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Financial Stability of Islamic and Conventional Banks in Saudi Arabia:

Evidence using Pooled and Panel Models

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ABSTRACT

The financial crises are considered the major challenges facing the prosperity and stability of the banking system and menace its stability. Several studies on financial and banking sector have demonstrated that Islamic banks have shown more financial robustness and stability compared to conventional banks, over periods of financial crises. This research aims to measure the stability extent of the Saudi Arabia banks including Islamic banks and conventional banks using quarterly data from 2005 to 2011. This period is characterized by the global financial crisis shocks (2007-2008). The sample used is composed of six banks including two Islamic banks (*AlRajhi* Bank and *AlBilad* Bank) and four traditional banks (*Riyad* Bank, Saudi Investment Bank, Saudi British Bank and Saudi American Bank). This sample represents an important part of 64% of the Saudi banking sector and covers close to two thirds of banks whose shares are traded on the Saudi stock market. The research focuses on three types of variables related to bank, banking system and macroeconomic levels. The paper is based on quantitative tools using panel regression and pooled regression to model the z-score index for testing the banks stability in Saudi Arabia. The panel data model shows that Islamic banks reduce relatively the value of the financial stability index; meanwhile, they contribute efficiently to enhance the financial stability through the diversification of their assets. The findings indicate those *Riyad* Bank and SAMBA groups support efficiently the financial stability of banking sector, while *AlRajhi* bank has a positive but moderate role in enhancing the banking sector stability. The Saudi banking sector has relatively less level of competitiveness, that affecting negatively the financial stability. The limited representation of Islamic banks in the Saudi banking sector jeopardizes any efforts to improve the financial stability index.

JEL Classification:
Key words: Islamic Banks, Financial Crisis, Financial Stability, Z-score Model, Saudi Arabia.

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I. Introduction

Financial crises are strongly related to financial and banking systems, given the international financial liberalization market, where a local financial system is no longer isolated from changes of the global system. In the last decade of twentieth century Islamic banks were firstly established and had growing role in the international financial system since then. In fact, CIBAFI (2010) indicates that total world Islamic finance has reached around one trillion U.S. dollars at the end of 2009.

During the last financial crisis (2007-2009) a large number of conventional banks around the world have announced bankruptcy (140 U.S. Banks in 2009)[1]; while no single Islamic bank failure has been reported. The logical question to be raised here, is whether Islamic banks are immunized against financial shocks? And if so, can this be explained by the free-interest system, or by the fact that the Islamic banks do not invest in derivatives, "*Tawaruq*" and loans sale?[2] (Chapra, 2000a, 2000b; Siddiqi, 2000; Hassan, 2006). In other word, can the immunity of Islamic banks against international financial crises be due to its incomplete integration in the global financial system?

Studying the stability of Islamic banks requires the distinction between banks according to its asset structure in its budget. Firstly Islamic banks adopted single layer *Mudarabah*, where they mobilize their liabilities directly in different investment opportunities. This model was faced by a lot of operational risks. Accordingly, Islamic banks switched to the use of multi-layers *Mudarabah* Islamic model, *i.e.*, *Mudarabah* of assets (sources) and liabilities (uses), where all assets are financed through Profit Loss Sharing system (PLS).

The purpose of this paper is to test the hypothesis that Saudi Islamic banks are relatively less vulnerable to international financial crises, compared to Saudi conventional banks. The financial system and banking system in particular are always threatened by risks which lead to financial crises. Banking sector could be major driver of financial crises or one of channels transmitting the impacts of crises to other financial sectors and local or international real economies. Historical data shows that the banking sector was mostly the heavily damaged party by financial crises. During the last international financial crisis the banks losses in the

[1] http://www2.fdic.gov/hsob/SelectRpt.asp?EntryTyp=30

[2] The sale of loans is forbidden in Islam even if there are non interest loans.

world were estimated to be more than 1.8 trillion dollar, followed by insurance companies with around one trillion dollar. The importance of this paper stems from the perception that the stability of Saudi Islamic banks in responses to financial shocks, due to the adoption of the PLS system, is expected to contribute positively to the international financial stability.

II. Nature of financial banks crises

Since the financial crises of Latin-America and East Asia during the 1990s, international organizations have paid more attention to find out the causes and factors leading to the international financial crises. These efforts were conducted to elaborate an Early Warning System to expect the occurrence of future crises, to take precaution measures to reduce their damaging impacts.

Although each financial crisis has its own features and causes, there are some common internal and external features and reasons for all crises. In light of previous studies, the main reason behind the possibility of financial crises is asymmetry of information available to different participants, concerning rigorous macroeconomic fluctuations, including term of trade changes, variability of world interest rates and incentives to the flow of funds, exchange rate changes, and the vast expansion of banks credit, followed by a sudden collapse of asset prices, causing a miss-match between banks liabilities and assets maturity. In addition, money supply was growing at faster rate than GDP. Moreover, financial crises were caused by excessive government interventions through banking sector regulation (conflicted objectives of government policy and interest groups in banking operations), and the weak accounting and legal systems concerning banks objectivity and comprehensive attitude toward exposure and dissemination of banks financial standing, as well as the inefficient monitoring and control of banks, concerning early corrective actions, and coordination between banks owners, managers, and investors, and concerned government agencies.

Banks financial crises may also happen as a result of changes in exchange rates, through banks speculation in FOREX, or the unexpected deterioration of the value of its holding of real and financial assets. Central banks are willing, in such cases, to play its role as last resort to rescue insolvent banks and to prevent the occurrence of a banking system crisis. Accordingly, it is believed that the existence of one of more of the abovementioned factors definitely enhances the possibility of a banking sector crisis. An economy, under these circumstances, will not be able to accommodate or absorb financial shocks generated by the

instability of prices, interest rates and exchange rates. It would be difficult for the economy also to resist shocks of liquidity, credit and shocks related to changes in the structure of emerging financial institutions, as a result of reassessment of their financial assets, and changes in organizational structure or in the demand of assets. Therefore, several financial indices have been developed, such an early warning devices, to expect future financial shocks and to moderate its inverse financial and economic impacts.

Banks receive loan applications form investors of different levels of risk and moral commitments toward financial deals with banks. Feasibility studies of investor's project may help banks to assess the applicant level of risks, which consequently lessen adverse selection. However, such studies do not help bank to avoid moral hazards, which normally happen after signing the loan agreement. Furthermore, some loans may involve uncertainty concerning investors' default intention. It is not an easy task for banks to accurately make the distinction between these level of risks caused by asymmetric information of banks and investors.

Financial crises may be an exchange rate crisis, which leads to a large loss of the country international reserves, as a result mainly of the local currency devaluation. Another type of financial crises is that caused by bank failure, a situation that requires central bank interference to provide banks with reserves and to restructuring the banking system. Financial crises may also take place as a result of debt crisis, when debtors default on bank loans, or even when banks believe that defaults become a definite event. Facing such circumstances, banks are expected to adopt credit rationing strategy, depriving the economy from any new loans, settling outstanding loans. In some cases, the financial crisis may be related to the public debt, to Government failure in the repayment of the public debt, raising investment risk, discouraging foreign capital inflow, causing an exchange rate crisis. Facing such uncertainties, banks charge higher interest rates on loans by adding some risk allowance as an insurance premium. However, risky investors are the most likely to be willing to pay the high interest rates, given the high rates of returns expected on their projects. By contrast, low risk and moderate returns projects may turn to be infeasible, given the high financing cost. Accordingly, Banks will be forced to finance mainly risky projects, a practice known as adverse selection, which endanger the financial stability of the banking sector.

Moral hazards may also occur as a result of asymmetric information between banks and investors with respect to after contracting behavior of the later. Looking for highest possible profits, some investors violate the loan contract by utilizing funds received from banks in rather riskier projects than those agreed upon in the contract. Thus, moral hazards raise banks' risk, increase interest on loans, and enhance adverse selection by banks, which all lead to inefficient allocation of financial resources and adverse impacts on the economy performance.

III. Literature review

There are few papers using quantitative models to analyze the financial stability of the Islamic and conventional banks. Čihak and Hesse (2010, 2008) analyze, via z-score as a criterion of stability, a sample of twenty countries extracted from the BankScope database, which contain the Islamic banks and conventional banks. The Islamic banks are classified into small and large banks following their assets-size with a threshold of one billion dollars and having at least 1% of the total assets of banks in the country. The findings of Čihak and Hesse indicate that small Islamic banks are more stable than small conventional banks and large Islamic banks, large conventional banks are more stable than large Islamic banks, and small Islamic banks are more stable than Islamic banks are large. They don't show if the large conventional banks are less stable than small Islamic banks.

The Islamic banks could be affected positively or negatively by financial crisis or banking crisis or bankruptcies of conventional banks even if the Islamic banks operate with its assets following the Islamic finance. So Standard & Poor's Credit Rating indicates that the Islamic financial institutions satisfy 15% of Muslims needs of financial services, and that the size of assets compatible to Islamic-*Shariah* reaches 400 billion dollars in 2009 *i.e.* approximately 10% of international market, which is around 4 trillion dollars. The expansion of the Islamic finance model could reduce the immunity of Islamic banks.

The paper of AlKholi (2009), by using several stability bank indexes, concludes that the Saudi Islamic and conventional banks have been supported by SAMA and reflect fragile stability. He shows that the Saudi banking sector has successfully absorbed the shocks of international financial crisis. This shock absorption increased the customers' confidence and contributed to avoid a local financial crisis and its detrimental repercussion on real economy. Saudi banks reserves have been increased by more than three times to face the loan losses,

SAMA policy and credit rationing by banks reduce significantly the negative effects of the international financial crisis on Saudi banks. During the first nine months of 2009, the profitability of Saudi banks indicates a tenuous decline around 2.6% (18.86 billion Riyals in 2009 versus 19.37 billion Riyals in 2008). At the same time, *AlBilad* Bank and Saud British bank recorded losses respectively at 66% and 11%; the losses of *AlBilad* Bank would be more related to local factors.

