The Effect o f Commerce-Finance-Banking Linkage Restrictions on Banksassets Quality: The Case of Developing Countries

Tahmasb Mazaheri[1], Saeid Shirkavnd[2] & Ali Jamali[3]

Abstract

The purpose of this study is to investigate the effect of banks non-bank financial and commerce activities restrictions on their assets quality in developing countries from 2000 to 2012. The researchsampleincludes the banking systemsof 108developing countries. The dependent variable is the ratio of non-performing loan to total assets of banks (proxy of assets quality), and independent variables include proxies of non-bank financial (*banking-financelinkage)* and commerceactivities (*banking-commercelinkage)* restrictions including insurance, capital market, real estate and investment in non-financial firms. The research also control for the effect of some country-specific and industry-specific variables. Due to the endogeneity problem of the variables, dynamic panel data and GMM are used for analyzing data. The results show that tighterrestrictions on the non-bank financial activities (insurance, real estate and real estate) generally havesignificant negative effect on banks assets quality. Securities market activities restrictions also have a significant negative effect on banks assets quality. In contrast, the increases in insurance and real estate activities restrictions havesignificant positive effect on banks assets quality. Increasing the stringency of banks commerce activities restrictions does improve banks assetsquality.

Keywords: *banking regulation, banking-commerce linkage restriction, banking-financelinkagerestriction, assets quality*

Introduction

Banking regulations and supervision governing the banking industry in the world have been enacted to maintain economic stability and to improve banks performance and efficiency, and are constantly updated and revised. However, the effectiveness and their positive role and impact on performance and efficiency of banks have been questioned in many cases. In fact, the relationship between banking regulation and supervision and banks performance in each country seems to be influenced by the economic structure, the degree of development of its economy and the characteristics of its banking industry. One of the aspects of banking regulationis the restrictions on non-bank financial and commerce activities of banks. Basically, banks have four categories of activities other than conventional banking activities: (1) securities related activities (2) insurance activities (3) real estate activities; (4) Ownership of non-financial firms. These activities can be prohibitedrestricted, permitted, or unrestricted restricted in any country (Barth, Caprio, & Levine, 2004).

[1] Faculty Member and Assistant Professor, Department of Finance and Insurance, Faculty of Management, University of Tehran,
Address: Tehran, Jalal Al-Ahmad Ave., after Gisha Bridge, Faculty of Management, Tehran University,
Email: tmazaheri@ut.ac.ir **Phone:** 09121118758
[2] Faculty Member and Assistant Professor, Department of Finance and Insurance, Faculty of Management, University of Tehran,
Address: Tehran, Jalal Al-Ahmad Ave., after Gisha Bridge, Faculty of Management, Tehran University,
Email: shirkavnd@ut.ac.ir **Phone:** 09122883638
[3] Ph.D. candidate of financial management (FinanceLaw), Faculty of Management, University of Tehran
Address: Tehran, Jalal Al-Ahmad Ave., after Gisha Bridge, Faculty of Management, Tehran University
Email: ali.jamali2006@ut.ac.ir **Phone**: 09124963834

There is no consensus on restricting banking activities. Its supporters believe that banking restrictions help prevent complex structures that are difficult to monitor. It also makes it easier to monitor big banks. These restrictions lead to improved performance by obliging banks to perform activities that have a better performance and keeping their balance sheetssimple. In support of this theoretical view, Pasiouraset al. (2009) have shown empirically that tightening restrictions on bank activities have improved the bank's earning efficiency. Opponents of this view, however, argue that such restrictions will prevent banks from achieving economies of scale and scope and diversifying their income channels. Claassens et al. (2001) and Djankov et al. (2002) claim that such restrictions only increase the bargaining power of lawmakers and banking supervisors and are not necessarily appropriate for the banking industry. This view holds that limiting the banks activities will reduce efficiency and weaken banks performance. This view was also emphasized in the empirical findings of Barth et al. (2013) and Chortareas et al. (2001) works.

In general, previous studies on the impact of non-bank financial and commerce activities restrictions on assets quality and other functional aspects such as liquidity, profitability, etc. are not consensual.Theyarealsolimited to developed countries in terms of geographical scope and statistical community. However, theresults of these studies have shown that economic environments and even different geographic regions have significant effect on them. So, it seems to consider this relationship in different context would be applicable. Another point is that due to the large number of dimensions and variables of banking regulation, each research can only examine the effectof some of these dimensions. The present study aim at escaping from this regulation ramification, merely examines the effect of activities restrictions. While the present study is related to Pasiouras (2009) and Barth et al.(2004) in studyingthe impact of regulation on bank efficiency and performance, it is fundamentally different in some respects. The first and probably the most important is that we examine the impact ofbanking activities restrictionsregulationfour aspects on banks assets quality.Second, we use dynamic panel data model (GMM) rather than static one (GLS). The main advantage of GMM over GLS is that it allows us to incorporate the past effect of dependent variable as an instrument on independent variables (activities restrictions variables). In fact in some point we observe endogeneity problem in our variables and dynamic panel data modelcould manage that efficiently. Third, we use an original database collected from the World Bank by Barth et al. (2013) for four periods (2001, 2006, 2008, and 2012). Finally, we focus on an interesting and original sample including developing countries based on IMF 2015 annual report over the period 2000 to 2012. This period includes the recent financial shocks, enabling us to consider the effect of recent anti-crisis regulation and supervision measures on these countries.

The rest of the paper is organized as follows.Section 2 briefly presents the research background. Section 3 lays out the approaches to banks non-bank financial and commerce activities and the proponents and components of banks activities restrictions.Section 4 covers the methodological issues and data for our empirical work. Section 5 analyses the data. Section 6 discusses the empirical results, and Section 7 concludes.

Research background

Researchesin the field of banking regulationand its impact on performance and efficiency can be classified according to different foundations. A bunch of previous research in this regard has been innovated in terms of sample size or geographic area. Some of studies have been at the level of banking industry of a country (such as those of (Banker, Chang, & Lee, 2010)in the Korean banking industry, (Gordon, Baptista, & Yan, 2014), and (Gordon, Baptista, & Yan, 2014)in the US banking industry), others are at the level of the banks of a region (such as those of (Haque & Brown, 2016)in the Middle East banks, (Teixeira, Silva, Fernandes, & Alves, 2014)in European and US commercial banks, (Lim & Yong, 2016)in European banks, the United States, Canada and Australia), or at the level of the entire the world banks (such as the work of (Delis, Molyneux, & Pasiouras, 2011)in 22 commercial banks across different countries). From this perspective present research innovation is to choose among developing countries based on the IMF's 2015 annual report.

