Market power, revenue diversification and bank stability: Evidence from selected South Asian countries

My Nguyen[1], Michael Skully[2], Shrimal Perera[*]

Department of Accounting and Finance, Monash University, Caulfield East, Victoria 3145, Australia

ARTICLE INFO

ABSTRACT

We investigate the association between bank market power and revenue diversification and whether revenue diversification interacts with market power impacting on individual bank stability. These issues are explored in the context of four South Asian banking markets (Bangladesh, India, Pakistan and Sri Lanka) during 1998–2008. Our Generalised Methods of Moments (GMM) estimators indicate that South Asian banks with greater market power focus more on traditional interest income generating activities. Such banks, however, become more stable when they diversify across both interest- and non-interest income activities.

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1. Introduction

A major objective of financial liberalisation is to foster competition. Due to heightened competitive pressures after two decades of promoting foreign bank entry, consolidation and other structural reforms, depository institutions have diversified their revenue sources in order to maintain future cash flows and franchise values. As a result, non-interest income activities, such as loan origination, securitisation, standby-letters of credit and derivative securities have increased dramatically.

* Corresponding author. Tel.: +61 3 9903 4455; fax: +61 3 9903 2422.
  E-mail addresses: My.Nguyen@monash.edu (M. Nguyen),
Michael.Skully@monash.edu (M. Skully), Shrimal.Perera@monash.edu (S. Perera).
  [1] Tel.: +61 3 9903 4726; fax: +61 3 9903 2422.
  [2] Tel.: +61 3 9903 2407; fax: +61 3 9903 2422.

Despite this increasing presence of bank non-interest income, the existing literature is silent on which bank characteristics (particularly bank market power resulting from the imperfections in competitive dynamics), industry and/or market conditions are associated with non-interest revenue growth. While large banks and those with technological advances extract more non-interest income than smaller ones (Rogers and Sinkey, 1999; DeYoung and Rice, 2004), there is still little systemic understanding of why non-interest income varies among them. Even though recent research focuses on the association between bank non-interest income and net interest margins (Lepetit et al., 2008a), technology advances (DeYoung and Rice, 2004; Carbó-Valverde and Rodríguez-Fernández, 2007), credit risks (Lepetit et al., 2008a) and efficiencies (Lozano-Vivas and Pasiouras, 2010), the relationship between bank non-interest income and market power, however, remains unexplored. Our study is thus motivated by these knowledge gaps and examines whether market power has a significant impact on bank non-interest income after controlling for other bank-, industry- and country-specific factors. We argue that investigating such impact is important because market power helps banks identify new fee- and commission-based revenue growth opportunities and affords them greater bargaining capacity in contract creation.

The impact of bank market power on net interest margins (Maudos and Fernández-de-Guevara, 2004), on financial stability (Jiménez and Saurina, 2004; Agoraki et al., 2011), on bank efficiency (Delis and Tsionas, 2009; Turk-Ariss, 2010) and on bank regulations (Beck et al., 2006; Fonseca and González, 2010) have also been extensively discussed. As far as it could be ascertained, only one empirical study shows how market power increases when banks diversify into non-traditional banking activities and this analysis was limited to five developed European countries (Carbó-Valverde and Rodríguez-Fernández, 2007). Authors argue that banks can source market power in non-traditional banking business when they set a lower interest margin and/or charge a lower rate for traditional loan products. Therefore, it is possible that bank market power and revenue diversification are simultaneously determined. Thus, we employ the Generalised Method of Moments (GMM) with fixed-effect corrections instead of the more traditional Two-Stages Least Squares (2SLS) method. Moreover, the GMM estimator is more efficient than the 2SLS method because it accounts for heteroskedasticity and is robust to the distribution of errors (Fiordelisi et al., 2011).

Financial liberalisation also allows commercial banks to compete on a wider range of market segments (investment banking and market trading). While some studies show that the combination of lending and other earning activities affords diversification and risk reduction benefits for banks, others find that revenue diversification has a significant positive impact on earnings volatility (Stiroh, 2004; Stiroh and Rumble, 2006).

Despite the richness of related studies, none has examined empirically whether revenue diversification interacts with market power impacting on bank stability. Such investigation is important because different bank revenue sources (interest vis-a-vis non-interest) may have a varying impact (direct or indirect) on stability through bank market power. Thus, our study contributes to knowledge and literature in several ways. It is the first study that examines whether market power in lending and deposit markets manifests in higher non-traditional income after controlling for other bank-specific and country-level factors. It also investigates, for the first time, whether revenue diversification interacts with market power impacting on individual bank stability.

We further perceive that implications of prior studies of bank market power, revenue diversification and bank stability (predominantly on the US and Europe) may not apply to emerging/developing banking markets. This is because the latter often operated as repressed financial systems in the 1980s and have since undergone significant regulatory and structural changes. As such these banking markets in transition have unique and different characteristics warranting a proper and separate investigation (Aleem, 2010).