Hasan & Dridi (2010) determine the effects of recent international financial crisis, especially during the period (2007-2008), on the conventional and Islamic banks in eight countries, including the GCC countries. Using a range of banking indicators such profitability, loan growth, asset growth and the external credit rating, they find that Islamic banks have been affected by the crisis, but in a different way comparatively to conventional banks. The Islamic banks profitability in 2008 reduces the negative impact of the international financial crisis. Also, the growth rate of credits and investments assets (loans granted in the PLS system) exhibit that the performance of Islamic banks is better than conventional banks, given the large losses incurred by conventional banks following the international financial crisis. Then, the Islamic banks contribute to realize the financial stability. However, the Islamic banks have some weaknesses related to their risk management. In that case, they are exposed to potential financial shocks, which require reliable financial instruments to resolve the risk management above all liquidity risk.

The study of Imam and Kpodar (2010) identifies the factors affecting the world expansion of Islamic banks, which, in case of success, could be a new alternative financial model for finance industry. They use many factors affecting the international spread of Islamic banks such rate of Muslim population per country, technology of the domestic financial system, competitiveness of the domestic financial system, average of per capita income, real interest rate, events of September 11 2001, crude oil price, and integration degree to Middle East countries. The findings show that the average of per capita income and the competitiveness in the banking system have significant positive impacts on the spread of Islamic banks, expressing the increasing need for Islamic financial intermediation across the world. Also, the decrease in real interest rates less than 3.5% conducts to more deposits in the Islamic banks. The paper of Ariss (2010) focuses on competitiveness conditions of Islamic and conventional banks by using several indicators such PR H-statistic index and Lerner index (market power of bank). Using yearly data from 2000 to 2006, the findings indicate that the weakness

competitiveness is related significantly and positively to higher level of profitability, and that traditional banks are more competitive than the Islamic banks. Quasi all research uses annual data; our paper by using quarterly data contributes to enrich the previous research modeling the financial stability of banks in face of shocks due to financial crises. The panel data features are firstly that the sample from 2005 to 2011 represents an important part of 64% of the Saudi banking sector with Islamic and conventional banks and covers close to two thirds of banks whose shares are traded on the Saudi stock market, and secondly that the sample contains the events of the recent global financial crisis (2007-2009).

IV. Banks Data and tests

Saudi banking system is composed of a total of eleven banks, including two distinguished groups, Islamic and conventional banks (Table 1 and Table 2). Four banks were classified as Islamic banks, according to the non-interest financing practice of this group of banks.[1] The rest seven banks are conventional banks. For the purpose of this paper, a sample of six banks were selected, two Islamic banks (*AlRajhi* and *AlBilad* banks), and four conventional banks (*Riyad* bank, Saudi Investment bank, Saud British bank, and Saudi American bank), where the last two represent offshore banks, with its close links to international banks around the world that allow the investigation of the international financial crisis impacts on these banks and on the Saudi financial system (see appendix 8.1: panel definitions).

The stability index (z-score) in sub-annual level is calculated using quarterly data collected and constructed from the Saudi financial market "*Tadawul*" over the period 2005-2011.[3] The last financial crisis has revealed some weaknesses of the Saudi banking system, on top of which are: first, the high concentration of bank loans to a limited number of firms and individuals. Second, the large portion of banks' investment in foreign assets with relatively high rates of returns compared to interest rates on domestic assets, especially after lowering the reverse repo by SAMA, and the lack of new government bonds during the same period, and the resulted liquidity surplus, which were channeled to the international markets (Ghassan et *al*., 2011).

The world financial crisis has caused some Saudi banks to encore losses, particularly those involved in foreign investment, loans trade, speculation in foreign currency and gold markets, and financial derivatives deals. Third, banks showed some degree of credit rationing and

[3] The international database BankScope allows only annual financial data.

become relatively more conservative in issuing new loans. On the other hand, Saudi banking sector have shown some healthy signs during the financial crisis, where its record profitability levels were maintained. Net banks' profits were declined only by approximately 2.6% after the conservative measures taken by banks. Total reserves, voluntarily, boosted to 6.04 billion Riyals, over the period January to September 2009, compared with 1.58 billion Riyals a year before, as a precautionary action to meet any possible losses due to investors' defaults on banks' loans. It was also noticed that equity capital of Saudi banks have increased, and banks' assets have not suffered the drastic negative impacts that hit banks' sectors in industrial countries around the world, where some giant famous banks were forced to announce bankruptcy. Saudi banks' huge reserves, most likely have shielded domestic banks against the tremendous negative impacts of international financial crisis. Moreover, some well-known international credit rating agencies as Moody's and Standard & Poor's, has reported that basic financial forecasts of the Saudi banking sector are relatively stable, flexible and had the ability to absorb negative shocks of the international financial crisis and the declining world economic growth.

The prior step is to implement the panel unit root test on the relevant variables given in equation (x) below (Descriptive statistics, Tables 3).[2] A widely used panel unit root tests are Hadri (1999) as a common root test and Im, Pesaran and Shin (IPS, 2003) as an individual root test. The Hadri test considers the null hypothesis of no unit root and assumes that persistence parameters are common *i.e.* identical in the panel data. Accordingly, it assumes a common process of the panel unit root under null hypothesis $(\rho_i=\rho, i=1, \dots, 6)$ considering a following process for panel data $y_{it} = \rho_i + \eta_i t + \varepsilon_{it}$ where $\varepsilon_{it}$is the specific-individual error, t stands for a time-trend which is related to fixed or individual effects. Similarly to KPSS test, this test depends on the residuals from the individual OLS regressions on constant and time-trend. The statistic LM_1 is formed allowing for homoscedasticity hypothesis and alternatively the statistic ML_2 is related to consistent heteroscedasticity assumption, which leads to Z-statistic values (Table 4.2). The IPS test considers the null hypothesis of unit root and supposes that the persistent coefficient may vary between banks. Accordingly, it assumes an individual process of the panel unit root under null hypothesis $(\rho_i=0, i=1, \dots, 6)$ and considering a following individual ADF regression for each bank $\Delta y_{it} = \rho_i y_{it-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{it-j} + X_{it}^{'} \alpha + \varepsilon_{it}$. The average of the t-statistics of ρ_i from the individual ADF regressions is adjusted to calculate $\bar{t}_{NT}$ statistics. When the lag order $p_i$is

non-zero for some cross-sections, the IPS test shows that a properly standardized $\bar{t}_{NT}$ *i.e.* $W_{\bar{t}_{NT}}$statistic fellows asymptotically a standard normal distribution (Table 4.1). The results of unit root panel test indicate that banks' variables have unit root using either IPS or Hadri test. This finding suggests that the bank's variables would be cointegrated. Also, the results of unit root tests exhibit that banking sector and macroeconomic variables are no stationary except the economic growth variable.

V. Stability index Model

5.1 Banks Financial Stability Measurement

There are several well-known methods measuring the stability of financial systems, and banking sector in particular. Among these methods, Value at Risk (VaR) (Holton, 2003, Manganelli & Engle, 2001), Stress Test (Aragonés et *al*., 2001; BIS, 2000) and z-score model (Altman, 1983). This model is considered the best amongst all other methods, as it has the advantage of predicting the possibilities of future bank insolvency, while other methods just find out if the bank may faces a liquidity problem.

In fact, insolvency is more serious and dangerous problem than liquidity, which means that the bank liabilities exceed its assets, or the bank become insolvent. A bank may become illiquid even when it is solvent, if its assets are held in illiquid assets (long term financial assets or real assets) that can only be liquidated at high cost. The bank may be forced to sell such assets at considerable loss, by selling it at lower than its nominal value.

Altman measure can be applied to conventional and Islamic banks as well, using banks' accounting data. The z-score for banks takes the following definitions:

$$z = \frac{k_{t;q}+\mu_{t;q}}{\sigma_{t;q}} \qquad (1)$$

$$k_{t;q} = \left(\frac{E}{A}\right)_{t;q},\ \mu_{1,t;q} = \overline{\left(\frac{R_{t;q}}{A_{t;q}}\right)} \quad \text{or} \quad \mu_{2,t;q} = \frac{\bar{R}_{t;q}}{\bar{A}_{t;q}},\quad \sigma^2 = V\left(\frac{R}{A}\right)_{t;q} \qquad (2)$$

where k is the ratio of equity capital plus total reserves to assets. μ represents the ratio of average returns to assets, where average returns are calculated on base of four observations per year; we use the first formula. σ stands for the standard deviation of returns to assets, and measures the volatility of returns on assets.[3] The z-score bank's stability index is used for

predicting financial distress. It is based on a standard indicator of financial soundness of a group of different financial institutions, and focuses on bank's risk of insolvency.[4] The z-score reflects the probability of insolvency or bank liabilities exceed assets. Assuming a normally distributed bank return μ, then the probability of default is $p(\mu < -k) = \int_{-\infty}^{z} N(0,1)d\mu$. The z-score measures the number of standard deviations that a return realization has to fall in order to deplete equity (Čihak, 2007). The greater z-score indicates the lower likelihood of bank insolvency risk; the index will take high value when capitalization, measured in terms of risk error, is large.

The z-score seems to be appropriate to measure the Islamic bank risk, because it is not affected by the nature of the bank activities; but it focuses on risks involved in the investment of bank assets and reserves. It is specially suitable for banks adopting investment strategies that prefer high risk assets given a high rate of return, or low risk assets even at low rate of returns, which guarantees the z-score objectivity (Čihak & Hesse, 2010, 2008; Maechler et *al*., 2005). But in the context of financial shocks and crises the high risk may lead to meager or negative returns, whilst the small risks may turn to big returns. These volatilities require a specific modeling of z-score index to explain its determinants in the long run such the GARCH models.

The z-score index may be incompatible with the nature of Islamic banking relying mainly on the PLS system, which leads to a common risk of the investor and bank via "*Mudarabah*" and "*Musharakah*" contracts. It is probable that the capital value and reserves do not reflect the financial strength of Islamic banks, because the investor shall bear a part of the risk according to a formula of PLS contracts, and thus reduce fairly the risk of Islamic Banks. These banks may seek for adjustments processes in risk-taking rates by the investors through appropriate contracts of PLS system and new methods of capital investment. The conventional banks also seek for adjustment processes of interest rates on deposits and loans to avoid insolvency (Čihak & Hesse, 2010, 2008).

