leads to monopolistic behavior in the market and larger banks took the advantage of their monopolistic attitude and earn higher returns. And the other finding of their study was that the performance of large banks is good as compared to small and medium banks.

Athanasoglou, Delis, and Staikouras (2006), in their study have come across the determinants of bank profitability in South Eastern European countries. For this purpose they have gathered data from 1998 to 2002 comprising of total almost 132 banks from different countries and used GLS as well as 3SLS econometric techniques. They have found that operating expenses shows negative relationship but size of the

banking industry shows positive relationship and support the theory of economies of scale. Concentration shows positive significant relationship with profitability it means that banks enjoyed monopoly returns. Macro variable inflation has positive trend with respect to the profitability of banking industry. Liquidity in banking industry of SEE region has not any significant impact on the profitability of banks because in that region banking industries still lag behind in meeting the liquidity principles as compared to countries with developed banking system.

Athanasoglou et al. (2008) conduct a research on the banking system considering the Greek commercial banks during the period of 1985 to 2001 by using Generalized Method of Moments (GMM), they found that there was no any significant relationship exist in concentration and the profitability of banks. Capital is an important ingredient in determining the profitability of banking industry. Credit risk showed negative relationship with profits. This means that if banking industry will expose more to credit risk it would have decreasing trend in the profitability. Another main finding of their study was the unsupportive evidence of Structure Conduct Performance Hypothesis (SCP) because it relates to concentration of the industry and in their research there is no any significant relationship found between concentration and profitability so SCP was not proved in this study.

Bennaceur and Goaied (2008) perform a study on the banking system of Tunisia. For this purpose they have used 10 banks from the period of 1980 to 2000. GLS econometric technique was used by them and the two proxies were used to measure the performance of banking industry which was nim and roa. In Tunisian banking industry loans are positively connected with high interest margins. It means that if loans are increases the ability of banking industry to generate more interest spread also increase. But the size of the banking

industry has negative impact which did not support for the economies of scale. Development of stock market also flourishes the banking industry. Another main finding of their study was that if the banks are well capitalized then they might charge more for loans and pay less on their liabilities (deposits) because on that time banks faces less risk.

Kosmidou (2008) conduct research on the banking system of Greece by capturing 23 banks from the time period of 1990 to 2002. The author has used an unbalanced time series data set. Results showed that equity to asset ratio have positive association with profitability of banking system. Size of the banking structure has positive but insignificant relation with profitability of banking industry but it did not remain same when macroeconomic variables were entered in the model it would change its sign to positive. Those banks which have high capitalization ratio shows that they have the ability to compete in the market and avail the profitable opportunities in the future to obtain maximum profits.

Sufian and Chong (2008) conducted a study in Philippines by focusing on the factors affecting the performance of banking system during 1990 to 2005 found that credit risk is negatively attached with the performance of banks in Philippines. Similarly the size of banks also negatively linked with the profitability of banks which shows economies of scales for smaller banks or diseconomies of scale for larger banks. This relation shows that larger banks in Philippines are tend to be less profitable as compared to smaller banks.

Major reforms in China in 1997 have an important objective of transforming banks into market functioning and profitable institutions. Non-performing loans were a big problem for the Chinese banks at that time. Restructuring of banks in China, stimulating the upper limit and flooring rates from loans and deposits were also the part of those reforms. García-Herrero et al. (2009) examine the impact of various

factors on the profitability of Chinese banking system. They have considered 87 banks including the time span of 8 years from 1997 to 2004. The technique used by them is GMM estimator. Their findings suggest that in China capital proxy of which is equity to asset ratio have positive relationship with profitability. They were made a statement that better capitalized banks have more profitability as compared to less capitalized banks. They have found that higher interest rates on loans and inflation have positively affects the profitability of Chinese banking industry while instability in interest rates decreases the profitability of banking industry.

Ramlall (2009) also found negative linkage between credit risk and profitability. The author conducted research on the banking system of Taiwan and used loan loss provisions to total loans as measure for credit risk and concluded that as loan loss provisions increased the quality of asset decreased which is not good for the banking business.

Sufian and Habibullah (2009) conducted a research on the banking system of China by capturing (SOCBs), (JSCBs) and city commercial banks during 2000 to 2005. ROA and ROE were used as performance measures and bank size, credit risk, liquidity risk, gdp and inflation were being used as independent variables. The authors found that size of the banks was negatively related to the profitability of banking industry. Credit risk and liquidity were positively related with the profitability of banking industry.

Sufian (2009) conducted a study on the determinants of bank profitability in developing economy by focusing on China. He captured 16 banks consisting of twelve joint stock and four state-owned banking companies on time span of 2000-2007. By using multivariate regression technique he found that credit risk, size and capitalization have positive significant impact on the profitability of banking industry in China.

Bhatti and Hussain (2010) in their paper examines the relationship of profitability of banking sector in Pakistan with the concentration and competition by capturing twenty commercial banks from 1996 to 2004. In their study they used linear regression model. They used roa, roc and roe as a dependent variable and the basic independent variable was concentration ratio, so they found that competition have negative effect and concentration have positive effect on the profitability, and also found a strong evidence of concentrated environment in banking industry of Pakistan instead of competitive market. In short, their results have made sense that In Pakistan banks were enjoyed monopoly rents. They were also suggesting that in Pakistan trend of banking market structure is changing by the time form monopolistic to competitive.

Credit risk is one of the most important factors in the banking business, but most of the studies have shown the negative relationship of credit risk and profitability of banks. Ali et al. (2011) have conducted research on the banking system of Pakistan by capturing 22 commercial banks considering time period of 2006 to 2009. They have used roa and roe as profitability measures and found that credit risk has negatively connected with profitability.

The external factors are reflecting monetary and legal atmosphere of the country that ultimate affects the working and performance of the country's banking system (Alper & Anbar, 2011). They have studied on the bank specific and macroeconomic factors and found that only the real interest rate is the factor which affects the performance of banks and gdp and inflation have no effect. As the interest rate increases return on equity also shows increasing trend which means that there exist significant positive relation between interest rate and bank profitability. Interestingly they have also found that some other bank specific important variables such as liquidity

and capital adequacy have no significant relationship with the profitability of banks.

Ayadi and Boujelbene (2012) examined the relationship between bank related factors and bank's performance in Tunisia by considering twelve banks from 1995 to 2005 with the help Generalized Least Square model (GLS) of econometrics, their results supported the structure conduct performance hypothesis (SCP) which describes that concentration in the market have positive relation with the profitability of banks because if the market is concentrated, there exists collusive behavior and banks can earn higher profits. In their study a strong positive association appeared between capitalization and profitability. Economies of scale was also verified which shows positive relationship between size and the profitability of banks, but liquidity and credit risk have no significant relationship with profitability. With respect to macroeconomic variables, gdp and inflation both have no strong relationship with profitability.

Equity to asset ratio is perversely related with NIM(Hamadi & Awdeh, 2012). Their study consists of total 53 Lebanese banks which comprises of 32 domestic banks and 21 foreign banks. The time span captured for this research was from 1996 to 2009. They have found that size of the banking industry have indirect relation with the nim and explained that bigger banks have less margin in deposit and lending rates as compared to smaller banks, growth in deposits also have positive significant relation with nim. Equity to total assets explained that better capitalized banks offer higher rates to investors to acquire more finances and channel them as advances, since their high capitalization permits them to take on more in advancing exercises. And the benefit for bank could be in such a way that it lends at low rate that is why to increase the number of borrowers and enjoy the large economies of scale. Another important aspect of the research was that liquidity of

banking industry affects the profitability negatively. GDP and Inflation have opposite signs with respect to nim because in good economic conditions banks increases their deposit rates to attract more depositors and on the same time lowers the lending rates to channelize the funds. And in good conditions credit risk also decreases. But on the other hand inflation has positive impact on the nim. Because when inflation is higher interest rates on advances also increases that is why nim also increases.

Tan and Floros (2012) authors examined the factors affecting profitability of banking sector in china, for this purpose they took 101 Chinese banks which includes five government banks 12 joint stock and 84 city commercial banks. This study comprises of total 7 years from 2003-2009. The methodology used by him was generalized method of moments (GMM). The authors found thattax have indirect relationship with profitability of banks in china, as the banks pay more tax the profitability decreases. Similarly credit risk shows same behavior with profitability, it means that when credit risk increases it would lead to decreases the profitability of banking industry because non-performing loans increases as credit risk increases. Non-traditional activities have negative relationship with profitability. Noteworthy result of concentration in Chinese banking industry which shows that concentration has negative impact on the profitability of banks and showed support for the efficient structure hypothesis. Another main finding of their study was that inflation cost efficiency and banking sector development have direct relationship with the profitability of banking industry.

Gunter, Krenn, and Sigmund (2013) have used bank specific, market base and macroeconomic indicators to examine the determinants of net interest margin in the banking industry of Austria. The authors used 42000 observations from 1996 to 2012. They used quarterly data of 1,011 number of

banks. Different panel estimation techniques were used by the authors for proper evaluation of results. They examined that loan loss provisions have significantly negative relationship with nim. Staff expense and other operating expenses have positive significant impact on nim. Leverage ratio have negative impact on nim because holding of more equity decreases the net interest income of banks. Macroeconomic factors such as gdp and inflation have significant impact but opposite to each other. GDP have positive impact on dependent variable but inflation have negative impact because of low inflation country status of Austria.