In selecting an appropriate sample, we were attracted to the unique bank restructuring and regulatory changes implemented by South Asian countries over the last decade. At a regional level, the South Asian Association of Regional Cooperation (SAARC) organisation has promoted cross-border trade and competition in financial services through its South Asian Free Trade Agreement (SAFTA). Its seven countries are also parties to intra-regional trade and economic agreements like the Indo-Lanka Bilateral Trade Agreement (ILBFTA) and the Sri Lanka–Pakistan Free Trade Agreement (SLPFTA). At an international level, they are also members of World Trade Organisation (WTO)

and signatories to the General Agreement on Trade in Services (GATS) which seek to remove discriminatory policies against foreign banks and ensure 'level playing fields' in financial markets. Understandably, these developments create extra pressure on competitive dynamics of South Asian banks.

In addition to these deregulation pressures, South Asian governments must respond to other regulatory developments in the increasingly 'globalizing' financial markets. Specifically, they are required to adopt international standards in bank supervision and regulation (for instance, capital adequacy, loan classification, and loan loss provisioning) and ensure compliance (Perera et al., 2007). Such increased regulatory focus may encourage South Asian banks to employ revenue diversification strategies in order to maintain their future cash flows and franchise values.

The current literature, however, lacks clear and robust evidence on South Asian banking competition and revenue diversification nor are there any cross-country comparisons. Such regional focus may prove important as South Asian countries integrate further intra-regional trade and economic agreements. Our sample therefore consists of 151 commercial banks operating in four South Asian countries (Bangladesh, India, Pakistan and Sri Lanka) over 1998–2008. The other three SAARC members (Bhutan, the Maldives and Nepal) are excluded due to data limitations. Our focus on these South Asian banking markets should help understand how such important structure changes (in bank competition, industry concentration, regulatory and macroeconomic conditions) affect the evolution of non-interest income. In particular, it should also help to identify whether changes in bank market power increase stability as banks diversify their income sources.

The remainder of this paper is structured as follows. The sample and methodology are explained in Section 2. Section 3 presents the main empirical results and analyses. Section 4 concludes.

2. Sample and method

2.1. Sample

The sample consists of 151 commercial banks operating in four selected South Asian countries (Bangladesh, India, Pakistan and Sri Lanka) over 1998–2008. To ensure comparability, other entities such as investment banks, savings banks, cooperative banks and other non-bank financial intermediaries (insurance companies, mortgage houses etc.) are also excluded as their regulatory requirements differ from those of commercial banks (Perera et al., 2007). In the case of mergers and acquisitions, the target and acquiring banks are treated separately as long as the data are reported separately. With a non-bank acquirer and no unconsolidated data available after the merger, the target bank is then excluded from the sample. The sample is also filtered by excluding banks with less than three consecutive yearly observations or when data on main variables (such as loans, personnel expenses and net income) is not available. To avoid survivorship bias, unbalanced bank-specific panel data are used to cover as many banks within the sample period. Overall, our sample consists of 1006 bank-year observations over the period 1998–2008. Table A1 provides the domicile and ownership of the sample banks.

The primary source of annual bank-specific data is the *BankScope* database published by Fitch Ratings and Bureau van Dijk. Additional country specific macroeconomic variables are obtained from International Monetary Fund's (2011) *International Financial Statistics*. The Banking and Finance Grading Scale (*BFGS*) is acquired from the Index of Economic Freedom (*IEF*) published by the Heritage Foundation and *the Wall Street Journal*. Aggregate banking industry data required to calculate industry-specific variables are sourced from the respective countries' central bank annual reports. Data for market structure are obtained from the World Bank's World Development Indicators (*WDI*) and Barth et al. (2002, 2004, 2008).

2.2. Method

This section explains the models and variable descriptions. Specifically, we first outline the models to investigate the association between bank market power and revenue diversification. Thereafter,

we document the model utilised to assess whether banks with greater market power are more stable when they diversify in non-traditional activities.

2.2.1. Association between bank market power and revenue diversification

To address the simultaneous relationship between bank market power and income from non-traditional activities, we employ GMM estimators developed for dynamic panel models by Arellano and Bover (1995) and Blundell and Bond (1998). The specific model is as follows:

$$RD_{i,j,t} = \Psi_1 - \beta_1 MP_{i,j,t} + \sum_{n=1}^{N} \in_n X_n + \sum_{c=1}^{\in} \zeta_c D_c + \varepsilon_{1i,j,t} \tag{1}$$

$$MP_{i,j,t} = \Psi_2 + \beta_2 RD_{i,j,t} + \sum_{n=1}^{N} \in_n X_n + \sum_{c=1}^{\in} \zeta_c D_c + \varepsilon_{2i,j,t} \tag{2}$$

where the subscripts i, j and t denote individual banks, countries, and time horizon and n indexes control variables, c indexes dummy variables; RD is share of non-interest income; Ψ is a constant; MP represents bank-specific market power proxies; X is a vector of control variables; D is a vector of time dummies to control for unobserved time-varying factors; ε_1, ε_2 are stochastic error terms; and β, γ, σ, ε, ζ are the parameters to be estimated.

In order to ensure the consistency of the GMM estimator, we use two specification tests to assess: (1) the hypothesis that the error term $\varepsilon_{i,j,t}$ is not serially correlated by testing whether the differenced error term is second-order serially correlated and (2) the validity of the instruments by running the Sargan test (by analysing the sample analog of the moment conditions used in the estimation process). Failures to reject the null hypotheses of both tests support our model specification. These specification tests are conducted using STATA software and the results are available from the authors upon request.