5.2 Financial Stability Model

The financial stability index is influenced by three sets of variables related to banks, banking sector and macroeconomic, respectively. The bank determinants include five variables: logarithm of z-score (LZSCOR), logarithm of total assets (LAST), loans to assets ratio for conventional banks or ratio of finance activity to assets in case of Islamic banks (ratio of

credits to assets, RCA),[5] in addition to ratio of operating costs to income (RCI) and income diversity (IDV).[6] The banking sector determinants include three variables: logarithm of Herfindahl index (LHHI), which measures banks' competitiveness, that ranges between zero for highly competitive and 10000 for a least competitive market (Ariss, 2010). It also includes the share of Islamic banks *i.e.* ratio of Islamic banks' assets to total assets of the banking sector (SHIB), which may also be measured by the ratio of Islamic banks' deposits to total bank sector deposits. The macro variables are both real rate of economic growth (GRW) and rate of inflation (INF).

To capture the impacts of a specific bank on financial banking stability, two bank dummy variables were introduced one for conventional banks (CBD) and the other for Islamic banks (IBD). These variables are expected to take on a negative sign indicating the financial weakness of the related bank group, whereas a positive sign reflecting the financial strength of the related bank group and its contribution to the banking sector stability. It is also possible to use a composed variable in testing the hypothesis that the Islamic banks contribute to the financial stability of banking sector. The IDV variable interacts with both dummy variables IBD and CBD. If the interaction with IBD takes on a positive sign, it implies that the diversity of Islamic bank's income enhances the stability of the banking sector.

Given that the cross-section observations are less than the time series observations $(N < T)$, and assuming the existence of serial correlation between banks' data, the unobserved random errors are expected to have variance covariance matrix $\Omega \otimes T$, with $\Omega = (\sigma_{ij})$, $i, j = 1, \dots, N$ where σ_{ij} is not necessarily equal zero (Heij et *al*. 2004). These features require using a Seemingly Unrelated Regression (SUR) model, which leads to formulate a pooled data model and use of several estimation techniques of z-score model.[7]

Based on the previous determinants of financial stability, the z-score model could be written as follows:

$$z_{it} = \alpha_i + \beta_i B_{it-1} + \gamma_i S_{t-1} + \omega_i M_{t-1} + \pi_i D_i + \varepsilon_{it} \qquad (3)$$

where B_{it-1} stands for banks variables, S_{it-1} and $M_{i,t}$ represent banking sector and macroeconomic variables, respectively. We use also D_i as dummy variable to exhibit to distinguish between the impacts of conventional and Islamic banks on the financial distress on bank i. The term ε_{it} indicates the unobserved stochastic errors. The variables in right side

of Eq. (3) are considered with one lag length to capture their effects on the expected z-score index.

Considering that the sum of cross fixed effects is zero (bottom of Tables 5), these effects appear in Figures 3 and represent the deviations from the global rate of z-score. The findings show that SIB, SAB banks and mainly BLD bank contribute positively to financial stability, whereas SAM and RJH banks and mostly RYD bank contribute negatively to financial index stability. To exhibit the global effect on banking sector, we formulate a Panel data model and using also numerous estimation methods:[8]

$$z_{it} = \alpha_i + \beta B_{it-1} + \gamma S_{t-1} + \omega M_{t-1} + \pi D_i + \varepsilon_{it} \qquad (4)$$

The findings indicate that Islamic banks reduce the financial stability index in the average rate of 11.4% (Table 7.1). But they contribute to the financial stability in banking sector through the income diversity index, which improves the z-score on average at rate 21.6%. The serial correlation due to the dummy variable (IBD) relativizes these results.

The results of the Table 7.3 have some goodness statistical features, they show that Islamic banks contribute to improving financial stability in average with rate of 8.3% (*i.e.* $\frac{0.806}{8.742}$) through the diversification of financial products. The results of Table 8.2 from Panel GLS estimation indicate that fixed cross effects on z-score vary between banks. *AlBilad* bank contributes negatively to z-score more than SAIB and in particular comparatively to the negative contribution of SABB (1.5% on average). Meanwhile *Riyad* Bank contributes efficiently to banking financial stability, SAMBA group enhances this stability significantly, and *AlRajhi* Bank has a slightly positive contribution (1.1% on average).

The Table 7.3 indicates that the index of operating cost to income has almost neutral role in improving the financial stability index, so it is reduced slightly at rate 0.01%. But, *AlBilad* bank has a high and unstable ratio of cost to income, while *AlRajhi* Bank proved to be highly competitive over to *Riyad* Bank. This ratio appears to be more unstable and less competitive in both SAIB and SABB. It appears from Table 7.3 that the variables of banks have the expected signs, as the banks that have a high level of RCA variable moves toward low index of financial stability (Table 8.2), such as *AlBilad* Bank in particular and SAIB. But, it seems that the marginal propensity (0.622) associated to the ratio of loans to assets (for conventional

banks) or to the ratio of finance to assets (for Islamic banks) has a significant positive sign, which emphasizes the effects of banks with moderate RCA ratios.

The modest presence of Islamic banks in the Saudi banking sector does not qualify them to improve effectively the banking financial stability. The dominance of conventional banks reflects that they contribute to increase the z-score index, although some financial distress as in SAIB and SABB. But, the presence of Islamic banks leads to net improvement of the financial stability, so that the fixed cross effects (Table 5.3) exhibit that *AlBilad* bank, with small size compared to *AlRajhi* Bank, gets better the z-score index, while *AlRajhi* bank tends to reduce the Islamic financial stability index. These results may be explained by the involvement of *AlRajhi* bank, through the Profit-Loss Sharing system, in direct investment operations or long run and high risk financial investment intermediation. These results are similar in part to the findings of Čihak and Hesse (2010, 2008), that the small Islamic banks are more stable than the large ones.

It seems that the impact of competitive banks index LHHI has a negative sign and high significant parameter, which indicates that the Saudi banking sector relatively complains of weak competition, reflecting negative effects on financial stability. In addition, the estimated equations exhibit that the inflation rate affects negatively and significantly the z-score index, which illustrates the importance of economic and financial policies of the government in support of the financial stability in banking system.

VI. Conclusion

The paper uses the z-score as financial distress index of sample of Saudi banks including conventional and Islamic banks. The financial stability model is explained by variables reliable to individual banks, banking sector and macroeconomic. The models are designed for both pooled and panel data and estimated by several methods, the findings may be summarized as follows.

Pooled data model shows that SAIB and SABB and mainly *AlBilad* bank contribute positively to its financial stability index, while SAMBA group, *AlRajhi* Bank and in particular *Riyad* bank have a negative impact on its financial stability index. However, panel data model shows that Islamic banks reduce relatively the value of the financial stability index; meanwhile, they contribute efficiently to enhance the financial stability through the diversification of their assets. The fixed cross effects on z-score indicate that *AlBilad* Bank

had the greatest negative contribution to the financial stability index, followed by SAIB and the SABB, this latter has the least negative impact on z-score. Results also show that *Riyad* Bank and SAMBA group efficiently support the financial stability of banking sector, while *AlRajhi* bank has a positive but relatively moderate role in enhancing the banking sector stability.

The findings indicate that the ratio of operating cost to income has almost neutral role in improving the financial stability index. *AlBilad* Bank has a high and unstable ratio of cost to income, while *AlRajhi* Bank proved to be highly competitive over to *Riyad* Bank. This ratio appears to be more unstable and less competitive in both SAIB and SABB. Conventional banks with high ratio of loans to assets or Islamic banks with high finance to assets ratio mostly have lower stability indices, as for instance *AlBilad* bank and SAIB. However, this ratio has a positive and significant marginal propensity, which emphasizes the effects of banks with moderate ratios. The competitiveness index seems to be negatively high and strongly significant, which indicates that the Saudi banking sector has relatively less level of competitiveness, that negatively affecting the financial stability. The limited representation of Islamic banks in the Saudi banking sector jeopardizes any efforts to improve the financial stability index.

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Annex

1. Banks identity

***Riyad* Bank** (RYD) is a Saudi Joint Stock Company founded in 1957. It operates with 237 branches, a branch in London (UK), and an agency in Houston (USA) and a representative office in Singapore. The RYD provides a full range of banking and investment services. It also provides to its customers non-interest based banking products approved and supervised by an independent *Shariah* Board established by RYD.

Saudi Investment Bank, SAIB (SIB) founded in 1976 and owned by the government. It operates with 45 branches, which 41 work under the *Alasalah* Brand. SAIB provides a full range of traditional wholesale, retail and commercial banking products and services in particular for the quasi-government and private industrial sectors including trade finance products for both imports and exports. Through *Alasalah* Islamic Banking brand, SAIB offers several Shariah-compliant products and services.

Saudi British Bank, SABB (SAB) is a Saudi Joint-Stock company founded in 1978 and licensed to conduct banking business. SABB has a very strong and rich record in banking business as well as a successful history in Saudi Arabia in the launch and provision of banking services and products for retail and corporate customers. SABB is one of the first banks to issue the credit cards in the Saudi Market, use ATMs for equity subscription services, in addition to the use of Braille language in ATMs and the financing and support of MBA scholarship program at UK universities for Saudi citizens.

Samba Financial Group (SAMBA, SAM) founded in 1980 and enjoys an extensive network of branches in Saudi Arabia as well as in UK, Pakistan and Dubai. The SAMBA adopts a strategy of expansion in the regional markets and provides world class services to meet the financial needs of its private, corporate and institutional customers. Its strong suite of comprehensive and integrated conventional and Shariah-compliant financial products and services as well as financial advisory services has propelled Samba to the top tier of Saudi Financial institutions. The Bank aims to invest in its staff, reinforce its social responsibility and maximize its shareholders returns. SAMBA was the first Bank in Saudi Arabia to offer Priority Banking (Gold and Diamond), Phone Banking, ATMs and Cash Deposit through ATMs, Debit Cards, Charge Cards, Islamic Credit Cards, Co-Branded Credit Cards, AlKhair Credit Cards for ladies, "*Murabaha*"-Based Cash Financing, Phone Banking, Leasing

("*Ijarah*"), Foreign Exchange Derivatives, Interest Rate Derivatives, Credit Shield Insurance, and Automated Signature Verification.