Another classification of research in this regard can be in terms of the framework of bankingregulation and supervision (such as Barth et al. (2004) and Barth et al. (2013) workswhich are based on the framework of banking regulationandsupervision with 10 dimensions proposed by World Bank; Mishkin (2000) work which is based on a framework including 8 dimensions for Bankingregulation and supervision; Allen et al. (2001) work which is based on amodel including16dimensionsfor banking regulation). From this perspective, our research is based on the framework developed by World Bank (Barth, Caprio, & Levine, 2001).

In another classification, research in this area can be divided according to the number of regulation dimensions studied. in this regard, a study may examines all aspects of banking regulation and supervision (such asBarth et al. (2001) which examined the effect of all regulation dimensions on economic stability of countries), another studymay examine the effect of multiple variables From one or more dimensions (such as Delis et al. (2011) work which only deals with the impact of the Basel Committee rules and non-bank activity limitation on productivity). Present research contributes to the current literature by focusing on the effectof banks activities restrictions components (including restrictions insurance activities, securities activities, Real estate activities and owning non-financial firms) on banks assets quality. In fact, the main contribution of this paper is toconsider the effects of *banking-commerce-finance linkage* (the term stated by Mandanis et al. (2009)) restrictions on banks assets quality.

Empirical results of researches show a different role of restricting the activities on banks performance. Barth et al. found that more stringent regulatory restrictions have led to greater profitability of banks that have suffered a major banking crisis. In contrast, they found that the more stringent the regulation, the less efficient the banks. In another study, Barth et al. (2004) showed that restricting bank activities is negatively associated with bank development and stability, as compared to when banks can diversify into other financial activities.Furthermore, in studies of the United States banking industry before Glass– Steagall, research suggests that universal banks did not systematically abuse their powers or fail more frequently (Kroszner & Rajan, 1994). Barth et al. (2004) andAgoraki et al. (2011) showed that limiting bank activities does not necessarily reduce financial vulnerabilities. According to Beck et al. (2006), restricting banking activities can increase the likelihood of a banking crisis by limiting the opportunities for diversification of risk. Hogue et al. found that these restrictions totally have a significant relationship with the risk in credit and debt crises and the creation of non-performing loans but they did not clarify the specific effect of each restriction. Delis et al. found that distance-to-default decreases by limiting bank activities and these restrictions help mitigate non-performing loans.Barth et al. (2013)also found in their study that heavier restrictions of banking activities negatively correlated with bank performance.

The contradictory results of the above research indicate that the effect of these restrictions on banks performance and efficiency require more researches of this kind.Present study contributes to the existing literature at some points. First, for the first time this paper analyzes specifically the effect of non-bank financial and commerce activities restrictionson quality of banks assets by analyzing each activities restriction one by one. In fact, while previous studies have examined the overall impact of these restrictions, the present study addresses the role of each of restrictionson insurance, securities, real estate activities and owning non-financial firms on quality of banks assets. In Addition, it should be added that previous studies have not indicated what the effects insurance, securities and real estate market size have on relation between restrictions and banks performance? This issue will be considered in this study by control forindustry-specific and country-specific variables. Finally, since thechanges in the restrictions may be a function of past performance of banks, we may encounter endogeneity problem. So this research uses a dynamic regression method, GMM, for modeling variables.

Theoretical background

Banking-commerce-finance linkage

Traditionally, Anglo- Saxon countries imposed a clear separation between banks and other types of firms, both financial and nonfinancial. Continental European and Asian countries, on the other hand, have traditionally taken a more relaxed approach to nonbanking corporations owning banks and to banks owing corporations engaged in nonbanking business. In recent years, Anglo-Saxon countries have converged with Continental European countries to the extent of permitting the emergence of new types of financial groups that combine at least two of the activities of banking, securities, and insurance. Such firms are known as financial conglomerates. At the same time, Continental Europeans have begun to adopt Anglo-Saxon restrictions on the separation of banking and commerce. Countries that in the past have taken a relatively permissive approach to banks owning, or being owned by, industrial or commercial groups have begun to adjust their regulatory requirements as the risks of bank- industry linkages have been more thoroughly recognized and as financial systems are liberalized and corporate finance evolves in the direction of greater reliance on capital markets rather than bank loans.

Regulation of the ownership of banks reflects prudential (safety and soundness) concerns as well as non-prudential objectives, such as avoiding potential conflicts of interest or undue concentrations of economic power (Mandanis & Taylor, 2009).

The two models of bank-commerce linkagesreflect not only differences in the relationship between financial and nonfinancial firms, but also fundamental differences in the way that firms raise money for their ongoing operations. This first model is the Anglo-Saxon or equity market system. This system is characterized by the ownership by the public of the shares of corporations.Most financing is provided through the capital market, while short-term financing needs are met through commercial paper. The role of banks in this system is primarily limited to arms-length financing, including takeovers and internal corporate restructuring, as a backstop to the capital markets. Investment banks may be active in giving strategic and financial advice and sometimes may take equity positions in firms for their own account, although this tends to be the exception to the rule. In this model, a bank's relationship with its customers can be very important but is limited chiefly to issues relating closely to the extension of credit. Banks engage in close monitoring and control of their customers only when the customer encounters repayment difficulty. The second model is the Continental European, Asian or bank-based system. Inthis system banks, as opposed to the investing public, own major equity stakes in corporations. Banks act as both commercial and investment bankers to their clients, thus assuming substantial equity as well as debt exposures. Bank representatives even serve on the boards of directors of some of their main clients. Moreover, banks may be owned by major industrial groups and play a significant role in providing funding to these groups. As a result, banks are embedded in complex cross-shareholding structures. Capital markets play only a limited role in financing corporations, and corporate disclosure is more limited than under the Anglo-Saxon system (Mandanis & Taylor, 2009).