2.2.2. Bank non-interest income

A bank's non-interest income activities include fee-generating activities ranging from underwriting to cash management and custodial services, securities trading, off-balance contracts as well as mark-to-market changes in the carrying values of assets and liabilities (Rogers and Sinkey, 1999; Stiroh, 2004). As a result, share of non-interest income RD is calculated as the ratio of net non-interest income as a percentage of total assets (Maudos and Solís, 2009).[3] Ideally, non-interest income should be split into fee-based and trading-based income, but this was precluded due to BankScope's data limitations.

2.2.3. Bank market power

The Lerner index is a more accurate measure of bank-specific market power than Panzar and Rosse *H*-statistic or the asset shares of the three largest banks (Brissimis et al., 2008) and measures the disparity between price and marginal cost expressed as a percentage of price. We employ two different specifications of Lerner index as the proxies of market power: a conventional Lerner (Berger et al., 2009; Turk-Ariss, 2010) and a funding-adjusted Lerner (Maudos and Fernández-de-Guevara, 2007; Turk-Ariss, 2010).[4]

2.2.4. Bank-, industry- and country-specific control variables

At the bank level, we control for bank size, cost efficiency, non-performing loans, interest margins, and capitalisation.[5] The inclusion of bank size (*BANKSIZE*) follows Lepetit et al. (2008a) who

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[3] Initially, we defined bank non-interest income relative to net operating income (Lepetit et al., 2008b). However, it led to a collinearity issue with the bank cost efficiency variable requiring a redefinition relative to total assets.

[4] For economy and brevity, we do not reproduce the derivation and estimation procedure for the traditional Lerner index and funding-adjusted Lerner index here.

[5] A bank's credit rating may affect its ability to diversify into non-interest income activities (Sturm and Williams, 2008). The BankScope database, however, only provides the most current ratings (Fitch Ratings and Bureau van Dijk, 2011). This limits our ability to consider this effect on bank revenue diversification. As our referee noted, it is a useful area for future research.

argue that larger banks tend to have more non-traditional activities. Bank cost efficiency (*EFFICIENCY*) is utilised to capture a well-managed bank's ability to reduce costs by improving the quality of fee- and commission-based products and to earn higher non-interest revenues (DeYoung and Rice, 2004). A negative relationship between bank interest margin (*NIM*) and income from non-traditional activities is anticipated because by setting a lower interest margin, banks can use loan products to establish long-term relationships with their existing customers and/or attract new ones. This allows banks to potentially increase their income from non-traditional activities (Lepetit et al., 2008a). The expected sign of bank capitalisation (*EQUITY*) is not expected a priori. On the one hand, a negative relationship is documented by Lepetit et al. (2008a) who find that cross-selling different products to core customers allows banks to offer relatively lower lending costs. On the other hand, consumers may view lower capital ratio banks as 'too risky' and so seek 'less risky' ones for non-traditional business, influencing banks' capacity to earn non-interest income (Lepetit et al., 2008b).

Dummy variables are used to control for different ownership forms (state- vs private-owned, foreign- vs domestic-owned) and for banks offering Islamic banking activities.[6] Arguably, state-owned banks (*STATE*) typically have greater capacity to generate non-interest income than other banks because of their relatively greater size and scope and so intrinsically may be more diversified (Sapienza, 2002). In addition, state-owned banks may be forced to lend to certain sectors or industries to fulfil government objectives rather than solely on commercial grounds (Sapienza, 2002). Their customer base, therefore, is relatively larger than that of private-owned banks, possibly resulting in higher non-interest income. The expected sign for the foreign ownership dummy variable (*FOREIGN* ≥ 50%) is not expected a priori. Some studies show that foreign banks have competitive advantages over their domestic-owned peers (Havrylchyk, 2006; Lensink et al., 2008) while others find them at a disadvantage. The latter is because local banks may have better information about their country's economy, language, laws and politics.[7] Since banks with Sharia-compliant windows, ceteris paribus, will generate more non-interest income, a positive coefficient of *ISLAMIC PRODUCT* is expected (Karim, 2001). *LISTED* are also expected to show a positive sign because in developing countries, such banks are usually among the largest and best performing banks (Koutsomanoli-Filippaki and Mamatzakis, 2009).

We also control for bank market saturation using a three bank concentration ratio (*3k-CONCENTRATION*) (Bikker and Haaf, 2002). This is due to the ongoing concern in the literature regarding market power proxies (Lepetit et al., 2008a; Schaeck et al., 2009). Its inclusion also helps to generalise findings. Finally, country-specific variables are bank activity restrictions (*RESTRICTIONS*), banking systems openness (*ENTRY FREEDOM*), their operating environment (*BUSINESS CYCLE*) and overall capital market development (*FINANCIAL DEVELOPMENT*). *RESTRICTIONS* indicates the degree to which banks face regulatory activity restrictions regarding the securities markets, insurance, real estate and owning non-financial firms.[8] Fewer activity restrictions should enable banks to operate more freely, and so focus on those activities most likely to increase shareholder value (Mercieca et al., 2007). *ENTRY FREEDOM* indicates the banking system's openness to foreign bank entry and operations as well as governments' influence over bank asset allocation. A positive coefficient is thus expected for this variable. Positive coefficients are also expected for *BUSINESS CYCLE* and *FINANCIAL DEVELOPMENT* which are used as a surrogate for each market's overall economic conditions.