Sayedi (2014) investigated the impact of credit risk, market power and exchange rate on profitability of banking industry in Nigeria. The author used 15 money deposit banks over the period of 2006 to 2011. In this study linear regression technique was utilize for empirical analysis. Author found market power has significant positive impact on roa and exchange rate has insignificant positive relation with roa but significant negative impact on roe. While credit risk has insignificant negative impact on bank profitability.

Gizaw, Kebede, and Selvaraj (2015) conducted a study on the impact of credit risk on profitability performance of Ethiopian commercial banks. For this purpose they used secondary data of 8 commercial banks from 2003-2012. Panel data regression and descriptive analysis have used for results. Authors found that loan loss provisions reserves are significantly positively related to ROE and ROA both and argued that management strengthen its credit policies therefore positive relation exist between credit risk and bank profitability.

2.1 Performance Measure

Net interest margin is being used as dependent variable and a measure of performance by many authors in past such as

(Gunter et al., 2013),(Tan & Floros, 2012) and(Sidabalok, 2012). Net interest margin is used as dependent variable because it covers larger portion of the bank's income and focus on the lending, investing and funding activities (Tan & Floros, 2012).

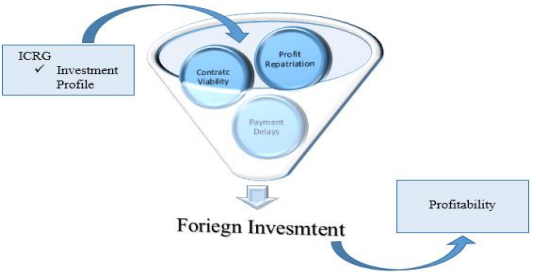
Size is utilized to catch the way that bigger banks are better set than smaller banks in tackling economies of scale in transactions to the plain impact that they will have a tendency to appreciate a more elevated amount of benefits. Therefore, a positive relationship is expected in the middle of size and benefits, Therefore there is expected positive relationship between size and profitability. Ayadi and Boujelbene (2012),Guru et al. (2002) andGoddard et al. (2004) have also found positive relationship between size and profitability of banking industry. Bennaceur and Goaied (2008) in contrast found negative relationship between size and profitability and argued that when banks operated above from the optimum level then scale inefficiencies created. Despite of all of these results, there may be no statistical significant relation between Size and Profitability. Some studies such as(Heffernan & Fu, 2008; Shih, Zhang, & Liu, 2007) found no significant relationship between Size and Profitability and argue that it might be due to government intervention.

Credit risk is measured by loan loss provisions to total advances used by many authors such as. (Gizaw et al., 2015)(Tan & Floros, 2012). Gizaw et al. (2015) found positive relation between credit risk and profitability and argue that since banks have already provided for the losses therefore recovery tactics are used for NPLs which directly hit the profitability of banks. But most of the times negative relationship exists between credit risk and profitability (Gunter et al., 2013)(Athanasoglou et al., 2008) that an increase in loan loss provisions decrease the profitability of banking sector. Sayedi (2014) found no significant connection between credit risk and profitability.

Concentration, eight banks Concentration ratio is being used in this study. It captures most of the part of the banking industry in Pakistan, India and China. Al-Karasneh and Fatheldin (2005),Bhatti and Hussain (2010) and Bourke (1989) found positive relationship between Concentration and Profitability and explained that higher Concentration leads to take monopolistic returns by the larger banks. But concentration can affects Profitability of banks in negative sense too. García-Herrero et al. (2009) found negative relation and argue that higher concentration leads to decrease asset quality thus profitability decreased. Smirlock (1985) found no significant relationship between Concentration and Profitability and explained that certain loan rates are higher in concentrated market but did not affect profitability enough that is why there is no relationship exists between concentration and profitability.

ICRG (International Country Risk Guide) is a proxy for Governance. ICRG is combination of three components Political, Economic and Financial. Political factor has greatest importance. Investment Profile is one its component which comprises of contract viability, payment delays and profit repatriation. Profit repatriation and payment delays are two important factor with respect to inward FDIs (Hayakawa, Kimura, & Lee, 2013). This index is being used here to examine the impact of Governance. The Standards of this index tells that as rating of the component is high risk will be low and vice versa.

Figure 2.1>ICRG Graphical Explanatiom



Source: author's formulation

GDP is used here as a measure of Macroeconomic variable. Demirgüç-Kunt and Huizinga (1999) demonstrate that quick financial development expand benefit for countless nations. GDP catches rises and downswings showing in the business cycles. Hence, developments all in all action level are relied upon to produce immediate effects on benefit of banks.

Two value added measures are being used in this study to examine Expense Preference Theory and Edward Heggestad Mingo Hypothesis (EHM). Bourke (1989) introduced two proxies for this purpose which included earning before tax and staff expense to total assets (EBTSE) for Expense Preference Behavior and earning before tax, staff expense and loan loss provisions to total assets (EBTSLP) for (EHM). Bourke (1989) found negative relation between EBTSE and Concentration and explained that as Concentration increased staff expenses squeezed. But in case of (EHM) signs between Concentration and EBTSLP must be negative otherwise this theory will not hold. Summary of variables is shown in table I.

Table 2.1: Variables and their Description

Variable	Symbol	Measurement	Expected Effect
Dependent Variables			
Net Interest Margin	NIM	Net Interest Income/ Earning Assets	
Expense Preference Theory	EBTSE	Earning before tax + Salary expense/ Total assets	
Edward Heggestad Mingo Hypothesis	EBTSLP	Earning before tax + Salary expense + Loan loss provisions/Total assets	
Independent Variables			
Size	S	Natural Log of total assets	+
Credit Risk	CRK	Loan loss provisions/Total loans	-
Concentration	CR8	Total assets of 8 largest banks/ Total banking assets	Indeterminate
Governance	ICRG	Investment profile	Indeterminate
GDP	**LY**	**GDP**	**Indeterminate**

Note: + indicate positive relation; - indicate negative relation; Indeterminate means no indication

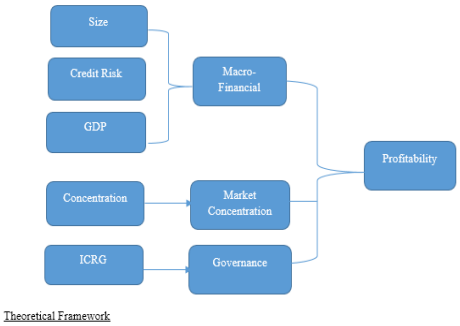
CHAPTER 3

THEORETICAL FRAMEWORK AND HYPOTHESIS:

3.1 Profitability Model

Many factors affect the profitability of banking industry which are mainly related to market structure, Governance of particular country and Macro-Financial factors. Net interest margin is used as dependent variable for bank profitability. Size, credit risk, GDP, concentration and governance are used as independent variables.

Figure 3.1: Profitability Model



Source: Author's Formulation

3.2 Managerial Behavioral Model

Market structure affects the behavior of management towards risk and utility maximization. Concentration is used as independent variable to check the behavior of management. Two theories have been testing related to risk and utility maximization behavior of management.

Figure 3.2: Managerial Behavior

Source: Bourke (1989)

3.3 Summary of Hypothesis:

Size of the banking industry can also impact the profitability of banking industry, this impact might be in favor of profitability or against it. So it necessary to develop a hypothesis regarding its relation on bank profitability.

Hypothesis 1:

H_{A1}: There is a link between size and profitability of banks.

In recent years in Asia many banking industries have faced severe NPLs problem which decrease their profitability. But governments of different countries have implemented policies to nip out this problem. So it is very important to check the impact of NPLs on the profitability of banking industries.

Hypothesis 2:

$\mathbf{H_{A2}}$: There is relationship between credit risk and profitability of banks.

Industry structure is crucial for profitability of banking industry. In concentrated market structure banks can earn monopoly returns by increasing interest rates on advances but on the other side of the wall concentration may affect profitability negatively due to deterioration of asset quality as well as there might be chances of non-existence of relationship. So there is a need to test its impact on the profitability of banking industry.

Hypothesis 3:

$\mathbf{H_{A3}}$: There is a link between concentration and profitability of banks.

Macroeconomic factors in a country can also impact the profitability of banking industry. When GDP of economy increases, ultimately country moves toward growth and new projects needs financing from banks, this will increase the profitability of banking industry. So it will be interesting to check the impact of GDP on bank profitability.

Hypothesis 4:

$\mathbf{H_{A4}}$: There is a connection between GDP and bank profitability.

Governance of any country can play a vital role in the development and growth of banking on bank profitability that is why a hypothesis should develop for this purpose.

Hypothesis 5:

$\mathbf{H_{A5}}$: There is a relationship between governance and bank profitability.

The structure of banking industry may vary in different economies such as monopolistic structure or competitive structure. In monopolistic banking industry some large banks have more power and market share as compared to others and enjoy high returns (monopoly returns), and most of the times banks with monopoly power take their possible profit in the shape of risk averse behaviorEdwards and Heggestad (1973). Similarly another behavior which might exist under concentrated market structure that banks with monopoly power have a behavior towards utility maximizer (Edwards, 1977). So it can be hypothesized that all the banking industries have shown same behavior under concentrated market.