In addition to the prohibition on bank-commerce linkages, Anglo-Saxon countries long prohibited the combination of banking and other types of financial activity, including securities and insurance business. The separation of banking and securities business in the United Kingdom was a consequence of Stock Exchange rules, which effectively prohibited institutional membership until 1986. These rules aimed to ensure that in the event a member defaulted, the other members of the exchange should have first claim on the available assets. Such rules prohibited limited liability corporations engaged in other businesses from becoming members of the exchange. However, the United Kingdom imposed little statutory interference with the functioning of the Stock Exchange until well into the 1980s. Thus, the limitations that existed were a product of custom, practice, and club rules, rather than legislation. Although it was not expressly prohibited by law or statute, the Bank of England also exercised its informal moral suasion to prevent banks from acquiring insurance companies or vice versa (Mandanis & Taylor, 2009). Most academic studies regarding economies of scope in the financial sector have failed to produce clearly positive results (De Nicolo, Zephirin ; Philip F. Bar, Bartholomew, & Zaman, 2003). Finally, it is worth noting that industrial and commercial businesses formed conglomerates long before the evolution of financial conglomerates. Yet, since the 1980s–1990s, shareholders of industrial conglomerates have sought to create value through divesting noncore businesses, and the equities of diversified industrial conglomerates have tended to underperform the stock market. Therefore, it remains to be seen whether the trend toward financial conglomerates is permanent or a passing fashion. Nonetheless, if financial conglomerates go the way of many industrial conglomerates and break up into their component parts, this will, most likely, result from market forces rather than future regulatory action (Mandanis & Taylor, 2009) (De Nicolo, Zephirin ; Philip F. Bar, Bartholomew, & Zaman, 2003).

In the United States the legal position—although not the policy itself—was quitedifferent. The contemporary view of the events leading up to the banking crisis of 1929–1933 was that banks' securities affiliates had played a key role in undermining confidence in the financial system. In 1931, the Senate Committee on Banking and Currency, chaired by Senator Carter Glass, issued an influential report.In 1971, the U.S. Supreme Court reflected on the legislative history of this period and found that Congress's concern was not limited to the potential for heavy bank losses that attend speculative stock trading.

A wave of structural deregulation ensued as the barriers to banks owning securities firms and insurance companies were dismantled. Supporters of the deregulation often emphasized efficiencies of financial conglomerate groups. One of the most powerful efficiencies is in the economies of scope. Economies of scope arise when the average total cost of production decreases asa result of increasing the number of different goods produced. In the past 30 years, both the United States and the United Kingdom have dismantled many of the legal impediments to the combination of banking with otherfinancial services (Council Directive 93/6 on the Capital Adequacy of Investment Firms and Credit Institutions, 1993).

The process of structural deregulation, described previously, which began in Britain in the mid-1980s, projected similar changes in the United States. Other countries including Developing countries also follow these paths, depending on the type of system they have, with an interruption.

To sum up this discussion, there are five theoretical reasons in favor of limitingcommerce and non-bank financial activities of banks. First, there is a likelihood of conflicts of interest when banks engage in activities such as securities, insurance, and investment in real estate(John, Teresa, & Saunders, 1994) (Saunders, 1985). Second, as much as moral hazard problem encourages more risky behaviors, if banks participate in activities other than banking, they will have more opportunity to increase this risk appetite (Boyd, Chang, & Bruce, 1998). Third, it's harder to control the complex banks. Fourth, such banks may grow so politically and economically that they cannot be ordered and reformed. Finally, large financial clusters may reduce competition and performance. Therefore, governments can help improve banking by limiting banking activities.There are other theoretical reasons that agree to allow banks to perform these activities. First, less regulatory constraints createeconomics of scale and scopefor banks. Secondly, less regulatory constraints can increase the profit margin of banks and increase the incentive of banks to take prudent behaviors(Claessens & Klingebiel, 2001). Finally, wider activities can enable banks to diversify their income channels and thereby create more stable banks.These disagreements and divergences in results necessitate further research in this area.

Bank assets quality measurement

Various variables have been proposed for assessing performance of banks fromassets qualityperspective that mostly are based onthe CAMELS model. This model introduces the indicators of capital adequacy, assets quality, liquidity, profitability and management quality for banks performance evaluation and rating (Rose & Hudgins, 2012). This model is used to show financial performance of banks based on different dimensions. Central banks in many countries use this system to assess financial soundness of banks (Doumpos & Zopounidis, 2010). Different researchers have used different indicators for measuring assets quality based on this model. Dincer et al. (2011) study performance of the Turkish banking sector after the global crisis using the CAMELS model. They usefinancial assets to total assets, loans and receivables to total assets, fixed assets to total assets as indicators measuring assets quality. Roman et al.(2013) use impaired loans to gross loans, loan loss provision to net interest revenue, total loan to total assets to analysis of Romanian banks.Soni (2012) examines applicability of the regulatory framework of the Indian banking system usingnon-cash receivables to total receivables, non-performing loans to total assets, total investments to total assets, percent change in non-cash receipts. Iqbal(2012)evaluate banking sector's performance in Bangladesh-A banksusing NPL ratio.

As you can see non-performing loans is one the most important indicators among above research to evaluate banks assets quality. So, this research usesnon-performing loans to total assets ratio as the representative indicator of banks assets quality. Therefore, in order to investigate the effect of activities restrictions on banks assets quality, this indicator is used as a dependent variable with the symbol "NPLTA".

Therefore, the research hypotheses based on research and theoretical backgrounds are as following:

Hypothesis 1: Restriction on non-bank financial activities (security, insurance and real estate) has a significant and positive effect on banks assets quality in developing countries.

Hypothesis 2: Restriction on non-bank financial activities (security, insurance and real estate) separately has a significant and positive effect on bank assets quality in developing countries.

Hypothesis 3: Restriction on commerce activities (owning nonfinancial firms) has a significant and positive effect on bank assets quality in developing countries.

Data and methodology

Data and variables

Regulatory and banking restrictions data in this study has been gathered from the World Bank databases. Also, financial data of banks was taken from the BvD, partly from the Heritage Foundation, and the International Monetary Fund.

The statistical population of the study is the banking industry of all developing countries, the number of which is based on the IMF's 2015 report of 152 countries. The sample size, According to Morgan's table is around 107. The dependent variable isthe ratio of non-performing loans to total assets (NPLTA). All the data are over a 12-year period from 2000 to 2012 in four time intervals 2000, 2004, 2008, and 2012, with a four-year average at each time interval.