***AlRajhi* Bank** (RJH) founded in 1976 and considered as one of the largest banking corporations in Saudi Arabia with a Saudi fully paid capital. RJH has the largest branch network (more than 500 branches) and the largest (ATM) network (2000 machines) and over 17,000 (POS) installed with merchants all over the Kingdom. The objectives of RJH are represented in practicing banking and investment activities respecting Islamic law. RJH is practicing banking and investment (individuals, companies) for its own account or on behalf of others within and outside the Kingdom.

***AlBilad* Bank** (BLD) is a Saudi joint stock company founded in 2005. The objectives of BLD are to provide all Islamic *Shariah* compliant banking services. The bank has, as part of its organizational structure, *Shariah* Department to be in charge of the follow-up and monitoring of the implementation of the *Shariah* decisions issued by the *Shariah* Committee.

2. Tables and Figures

Table 1: Banks Listed in the Saudi Stock Exchange (2012)

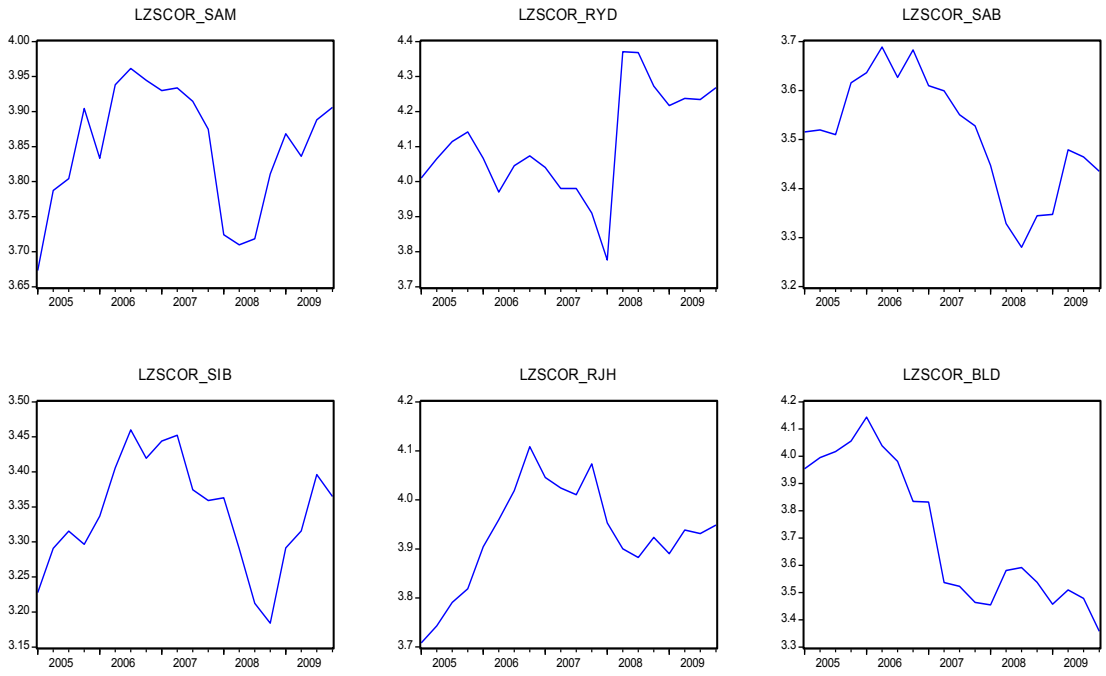
Bank	Code	Bank type	Capital (Billion SAR)
1. *Riyad* Bank	RYD	Conventional with IW	15.0
2. *Al-Jazirah*	JZR	Islamic	03.0
3. Saudi Investment Bank	SIB	Conventional with IW	04.5
4. Saudi Hollandi Bank	SHD	Conventional	03.3
5. Saudi Fransi Bank	SAF	Conventional with IW	07.2
6. Saudi British Bank (SABB)	SAB	Conventional with IW	07.5
7. Arab National	ARN	Conventional with IW	06.5
8. Saudi American Bank (SAMBA)	SAM	Conventional with IW	09.0
9. *AlRajhi* Bank	RJH	Islamic	15.0
10. *AlBilad* Bank	BLD	Islamic	03.0
11. *AlInma* Bank	IMA	Islamic	15.0

Source: http://www.tadawul.com.sa (2012). IW stands for Islamic windows.

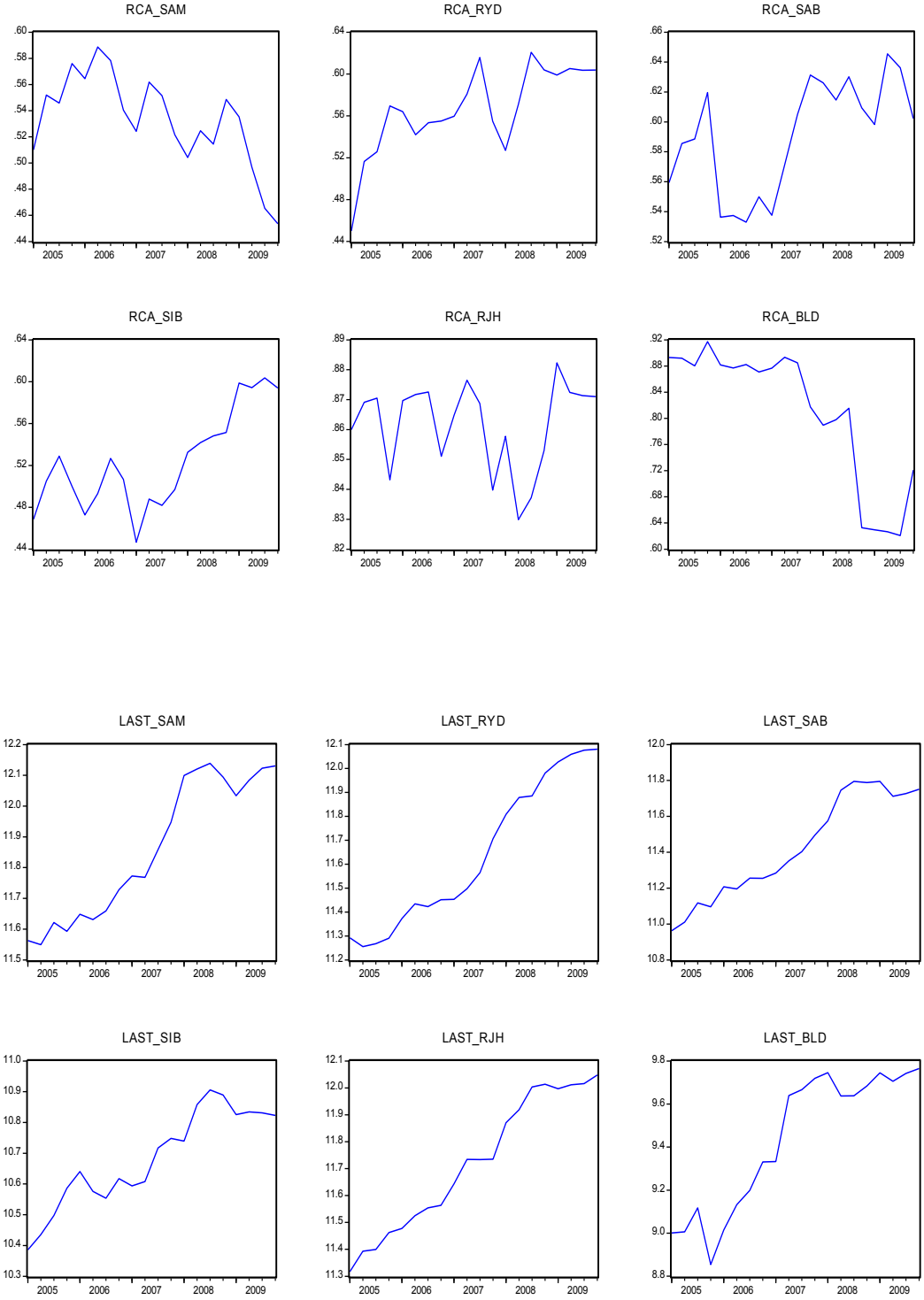
Table 2: Main Differences between Islamic and Conventional Banks

	Conventional Banks	Islamic Banks
Model	Based on conventional law, Maximize profits subject to differential interest rates.	Based on Islamic law (*Shariah*), Maximize profits subject to Profit-Loss Sharing (PLS) System.
Risk	• Shifting risk when involved or expected. • Guarantee all its deposits. • Focus on credit-worthiness of the clients.	• Bearing risks when involved in any transaction. • Guarantee only current account deposits, but other deposits are invested via multilayer *Mudarabah* system as a part of PLS system. • Focus on the viability of the projects.
Money and liquidity	• Interests on borrowing from the any market. • Sale of Debts.	• Based on *Shariah*-compliant for any transaction. • Large restrictions on sale of Debts.