Hypothesis 6:

$\mathbf{H_{A6}}$:Banking industries of different countries have shown same behavior under concentrated market structure.

CHAPTER 4

DATA AND METHODOLOGY

4.1 Data Description

For this research it is decided to take panel data from the 2003 to 2013 of 25 scheduled banks from three countries (Pakistan, India and China). The panel dataset consists of Secondary data. The reason to choose these countries is that these countries make exceptional growth in their banking industries through reforms in different stages in recent years. Their banking assets with respect to GDP grew in recent years and these countries have emerging banking markets in Asian region.

The reason of selecting the time span from 2003 to 2013 is that in respective countries reforms have introduced in different parts and in the last decade of 20th century almost all the major reforms have implemented such as in India Narismaham Committee I (1991) and its recommendations in 1998, in China establishment of AMCs and in Pakistan recovery Act 1997. So it is important to study and analyze the performance of respective countries banking industries in this time span.

The complete data are collected from annual financial statements of the Commercial Banks of respective countries, Handbook of Statistics of Pakistan (SBP), Reserve Bank of India (RBI), China Banking Regulatory Commission (CBRC), WDI (World Development Indicator), Economic Survey of Pakistan, International Financial Statistics (IFS) and International Country Risk Guide (ICRG).

4.2 Methodology

Panel data is used for this study. Panel data is a type of data which comprises of both time series and cross sectional data. In this type of data different cases such as companies, people and states were examined in more than one time frame. Time series data consist of observations which are in sequence and structured in time. Such as share prices in stock markets as well as month wise profits.Cross sectional data is a type of data in which different subjects are observed in a same time frame for example per capita income.So panel data is combination of time series and cross sectional data and also called as pooled, micro panel and longitudinal data.

4.2.1 Benefits of Panel Data:

Panel data is paramount as compared to time series and cross sectional because

- ✓ It minimizes the biasness due to comprehensive dataset.

- ✓ It takes heterogeneity into consideration, obtained individual-specific results.
- ✓ It provides better precision of regression assessment.
- ✓ It is suitable for studying dynamics

4.2.2 General Equation:

$$\pi_{i,t,s} = c + \sum_{l=1}^{j} \beta_j X_{i,t,s}^{j} + \varepsilon_{i,t,s}$$

In the equation, right side consist of X (independent variables), ε is error term and c is the heterogeneous intercept and on the left side of the equations the dependent variable. In these equations i represent banks, t represents time and s represents countries. .

4.2.3 Econometric Techniques:

There are many econometric techniques which have been used in past for estimation purpose such as Ordinary Least Square (OLS), Fixed Effect and Random Effect model. First of all Ordinary Least Square is best technique for panel data but in the presence of a diseases named as endogeneity its prediction did not prove to be good because the assumption of OLS technique that E(u) = 0, and in the presence of endogeneity this assumption could not hold anymore. So OLS is not good under these circumstances.

FE and RE models can be the next option if there is endogeneity problem exists. For FE model we assumed that α_i=α. In FE model specific effects of country or individual are interrelated with regressors.

4.2.4 Hausman Test:

Hausman test is being used to choose between RE and FE model.

H_0: Fixed effects and Random effects are equally reliable but Random effect estimators are more capable.
H_A: Fixed effect estimators are reliable as compared to Random effects.
If results shows that FE estimators are more reliable as compared to RE because of calculated χ^2 is greater than critical χ^2 it means null hypothesis is rejected. The main drawback for FE model is that the presence of endogeneity problem. When this problem occurs in the data then FE model is not suitable. Because in endogeneity problem there is some relationship exist between error term and explanatory variable which is due to omitted variables from the model.

4.3 Dynamic Panel Model

In this study following models will use for empirical analysis.

$$NIM_{i,t,s} = \alpha + NIM_{i,t-1,s} + \beta_1 S_{i,t,s} + \beta_2 CRK_{i,t,s} + \beta_3 CR8_{t,s} + \beta_4 GOV_{,t,s} + \beta_5 LY_{t,s} + \varepsilon_{i,t,s} \ldots\ldots\ldots\ldots \quad (1)$$

$$EBTSE_{i,t,s} = \alpha + EBTSE_{i,t-1,s} + \beta_1 S_{i,t,s} + \beta_2 CRK_{i,t,s} + \beta_3 CR8_{t,s} + \beta_4 GOV_{,t,s} + \beta_5 LY_{t,s} + \varepsilon_{i,t,s} \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

$$EBTSLP_{i,t,s} = \alpha + EBTSLP_{i,t-1,s} + \beta_1 S_{i,t,s} + \beta_2 CRK_{i,t,s} + \beta_3 CR8_{t,s} + \beta_4 GOV_{,t,s} + \beta_5 LY_{t,s} + \varepsilon_{i,t,s} \ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

On the left hand side NIM (net interest margin) for profitability, EBTSE (earnings before tax and staff expense) and EBTSLP (earnings before tax, staff expense and loan loss provision) are used as proxy to test managerial behavior of banking industry. On the right hand side there is a mixture of independent variables consist of macro financial, governance and market structure. Where 'i' stands for bank 't' stands for time and 's' for country.

4.4 Generalized Method of Moments (GMM)

To handle with all these problems Generalized Method of Moments (GMM) is being used in this study. GMM estimator is

very famous from the recent past developed by (Arellano & Bond, 1991). The popularity of this method is because of two simple reasons, first one is this method is very simple and easy even in the presence of some econometric diseases and the second one is weak supposition for instrumental variables. GMM technique is very useful when the sample consists of small T and large N observations; independent variables in the model are not necessarily exogenous which means that right hand side variables are associated with previous as well as may be current residual term and Heteroskedasticity as well as autocorrelation must present within individuals (Roodman, 2009). In GMM estimator instrumental variables are developed to cope up with the problem of endogeneity problem (Mehmood & Parvez, 2013),(Arellano & Bover, 1995),(García-Herrero et al., 2009) and(Tan & Floros, 2012) have used GMM technique. In this study both DGMM and SGMM techniques are used.

4.4.1 Difference Generalized Method of Moments:

In Difference GMM lagged values are used. Results can be appropriate by using DGMM, because this technique used instrumental variables and eliminate the problem of endogeneity (Holtz-Eakin, Newey, & Rosen, 1988). But (Bond, Hoeffler, & Temple, 2001) describe that difference GMM is not as better as System GMM because of some problems such as variance of country specific effects increases as compare to variance of error term and the problem of continual of time series data which makes instrumental variables weak.

4.4.2 System Generalized Method of Moments:

SGMM can be better option if panel data consist of small 'T' and large 'N'. (Bond et al., 2001) explained when data set is small and in a persistent condition then DGMM performs not well. So in our case data set is small that is why we prefer SGMM on DGMM.

In this study AR(1) and AR(2) are used to test either autocorrelation is present or not in our model. AR(1) if finds to be significant it means that null hypothesis is refused and there is autocorrelation exist in our model. But the most important is AR(2) which must be insignificant to defend the statement of nonexistence of autocorrelation in the model.

4.4.3 Hansen Test:

Hansen test is being used to test the appropriateness or validity of instruments used in the model as well as to check that either model is over identified or not.

H_0: Instruments are appropriate or valid.

H_A: Instruments are not appropriate or valid.

If the null hypothesis is accepted it means that model is correctly specified and the instruments used in our study are appropriate.

CHAPTER 5

RESULTS AND INTERPRETATION

5.1. Descriptive Statistics

Table 5.1: Descriptive Analysis

	Mean			Standard Deviation			Minimum			Maximum		
Variable	**Pakistan**	**India**	**China**	**Pakistan**	**India**	**China**	**Pakistan**	**India**	**China**	**Pakistan**	**India**	**China**
Size	8.5811	10.417	13.063	.62761	.73766	1.0978	6.9006	8.342	10.204	9.6882	11.44	14.929
CRK	.04888	.01682	.00778	.01294	.03225	.0131	.01535	0	.0008	.07537	.175	.1247
CR8	.41120	.21136	.45247	.03705	.02059	.07832	.36054	.178	0.354	.47878	.24	0.57
ICRG	6.6181	8.644	7.2412	1.393	.3315	.49159	4	8.167	6.5	8	9.333	7.988
LY	6.7944	6.9447	8.069	.25011	.35038	.56848	6.3026	6.337	7.149	7.1708	7.371	8.8607
EBTSE	.02738	.02340	.01587	.01214	.00720	.00417	.00357	.006	.0046	.06172	.038	.02270
EBTSLP	.08306	.02606	.01686	.02234	.00653	.00795	.0241	.01602	.0054	.14021	.05765	.08242
NIM	.08386	.03704	.03054	.03088	.04727	.00932	.0342	.002	.0019	.14794	.381	.06654

Source: Author's calculation

Mean value of Size (in terms of total assets) of the banking industry is $8 billion, $13 billion and 10 billion in Pakistan, China and India respectively which shows that banking industry in Pakistan is not as large as in China and India (Table II) . It is fluctuated between $6 to $9 billion in Pakistan $10 to $14 in China and $8 to $11 in India. The statistics of

Pakistani banking industry for credit risk is fluctuated between .015 and .075 and Mean value is .048. For China, same variable is fluctuated between .0008 and .1247 while in India it varied from 0 to .175. Results for market concentration reveals that mean value stands at .411, .452 and .211 in Pakistan, China and India respectively.