Independent variables of this study include the variables of regulation and restrictionson non-bank financial and commerce activities based on the framework of the World Bank (Barth, Caprio, & Levine, 2001). We define independent variables according to Barth et al. (2003) approach. So, thevalue of each restriction proxy ison the range 1 (permitted) through 4 (prohibited).

The research also control for the effect of some industry-specific, and macroeconomic variables. Since the identified control variables are high (about 30 variables), a general-to-specific(Hoover & Perez, 1999)approach proposed by Hoover and Perez (1999) is used.Table 1 shows control variables list after performing general-to-specific approach.

Table 1.Control variables

Categories	Control variable	Definition
Country-specific	*Heritage economic freedom*	A measure based on 12 quantitative and qualitative factors, grouped into four broad categories, or pillars, of economic freedom: Rule of Law, Government Size, Regulatory Efficiency, Open Markets
	Inflation	Consumer price index
	Insurance market size	Insurance premium volume to GDP
	Real estate market size	Real Estate Deals to GDP
	Economic development	Natural logarithm of GDP
	Stock market size	Stock market Capitalization to GDP
Industry-specific	*Non-interest income to total income*	Bank's income that has been generated by noninterest related activities as a percentage of total income (net-interest income plus noninterest income). Noninterest related income includes net gains on trading and derivatives, net gains on other securities, net fees and commissions and other operating income.
	Zscore	It captures the probability of default of a country's commercial banking system. Z-score compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns.
	Boone index	A measure of degree of competition based on profit-efficiency in the banking market. It is calculated as the elasticity of profits to marginal costs. An increase in the Boone indicator implies a deterioration of the competitive conduct of financial intermediaries.
	Lerner index	A measure of market power in the banking market. It compares output pricing and marginal costs (that is, markup). An increase in the Lerner index indicates a deterioration of the competitive conduct of financial intermediaries.

**Control variables definitions have been achieved from *The Global Financial Development Database*. An extensive dataset of financial system characteristics for 203 economies managed by *The Word Bank*. It contains annual data, starting from 1960. It has been last updated in September 2015 and contains data through 2013 for 109 indicators, capturing various aspects of financial institutions and markets.

Conceptual model of the research is as following (Figure 1):
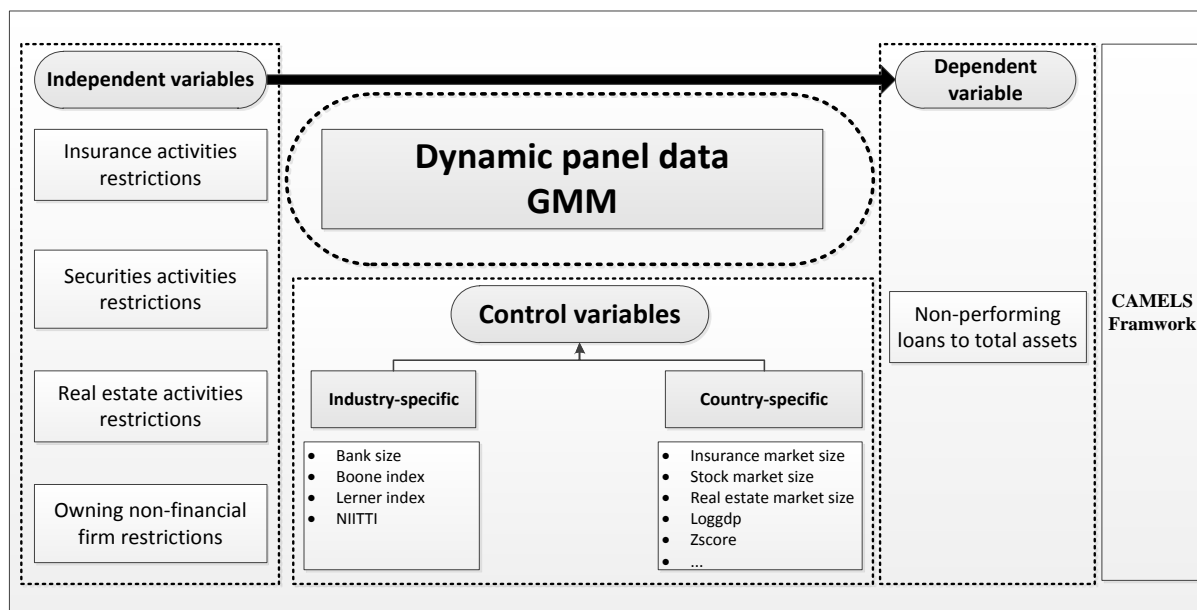
Figure1.Research conceptual model

Descriptive statistics

Table 2 shows some descriptive statics of the variables. Besides, Table 3 shows that the correlations between research proxies for restrictions range between [0.007, 0.36], which indicates that the various independent variables of the research capture different dimensions of the regulatory framework of activities restrictions.

Table 2. Descriptive statistics

Variables	Mean	Max %	Min %	Std. Dev.	definition
NPLTA	1.5	99.0	0.0	103.8	Non-performing loans to total assets
INSU_ACT	2.9	4.0	0.0	1.0	Restrictions on of insurance activities
OWNNFF_ACT	2.7	4.0	0.0	0.9	Restrictions on commerce activities
RS_ACT	3.0	4.0	0.0	1.1	Restrictions on real estate activities
SEC_ACT	2.0	4.0	0.0	1.0	Restrictions on securities activities
FIN_ACTS	7.8	12.0	0.0	2.1	Restrictions on non-bank financial activities
ECOFREE	57.8	78.6	29.5	8.0	Heritage economic freedom
INFL	66.4	102.5	0.0	24.8	Inflation
INSURTGDP	0.7	2.0	0.0	0.7	Insurance market size
RSTGDP	0.0	0.1	0.0	0.0	Real estate market size
LERNER	0.2	0.7	-0.4	0.2	Lerner index
LOGGDP	10.1	12.7	8.3	0.9	Natural logarithm of GDP
NIITTI	0.3	0.9	0.0	0.2	Non-interest income to total income
SECTGDP	0.1	1.2	0.0	0.2	Stock market size
BOONE	-0.1	1.3	-3.2	0.3	Boone index
ZSCORE	11.8	46.5	0.0	9.0	Zscore