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[6] To ensure classification accuracy, ownership details are hand-collected for each bank and each year from respective sample bank's website.

[7] We consider a bank as foreign-owned if more than 50% of the total shares is held by non-domestic residents in a particular year (*FOREIGN* ≥ *50%*). For robustness, the entire analysis was redone by only including those banks for which more than 30% of the shares are owned by foreign residents. The findings of this analysis are similar and are available from the corresponding author.

[8] This is a composite index and takes on values between (1) and (4) for each of the four categories under consideration, whereby the activities are classified as unrestricted (1), permitted (2), restricted (3) or prohibited (4) with possible index variation between 4 and 16. These classifications are possible by utilising the study conducted by Barth et al. (2002, 2004, 2008). Higher values indicate greater restrictions on bank activities.

2.2.5. Market power, revenue diversification and bank stability

To examine the effect of interaction between market and revenue diversification on bank stability, the following model is specified:

$$BS_{i,j,t} = \Psi_3 - \beta_3 MP_{i,j,t} + \gamma_3 RD_{i,j,t} - \sigma_3 MP_{i,j,t} \times RD_{i,j,t} + \sum_{n=1}^{N} \in_n X_n + \sum_{c=1}^{C} \zeta_c D_c - \varepsilon_{3i,j,t} \quad (3)$$

where *BS* denotes bank stability. All other variable definitions remain unchanged as explained earlier under Eqs. (1) and (2). The variable construction and selection are explained in Sections 2.2.6 and 2.2.7. The detailed variable descriptions are provided in Table 1. We estimate Eq. (3) using the fixed effect

Table 1
Variable definitions.

Variable	Proxy	Definition
Panel A: dependent variables		
RD	Total non-interest income	Total non-interest income/total assets
BS	Z-Score	Average return on assets and equity to total assets divided by the standard deviation of return assets
Panel B: bank-specific variables		
CON_LERNER	Conventional Lerner index	Bank's ability to price above its marginal costs as computed by Turk-Ariss (2010)
FUND_LERNER	Funding-adjusted Lerner index	Bank's ability to price above its marginal costs as computed by Turk-Ariss (2010)
LOANSHARE	Bank specialization in the loan markets	Total bank loans divided to total financial sector loans
DEPOSITSHARE	Bank specialization in the deposit markets	Total bank deposits divided to total financial sector loans
BANKSIZE	Bank size	Natural log of bank total assets
EFFICIENCY	Bank cost efficiency	Ratio of total cost to total income
NPL	Ex-post credit losses	Loan loss provisions divided by net loans
NIM	Bank interest margin	Net interest income to total earning assets
EQUITY	Bank capitalisation	Ratio of total equity to total assets
STATE	State ownership	A dummy variable that takes the value of 1 for banks that are 50% or more state owned, each year
FOREIGN $\geq 50\%$	Foreign ownership	A dummy variable that takes the value of 1 for banks that are 50% or more foreign owned, each year
ISLAMIC PRODUCT	Islamic banking activities	A dummy variable that take the value of 1 for banks that offering Islamic banking products, each year
LISTED	Listed banks	A dummy variable that take the value of 1 for banks that are listed in stock exchanges, each year
Panel C: industry-specific variables		
3k-CONCENTRATION	Market concentration	Market shares of the three largest banks
Panel D: country-specific variables		
BANKING FREEDOM	Openness of the banking sector	Banking freedom
RESTRICTIONS	Activities restrictions (security markets, insurance, real estate and owning shares in non-financial firms)	Takes on values between (1) and (4) for each of the four categories unrestricted (1), permitted (2), restricted (3) or prohibited (4) with index variation between 4 and 16
BUSINESS CYCLE	Business cycle	Annual real GDP Growth Rate
FINANCIAL DEVELOPMENT	Financial development	Annual market capitalisation to GDP
AFC	Asian Financial Crisis	Takes on values of 1 for crisis years (1998–1999) and 0 otherwise
GFC	Global Financial Crisis	Takes on values of 1 for crisis years (2007–2008) and 0 otherwise

Note: This table defines the variables used to estimate the association between bank stability, market power and revenue diversification in selected South Asian banks during 1998–2008.

panel least squares method. This helps to eliminate omitted variable bias and control for unobserved heterogeneity, which may be constant over time and units (banks).