Figures 1: Banks data



Figures 1: Banks data (Cont. 1)



Figures 1: Banks data (Cont. 2)

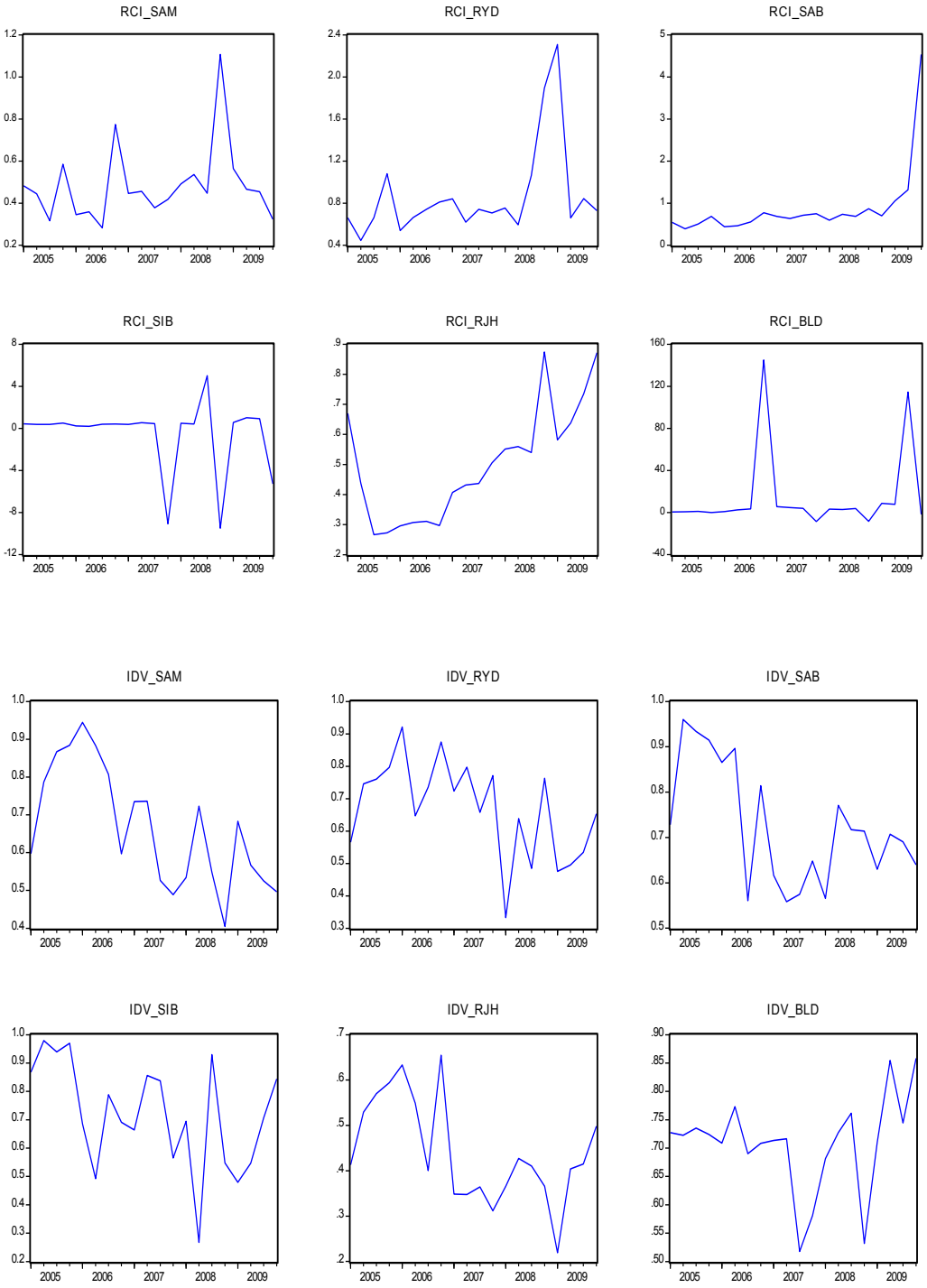


Table 3.1: Descriptive Statistics for LZSCOR

CROSSID	Mean	Quant.*	Std. Dev.	Skew.	Kurt.
SAM_1	3.848	3.872	0.088	-0.588	2.122
RYD_2	4.107	4.070	0.155	-0.025	2.482
SAB_3	3.511	3.518	0.120	-0.333	2.129
SIB_4	3.340	3.348	0.078	-0.272	2.292
RJH_5	3.928	3.935	0.106	-0.393	2.637
BLD_6	3.717	3.586	0.260	0.271	1.433
All	3.742	3.797	0.296	-0.039	1.937

Table 3.2: Descriptive Statistics for LAST

CROSSID	Mean	Median	Quant.*	Std. Dev.	Skew.	Kurt.
SAM_1	11.858	11.816	11.816	0.226	0.019	1.330
RYD_2	11.640	11.531	11.531	0.305	0.237	1.486
SAB_3	11.426	11.377	11.377	0.289	-0.008	1.550
SIB_4	10.683	10.678	10.678	0.155	-0.229	1.950
RJH_5	11.721	11.734	11.734	0.249	-0.061	1.544
BLD_6	9.434	9.638	9.638	0.319	-0.459	1.574
All	11.127	11.428	11.428	0.889	-1.033	3.005

Table 3.3: Descriptive Statistics for RCA

CROSSID	Mean	Median	Quant.*	Std. Dev.	Skew.	Kurt.
SAM_1	0.533	0.538	0.538	0.036	-0.566	2.829
RYD_2	0.566	0.567	0.568	0.041	-0.969	4.065
SAB_3	0.591	0.600	0.600	0.037	-0.301	1.719
SIB_4	0.524	0.517	0.517	0.046	0.370	2.118
RJH_5	0.862	0.869	0.869	0.015	-0.791	2.475
BLD_6	0.809	0.874	0.874	0.104	-0.937	2.300
All	0.647	0.596	0.596	0.146	0.663	1.843

Table 3.4: Descriptive Statistics for RCI

CROSSID	Mean	Median	Quant.*	Std. Dev.	Skew.	Kurt.
SAM_1	0.484	0.451	0.451	0.184	2.123	7.829
RYD_2	0.868	0.735	0.735	0.453	2.260	7.207
SAB_3	2.914	0.689	0.689	9.944	4.126	18.036
SIB_4	-0.552	0.412	0.412	3.427	-1.663	5.249
RJH_5	0.499	0.472	0.472	0.189	0.554	2.386
BLD_6	14.619	3.212	3.213	39.916	2.683	8.498
All	3.139	0.574	0.574	17.314	6.993	52.995

Table 3.5: Descriptive Statistics for IDV

CROSSID	Mean	Median	Quant.*	Std. Dev.	Skew.	Kurt.
SAM_1	0.667	0.640	0.640	0.159	0.208	1.802
RYD_2	0.668	0.690	0.690	0.149	-0.440	2.584
SAB_3	0.725	0.711	0.711	0.132	0.410	1.904
SIB_4	0.717	0.701	0.701	0.192	-0.498	2.597
RJH_5	0.441	0.412	0.412	0.115	0.304	2.356
BLD_6	0.709	0.719	0.719	0.086	-0.682	3.706
All	0.655	0.684	0.684	0.171	-0.236	2.464

*Quantiles computed for p=0.5, using the Rankit (Cleveland) definition.

Table 4.1: Panel unit root

	LZSCOR	LAST	RCA	RCI	IDV
Model	IE	IE, IT	IE	IE	IE, IT
IPS_W-stat (Prob.-value)	-0.506 (0.31)	-0.773 (0.22)	-0.636 (0.26)	-0.398 (0.34)	-0.866 (0.19)
IPS_$\bar{t}$-stat (Critical-value)	-1.713 (-2.42)				
Decision	NS	NS	NS	NS	NS

Table 4.2: Panel unit root

	LZSCOR	LAST	RCA	RCI	IDV
Model	IE, IT	IE, IT	IE, IT	IE, IT	IE
Hadri_Z-stat (Prob.-value)	2.968 (0.0015)	2.817 (0.002)	4.064 (0.0000)	3.065 (0.001)	4.020 (0.0000)
Hadri_HC_Z-stat (Prob.-value)	2.978 (0.0015)	2.190 (0.014)	3.312 (0.0005)	23.982 (0.0000)	3.436 (0.0003)
Decision	NS	NS	NS	NS	NS

Note: IE, IT and NS are Individual Effects, Individual linear Trends and Non Stationarity, respectively.

Table 5.1: PLS Estimation of z-score model

Dependent Variable: LZSCOR?
Method: Pooled Least Squares
Sample (adjusted): 2005Q2 2009Q4
Included observations: 19 after adjustments
Cross-sections included: 6
Total pool (balanced) observations: 114

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	405.1239	203.9526	1.986363	0.0504
LHHI(-1)	-43.80782	22.32002	-1.962714	0.0531
SHIB(-1)	-67.78258	35.22877	-1.924069	0.0579
INF(-1)	-1.925408	1.407210	-1.368245	0.1750
LAST_SAM(-1)	-0.094274	0.149309	-0.631402	0.5296
LAST_RYD(-1)	0.312758	0.119997	2.606377	0.0109
LAST_SAB(-1)	-0.278381	0.118287	-2.353433	0.0210
LAST_SIB(-1)	-0.230379	0.224252	-1.027321	0.3073
LAST_RJH(-1)	0.208745	0.134581	1.551069	0.1248
LAST_BLD(-1)	-0.733271	0.106329	-6.896225	0.0000
RCA_SAM(-1)	0.063777	1.051747	0.060639	0.9518
RCA_RYD(-1)	-1.530371	0.708819	-2.159045	0.0338
RCA_SAB(-1)	-1.239895	0.781145	-1.587280	0.1163
RCA_SIB(-1)	-0.216678	0.644141	-0.336383	0.7375
RCA_RJH(-1)	0.439917	1.524202	0.288622	0.7736
RCA_BLD(-1)	0.113864	0.293848	0.387494	0.6994
RCI_SAM(-1)	0.016033	0.140548	0.114074	0.9095
RCI_RYD(-1)	0.014514	0.051751	0.280460	0.7798
RCI_SAB(-1)	0.122248	0.132076	0.925589	0.3574
RCI_SIB(-1)	-0.001828	0.006708	-0.272476	0.7859
RCI_RJH(-1)	-0.425608	0.177456	-2.398382	0.0188
RCI_BLD(-1)	-0.000197	0.000519	-0.379905	0.7050
IDV_SAM(-1)	0.060295	0.231529	0.260421	0.7952
IDV_RYD(-1)	-0.318230	0.128661	-2.473408	0.0155
IDV_SAB(-1)	0.006919	0.189774	0.036459	0.9710
IDV_SIB(-1)	-0.121753	0.133137	-0.914493	0.3632
IDV_RJH(-1)	-0.192515	0.247283	-0.778520	0.4385
IDV_BLD(-1)	0.175048	0.283271	0.617953	0.5383

Fixed Effects (Cross)