Empirical model

This section presents the model used to estimate the relationship between banking restrictionsregulation and banksassets quality variable (NPLTA). We estimate a dynamic model based on an unbalanced panel.The model used in this study is based on the Albertazzi and Gambacorta (2009), which have analyzed the econometric analysis using dynamic panel data (Albertazzi & Gambacorta, 2009).

$$Y_{i,t} = \alpha + \eta_i + \beta Y_{i,t-1} + \sum_{j=1}^{l} \gamma_j M_{j,t} + \sum_{j=1}^{l} \emptyset_j I_{j,t} + \sum_{j=1}^{l} \delta_s Z_{s,i,t} + \varepsilon_{i,t}$$

The ratio of NPL to total assets (NPLTA)	$Y_{i,t}$
Fixed components	α
Fixed effect	η_i
Country-specific variables	M_{jt}
Industry-specific variables	I_{jt}
Independent variables (insurance, securities, Real Estate and owning non-financial firms restrictions proxies)	$Z_{si t}$
Error term	$\varepsilon_{i,t}$

This equation represents a dynamic panel data model, and thus we estimate it using the GMM for dynamic panels proposed by Blundell and Bond (1998) and discussed in an appliedsetting by Roodman (2009). For efficiency-related reasons, we use the two-step estimator with robust standard errors, which are adjusted with Windmeijer's (2005) correction procedure. The GMM also allows instrumenting the control variables (using lags) and reduce the potential endogeneity of these variables that could in turn bias the results on the coefficients of main interest. GMM estimator consistency depends on validity of "no serial-correlation between error terms and instruments" assumption. To test the validity of the instruments,Sargan-Hansen test or Sargan's J test which is a statistical test used for testing over-identifying restrictions in a statistical model is used (Sargan, 1958) (Hansen, 1982).To verify that our models do not suffer fromautocorrelation M2 statistic is used (Deli & Iftekhar, 2016).

Table 3.Correlation coefficient matrix of variables

	NPLTA	FIN_ACTS	SEC_ACT	INSU_ACT	RS_ACT	OWN_NFF	INSURTGDP	SECTGDP	RSTGDP	NIITTI	ECOFREE	INFL	ZSCORE	BOONE
NPLTA	1.000	0.013	0.049	0.020	0.034	-0.007	0.084	-0.075	-0.318	-0.072	0.004	0.036	-0.230	0.012
FIN_ACTS	0.013	1.000	0.108	-0.004	0.194	0.165	-0.028	-0.093	-0.127	0.073	0.080	0.054	-0.152	0.008
SEC_ACT	0.049	0.108	1.000	0.219	0.148	0.245	-0.054	-0.102	-0.188	-0.040	-0.149	-0.047	-0.281	0.019
INSU_ACT	0.020	-0.004	0.219	1.000	0.373	0.055	-0.028	-0.152	-0.077	-0.177	0.066	-0.073	-0.039	0.068
RS_ACT	0.034	0.194	0.148	0.373	1.000	0.246	0.025	0.093	0.030	-0.061	0.205	-0.064	-0.069	0.157
OWNNFF_ACT	-0.007	0.165	0.245	0.055	0.246	1.000	0.084	0.028	-0.083	0.048	0.033	-0.001	-0.080	0.099
INSURTGDP	0.084	-0.028	-0.054	-0.028	0.025	0.084	1.000	0.168	0.099	0.146	0.175	0.158	0.012	0.086
SECTGDP	-0.075	-0.093	-0.102	-0.152	0.093	0.028	0.168	1.000	0.247	-0.050	0.141	0.001	0.062	0.071
RSTGDP	-0.318	-0.127	-0.188	-0.077	0.030	-0.083	0.099	0.247	1.000	0.124	0.120	-0.021	0.191	-0.068
NIITTI	-0.072	0.073	-0.040	-0.177	-0.061	0.048	0.146	-0.050	0.124	1.000	0.034	0.117	0.076	-0.107
ECOFREE	0.004	0.080	-0.149	0.066	0.205	0.033	0.175	0.141	0.120	0.034	1.000	0.056	0.153	0.156
INFL	0.036	0.054	-0.047	-0.073	-0.064	-0.001	0.158	0.001	-0.021	0.117	0.056	1.000	-0.015	0.045
ZSCORE	-0.230	-0.152	-0.281	-0.039	-0.069	-0.080	0.012	0.062	0.191	0.076	0.153	-0.015	1.000	-0.069
BOONE	0.012	0.008	0.019	0.068	0.157	0.099	0.086	0.071	-0.068	-0.107	0.156	0.045	-0.069	1.000

Data analysis

In order to select model estimation method,it requirescarrying out the research variables stationary and unit-root tests.Table 4shows unit root test results. The dependent variable of the model and some instruments are nonstationary in the level and stationary in the first difference. In this situation, cointegration test should be performed and if the variables are cointegrated, dynamic panel data model could be used. Last rows of table 5 show the cointegration test result for the variable. The results suggest that the variables are cointergrated at a significant level of 5%.