Mean value of Governance 6.61, 7.24 and 8.26 respectively in Pakistan. China and India. It is fluctuated between 4 to 8 in Pakistan, 7 to 8 in China and 8 to 9 in India. The average value of GDP is 6.7 in Pakistan 8.06 in China and 6.94 in India.

5.2 Empirical Analysis

Profitability model explains that not only bank's related variables affects the banking profitability but also some other variables too which can affect the profitability. For analysis we have used SGMM and DGMM. In the Asian region three economies with emerging banking markets have responded to these variables. SGMM analyzes that size of the banking industry has significant relation with respect to bank profitability especially in case of Pakistan because Pakistan's banking industry is little bit behind as compared to other economies with emerging banking markets.

Table 5.2a: Regression Estimation For Profitability

Dependent Variable: NIM*i, t*,s

	Pakistan		**India**		**China**	
Variable	DGMM	SGMM	DGMM	SGMM	DGMM	SGMM
NIM*i, t* – 1	0.223	0.826	0.187	0.126	0.318	0.475
	(0.078)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
S*i, t*	-0.034	0.006	-0.009	-0.012	-0.013	-0.000
	(0.000)	(0.002)	(0.620)	(0.309)	(0.001)	(0.723)
CRK*i, t*	0.204	-0.091	-0.203	-0.160	0.526	0.446
	(0.135)	(0.674)	(0.003)	(0.074)	(0.000)	(0.001)
CR8*i, t*	0.114	-0.056	0.463	0.460	0.018	-0.036
	(0.066)	(0.442)	(0.368)	(0.367)	(0.441)	(0.035)
GOV*i, t*	0.011	0.002	0.014	0.020	-0.000	0.003
	(0.000)	(0.047)	(0.006)	(0.079)	(0.758)	(0.001)
LY*i, t*	0.015	-0.032	0.054	0.070	0.016	0.010
	(0.229)	(0.026)	(0.240)	(0.221)	(0.004)	(0.001)
AR(1)	0.892	0.028	0.160	0.112	0.021	0.014
AR(2)	0.592	0.134	0.303	0.306	0.383	0.261
Hansen test	0.855	0.948	1.000	1.000	1.000	1.000

Source: Authors' calculations using stata (12.0) command Xtabond, robust
P values are in parenthesis

In Pakistan size of the banking industry is directly related to the profitability. These results follow the economies of scale in Pakistan's banking industry (Gilchrist, 2012). According to the results size measured by total assets shows that as size of the industry keeps on growing, banks have more opportunities to invest and thus the deposit rates goes down as compared to lending rates and in this way profitability of banks increase, this variable is significant at 1% significance level. It means that size of the banking industry has better capacity to explain variation in profitability of banking sector in Pakistan. But as compared to Pakistan, China and India both the countries have larger banking industries and have showed no significant relationship between size and profitability. Heffernan and Fu (2008) found no relationship between size and profitability because up to a certain limit, size has affected profitability. After this breakeven point, it loses its impact. So our results match with their findings in case of China and India. It means that in India and China banking industries have already reached to its maximum limit therefore with the increase in size profitability will not increase.Our DGMM results are in line with SGMM. So our first hypothesis is not rejected in case of Pakistan which states that there is a link between size and profitability of banking industry.

Another important factor for bank profitability is credit risk which is measured by loan loss provisions to total advances used by many authors such as (Athanasoglou et al., 2008) and (Tan & Floros, 2012). In Pakistan, credit risk has insignificant negative impact on the profitability of banking industry. Both our techniques have shown similar results and these results support the findings of (Sayedi, 2014). But in China and India, credit risk has significant impact on bank profitability. For China, credit risk has positive significant results with profitability and significant at 1% significance level according to the both of GMM techniques and supports the findings

of(Gizaw et al., 2015). Since banks have already provided for the losses therefore recovery tactics are used for NPLs which directly hit the profitability of banks. In contrast, Indian banking sector has showed negative response towards credit risk and showed it is significant at 10%. These results support the findings of (Gunter et al., 2013) that an increase in loan loss provisions decrease the profitability of banking sector.

Concentration has no strong impact on the profitability of banking sector in respective economies except China. In China concentration has negative significant relationship with profitability of banking sector and supports our hypothesis stated that there is a relationship between concentration and profitability. García-Herrero et al. (2009), also found negative sign between concentration and profitability in Chinese banking sector and argued that high concentration leads to increase in NPLs due to imprudent lending practices which ultimately declines the profitability of banking industry. Concentration is statistical significant under DGMM in Pakistan and support the findings of(Bourke, 1989) but these results are not significant.

ICRG (International Country Risk Guide) is combination of three elements but here one of the components is used as a measure for Governance is investment profile. The standard of this index tells that as rating of the component is high risk will be low and vice versa. So when investment profile has more rating it means the country has enjoying favorable conditions and more foreigners will show interest for investment (Hayakawa, Kimura, & Lee, 2013). According to the results ICRG has positive influence on bank profitability. Both SGMM and DGMM showed its significance for the bank profitability in all the three countries. And these results are significant at 10%, 5% and 1% significant level. These results supported our hypothesis which states that there is a relationship between governance and bank profitability.

Macroeconomic conditions also affect bank profitability such as GDP. GDP has a mixture of significant impact on the respective countries except India under GMM techniques. In Pakistan GDP has negative impact on bank profitability and the results are significant at 5%. The results supports the findings of (Bonin, Hasan, & Wachtel, 2005; Demirgüç-Kunt & Huizinga, 1999), operating cost decreases as GDP increases so this will lead to narrow the interest margins thus negative relation exist between NIM and GDP (Azeez & Gamage, 2013). But In China GDP has positive significant impact on profitability of banks. These results show support for the findings of (Ali et al., 2011; Goddard et al., 2004).Positive sign indicates that when GDP increases economy grow and projects required more financing from banks. This variable is significant at 1%. DGMM also shows same results in China. These results supports the hypothesis regarding GDP.

Table 5.2b: Regression Estimation For Expense Preference Theory

Dependent Variable: EBTSE*i, t*,s

	Pakistan		**India**		**China**	
Variables	DGMM	SGMM	DGMM	SGMM	DGMM	SGMM
EBTSE*i*,t-1	-0.049 (0.752)	0.592 (0.000)	-0.584 (0.205)	0.985 (0.000)	0.522 (0.001)	0.310 (0.044)
S*i, t*	-0.009 (0.088)	0.005 (0.000)	-0.001 (0.624)	-0.002 (0.162)	-0.006 (0.001)	-0.000 (0.934)
CRK*i, t*	-0.268 (0.000)	-0.283 (0.004)	-0.103 (0.025)	-0.038 (0.054)	0.087 (0.184)	0.063 (0.043)
CR8*i, t*	0.095 (0.033)	0.075 (0.083)	-0.014 (0.436)	0.009 (0.640)	0.017 (0.001)	0.001 (0.904)
GOV*i, t*	0.007 (0.000)	0.003 (0.000)	0.004 (0.509)	-0.008 (0.004)	-0.001 (0.042)	0.000 (0.799)
LY*i, t*	-0.005 (0.385)	-0.088 (0.271)	0.003 (0.694)	-0.004 (0.094)	0.006 (0.029)	0.002 (0.210)
AR(1)	0.106	0.032	0.209	0.036	0.044	0.029
AR(2)	0.057	0.196	0.578	0.258	0.247	0.007
Hansen test	0.813	0.993	0.391	0.998	1.000	1.000

Source: Author's calculations using stata (12) command Xtabond, robust
P values are in parenthesis

Value added measures are being used in this study to analyze the managerial behavior towards expense preference as well as risk avoidance. For this purpose earning before tax and staff expense to total assets is used for expense preference behavior

and earning before tax, staff expense and loan loss provisions to total assets used for risk avoidance behavior as used earlier by (Bourke, 1989). In Pakistani banking industry relationship between concentration and dependent variable (EBTSE) is significantly positive which shows support for the existence of expense preference theory. Both SGMM and DGMM shows similar results and significant at 10% and 5% significance level respectively, and these results are in contradictory with previous studies such as (Bourke, 1989). In India results show no supportive evidence for this theory. In china under DGMM results show support for expense preference theory and significant at 1% but under SGMM results did not show strong relationship between concentration and EBSTE. In Pakistani banking industry, size has positive impact on the dependent variable (EBSTE) and significant at 1%. This indicates that when size of the banking industry increases it would lead to increases in staff expenses, but in China and India it has insignificant relation. Credit risk also has significant relationship in all the three countries under SGMM. In Pakistan and India credit risk has negative correspondence but in China it has positive significant relation. Governance have its impact on bank's staff expense, in Pakistan it has positive impact showing that as country enjoying better environment for investment it ultimately increases profitability of banks and staff salaries too. But opposite in India governance has negative significant impact which shows that as country facing less favorable conditions or highly risky environment for investment, bank management have to face a challenge of staff maintenance. To retain their experienced staff with their self they increase salaries. GDP has no any significant relationship in any of the respected country at 5% and 1% significance level.