C_SAM	-0.369695
C_RYD	-3.724646
C_SAB	2.067986
C_SIB	0.743502
C_RJH	-3.853596
C_BLD	5.136448

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.938639	Mean dependent var	3.745184
Adjusted R-squared	0.914398	S.D. dependent var	0.296972
S.E. of regression	0.086887	Akaike info criterion	-1.811212
Sum squared resid	0.611502	Schwarz criterion	-1.019154
Log likelihood	136.2391	F-statistic	38.72080
Durbin-Watson stat	1.668614	Prob(F-statistic)	0.000000

Figures 2.1: PLS Residuals of z-score model

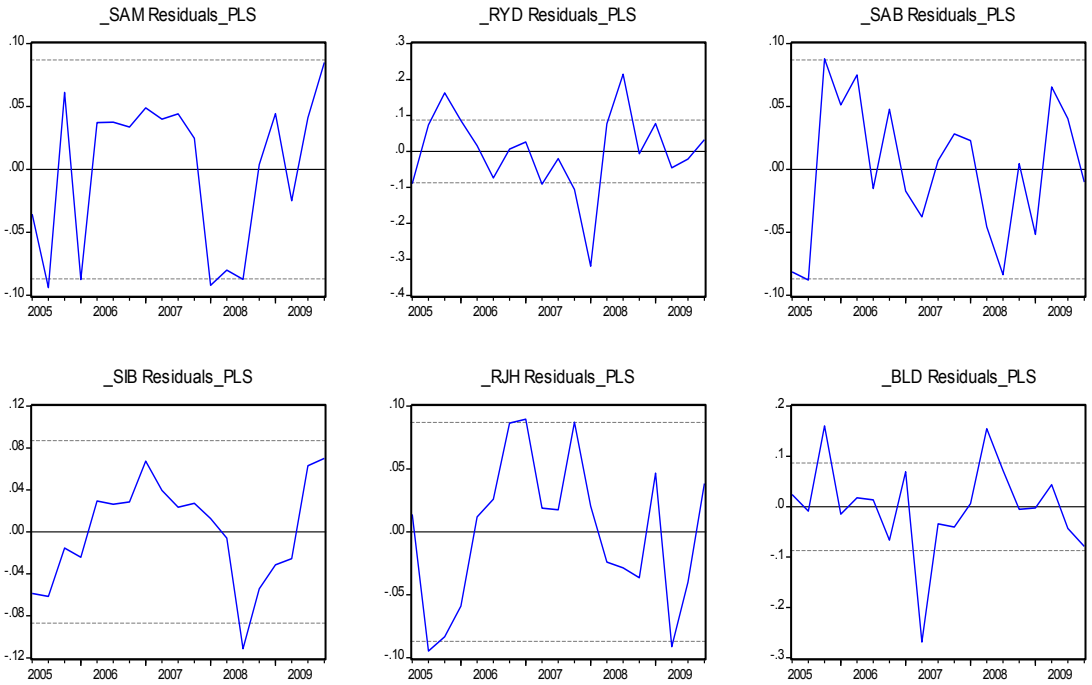


Table 6.1: Residual Correlation Matrix by Method Polled Least Square (PLS)

	_SAM	_RYD	_SAB	_SIB	_RJH	_BLD
_SAM	1.00000	0.01517	0.34024	0.65589	0.46101	-0.28884
_RYD	0.01517	1.00000	-0.13244	-0.37964	-0.34416	0.38974
_SAB	0.34024	-0.13244	1.00000	0.42124	-0.08388	0.07482
_SIB	0.65589	-0.37964	0.42124	1.00000	0.53043	-0.36510
_RJH	0.46101	-0.34416	-0.08388	0.53043	1.00000	-0.31687
_BLD	-0.28884	0.38974	0.07482	-0.36510	-0.31687	1.00000

Figures3.1: Panel Fixed Effects using Pooled LS method

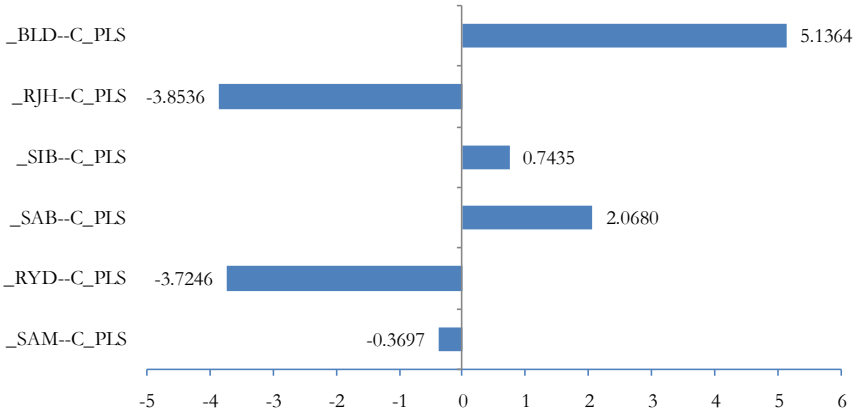


Table 5.2: SUR Estimation of z-score model

Dependent Variable: LZSCOR?
Method: Pooled EGLS (Cross-section SUR)
Sample (adjusted): 2005Q2 2009Q4
Included observations: 19 after adjustments
Cross-sections included: 6
Total pool (balanced) observations: 114
Linear estimation after one-step weighting matrix
Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	512.7458	167.3986	3.063024	0.0030
LHHI(-1)	-55.55613	18.31874	-3.032749	0.0033
SHIB(-1)	-85.82698	28.84727	-2.975220	0.0039
INF(-1)	-1.679285	1.091305	-1.538785	0.1278
LAST_SAM(-1)	-0.143673	0.102186	-1.405997	0.1635
LAST_RYD(-1)	0.322746	0.154840	2.084381	0.0403
LAST_SAB(-1)	-0.291123	0.074556	-3.904783	0.0002
LAST_SIB(-1)	-0.350277	0.109368	-3.202732	0.0019
LAST_RJH(-1)	0.134816	0.089057	1.513818	0.1340
LAST_BLD(-1)	-0.678814	0.108381	-6.263192	0.0000
RCA_SAM(-1)	-0.064091	0.524942	-0.122092	0.9031
RCA_RYD(-1)	-0.825364	0.834539	-0.989007	0.3256
RCA_SAB(-1)	-1.193274	0.419681	-2.843285	0.0056
RCA_SIB(-1)	-0.038035	0.234873	-0.161939	0.8718
RCA_RJH(-1)	-0.494111	0.749974	-0.658838	0.5119
RCA_BLD(-1)	0.234958	0.306650	0.766208	0.4458
RCI_SAM(-1)	0.025329	0.074892	0.338212	0.7361
RCI_RYD(-1)	-0.024915	0.061139	-0.407510	0.6847
RCI_SAB(-1)	0.083421	0.074610	1.118082	0.2668
RCI_SIB(-1)	-0.001503	0.002528	-0.594355	0.5539
RCI_RJH(-1)	-0.419420	0.092544	-4.532120	0.0000
RCI_BLD(-1)	0.000132	0.000525	0.252480	0.8013
IDV_SAM(-1)	0.057392	0.118545	0.484131	0.6296
IDV_RYD(-1)	-0.195442	0.150313	-1.300231	0.1972
IDV_SAB(-1)	-0.032188	0.110290	-0.291852	0.7711
IDV_SIB(-1)	-0.141041	0.047969	-2.940231	0.0043
IDV_RJH(-1)	-0.229842	0.128011	-1.795482	0.0763
IDV_BLD(-1)	0.115193	0.292878	0.393316	0.6951

Fixed Effects (Cross)

C_SAM	-0.147685
C_RYD	-4.712625
C_SAB	1.812095
C _SIB	1.515250
C_RJH	-2.599788
C_BLD	4.132753

Effects Specification
Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.995868	Mean dependent var	54.01909
Adjusted R-squared	0.994235	S.D. dependent var	14.88958
S.E. of regression	1.130498	Sum squared resid	103.5201
F-statistic	610.0356	Durbin-Watson stat	1.912531
Prob(F-statistic)	0.000000		

Figures 2.2: SUR Residuals of z-score model

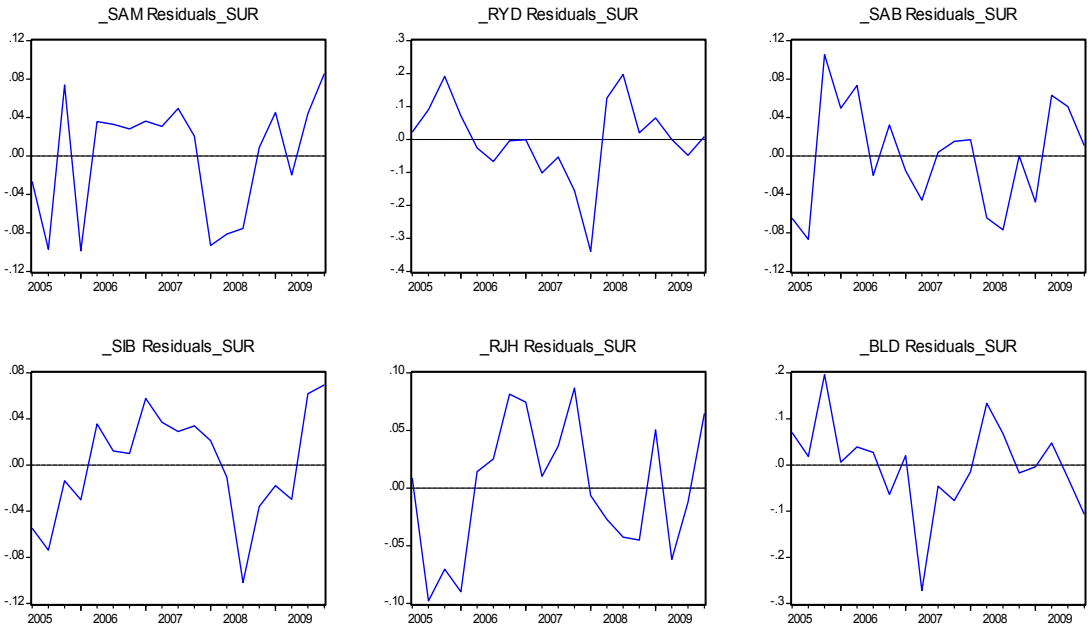


Table 6.2: Residual Correlation Matrix by Method Polled EGLS (SUR)