2.2.6. Bank stability

We use Z-index as the bank stability measure. It combines profitability, leverage and return volatility in a single bank distance-to-risk measure. The Z-index presents the number of standard deviations below the mean by which profits would have to fall before just depleting the equity capital. It is given by the ratio:

$$Z_{i,j,t} = \frac{\overline{RDA_{i,j,t}} + \overline{E/TA_{i,j,t}}}{\delta_{KUA}} \qquad (4)$$

where $\overline{RDA}$ and $\overline{E/TA}$ are the average return on total assets and equity to total assets over the sample period, respectively, and δ_{KUA} is the standard deviation of average return on total assets. Thus, our measure of bank stability increases with higher profitability and capitalisation levels and decreases with unstable earnings reflected by a higher standard deviation of return on assets.[9]

2.2.7. Bank-, industry- and country-specific control variables

Bank non-interest income and market power remain defined as in Sections 2.2.2 and 2.2.3. We control for *BANKSIZE* and expect larger banks to be more stable than smaller ones because of enhanced diversification opportunities and economies of scale in information production, monitoring and transaction costs. Thus, they have less probability of insolvency risk than smaller banks. We also control for bank cost efficiency (*EFFICIENCY*) following Agoraki et al. (2011). We further incorporate the ratio of loan loss provision to net loans (*NPL*) to account for credit risk, since it is a determinant of bank stability. Banks with higher level of equity are subject to less capital risk and are therefore more stable (Rogers and Sinkey, 1999).

Using dummy variables, we consider the effect of bank ownership on bank stability following Berger et al. (2009). Also South Asian banks Islamic banking windows are expected to be safer than conventional banks because of enhanced risk sharing and stronger market discipline (Chong and Liu, 2009). The *3k-CONCENTRATION* variable is included because market structure is found to influence bank stability (Beck et al., 2006). The expected sign of this concentration variable is not determined a priori. On the one hand, banks' probability of failure is positively related with concentration (Boyd and DeNicoló, 2005). On the other hand, banks in concentrated systems will tend to receive larger subsidies through implicit "too important to fail" policies that reduce bank failure.

Country-specific variables such as *RESTRICTIONS*, *BUSINESS CYCLE* and *FINANCIAL DEVELOPMENT* are considered. Their definitions can be found in Table 1. It is expected that restricted banking systems hinder competition and reduce bank stability (Barth et al., 2002; Claessens and Laeven, 2004). Negative coefficients are also expected for *BUSINESS CYCLE* and *FINANCIAL DEVELOPMENT* because problem loans develop in line with the business cycle (Delis and Tsionas, 2009) and level of capital market development (Jiménez and Saurina, 2004).

3. Empirical results

3.1. Bank market power and revenue diversification

The mean values for the data set by country are shown in Table 2. The results for the entire sample period (1998–2008) are presented in Table 3 while Table 4 excludes the crisis years (i.e., 1998–1999 due to the Asian Financial Crisis and 2007–2008 due to the Global Financial Crisis).[10] All reported t-statistics are corrected for heteroskedasticity using White diagonal standard errors and covariance.

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[9] For robustness, we use risk-adjusted measures of return for each bank following Mercieca et al. (2007) and Turk-Ariss (2010).

[10] Since India has a relatively large number of commercial banks compared to other sample countries, Eqs. (1) and (2) were reestimated without Indian bank data. The results are consistent with our preliminary analysis and are available upon request. We thank the referee for this important suggestion.

Table 2
Mean values of variables (Averages for 1998–2008).

	Bangladesh	India	Pakistan	Sri Lanka
Panel A: dependent variable				
RD	0.06	0.09	0.08	0.07
BS	7.41	8.33	7.54	8.93
Panel B: bank-specific variables				
CON_LERNER	0.76	0.66	0.67	0.73
FUND_LERNER	0.71	0.57	0.71	0.64
LOANSHARE	0.03	0.26	0.03	0.09
DEPOSITSHARE	0.04	0.02	0.11	0.10
BANKSIZE	5.98	7.99	6.72	6.01
EFFICIENCY	0.70	0.54	0.73	0.73
NPL	0.01	0.01	0.02	0.01
NIM	0.02	0.03	0.03	0.04
EQUITY	0.06	0.07	0.09	0.09
Panel C: industry-specific variables				
3k-CONCENTRATION	0.48	0.34	0.53	0.66
Panel D: country-specific variables				
BANKING FREEDOM	28.18	30.00	43.64	48.18
RESTRICTIONS	13.00	11.00	13.00	11.00
BUSINESS CYCLE (%)	5.55	6.82	4.55	5.00
FINANCIAL DEVELOPMENT	0.04	0.59	0.22	0.15

Source: Compiled using data from the respective central banks and sample banks' websites, *BankScope* and the International Monetary Fund (2011).

A wide battery of diagnostics were conducted including Durbin-Wu-Hausman test for endogeneity, the Correlation matrix (and the formal Variance Inflation Factor and Tolerance Statistics) for multi-collinearity, the Breusch–Pagan/Cook–Weisberg tests for heteroskedasticity, the Jarque Bera tests for normality and the Hausman test for fixed versus random effect specification. These results, available from the authors, indicate that endogeneity is present between *RD* and *CON_LERNER* and *FUND_LERNER* variables. This justifies our use of GMM estimators to account for the observed simultaneity between revenue diversification and bank market power.