Table 5.2c: Regression Estimation For Edward Heggestad Mingo Hypothesis

Dependent Variable: EBTSLP*i, t, s*						
	Pakistan		**India**		**China**	
Variables	DGMM	SGMM	DGMM	SGMM	DGMM	SGMM
EBTSLPi,t-1	-0.053 (0.847)	0.587 (0.012)	0.223 (0.034)	0.393 (0.001)	-0.088 (0.322)	0.113 (0.049)
S*i, t*	-0.023 (0.005)	0.008 (0.043)	0.006 (0.257)	0.001 (0.504)	-0.001 (0.192)	-0.000 (0.517)
CRK*i, t*	-0.158 (0.235)	-0.434 (0.002)	0.091 (0.366)	0.026 (0.438)	0.526 (0.000)	0.428 (0.000)
CR8*i, t*	0.366 (0.000)	0.267 (0.000)	-0.032 (0.308)	-0.040 (0.273)	0.025 (0.005)	0.009 (0.308)
ICRG*i, t*	0.015 (0.000)	0.007 (0.006)	-0.000 (0.943)	-0.001 (0.498)	-0.000 (0.260)	0.000 (0.688)
LY*i, t*	0.010 (0.431)	-0.005 (0.667)	-0.012 (0.210)	-0.004 (0.256)	0.001 (0.505)	0.003 (0.152)
AR(1)	0.304	0.031	0.121	0.166	0.041	0.048
AR(2)	0.655	0.101	0.406	0.359	0.881	0.419
Hansen test	0.737	0.990	1.000	1.000	0.894	1.000
Source: Author's calculations using stata (12) command Xtabond, robust **P values** are in parenthesis						

Another value added measure which is being used to test (EHM Hypothesis) is EBSTLP. In our third model EBSTLP is dependent variable. The results show that in Pakistan and China although concentration is being significantly affects the dependent variable under SGMM and DGMM but signs indicate that there is positive relationship. Not even in SGMM but also under DGMM technique in Pakistan. Which is not in line with the findings of (Bourke, 1989) but in India although the results are insignificant under SGMM and DGMM but negative sign shows support for Edward Heggestad Mingo Hypothesis. It means that when concentration increases it would lead to decrease the loan losses which show that management's behavior is purely risk averse. But in Pakistan and China results show opposite signs and indicate that there might be more dependence of managers on stockholders of the company that is why in more concentrated banking industry managers might be less risk averse. In Pakistan Size also matters in this case and affects it positively because when Banks increase their size, it ultimately increases its number of employees and staff expense also increases but in China and India it has insignificant impact. Credit risk in China has positive impact because when Credit risk increases it would

lead to increase in loan loss provisions so there is positive relation between these two.

Table5.2d: Hypothesis Testing

Hypothesis	**Pakistan**	**China**	**India**
There is link between size and profitability	Supported	Rejected	Rejected
There is relationship between Credit risk and profitability	Rejected	Supported	Supported
There is a link between concentration and profitability	Rejected	Rejected	Supported
There is a connection between GDP and profitability	Supported	Supported	Supported
There is a relationship between Governance and profitability	Supported	Supported	Supported
Banking industries of different countries have shown same behavior under concentrated market	**Pakistan** **China** **India**	Rejected	

Source: Authors' formulation

CHAPTER 6

CONCLUSIONS, RECOMMENDATIONS AND FUTURE RESEARCH

6.1 Conclusion

Banking industries in all over the world differ with respect to its operations and size. Banking industries have to face different macroeconomic conditions, different financial conditions and different market structures all around the world. In this study by capturing the economies of Asia with emerging banking markets analyzed that how banks in different economic conditions react with respect to macro-financial variables, governance and market structure.

Our results can approve findings of some previous research studies such as Size of the banking industry in Pakistan have a positive and significant relationship with profitability of banking industry but in China and India it has no impact. In china and India banking industry have already grew much that now size did not matter for their profitability. Similarly other important factors such as credit risk, concentration, governance and GDP have mixture type impact on profitability in different economies. Our results shows that Pakistani banking sector did not response towards non-

performing loans because of the reason that now banks in Pakistan are more concerned about investing activities as compared to in previous years but in India credit risk have negative impact on the profitability and shows that when credit risk become high it would lead to decrease the profitability of banking industry in India as compared in China credit risk have positive significant impact on the profitability of banking industry because it might be possible that in China management mainly focus on overhead expenses and not want to exceed these expenses over a limit by monitoring the lending activities instead want to invest in profitable projects and earn more from there.

Concentration have not significant impact on respective economies except China where the results shows that country where banks with high market power faces low profitability due to increase in loan loss provisions, in Pakistan concentration effect the profitability of banking industry but insignificantly. Governance another important factor in this study which shows positive significant impact on profitability in all the selected countries. In all these countries banking industries react differently under macroeconomic conditions such as gdp has different types of impacts on different banking industries. Chinese banking industry show positive relationship with respect to gdp and Pakistani banking industry shows negative association but Indian banking industry did not react significantly.

Managerial behavior of banking industries in all the three countries are also being tested in this study. For this purpose two theories Expense Preference Theory and are used. In agreement with the relationship between concentration and these two theories we have found significant support for EPT in respected economies except in India under GMM techniques, which implies that the management of banking industry under concentrated market structure give value to its employees in

shape of bonuses and increments, same attitude is observed in Chinese banking industry but the relationship is not very strong.

With respect to EHM we have not found supportive evidence and conclude this theory largely dependent on managerial discretion according to which if managers are not highly independent from the interests of stockholders, EHM will not be approved as results show that in Pakistan there is significant positive relationship between concentration and EBTSLP and same case is found in China though it is not very strong relationship but it shows that to some extent in Pakistan and China management is not highly independent from the interest of stockholders that is why this theory does not exist in these countries.

6.2 Recommendations

Under this study some policy implications are suggested to the management of the banking industries. It has found that under concentrated market structure managers spend a lot on staff expenses instead of doing arrangements to control non-performing loans as well as in other profitable projects which might boost up economic growth. It is recommended that regulatory authorities should make such policies with the help of which banks can earn potential profits under concentrated market structure. It is highly recommended to make arrangements with respect to investment opportunities for foreigners to attract them which also can improve economic activities and profitability of banking industry as well.

6.3 Future Research

European countries are better ranked according to banking industries as compared to Asian countries. It can be examined that how European banking industries are more developed than Asian banking industries with the help of comparison of these

banking industries. This study analyzes the importance of governance considering one component of ICRG, in future more components of ICRG can be considered for betterment of analysis.

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APPENDICES

Banks for study:

Sr. No.	Bank Name	Country
1	Allied Bank Limited	Pakistan
2	Askari Bank Limited	Pakistan
3	Bank Alfalah Limited	Pakistan
4	Bank Al Habib Limited	Pakistan
5	Habib Bank limited	Pakistan
6	Muslim Commercial Bank Limited	Pakistan
7	National Bank of Pakistan	Pakistan
8	United Bank Limited	Pakistan
9	Agriculture Bank of China	China
10	Bank of China	China
11	Bank of Communication	China
12	China Construction Bank	China
13	China Development Bank	China
14	China Merchant Bank	China
15	China Minsheng Bank	China
16	China CITIC Bank	China
17	Industrial and Commercial Bank of China	China
18	AXIS Bank	India
19	Bank of Baroda	India
20	Bank of India	India
21	Canara Bank	India
22	HDFC Bank	India
23	ICIC Bank	India
24	Oriental Bank of Commerce	India
25	Punjab National Bank	India