	_SAM	_RYD	_SAB	_SIB	_RJH	_BLD
_SAM	1.00000	-0.04561	0.39510	0.63394	0.59119	-0.25499
_RYD	-0.04561	1.00000	-0.15344	-0.55856	-0.42063	0.53889
_SAB	0.39510	-0.15344	1.00000	0.42006	-0.04031	0.12961
_SIB	0.63394	-0.55856	0.42006	1.00000	0.64462	-0.46587
_RJH	0.59119	-0.42063	-0.04031	0.64462	1.00000	-0.44098
_BLD	-0.25499	0.53889	0.12961	-0.46587	-0.44098	1.00000

Figures3.2: Panel Fixed Effects using SUR method

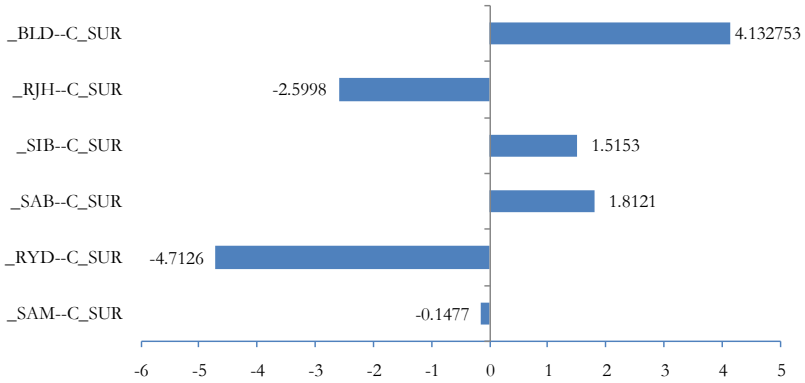


Table 5.3: Double GLS-SUR Estimation of z-score model

Dependent Variable: LZSCOR?
Method: Pooled IV/Two-stage EGLS (Cross-section SUR)
Sample (adjusted): 2005Q2 2009Q4
Included observations: 19 after adjustments
Cross-sections included: 6
Total pool (balanced) observations: 114
Linear estimation after one-step weighting matrix
Instrument list: c lhhi(-1) shib(-1) inf(-1) @cxinst last?(-1) rca?(-1)rci?(-1) idv?(-1) idv_ibd?(-1)
Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.44979	3.608446	3.173053	0.0021
LHHI(-1)	-0.697518	0.400972	-1.739566	0.0857
SHIB(-1)	0.338608	1.026395	0.329900	0.7423
INF(-1)	-0.514414	1.170320	-0.439550	0.6614
LAST_SAM(-1)	-0.089445	0.108586	-0.823731	0.4125
LAST_RYD(-1)	0.308048	0.161393	1.908682	0.0598
LAST_SAB(-1)	-0.241410	0.081078	-2.977523	0.0038
LAST_SIB(-1)	-0.316347	0.118227	-2.675763	0.0090
LAST_RJH(-1)	0.189620	0.094400	2.008680	0.0479
LAST_BLD(-1)	-0.736098	0.103118	-7.138387	0.0000
RCA_SAM(-1)	0.082126	0.558142	0.147141	0.8834
RCA_RYD(-1)	-0.724942	0.889108	-0.815359	0.4173
RCA_SAB(-1)	-1.489424	0.448639	-3.319869	0.0014
RCA_SIB(-1)	-0.104803	0.255478	-0.410222	0.6827
RCA_RJH(-1)	-0.337315	0.825487	-0.408625	0.6839
RCA_BLD(-1)	0.052518	0.281525	0.186549	0.8525
RCI_SAM(-1)	0.032819	0.077780	0.421954	0.6742
RCI_RYD(-1)	0.003192	0.066286	0.048155	0.9617
RCI_SAB(-1)	0.097760	0.076668	1.275112	0.2059
RCI_SIB(-1)	-0.001052	0.002741	-0.383748	0.7022
RCI_RJH(-1)	-0.446947	0.097857	-4.567328	0.0000
RCI_BLD(-1)	0.000331	0.000484	0.683699	0.4961
IDV_SAM(-1)	0.101979	0.125921	0.809865	0.4204
IDV_RYD(-1)	-0.187360	0.161289	-1.161646	0.2488
IDV_SAB(-1)	0.030768	0.111730	0.275374	0.7837
IDV_SIB(-1)	-0.166351	0.052959	-3.141103	0.0024
IDV_RJH(-1)	-0.163738	0.134712	-1.215464	0.2277
IDV_BLD(-1)	0.066311	0.270120	0.245485	0.8067
Fixed Effects (Cross)				
_SAM—C	-0.652164			
_RYD—C	-4.378241			
_SAB—C	1.614018			
_SIB—C	1.456042			
_RJH—C	-3.141821			
_BLD—C	5.102171			

Effects Specification
Cross-section fixed (dummy variables)

Weighted Statistics			
R-squared	0.996480	Mean dependent var	51.41742
Adjusted R-squared	0.995089	S.D. dependent var	16.43169
S.E. of regression	1.151517	Sum squared resid	107.4053
Durbin-Watson stat	1.721575	Instrument rank	33.00000

Figures 2.3: Double GLS-SUR Residuals of z-score model

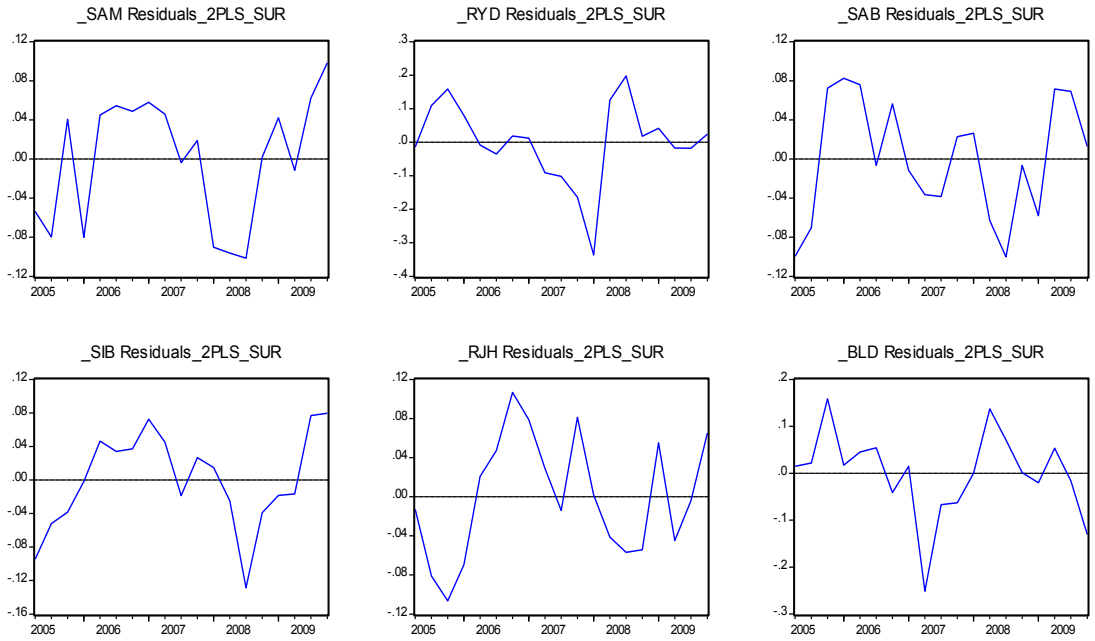


Table 6.3: Residual Correlation Matrix by Method Polled Double EGLS (SUR)

	_SAM	_RYD	_SAB	_SIB	_RJH	_BLD
_SAM	1.00000	-0.10174	0.38804	0.71126	0.60867	-0.39921
_RYD	-0.10174	1.00000	-0.19183	-0.41726	-0.43326	0.46786
_SAB	0.38804	-0.19183	1.00000	0.56992	0.06064	0.07292
_SIB	0.71126	-0.41726	0.56992	1.00000	0.64901	-0.44848
_RJH	0.60867	-0.43326	0.06064	0.64901	1.00000	-0.52516
_BLD	-0.39921	0.46786	0.07292	-0.44848	-0.52516	1. 00000

Figures3.3: Panel Fixed Effects using 2GLS-SUR method

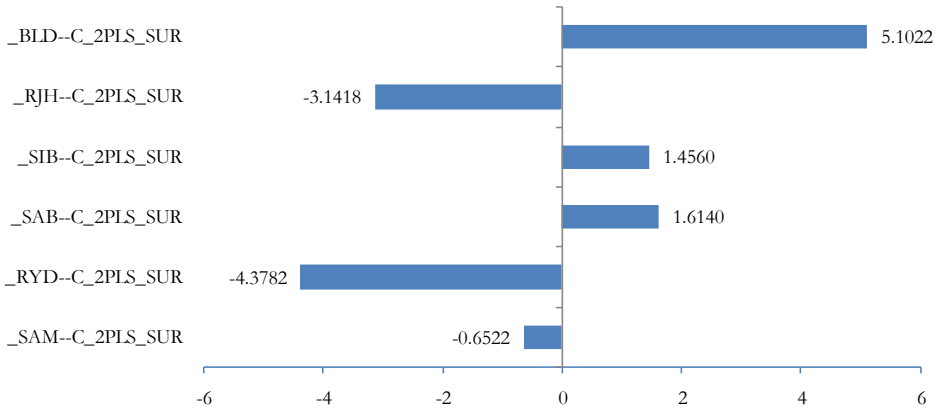


Table 7.1: Panel GLS Estimation of z-score model

Dependent Variable: LZSCOR
Method: Panel EGLS (Cross-section SUR)
Sample (adjusted): 2005Q2 2009Q4
Cross-sections included: 6
Total panel (balanced) observations: 114
Linear estimation after one-step weighting matrix
Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	386.8130	281.0306	1.376409	0.1717
IBD	-0.392953	0.095470	-4.115988	0.0001
RCA(-1)	0.739478	0.128690	5.746217	0.0000
RCI(-1)	-0.000652	0.000605	-1.078293	0.2834
LAST(-1)	0.217003	0.016059	13.51320	0.0000
IDV(-1)	-0.203617	0.050121	-4.062549	0.0001
IDV_IBD(-1)	0.811252	0.167535	4.842288	0.0000
LHHI(-1)	-42.22516	30.76311	-1.372591	0.1729
SHIB(-1)	-66.66704	48.52463	-1.373880	0.1725
INF(-1)	-9.009449	1.575629	-5.718003	0.0000
GRW(-1)	-0.218694	0.111585	-1.959877	0.0527