The negative and significant coefficients of *CON_LERNER* and *FUND_LERNER* in Table 3 (Columns 1–4) indicate that South Asian banks with higher market power generate less income from non-traditional activities. These banks seem to focus more on traditional interest income generating activities. In other words, South Asian's banks market power in lending markets have not translated into higher income from non-traditional activities. The alternative measures of bank market power (*LOANSHARE* and *DEPOSITSHARE*) also have statistically significant and negative signs (Columns 5–8) and thus confirm our findings. The Asian Financial Crisis and Global Financial Crisis do not seem to have any impact on these observations as results in Table 4 (excluding crisis affected 1997–1998 and 2007–2008) remain consistent with Table 3 for all measures of bank market power. The negative relationship between bank market power and revenue diversification is, therefore, robust.

Positive and significant coefficients are reported for *BANKSIZE*, *NPL*, *EQUITY*, *ISLAMIC PRODUCT*, *LISTED*, *BUSINESS CYCLE* and *FINANCIAL DEVELOPMENT*. As expected larger banks (most of which are listed) have succeeded in penetrating fee- and commission-based product market. This is an interesting observation given the significant and negative association between market power proxies and share of non-interest income as reported earlier. Moreover, South Asian banks characterised by higher capital ratios (*EQUITY*) and credit losses (*NPL*) are focusing more on diversifying their revenue sources. Also, as expected, those banks with Islamic banking windows have relatively higher shares of fee and commission income. At the country level, those with better performing economies and greater financial development have banks that offer broader set of products thus generating relatively higher shares of non-interest income.

Table 3

Association between bank market power and revenue diversification for South Asian banks during 1998–2008.

	Dependent variable: RD							
	CON_LERNER		FUND_LERNER		LOANSHARE		DEPOSITSHARE	
	1	2	3	4	5	6	7	8
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
CON_LERNER	−0.03*	−0.34	–	–	–	–	–	–
FUND_LERNER	–	–	−0.04**	−1.72	–	–	–	–
LOANSHARE	–	–	–	–	−0.00*	−1.90	–	–
DEPOSITSHARE	–	–	–	–	–	–	−0.09***	−3.5
BANKSIZE	0.06***	5.99	0.07***	10.57	0.06***	5.48	0.06***	6.69
EFFICIENCY	−0.00	−0.16	−0.00	−1.10	−0.00	−1.44	−0.00	−0.25
NPL	0.17**	0.91	0.16	0.87	0.17***	4.00	0.12***	3.82
NIM	−1.23***	−8.60	−1.19***	−8.81	−1.16***	−4.74	0.06	0.14
EQUITY	0.00**	3.32	0.00***	3.90	0.00**	2.17	0.00*	1.77
STATE	0.02	0.91	0.02**	0.97	0.02	0.96	0.02	0.85
FOREIGN ≥ 50%	−0.00	−0.07	−0.00	−0.06	−0.00	−0.17	−0.04*	−1.90
ISLAMIC PRODUCT	0.00***	0.11	0.02***	1.03	0.02**	1.10	0.03***	2.04
LISTED	0.10***	6.17	0.10***	6.48	0.10***	4.81	0.09***	4.47
3k-CONCENTRATION	−0.25**	−2.46	−0.22	−2.31	−0.16*	−1.86	−0.29***	−2.89
BANKING FREEDOM	0.00*	1.79	0.00	1.53	0.00	1.09	0.00	0.92
RESTRICTIONS	−0.04***	−4.61	−0.04***	−4.67	−0.03***	−4.38	−0.04***	−4.31
BUSSINESS CYCLE	0.00**	0.59	0.00**	1.33	0.01**	1.96	0.00	1.28
FINANCIAL DEVELOPMENT	0.05**	2.05	0.05**	2.06	0.08**	2.93	0.06**	2.50
CONSTANT	0.99***	3.73	1.17***	8.69	0.98***	6.51	1.02***	6.28
Adjusted *R*-squared	0.30		0.33		0.32		0.28	
F-Statistic	26.69		28.09		27.15		25.16	
Total panel (unbalanced) observations	1006		996		1006		831	

Note: The reported *t*-statistics are corrected for heteroskedasticity using robust standard errors in STATA software.

* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

Table 4
Association between bank market power and revenue diversification for South Asian banks during 2000–2006.