Regression Results

```
xtabond2 ebtse l.ebtse s crk cr8 icrg ly, gmm(l.ebtse) iv(s crk cr8 icrg ly) nolevel robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step difference GMM
------------------------------------------------------------------------------
Group variable: id1                     Number of obs      =        81
Time variable : years                   Number of groups   =         9
Number of instruments = 50              Obs per group: min =         9
Wald chi2(6) =    456.93                               avg =      9.00
Prob > chi2  =     0.000                               max =         9
------------------------------------------------------------------------------
```

```
------------------------------------------------------------------------------
             |               Robust
       ebtse |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ebtse |
         L1. |   .5221378   .1605445     3.25   0.001     .2074763    .8367993
             |
           s |  -.0067344   .0021054    -3.20   0.001    -.0108608   -.0026079
         crk |   .0872727   .0657273     1.33   0.184    -.0415504    .2160959
         cr8 |   .0179593   .0054485     3.30   0.001     .0072804    .0286383
        icrg |   -.001948   .0009602    -2.03   0.042    -.0038299   -.0000661
          ly |   .0063714   .0029252     2.18   0.029     .0006381    .0121047
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/.).L.ebtse
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.01  Pr > z =  0.044
Arellano-Bond test for AR(2) in first differences: z =  -1.16  Pr > z =  0.247
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(44)  =  43.19  Prob > chi2 =  0.506
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(44)  =  5.16  Prob > chi2 =  1.000
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  iv(s crk cr8 icrg ly)
    Hansen test excluding group:     chi2(39)  =  6.14  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(5)   =  -0.98  Prob > chi2 =  1.000


xtabond2 nim l.nim s crk cr8 icrg ly, gmm(l.nim) iv(s crk cr8 icrg ly) robust nolevel
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
Difference-in-Sargan/Hansen statistics may be negative.


Dynamic panel-data estimation, one-step difference GMM
------------------------------------------------------------------------------
Group variable: id1                       Number of obs      =        81
Time variable : years                     Number of groups   =         9
Number of instruments = 50                Obs per group: min =         9
Wald chi2(6) =    254.59                                   avg =      9.00
Prob > chi2  =    0.000                                    max =         9
------------------------------------------------------------------------------
             |               Robust
         nim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         nim |
         L1. |   .3182572   .0806321     3.95   0.000     .1602211    .4762933
             |
           s |  -.0131479   .0040835    -3.22   0.001    -.0211513   -.0051445
         crk |   .5261946   .1104199     4.77   0.000     .3097755    .7426137
         cr8 |   .0185546   .0240999     0.77   0.441    -.0286803    .0657896
        icrg |  -.0005942   .0019306    -0.31   0.758    -.0043781    .0031897
          ly |   .0160522   .0055551     2.89   0.004     .0051645     .02694
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
```

```
 GMM-type (missing=0, separate instruments for each period unless collapsed)
   L(1/.).L.nim
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.31  Pr > z =  0.021
Arellano-Bond test for AR(2) in first differences: z =   0.87  Pr > z =  0.383
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(44)  =  33.98  Prob > chi2 =  0.862
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(44)  =   4.84  Prob > chi2 =  1.000
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  iv(s crk cr8 icrg ly)
    Hansen test excluding group:     chi2(39)  =   4.72  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(5)   =   0.12  Prob > chi2 =  1.000


xtabond2 ebtslp l.ebtslp s crk cr8 icrg ly, gmm(l.ebtslp, lag(2 2)) iv(s crk cr8 icrg ly) nolevel robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step difference GMM
------------------------------------------------------------------------------
Group variable: id1                       Number of obs      =        81
Time variable : years                     Number of groups   =         9
Number of instruments = 13                Obs per group: min =         9
Wald chi2(6)  =    786.02                               avg =      9.00
Prob > chi2   =    0.000                                max =         9
------------------------------------------------------------------------------
             |               Robust
      ebtslp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ebtslp |
        L1.  |  -.0882758   .0890957    -0.99   0.322    -.2629001    .0863485
             |
           s |  -.0015339   .0011749    -1.31   0.192    -.0038367    .0007688
         crk |   .5264848   .0627257     8.39   0.000     .4035447     .649425
         cr8 |    .025448   .0091319     2.79   0.005     .0075499    .0433462
        icrg |  -.0006989   .0006205    -1.13   0.260     -.001915    .0005172
          ly |   .0012747   .0019141     0.67   0.505    -.0024769    .0050263
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L2.L.ebtslp
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.04  Pr > z =  0.041
Arellano-Bond test for AR(2) in first differences: z =  -0.15  Pr > z =  0.881
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(7)   =   9.30  Prob > chi2 =  0.232
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(7)   =   2.90  Prob > chi2 =  0.894
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  iv(s crk cr8 icrg ly)
    Hansen test excluding group:     chi2(2)   =   1.24  Prob > chi2 =  0.537
    Difference (null H = exogenous): chi2(5)   =   1.65  Prob > chi2 =  0.895
```

```
xtabond2 ebtse l.ebtse s crk cr8 icrg ly, gmm(l.ebtse, lag(1 0)) iv(s crk cr8 icrg) robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate robust weighting matrix for Hansen test.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: id1                     Number of obs      =        90
Time variable : years                   Number of groups   =         9
Number of instruments = 32              Obs per group: min =        10
Wald chi2(6)  =  2503.57                               avg =     10.00
Prob > chi2   =    0.000                               max =        10
------------------------------------------------------------------------------
             |               Robust
       ebtse |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ebtse |
         L1. |   .3101418   .1540371     2.01   0.044     .0082346    .612049
             |
           s |  -.0000468   .0005672    -0.08   0.934    -.0011585   .0010649
         crk |   .0632225   .0312493     2.02   0.043     .0019749   .1244701
         cr8 |   .0011894   .0098826     0.12   0.904    -.0181802   .0205589
        icrg |   .0001545   .0006063     0.25   0.799    -.0010339   .0013428
          ly |    .002801   .0022359     1.25   0.210    -.0015812   .0071833
       _cons |  -.0127424   .0137339    -0.93   0.354    -.0396603   .0141755
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(0/1).L.ebtse
Instruments for levels equation
  Standard
    _cons
    s crk cr8 icrg
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    DL.L.ebtse
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.18  Pr > z =  0.029
Arellano-Bond test for AR(2) in first differences: z =  -2.68  Pr > z =  0.007
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(25)   =  94.97  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(25)   =  2.62  Prob > chi2 =  1.000
  (Robust, but can be weakened by many instruments.)


xtabond2 nim l.nim s crk cr8 icrg ly, gmm(l.nim) iv(s crk cr8 icrg ly) robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate robust weighting matrix for Hansen test.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: id1                     Number of obs      =        90
Time variable : years                   Number of groups   =         9
Number of instruments = 60              Obs per group: min =        10
Wald chi2(6)  =  543.62                                avg =     10.00
Prob > chi2   =    0.000                               max =        10
```

```
------------------------------------------------------------------------------
             |               Robust
         nim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         nim |
          L1. |   .4754403   .0448071    10.61   0.000     .3876199    .5632607
              |
           s |   -.000209   .0005886    -0.35   0.723    -.0013627    .0009448
         crk |   .4461271   .1382629     3.23   0.001     .1751367    .7171174
         cr8 |  -.0361238   .0171788    -2.10   0.035    -.0697937   -.0024539
        icrg |   .0033817   .0010413     3.25   0.001     .0013408    .0054227
          ly |    .010284   .0032347     3.18   0.001      .003944    .0166239
       _cons |  -.0755331   .0247333    -3.05   0.002    -.1240095   -.0270568
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/.).L.nim
Instruments for levels equation
  Standard
    _cons
    s crk cr8 icrg ly
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L.nim
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.45  Pr > z =  0.014
Arellano-Bond test for AR(2) in first differences: z =  -1.12  Pr > z =  0.261
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(53)   =  61.35  Prob > chi2 =  0.202
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(53)   =  5.86  Prob > chi2 =  1.000
  (Robust, but can be weakened by many instruments.)


xtabond2 ebtslp l.ebtslp s crk cr8 icrg ly, gmm(l.ebtslp) iv(s crk cr8 icrg ly) robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate robust weighting matrix for Hansen test.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: id1                       Number of obs      =        90
Time variable : years                     Number of groups   =         9
Number of instruments = 60                Obs per group: min =        10
Wald chi2(6) =    340.90                                  avg =     10.00
Prob > chi2  =     0.000                                  max =        10
------------------------------------------------------------------------------
             |               Robust
      ebtslp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ebtslp |
          L1. |    .113723   .0577703     1.97   0.049     .0004952    .2269508
              |
           s |  -.0003902   .0006016    -0.65   0.517    -.0015694     .000789
         crk |   .4280743   .0562691     7.61   0.000     .3177888    .5383598
         cr8 |    .009277   .0090917     1.02   0.308    -.0085423    .0270964
        icrg |   .0001879   .0004677     0.40   0.688    -.0007288    .0011047
          ly |   .0032256   .0022527     1.43   0.152    -.0011897    .0076409
       _cons |  -.0149755    .014126    -1.06   0.289    -.0426621     .012711
------------------------------------------------------------------------------
```

```
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/.).L.ebtslp
Instruments for levels equation
  Standard
    _cons
    s crk cr8 icrg ly
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L.ebtslp
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -1.98  Pr > z =  0.048
Arellano-Bond test for AR(2) in first differences: z =   0.81  Pr > z =  0.419
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(53)   =  64.63  Prob > chi2 =  0.131
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(53)   =   2.94  Prob > chi2 =  1.000
  (Robust, but can be weakened by many instruments.)


xtabond2 nim l.nim s crk cr8 icrg ly, gmm(l.nim) iv(s crk cr8 icrg ly) robust nolevel