Weighted Statistics

R-squared	0.996488	Mean dependent var	20.53343
Adjusted R-squared	0.996147	S.D. dependent var	15.67960
S.E. of regression	0.973223	Sum squared resid	97.55778
F-statistic	2922.777	Durbin-Watson stat	0.829717
Prob(F-statistic)	0.000000		

Figure 4.1: Standardized Residuals using Panel GLS method

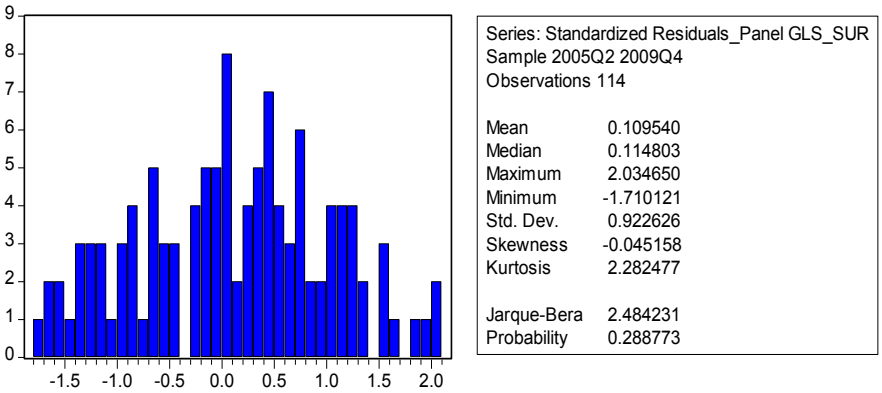


Table 7.2: Panel LS Estimation of z-score model

Dependent Variable: LZSCOR
Method: Panel Least Squares
Sample (adjusted): 2005Q2 2009Q4
Cross-sections included: 6
Total panel (balanced) observations: 114
Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	649.9624	208.3885	3.118994	0.0024
RCA(-1)	0.753470	0.233864	3.221823	0.0017
RCI(-1)	-0.000310	0.000923	-0.336332	0.7373
IDV(-1)	-0.318506	0.092603	-3.439492	0.0009
LHHI(-1)	-70.50640	22.79715	-3.092772	0.0026
SHIB(-1)	-110.8521	35.93047	-3.085184	0.0026
LAST(-1)	-0.226464	0.066587	-3.401041	0.0010
IDV_IBD(-1)	0.205734	0.216097	0.952044	0.3434
GRW(-1)	-0.108187	0.083645	-1.293404	0.1989
INF(-1)	-4.017214	1.435829	-2.797836	0.0062

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.845383	Mean dependent var	3.745184
Adjusted R-squared	0.823518	S.D. dependent var	0.296972
S.E. of regression	0.124757	Akaike info criterion	-1.202817
Sum squared resid	1.540869	Schwarz criterion	-0.842791
Log likelihood	83.56055	F-statistic	38.66364
Durbin-Watson stat	0.723910	Prob(F-statistic)	0.000000

Tables 8.1: Cross-Section Fixed Effects on z-score using Panel LS method

CROSSID_Cste_Method	Effect
SAM_C_Panel LS	0.406787
RYD_C_Panel LS	0.588175
SAB_C_Panel LS	-0.061484
SIB_C_Panel LS	-0.345498
RJH_C_Panel LS	0.048084
BLD_C_Panel LS	-0.636063

Figure 4.2: Standardized Residuals using Panel LS method

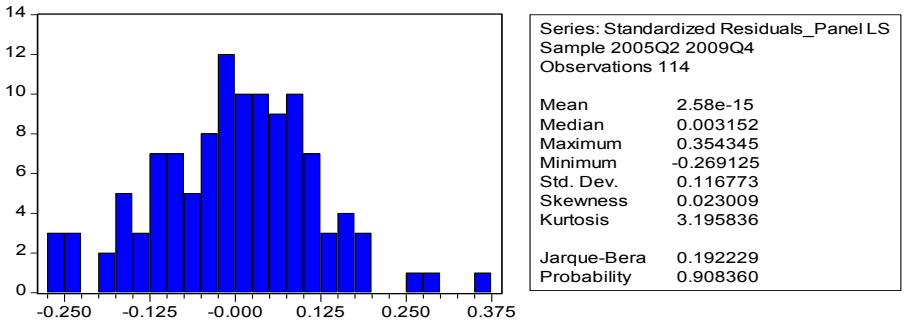


Table 7.3: Panel GLS Estimation of z-score model

Dependent Variable: LZSCOR
Method: Panel EGLS (Cross-section SUR)
Sample (adjusted): 2005Q2 2009Q4
Cross-sections included: 6
Total panel (balanced) observations: 114
Linear estimation after one-step weighting matrix
Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	518.6609	140.8547	3.682242	0.0004
RCA(-1)	0.661983	0.053565	12.35854	0.0000
RCI(-1)	-0.000499	0.000284	-1.756318	0.0821
IDV(-1)	-0.278767	0.028729	-9.703381	0.0000
LHHI(-1)	-56.16464	15.41028	-3.644621	0.0004
SHIB(-1)	-87.79749	24.26524	-3.618241	0.0005
LAST(-1)	-0.209518	0.033495	-6.255232	0.0000
IDV_IBD(-1)	0.309485	0.096961	3.191847	0.0019
GRW(-1)	-0.133255	0.056492	-2.358812	0.0203
INF(-1)	-3.341631	0.803610	-4.158273	0.0001

Effects Specification
Cross-section fixed (dummy variables)

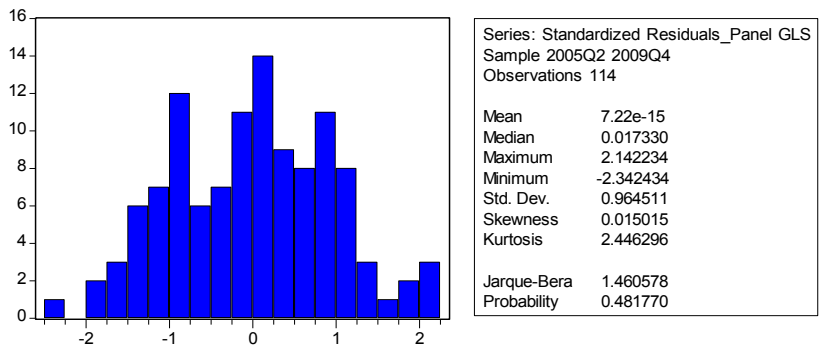
Weighted Statistics

R-squared	0.999381	Mean dependent var	39.48141
Adjusted R-squared	0.999294	S.D. dependent var	38.78086
S.E. of regression	1.030454	Sum squared resid	105.1218
F-statistic	11425.07	Durbin-Watson stat	1.309055
Prob(F-statistic)	0.000000		

Tables 8.2: Cross-Section Fixed Effects on z-score using Panel GLS method

CROSSID_Cste_Method	Effect
SAM_C_PanelGLS	0.402613
RYD_C_PanelGLS	0.590647
SAB_C_PanelGLS	-0.055532
SIB_C_PanelGLS	-0.332961
RJH_C_Panel GLS	0.039923
BLD_C_PanelGLS	-0.644689

Figure 4.3: Standardized Residuals using Panel GLS method



[1]This link "http://www.halal2.com/main.asp?id=71" specifies Islamic and non Islamic features of firms and banks registered in Saudi stock market.

[2] The panel unit test is more sensible to high autocorrelation, which involves appropriate lag length in the test equation. The Hadri test has a different procedure for choosing the lag length; it requires the choice of kernel method estimation and bandwidth method to weighting the auto-covariances by selecting the small ones.

[3] Strobel (2010) shows that the best measure of standard deviation require high frequency such the branch banks data.

[4] In fact, insolvency is more serious and dangerous problem than liquidity, which means that the bank liabilities exceed its assets, or the bank become insolvent. A bank may become illiquid even when it is solvent, if its assets are held in illiquid assets (long term financial assets or real assets) that can only be liquidated at high cost. The bank may be forced to sell such assets at considerable loss, by selling it at lower than its nominal value. The concept of financial distress, widely used to make financial analysis of banks data, indicates the negative performance of banks. The case of financial distress occurs when the bank becomes insolvent even if bank assets exceed its liabilities. While the concept of economic failure shows that the return rate of investments is less than the interest rate on short loans. Also, the financial failure happens when the enterprise is unable to pay its debts and short-term obligations. The bankruptcy indicates the inability of a company to pay its debts and short-term obligations and the difficulty to manage their financial needs from external funding sources.

[5] Instead of interest income (commissions) and interest charges in conventional banks, we use for Islamic banks finance income and finance charges.

[6] To calculate the income diversity, we use the following definition: $idv = 1 - \left|\frac{Net\ interest\ income - Other\ operating\ income}{Total\ operating\ income}\right|$ where the net interest income, for Islamic banks, includes positive and negative income flows related to many model of PLS system. The higher value of this index indicates a higher diversification of income.

[7] Such the Pooled Least Square (PLS) method, without cross-section weights and using standard errors and covariances; the Generalized Pooled Least Squares (PGLS) method, with cross-section weights (correcting for both cross-section heteroscedasticity and contemporaneous correlation) and using SUR errors and covariances; the P2GLS method, with cross-section weights and using SUR errors and covariances, and set of common, cross-section specific and period specific instrumental variables.

[8] Obviously, when we consider panel banks, the fixed effects are less appropriate than the stochastic effects, but the small number of banks in our sample does not authorize such hypothesis.