	Dependent variable: RD							
	CON_LERNER		FUND_LERNER		LOANSHARE		DEPOSITSHARE	
	1	2	3	4	5	6	7	8
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
CON_LERNER	−0.04*	−2.23	–	–	–	–	–	–
FUND_LERNER	–	–	−0.01**	−0.11	–	–	–	–
LOANSHARE	–	–	–	–	−0.00*	−0.56	–	–
DEPOSITSHARE	–	–	–	–	–	–	−0.37***	−2.76
BANKSIZE	0.06***	7.55	0.06***	7.70	0.06***	7.44	0.05**	6.09
EFFICIENCY	−0.00	−0.71	−0.00	−0.64	−0.00	−0.18	−0.00	−0.94
NPL	0.15	0.85	0.16	0.93	0.16	0.94	0.09**	2.78
NIM	−1.23***	−8.49	−1.17***	−8.21	−1.19***	−8.37	−0.15***	−0.40
EQUITY	0.00***	3.33	0.00***	3.37	0.00***	3.26	0.00***	1.79
STATE	0.02*	1.12	0.02**	1.17	0.02**	1.12	0.01*	0.49
FOREIGN ≥ 50%	−0.01	−0.45	−0.01	−0.43	−0.01	−0.25	−0.04	−1.65
ISLAMIC PRODUCT	0.00	0.03	0.01	0.26	0.00	0.11	0.02	1.43
LISTED	0.09***	5.39	0.09***	5.52	0.09***	5.58	0.08***	3.27
3k-CONCENTRATION	−0.20*	−1.84	−0.20**	−1.88	−0.19	−1.65	−0.26	−2.43
BANKING FREEDOM	0.00	1.25	0.00	1.39	0.00**	1.14	0.00**	0.74
RESTRICTIONS	−0.03***	−3.15	−0.03***	−2.70	−0.03**	−2.68	−0.03***	−3.12
BUSSINESS CYCLE	0.01**	1.07	0.01**	1.91	0.01**	1.65	0.00***	0.53
FINANCIAL DEVELOPMENT	0.06	0.85	0.05*	0.72	0.08	1.06	0.04*	0.67
CONSTANT	0.98	6.53	0.92	5.74	0.86	5.84	0.88	5.17
Adjusted R-squared	0.34		0.33		0.32		0.27	
F-Statistic	18.91		18.87		18.91		13.12	
Total panel (unbalanced) observations	655		655		660		660	

Note: The reported t-statistics are corrected for heteroskedasticity using robust standard errors in STATA software.

* Statistical significance at 10% level.

** Statistical significance at 5% level.

*** Statistical significance at 1% level.

Negative and significant coefficients are reported for *NIM*, *RESTRICTIONS* and *CONCENTRATION* variables. To the extent *NIM* reflects banks ability to extract economic rents by charging higher spreads (hence a proxy for market power in lending markets) this observation confirms further our findings for *CON_LERNER* and *FUND_LERNER* reported above. Collectively, it indicates that those South Asian banks with a dominant presence in writing loan contracts prefer to capitalise on their market power in traditional loan markets. At the country-level, those with more concentrated banking markets and relatively stringent restrictions on banking activities are populated with banks that focus more on core financial intermediation function.

Our ownership form dummy variables (state vs private and domestic vs foreign), however, do not present consistent results. Even though formal Variance Inflation Factor and Tolerance Statistics (available upon request from the authors) do not indicate multicolinearity issues, these ownership effects may have already been captured in *BANKSIZE*, *LISTED* and *RESTRICTIONS* variables. For example, most large and listed South Asian banks are state-owned ones. Similarly, foreign-owned banks are subject to additional compliance and regulation criteria than their local counterparts. Even though simple two sample tests indicate that market power and revenue diversification ratios are significantly different across state-owned versus private-owned ones, such differences are not evident once control variables are utilised in regressions.

3.2. Association between market power, revenue diversification and bank stability

The results from the fixed effect panel least squares estimate for the association between bank stability, revenue diversification and bank market power are provided in Table 5 (covering the entire sample period 1998–2008) and in Table 6 (excluding the crisis years, i.e., 1998–1999 and 2007–2008).[11]

The key variables of interest capturing the interaction effect between market power and revenue diversification on bank stability are *CON_LERNER* * RD* and *FUND_LERNER* *RD*. The respective coefficients of these are positive and significant implying that South Asian banks with greater market power are more stable when they diversify into non-traditional activities.[12] These findings are not influenced by the Asian Financial Crisis and the Global Financial Crisis as evidenced by Table 6, which only considers 2006–2007 period devoid of crisis-affected data.

In regards to control variables, positive associations are reported between bank stability and *BANK-SIZE*, *BUSINESS CYCLE* and *FINANCIAL DEVELOPMENT*. Thus, larger banks are more stable possibly due to their ability to derive enhanced diversification benefits (and opportunities) and economies of scale in information production, monitoring and transaction cost (Lepetit et al., 2008b). Also, those South Asian countries characterised by growing economies and greater financial development have more stable banks.

We also find that South Asian banks with riskier loan portfolios (as reflected by higher *NPL* ratios) are less stable. This finding is consistent with the coefficient for 3*k-CONCENTRATION* variable which indicate that more concentrated South Asian banking markets have less stable banks. Collectively, high concentration in these markets seems to generate increased competitive pressure resulting in enhanced lending to low-creditworthy customers. This, then is manifested in higher non-performing asset ratios and less stable banks.

3.3. Robustness tests

We subject our analyses to a number of robustness tests: a Granger causality test as an alternative test for endogeneity, a different proxy of the market structure (five-bank asset concentration, i.e., *5k-CONCENTRATION*), and alternative proxies for bank stability.

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[11] Eq. (3) was also re-estimated without Indian bank data. The results are consistent with our preliminary analysis and are available upon request.

[12] The alternative measures used for robustness purposes, *LOANSHARE*RD* and *DEPOSITSHARE*RD*, also support this view by showing consistently significant and positive coefficients (in Columns 5–8).

Table 5
Association between bank stability, revenue diversification and market power for selected South Asian banks in 1998–2008.