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate robust weighting matrix for Hansen test.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step difference GMM
------------------------------------------------------------------------------
Group variable: id1                       Number of obs      =        72
Time variable : years                     Number of groups   =         8
Number of instruments = 49                Obs per group: min =         9
Wald chi2(6)  =   4492.65                              avg =      9.00
Prob > chi2   =     0.000                              max =         9
------------------------------------------------------------------------------
             |               Robust
         nim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         nim |
          L1. |   .1876608   .0148904    12.60   0.000     .158476    .2168455
              |
           s |  -.0090918   .0183407    -0.50   0.620    -.0450389    .0268554
         crk |    -.20303   .067971    -2.99   0.003    -.3362508   -.0698093
         cr8 |   .4639107   .514996     0.90   0.368    -.5454628    1.473284
        icrg |   .0142921   .0052493     2.72   0.006     .0040037    .0245805
          ly |   .0547255   .0465402     1.18   0.240    -.0364916    .1459425
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/.).L.nim
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -1.41  Pr > z =  0.160
Arellano-Bond test for AR(2) in first differences: z =  -1.03  Pr > z =  0.303
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(43)   =  80.72  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(43)   =   1.77  Prob > chi2 =  1.000
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
```

```
 iv(s crk cr8 icrg ly)
   Hansen test excluding group:     chi2(38)  =   2.12  Prob > chi2 =  1.000
   Difference (null H = exogenous): chi2(5)   =  -0.35  Prob > chi2 =  1.000


xtabond2 ebtse l.ebtse s crk cr8 icrg ly, gmm(l.ebtse, lag(4 4)) iv(s crk cr8 icrg ly) robust nolevel
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate robust weighting matrix for Hansen test.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step difference GMM
------------------------------------------------------------------------------
Group variable: id1                             Number of obs      =        72
Time variable : years                           Number of groups   =         8
Number of instruments = 11                      Obs per group: min =         9
Wald chi2(6)  =     12.60                                      avg =      9.00
Prob > chi2   =     0.050                                      max =         9
------------------------------------------------------------------------------
             |               Robust
       ebtse |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ebtse |
         L1. |  -.5845572   .4609093    -1.27   0.205    -1.487923    .3188085
             |
           s |  -.0015738    .003214    -0.49   0.624    -.0078732    .0047256
         crk |  -.1032791   .0459995    -2.25   0.025    -.1934364   -.0131218
         cr8 |  -.0149104   .0191429    -0.78   0.436    -.0524298    .0226091
        icrg |   .0044634   .0067527     0.66   0.509    -.0087716    .0176984
          ly |   .0037645   .0095696     0.39   0.694    -.0149914    .0225205
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L4.L.ebtse
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  1.26  Pr > z =  0.209
Arellano-Bond test for AR(2) in first differences: z = -0.56  Pr > z =  0.578
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(5)   =  12.25  Prob > chi2 =  0.031
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(5)   =   5.21  Prob > chi2 =  0.391
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  iv(s crk cr8 icrg ly)
    Hansen test excluding group:     chi2(0)   =   0.94  Prob > chi2 =      .
    Difference (null H = exogenous): chi2(5)   =   4.27  Prob > chi2 =  0.511


xtabond2 ebtslp l.ebtslp s crk cr8 icrg ly, gmm(l.ebtslp) iv(s crk cr8 icrg ly) robust nolevel
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate robust weighting matrix for Hansen test.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step difference GMM
------------------------------------------------------------------------------
Group variable: id1                             Number of obs      =        72
Time variable : years                           Number of groups   =         8
```

```
Number of instruments = 49                      Obs per group: min =         9
Wald chi2(6) =    172.64                                avg =      9.00
Prob > chi2  =    0.000                                 max =         9
------------------------------------------------------------------------------
             |               Robust
      ebtslp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ebtslp |
        L1.  |   .2230574   .1052737     2.12   0.034     .0167248    .4293899
             |
           s |   .0065895   .0058113     1.13   0.257    -.0048005    .0179795
         crk |   .0912687   .1008778     0.90   0.366    -.1064481    .2889855
         cr8 |  -.0328524   .0322017    -1.02   0.308    -.0959667    .0302618
        icrg |  -.0001955    .002722    -0.07   0.943    -.0055305    .0051395
          ly |   -.012371    .00986    -1.25   0.210    -.0316963    .0069544
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/.).L.ebtslp
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -1.55  Pr > z =  0.121
Arellano-Bond test for AR(2) in first differences: z =   0.83  Pr > z =  0.406
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(43)  =  57.59  Prob > chi2 =  0.068
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(43)  =   2.99  Prob > chi2 =  1.000
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  iv(s crk cr8 icrg ly)
    Hansen test excluding group:     chi2(38)  =   1.50  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(5)   =   1.49  Prob > chi2 =  0.914


xtabond2 nim l.nim s crk cr8 icrg ly, gmm(l.nim, lag(2 2)) iv(s crk cr8 icrg ly) robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: id1                       Number of obs      =        80
Time variable : years                     Number of groups   =         8
Number of instruments = 22                Obs per group: min =        10
Wald chi2(6) =    369.56                                avg =     10.00
Prob > chi2  =    0.000                                 max =        10
------------------------------------------------------------------------------
             |               Robust
         nim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         nim |
          L1.|   .1261786   .0251673     5.01   0.000     .0768517    .1755056
             |
           s |  -.0123536   .0121405    -1.02   0.309    -.0361485    .0114413
         crk |  -.1602301   .0897084    -1.79   0.074    -.3360553    .0155951
         cr8 |   .4604066   .5100768     0.90   0.367    -.5393255    1.460139
        icrg |   .0204869   .0116717     1.76   0.079    -.0023891     .043363
          ly |   .070285   .0573894     1.22   0.221    -.0421961    .1827662
       _cons |  -.6008523   .4983093    -1.21   0.228    -1.577521    .3758161
```

```
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L2.L.nim
Instruments for levels equation
  Standard
    _cons
    s crk cr8 icrg ly
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    DL.L.nim
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -1.59  Pr > z =  0.112
Arellano-Bond test for AR(2) in first differences: z =  -1.02  Pr > z =  0.306
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(15)   =  44.06  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(15)   =   1.32  Prob > chi2 =  1.000
  (Robust, but can be weakened by many instruments.)



xtabond2 ebtse l.ebtse s crk cr8 icrg ly, gmm(l.ebtse, lag(4 4)) iv(s crk cr8 icrg ly) robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: id1                             Number of obs      =        80
Time variable : years                           Number of groups   =         8
Number of instruments = 18                      Obs per group: min =        10
Wald chi2(6)  =   2344.65                                      avg =     10.00
Prob > chi2   =     0.000                                      max =        10
------------------------------------------------------------------------------
             |               Robust
       ebtse |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ebtse |
         L1. |   .9859033   .0566314    17.41   0.000     .8749078    1.096899
             |
           s |  -.0024364   .0017441    -1.40   0.162    -.0058548    .0009819
         crk |  -.0381413   .0197615    -1.93   0.054    -.0768731    .0005904
         cr8 |   .0098181   .0210163     0.47   0.640    -.0313731    .0510093
        icrg |  -.0081279   .0028402    -2.86   0.004    -.0136946   -.0025612
          ly |  -.0044337   .0026476    -1.67   0.094    -.0096229    .0007555
       _cons |   .1263205   .0418759     3.02   0.003     .0442453    .2083958
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L4.L.ebtse
Instruments for levels equation
  Standard
    _cons
    s crk cr8 icrg ly
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    DL3.L.ebtse
------------------------------------------------------------------------------
```

```
Arellano-Bond test for AR(1) in first differences: z =  -2.10  Pr > z =  0.036
Arellano-Bond test for AR(2) in first differences: z =   1.13  Pr > z =  0.258
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(11)   =  17.95  Prob > chi2 =  0.083
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(11)   =   2.11  Prob > chi2 =  0.998
  (Robust, but can be weakened by many instruments.)


xtabond2 ebtslp l.ebtslp s crk cr8 icrg ly, gmm(l.ebtslp) iv(s crk cr8 icrg ly) robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: id1                     Number of obs      =        80
Time variable : years                   Number of groups   =         8
Number of instruments = 58              Obs per group: min =        10
Wald chi2(6) =    311.21                               avg =     10.00
Prob > chi2  =     0.000                               max =        10
------------------------------------------------------------------------------
             |               Robust
      ebtslp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ebtslp |
         L1. |   .3934157   .1237384     3.18   0.001     .1508929    .6359385
             |
           s |   .0010786   .0016127     0.67   0.504    -.0020823    .0042395
         crk |   .0264667   .0341072     0.78   0.438    -.0403822    .0933155
         cr8 |  -.0406184    .037062    -1.10   0.273    -.1132585    .0320218
        icrg |  -.0017066    .002516    -0.68   0.498    -.0066379    .0032247
          ly |  -.0048299    .004252    -1.14   0.256    -.0131637    .0035039
       _cons |   .0605687   .0369959     1.64   0.102    -.0119419    .1330794
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/.).L.ebtslp
Instruments for levels equation
  Standard
    _cons
    s crk cr8 icrg ly
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L.ebtslp
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -1.39  Pr > z =  0.166
Arellano-Bond test for AR(2) in first differences: z =   0.92  Pr > z =  0.359
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(51)   =  55.04  Prob > chi2 =  0.324
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(51)   =   1.65  Prob > chi2 =  1.000
  (Robust, but can be weakened by many instruments.)


xtabond2 nim l.nim s crk cr8 icrg ly, gmm(l.nim, collapse) iv(s crk cr8 icrg ly) robust nolevel
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
```

```
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step difference GMM
------------------------------------------------------------------------------
Group variable: id1                     Number of obs      =        72