Table 4.Unit-root and stationary tests

Test for unit root in 1st difference			Test for unit root in Level			Significance	Variables
PP – Fisher	ADF-Fisher	Levin, Lin & Chu t	PP – Fisher	ADF- Fisher	Levin, Lin & Chu t		
305.2	303.6	-297.3	249.0	214.4	-487.2	Statistic	
0.0000	0.0000	0.0000	0.8100	0.6200	0.2400	Prob.	NPLTA
0.0	0.0	0.0	99.2	86.4	-11.6	Statistic	FIN_ACTS
0.0000	0.0000	0.0000	0.0081	0.0658	0.0000	Prob.	
-	-	-	59.1	42.1	-8.1	Statistic	SEC_ACT
-	-	-	0.0157	0.2985	0.0000	Prob.	
-	-	0.5	112.7	100.8	-12.7	Statistic	INSU_ACT
-	-	0.6960	0.5161	0.8721	0.0000	Prob.	
-	-	-	56.3	48.6	-11.4	Statistic	RS_ACT
-	-	-	0.0168	0.0788	0.0000	Prob.	
-	-	-	47.4	43.0	-8.1	Statistic	OWNNFF_A
-	-	-	0.0970	0.1975	0.0000	Prob.	CT
-	-	0.5	112.7	100.8	-12.7	Statistic	BOONE
-	-	0.696	0.5161	0.8721	0.0000	Prob.	
-	-	-6.8	436.4	334.7	-26.2	Statistic	ECOFREE
-	-	0.0000	0.0000	0.0000	0.0000	Prob.	
120.1	120.1	-3.1	2.4	18.7	33.8	Statistic	INFL
0.9998	0.9998	0.001	1.000	1.000	1.000	Prob.	
690.6	684.5	-711.9	736.6	577.2	-1122.5	Statistic	INSURTGDP
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	Prob.	
118.1	120.5	-12.1	60.3	44.9	-8.2	Statistic	RSTGDP
0.0000	0.0000	0.0000	0.012	0.2038	0.0000	Prob.	
274.2	279.0	-238.6	142.6	131.4	-133.2	Statistic	SECTGDP
0.0000	0.0000	0.0000	0.0049	0.0359	0.0000	Prob.	
-	-	-0.8	230.7	216.5	-21.7	Statistic	LERNER
-	-	0.2089	0.0000	0.0000	0.0000	Prob.	
305.3	305.3	-290.6	210.0	191.8	-404.4	Statistic	ZSCORE
0.0000	0.0000	0.0000	0.0200	0.1430	0.0000	Prob.	
774.5	767.7	-4827.4	506.7	544.9	-6866.3	Statistic	NIITTI
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	Prob.	

Empirical Results and Discussion

Columns (1)–(6) in Table 5 summarize our results for model estimation of bank assets qualityvariable on individual restrictions proxies. The consistency of the GMM estimatordepends on the validity of the instruments. To address this issue we consider twospecification tests. The first is a Sargan test of over-identifying restrictions, which tests theoverall validity of the instruments by analyzing the sample analog of the moment conditionsused in the estimation process. The second test examines the hypothesis that the error termεi, is not serially correlated. The Sargan test provides no evidence of misspecification, whilethe serial correlation tests point to first- but no second-order autocorrelation of the residuals, which is in accordance with the assumptions underlying the selection of instruments.

Empirical Basic Model

The general-to-specific procedure (excluding bank regulation and restrictions) yields a number of significant variables that we select for our $M_{j,t}$ and $\emptyset_j$ vectors. In first column of table 5 dependent variable regressed on all control variables without inclusion of theindependent variables (the proxy of restrictions on activities). Based on the results of the baseline model, real estate market size, inflation, GDP andincome channel variables have a significant effect on the NPLTA. The size of the real estatemarket, which is derived from the ratio of real estate transactions to GDP, has a significantand negative effect on the NPLTA. In fact, for a unit of change in the size of the real estatemarket, NPLTA decreases by 681.7 units at a significant level of 5%. This result is consistentwith the theory, because as much as this market is more attractive, the investment of banks inthis sector is feasible and practically less non-performing loans are created.

Another variable that the research controls for its effect is consumer price index or inflation. The results show that inflation as a macroeconomic variable has a positive and significanteffect on the NPLTA. In other words, a unit increase in inflation would increase the NPLTAby 0.182 units. Indeed, inflation reduces the purchasing power of the community, whichleads to a decline in economic prosperity in many sectors, including the real estate market, which decreases repayments of facilities by borrowers in this sector, and increases nonperformingloans and deteriorates banks assets quality. GDP as a macroeconomic variable has a negative effect on the NPLTA ratio. In otherwords, a unit of GDP growth would reduce the NPLTA by 28.07 units, which meansimproving banks assets quality. In fact, as expected, economic boom helps decrease badquality assets of banks.

Non-interest income that has been generated by noninterest related activities as apercentage of total income (net-interest income plus noninterest income) is an index ofbanks diversification of income channels. Non-interest related income includes net gains on tradingand derivatives, net gains on other securities, net fees and commissions and other operatingincome. This variable (NIITTI) has a significant and positive effect on the ratio of NPLTA.Thus, if NIITTI increases by one unit, the NPLTA ratio increases by 26.07 units, whichmeans deteriorating the assets quality of banks.

Table 5.Research model estimation

Empirical Proxies model

Models Variables	Baseline	Non-bank financialactivities restrictions	Securities activities restrictions	Insurance activities restrictions	Real estateactivities restrictions	Owning non-financial firm
	[1]	[2]	[3]	[4]	[5]	[6]
NPL(-1)	-0.239*	-0.235*	-0.225*	-0.226*	-0.234*	-0.223*
	[0.003]	[0.003]	[0.005]	[0.004]	[0.004]	[0.008]
Real estate market size	-681.7*	-218.1	0.9	-291.6	411.6**	-271.3
	[170.8]	[254.5]	[264.9]	[241.0]	[316.9]	[371.8]
Inflation	0.182**	0.248**	0.001	0.06	0.014	-0.039
	[0.110]	[0.154]	[0.092]	[0.096]	[0.066]	[0.078]
LogGDP	-28.07*	-46.19*	4.1.1968	-17.48**	6.5.2018	2.1.1950
	[11.79]	[17.10]	[8.76]	[11.83]	[6.88]	[6.73]
Income channels diversification	26.07*	24.45*	-14.74**	-5.47	1.1.1980	-5.24
	[8.03]	[13.21]	[9.77]	[9.89]	[12.02]	[13.97]
Activities restrictions		2.735*	8.016*	-9.225*	-5.651*	-5.517**
		[0.983]	[2.152]	[2.805]	[2.240]	[3.217]
Country fixed effects	yes	yes	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes	yes	yes
Estimation method	GMM-Sys	GMM-Sys	GMM-Sys	GMM-Sys	GMM-Sys	GMM-Sys
No. observations	129	93	109	109	108	108
Arellano-Bond AR(-1) [p-value]	0.000*	0.000*	0.000*	0.000*	0.000*	0.000*
Arellano-Bond AR(-2) [p-value]	0.232	0.877	0.823	0.72	0.592	0.965
Sargan test [p-value]	0.527	0.246	0.551	0.048	0.077	0.076
Tests (Pedroni,Kao ,Fisher) H0=No Cointegration	0.000	0.000	0.000	0.000	0.000	0.000

Column (1) shows the outcomes of the general to specific approach, using all the control variables discussed in the main text, but not including our measures for bankRestrictions on activities. The next columns show the result if some measure of bank activities restrictions is added to the model shown in column (1). **/* indicates Significance levels of 10 and 5 %, respectively. Robust standard errors are shown in [ ].