Time variable : years                   Number of groups   =         8
Number of instruments = 14              Obs per group: min =         9
Wald chi2(6) =    377.33                               avg =      9.00
Prob > chi2  =    0.000                                max =         9
------------------------------------------------------------------------------
             |               Robust
         nim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         nim |
          L1.|   .2238743   .1268334     1.77   0.078    -.0247145    .4724631
             |
           s |  -.0345521   .0077031    -4.49   0.000    -.0496499   -.0194543
         crk |   .2043203   .1368499     1.49   0.135    -.0639005    .4725411
         cr8 |   .1148165   .0624734     1.84   0.066    -.0076292    .2372621
        icrg |   .0110229   .0025593     4.31   0.000     .0060067    .0160391
          ly |   .0155053   .0128815     1.20   0.229    -.009742     .0407526
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/.).L.nim collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -0.14  Pr > z =  0.892
Arellano-Bond test for AR(2) in first differences: z =   0.54  Pr > z =  0.592
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(8)    =  5.59  Prob > chi2 =  0.693
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(8)    =  4.03  Prob > chi2 =  0.855
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  iv(s crk cr8 icrg ly)
    Hansen test excluding group:     chi2(3)    =  3.48  Prob > chi2 =  0.323
    Difference (null H = exogenous): chi2(5)    =  0.54  Prob > chi2 =  0.990


xtabond2 ebtse l.ebtse s crk cr8 icrg ly, gmm(l.ebtse, collapse) iv(s crk cr8 icrg ly) robust nolevel
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step difference GMM
------------------------------------------------------------------------------
Group variable: id1                     Number of obs      =        72
Time variable : years                   Number of groups   =         8
Number of instruments = 14              Obs per group: min =         9
Wald chi2(6) =     53.86                               avg =      9.00
Prob > chi2  =    0.000                                max =         9
------------------------------------------------------------------------------
             |               Robust
       ebtse |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ebtse |
          L1.|  -.0495621   .1571543    -0.32   0.752    -.3575789    .2584547
             |
```

```
       s |  -.0095129   .0055784    -1.71   0.088    -.0204464    .0014206
     crk |  -.2686548   .0693411    -3.87   0.000    -.4045609   -.1327486
     cr8 |   .0958425   .0450496     2.13   0.033     .007547     .184138
    icrg |   .0070636   .0015313     4.61   0.000     .0040622     .010065
      ly |  -.0054768   .0063026    -0.87   0.385    -.0178297    .0068761
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/.).L.ebtse collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -1.62  Pr > z =  0.106
Arellano-Bond test for AR(2) in first differences: z =   1.91  Pr > z =  0.057
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(8)    =  18.35  Prob > chi2 =  0.019
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(8)    =   4.47  Prob > chi2 =  0.813
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  iv(s crk cr8 icrg ly)
    Hansen test excluding group:     chi2(3)    =   3.85  Prob > chi2 =  0.278
    Difference (null H = exogenous): chi2(5)    =   0.61  Prob > chi2 =  0.987


xtabond2 ebtslp l.ebtslp s crk cr8 icrg ly, gmm(l.ebtslp, collapse) iv(s crk cr8 icrg ly) robust nolevel
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step difference GMM
------------------------------------------------------------------------------
Group variable: id1                       Number of obs      =        72
Time variable : years                     Number of groups   =         8
Number of instruments = 14                Obs per group: min =         9
Wald chi2(6)  =     87.49                               avg =      9.00
Prob > chi2   =     0.000                               max =         9
------------------------------------------------------------------------------
             |               Robust
      ebtslp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ebtslp |
        L1.  |   -.053462    .276586    -0.19   0.847    -.5955605    .4886365
             |
           s |  -.0237355   .0084444    -2.81   0.005    -.0402863   -.0071847
         crk |  -.158148    .1330492    -1.19   0.235    -.4189197    .1026237
         cr8 |   .3665268   .048059     7.63   0.000     .2723329    .4607206
        icrg |   .0157755   .0041239     3.83   0.000     .0076927    .0238583
          ly |   .0108436   .0137785     0.79   0.431    -.0161617    .0378489
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/.).L.ebtslp collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -1.03  Pr > z =  0.304
Arellano-Bond test for AR(2) in first differences: z =  -0.45  Pr > z =  0.655
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(8)    =  23.10  Prob > chi2 =  0.003
```

```
 (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(8)    =  5.19  Prob > chi2 =  0.737
 (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
 iv(s crk cr8 icrg ly)
   Hansen test excluding group:     chi2(3)    =  5.33  Prob > chi2 =  0.149
   Difference (null H = exogenous): chi2(5)    =  -0.14  Prob > chi2 =  1.000


xtabond2 nim l.nim s crk cr8 icrg ly, gmm(l.nim, collapse) iv(s crk cr8 icrg ly) robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: id1                       Number of obs      =        80
Time variable : years                     Number of groups   =         8
Number of instruments = 16                Obs per group: min =        10
Wald chi2(6)  =   3080.94                              avg =     10.00
Prob > chi2   =     0.000                              max =        10
------------------------------------------------------------------------------
             |               Robust
         nim |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         nim |
          L1.|   .8261729   .068836    12.00   0.000     .6912569    .961089
             |
           s |    .006708   .0022072     3.04   0.002     .0023819    .0110341
         crk |   -.0911898   .2170017    -0.42   0.674    -.5165052    .3341257
         cr8 |   -.0567476    .073806    -0.77   0.442    -.2014047    .0879094
        icrg |    .0028944   .0014596     1.98   0.047     .0000336    .0057552
          ly |   -.0329399   .0147805    -2.23   0.026    -.0619091   -.0039707
       _cons |    .1928768   .1293871     1.49   0.136    -.0607172    .4464708
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/.).L.nim collapsed
Instruments for levels equation
  Standard
    _cons
    s crk cr8 icrg ly
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L.nim collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.20  Pr > z =  0.028
Arellano-Bond test for AR(2) in first differences: z =   1.50  Pr > z =  0.134
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(9)    =  24.27  Prob > chi2 =  0.004
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(9)    =  3.36  Prob > chi2 =  0.948
  (Robust, but can be weakened by many instruments.)
```

```
xtabond2 ebtslp l.ebtslp s crk cr8 icrg ly, gmm(l.ebtslp, collapse) iv(s crk cr8 icrg ly)robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: id1                     Number of obs      =        80
Time variable : years                   Number of groups   =         8
Number of instruments = 16              Obs per group: min =        10
Wald chi2(6)  =    922.65                              avg =     10.00
Prob > chi2   =     0.000                              max =        10
------------------------------------------------------------------------------
             |               Robust
      ebtslp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ebtslp |
        L1.  |   .5879192   .2342421     2.51   0.012     .1288132    1.047025
             |
           s |   .0089093   .0044027     2.02   0.043     .0002802    .0175383
         crk |  -.4341133    .141447    -3.07   0.002    -.7113444   -.1568822
         cr8 |   .2673544   .0333994     8.00   0.000     .2018928    .332816
        icrg |    .007338   .0026489     2.77   0.006     .0021462    .0125298
          ly |  -.0054959   .0127574    -0.43   0.667    -.0304999    .0195082
       _cons |  -.1415282   .0822395    -1.72   0.085    -.3027147    .0196583
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/.).L.ebtslp collapsed
Instruments for levels equation
  Standard
    _cons
    s crk cr8 icrg ly
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L.ebtslp collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.15  Pr > z =  0.031
Arellano-Bond test for AR(2) in first differences: z =  -1.64  Pr > z =  0.101
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(9)    =  42.38  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(9)    =   2.10  Prob > chi2 =  0.990
  (Robust, but can be weakened by many instruments.)


xtabond2 ebtse l.ebtse s crk cr8 icrg ly, gmm(l.ebtse, lag(2 2)) iv(s crk cr8 icrg ly)robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate robust weighting matrix for Hansen test.
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: id1                     Number of obs      =        80
Time variable : years                   Number of groups   =         8
Number of instruments = 22              Obs per group: min =        10
Wald chi2(6)  =    361.94                              avg =     10.00
Prob > chi2   =     0.000                              max =        10
```

```
------------------------------------------------------------------------------
             |               Robust
       ebtse |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ebtse |
         L1. |   .5921634    .135754     4.36   0.000     .3260905    .8582362
             |
           s |   .0056368   .0008302     6.79   0.000     .0040096    .0072641
         crk |  -.2832929   .0995834    -2.84   0.004    -.4784728   -.0881131
         cr8 |   .0750607   .0432924     1.73   0.083    -.0097909    .1599124
        icrg |   .0032882   .0007308     4.50   0.000     .0018558    .0047205
          ly |  -.0088338   .0080295    -1.10   0.271    -.0245713    .0069036
       _cons |  -.0162458   .0697299    -0.23   0.816    -.1529139    .1204223
------------------------------------------------------------------------------
Instruments for first differences equation
  Standard
    D.(s crk cr8 icrg ly)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L2.L.ebtse
Instruments for levels equation
  Standard
    _cons
    s crk cr8 icrg ly
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    DL.L.ebtse
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.14  Pr > z =  0.032
Arellano-Bond test for AR(2) in first differences: z =   1.29  Pr > z =  0.196
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(15)  =  24.14  Prob > chi2 =  0.063
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(15)  =   4.85  Prob > chi2 =  0.993
  (Robust, but can be weakened by many instruments.)

  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L.ept
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.30  Pr > z =  0.021
Arellano-Bond test for AR(2) in first differences: z =   1.23  Pr > z =  0.217
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(51)  =  70.06  Prob > chi2 =  0.039
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(51)  =   4.60  Prob > chi2 =  1.000
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(43)  =   4.60  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(8)   =   0.00  Prob > chi2 =  1.000
  iv(s cr cr8 icrg ly)
    Hansen test excluding group:     chi2(46)  =   1.95  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(5)   =   2.65  Prob > chi2 =  0.753
```