Next, we subsequently add our proxies for bank activities restrictions to the baselinemodel. We commence by including aggregate measure of restrictions on all non-bankfinancial activities(*banking-finance linkage*) which is the sum of 3 measures of restriction on securities, restriction on real estate,and restriction on insurance activities (column (2) of Table 5).The result shows thatrestrictions on all non-bank financial activities have a significant positive effect on the NPLTA. Indeed, the morethe stringent restrictions the less the assets quality of banks. That is to say, one unit increasein the NPLTA ratio increases NPLTAby 2.735 units at a significant level of 5%. This shows thattighter restrictions on nonbankfinancialactivities generally have negative effecton the assets qualityof banks.This result confirms the view that restrictions on bank activities do not necessarily reduce financial fragility (Barth, Caprio, & Levine, 2004)(Agoraki, Delis, & Pasiouras, 2011) (Klomp & de Haan, 2015). Beck et al. (2006) even report that activity restrictions increase the likelihood of a banking crisis due to limiting the opportunities to diversify risk (Beck, Demirguc-Kunt , & Levine, 2006). In contrast, Delis and Staikouras (2011) find that the distance-to-default is reduced by regulation limiting bank activities (Delis & Staikouras, 2011).

Next, we include our proxy for restrictionon securities activities. The results indicate that this type of restriction has significant and positive effect on banks NPLTA (column (3) in Table 5). Our results suggest that restrictions on securities activities significantly increases banks NPLTA. If the level of securities activities restrictions increases by one unit, banksNPLTAincreases by 8 units. We find a significant and negative effect of insurance activities restrictions on the level of NPL to total assets (column 4 in Table 5).In other words, on unit increase in insurance activities restrictions decreases NPLTA by 9.25 units. One potential explanation for our result is that banks in developing countries may be more involved in less complex activities such as insurance activities and restrictions on these activities may results in comprehensive assets quality improvement.

Our results also suggest that real estate activities restrictions significantly improve banksassets quality (column 5 in Table 5).It shows that tighteningrestrictions on real estate activities has negative and significant effect on the NPLTA. In other words, one unit increase in restrictions stringency results in 5.651 units decreasein NPLTA, which means increasing banks assetsquality.This is in the line with the theoretical result. Because investment in real estate given its long-term return period and maturity results in more NPL and more bad assets.

Finally, we include proxy for restrictions on owning nonfinancial firm (*Commerce-banking linkage*) in the baseline model (the last column of Table 5). Our results suggest that restrictions on these activities significantly reduce banks NPLTA. Indeed, one unitincrease in these activities restrictions decreases NPLTA by 5.517 units and increasesassets quality at a significant level of 10%. It is completely in line with the theory because one of the main risks arising from a close relationship between banks and industrial corporations (commerce activities)relates to the nature of the bank's loans. Banks in such systems tend to make loans with longer maturities than those in moreequity-based systems (Mandanis & Taylor, 2009). So, more stringency restrictions may help decrease banks NPL and increase assets quality.

Conclusion

The purpose of this research is to analyze the relationship between restrictions on *Banking-commerce-financelinkage*and banks assets quality. We use the data provided by Barth et al. (2004) to construct five measures of bank activities restrictions and use the non-performing loans to total assets as proxy for banks assets quality. Our data consists of 107banking systems of developing countries in the 2000 to 2012period. To address potential endogeneity problems we estimate our models by system-GMM.

Our findings suggest that restrictions on all non-bank financial activities have a significant positive effect on the NPLTA as the proxy for banks assets quality. Indeed, the more the stringent restrictions the less the assets quality of banks. Notably restrictions on securities activities significantly decrease banks assets quality. We also find a significant and positiveeffect of insurance activities restrictions on banks assets quality.

It also suggests that real estate activities restriction significantly improve banksassets quality. Finally, restrictions on owning non-financial firms improve banks assets quality significantly. As a general result of this study, we can say that restrictions on *banking-finance linkage* have negative effect on banks assets quality. One the other hand, it can also be argued that restrictions on *banking-commerce linkage* have positive effect on banks assets quality.

Resources

Agoraki, M.-E. K., Delis, M. D., & Pasiouras, F. (2011). Regulations, competition and bank risk-taking in transition countries. Journal of Financial Stability, 38–48. doi:10.1016/j.jfs.2009.08.002

Albertazzi, U., & Gambacorta, L. (2009). Bank profitability and the business cycle. Journal of Financial Stability, 393–409. doi:10.1016/j.jfs.2008.10.002

Allen, F., & Herring, R. (2001). Banking Regulation versus Securities Market Regulation. Wharton School University of Pennsylvania.

Banker, R. D., Chang, H., & Lee, S.-Y. (2010). Differential impact of Korean banking system reforms on bank productivity. Journal of Banking & Finance, 1450-1460.

Barth, J. R., Caprio, G. J., & Levine, R. (2004). Journal of Financial Intermediation, 13, 205–248.

Barth, J. R., Lin, C., Ma, Y., Seade, J., & Song, F. M. (2013). Do bank regulation, supervision and monitoring enhance or impede bank efficiency? Journal of Banking & Finance, 2879–2892.
doi: http://dx.doi.org/10.1016/j.jbankfin.2013.04.030

Barth, J., Caprio, G., & Levine, R. (2001). The regulation and supervision of banks around the world - a new database. World Bank Policy Research Working Papers.

Beck, T., Demirguc-Kunt , A., & Levine, R. (2006). Bank concentration, competition, and crises: First results. Journal of Banking & Finance, 30(5), 1581-1603 .

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions. Journal of Econometrics, 115-143.

Boyd, J. H., Chang, C., & Bruce, S. D. (1998). Moral Hazard under Commercial and Universal Banking. Journal of Money, Credit and Banking, 30(3), 426-468. doi:10.2307/2601249

Chortareas, G. E., Girardone, C., & Ventouri, A. (2012). Bank supervision, regulation, and efficiency: Evidence from the European Union. Journal of Financial Stability, 292–302. doi:10.1016/j.jfs.2011.12.001

Claessens, S., & Klingebiel, D. (2001). Competition and Scope of Activities in Financial Services. The World Bank Research Observer, 16(1). Retrieved from http://hdl.handle.net/10986/17134

(1993). Council Directive 93/6 on the Capital Adequacy of Investment Firms and Credit Institutions.

De Nicolo, G., Zephirin ; Philip F. Bar, M. G., Bartholomew, P. F., & Zaman, J. (2003). Bank Consolidation, Internationalization, and Conglomeration : Trends and Implications for Financial Risk. IMF working papers.

Banking and Finance. doi:10.1016/j.jbankfin.2016.11.022

Delis, M. D., Molyneux, P., & Pasiouras, F. (2011). Regulations and Productivity Growth in Banking: Evidence from Transition Economies. Journal of Money, Credit and Banking.

Delis, M., & Staikouras, P. K. (2011). Supervisory Effectiveness and Bank Risk. Review of Finance, 15(3), 511-543.

Dincer, H., Gencer, G., Orhan, N., & Sahinbas, K. (2011). A performance evaluation of the Turkish banking sector. (pp. 1530-1545). Social and Behavioral Sciences. doi:http://dx.doi.org/10.1016/j.sbspro.2011.09.051

Djankov, S., La Porta, R., Lopezde, F., & Shleifer, A. (2002). The Regulation of Entry. The Quarterly Journal of Economics, 117(1), 1-37. doi:10.3386/w7892

Doumpos, M., & Zopounidis, C. (2010). A multicriteria decision support system for bank rating. 55-63. doi:10.1016/j.dss.2010.07.002

Gordon, A. J., Baptista, A. M., & Yan, S. (2014). Bank regulation and internationalfinancial stability: A case against the 2006 Basel framework for controlling tail risk in trading books. Journal of International Money and Finance, 107-130. doi:http://dx.doi.org/10.1016/j.jimonfin.2014.01.001

Hansen, P. L. (1982). Large Sample Properties of Generalized Method of Moments Estimators. Econometrica, 50(4), 1029–1054. doi:10.2307/1912775. JSTOR 1912775

Haque, F., & Brown, K. (2016). Bank Ownership, Regulation and Efficiency: Perspectives from the Middle East and North Africa (MENA). international review of economics and finance. doi:h t tp: / /dx.doi .org/10.1016/ j .i ref.2016.10.015

Hoover, K. D., & Perez, S. J. (1999). Data mining reconsidered: encompassing and the general-to-specific approach to specification search. 2(2), 167-191. Retrieved from http://www.jstor.org/stable/23115013

Hoque, H., Andriosopoulos, D., & Kostas, A. (2013). Bank regulation, risk and return: Evidence from the credit and sovereign debt crises. Journal of Banking & Finance. doi:http://dx.doi.org/10.1016/j.jbankfin.2014.06.003

Iqbal, M. (2012). banking sector's performance in bangladesh- an application of selected CAMELS ratio. Thailand: Asian Institute of Technology.

John, K., Teresa, J. A., & Saunders, A. (1994). Universal banking and firm risk-taking. Journal of Banking & Finance, 307-323. doi:https://doi.org/10.1016/0378-4266(94)00037-9

Klomp, J., & de Haan, J. (2015). Bank regulation and financial fragility in developing countries: Does bank structure matter? Review of Development Finance, 5, 82–90. doi:http://dx.doi.org/10.1016/j.rdf.2015.11.001

Kroszner, R. S., & Rajan, R. G. (1994). Is the Glass-Steagall Act Justified? A Study of the U.S. Experience with Universal Banking Before 1933. The American Economic Review, 84(4).

Kupiec, P., Yan, L., & Claire, R. (2016). Does Bank Supervision Impact Bank Loan Growth? Journal of Financial Stability. doi:http://dx.doi.org/doi:10.1016/j.jfs.2016.11.006

Lim, C., & Yong, K. (2016). Regulatory pressure and income smoothing by banks in response to anticipated changes to the Basel II Accord. China Journal of Accounting Research. doi:http://dx.doi.org/10.1016/j.cjar.2016.08.003

Mandanis, H. S., & Taylor, M. W. (2009). Global Bank Regulation: Principles and Policies. Academic Press, Incorporated.

Mishkin, F. S. (2000). Prudential Supervision: Why Is It Important and What Are the Issues? In F. S. Mishkin, Prudential Supervision: What Works and What Doesn't (pp. 1-30). University of Chicago Press.

Pasiouras, F., Tanna, S., & Zopounidis, C. (2009). The impact of banking regulations on banks' cost and profitefficiency: Cross-country evidence. International Review of Financial Analysis, 294–302. doi:10.1016/j.irfa.2009.07.003

Puri , M. (1996). Commercial banks in investment banking: Conflict of interest or certification role? Journal of Financial Economics, 373-401.

Roman, A., & Şargu, A. C. (2013). Analysing the Financial Soundness of the Commercial Banks in Romania: An Approach based on the Camels Framework. Procedia Economics and Finance, 6, 703-712. doi:https://doi.org/10.1016/S2212-5671(13)00192-5

Roodman, D. (2009). A Note on the Theme of Too Many Instruments. Oxford Bulletin of Economics and Statistics, 71(1). doi:https://doi.org/10.1111/j.1468-0084.2008.00542.x

Rose, P. S., & Hudgins, S. C. (2012). Bank Management & Financial Services. McGraw-Hill Education.

Sargan, J. D. (1958). The Estimation of Economic Relationships Using Instrumental Variables. Econometrica, 393–415. doi:10.2307/1907619.

Saunders, A. (1985). Conflicts of interest: An economic view. Deregulating Wall Street: commercial bank penetration of the corporate securities market, 207-230.

Soni, R. (2012). Applicability of CAMELS Rating for Supervisory Regulation of the Indian Banking System. Vishwakarma Business Review, 2(2), 14-20.

Teixeira, J. C., Silva, F. J., Fernandes, A. V., & Alves, A. C. (2014). Banks' capital, regulation and the financial crisis. North American Journal of Economics and Finance. doi:http://dx.doi.org/10.1016/j.najef.2014.01.002

Windmeijer, F. (2000). A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM Estimators. Journal of Econometrics, 126(1), 25-51. doi:10.1016/j.jeconom.2004.02.005