	Dependent variable: BS							
	CON_LERNER		FUND_LERNER		LOANSHARE		DEPOSITSHARE	
	1	2	3	4	5	6	7	8
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
RD	0.53*	1.88	0.53*	1.88	0.17**	0.38	1.20*	1.86
CON_LERNER	−0.29	−0.91	–	–	–	–	–	–
CON_LERNER*RD	0.58**	1.54	–	–	–	–	–	–
FUND_LERNER	–	–	−0.17	−0.47	–	–	–	–
FUND_LERNER*RD	–	–	0.79*	1.90	–	–	–	–
LOANSHARE	–	–	–	–	−0.16	−0.67	–	–
LOANSHARE*RD	–	–	–	–	1.73*	0.95	–	–
DEPOSITSHARE	–	–	–	–	–	–	−0.60	−0.71
DEPOSITSHARE*RD	–	–	–	–	–	–	0.20**	0.03
BANKSIZE	0.25***	3.83	0.08*	0.07	0.07**	0.84	0.07	0.73
EFFICIENCY	−0.00	−1.07	−0.00	−0.00	−0.00	−0.96	−0.00	-0.68
NPL	−1.33*	−0.66	−1.06***	−0.26	−3.11	−0.60	−0.73	−0.35
NIM	1.61	1.32	1.86**	0.95	1.58*	0.66	12.72*	1.96
EQUITY	0.03**	3.28	0.02	0.01	0.03	1.90	0.00	0.36
STATE	0.36*	1.86	0.27**	0.15	0.16	0.68	0.28	1.00
FOREIGN ≥ 50%	0.36	1.49	0.42	0.21	0.45	1.32	0.10	0.34
ISLAMIC PRODUCT	0.11	0.63	0.22	0.19	0.39*	1.85	0.22	1.03
LISTED	0.09	0.59	0.13	0.14	0.17	0.81	0.19	0.94
3k-CONCENTRATION	−2.12**	−2.06	−2.89**	−1.20	−1.05	−0.86	−1.34	−1.02
BANKING FREEDOM	0.01	0.95	0.01	0.02	0.02	1.53	0.01	0.49
RESTRICTIONS	−0.15	−1.76	−0.26	−0.10	−0.20	−1.96	−0.46	−3.88
BUSSINESS CYCLE	0.56***	15.50	0.54***	0.02	0.55***	11.99	0.59***	11.32
FINANCIAL DEVELOPMENT	1.47***	11.68	1.46***	0.13	1.16***	3.31	1.53***	4.22
CONSTANT	−0.04	−0.03	−0.55	−1.25	−1.50	−0.96	−2.57	−1.58
Adjusted R-squared	0.31		0.32		0.32		0.36	
F-Statistic	23.70		20.70		14.48		13.78	
Total panel (unbalanced) observations	724		716		543		581	

Note: The reported t-statistics are corrected for heteroskedasticity using robust standard errors in STATA software.

* Statistical significance at 10% level.

** Statistical significance at 5% level.

*** Statistical significance at 1% level.

Table 6
Association between bank stability, revenue diversification and market power for selected South Asian banks in 2000–2006.

	Dependent variable: BS							
	CON_LERNER		FUND_LERNER		LOANSHARE		DEPOSITSHARE	
	1	2	3	4	5	6	7	8
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
RD	2.03**	1.47	0.05**	0.06*	0.29**	0.99	0.08***	0.24
CON_LERNER	−0.29	−0.58	–	–	–	–	–	–
CON_LERNER*RD	0.57*	1.28	–	–	–	–	–	–
FUND_LERNER	–	–	−0.23	−0.64	–	–	–	–
FUND_LERNER*RD	–	–	0.51***	0.48	–	–	–	–
LOANSHARE	–	–	–	–	−0.00	−0.67	–	–
LOANSHARE*RD	–	–	–	–	0.01**	0.32	–	–
DEPOSITSHARE	–	–	–	–	–	–	−1.09	−2.29
DEPOSITSHARE*RD	–	–	–	–	–	–	0.15***	0.18
BANKSIZE	0.14**	1.96	0.17***	2.30	0.09***	1.58	0.08**	1.45
EFFICIENCY	−0.00	−0.09	−0.00	−0.39	−0.00	−0.25	−0.00	−0.19
NPL	−0.55*	−0.44	−0.56**	−0.44	−0.26**	−0.21	−0.49**	−0.39
NIM	0.81	0.73	1.30	1.13	1.23	1.16	4.43	1.58
EQUITY	0.01**	1.24	0.01**	1.07	0.01***	1.02	0.01**	0.85
STATE	0.36*	1.91	0.38**	1.96	0.22**	1.52	0.21**	1.30
FOREIGN ≥ 50%	0.18	0.75	0.18	0.74	0.01	0.07	0.12	0.51
ISLAMIC PRODUCT	0.13	0.75	0.10**	0.63	0.07**	0.49	0.19	1.24
LISTED	0.15	0.99	0.16	1.04	0.10	0.85	0.19	1.42
3k-CONCENTRATION	−1.50***	−1.54	−1.36***	−1.39	−0.86	−1.10	−2.01	−2.32
BANKING FREEDOM	−0.01	−1.54	−0.01	−1.53	−0.01	−1.71	−0.01	−1.29
RESTRICTIONS	−0.48	−5.22	−0.50	−5.43	−0.45	−6.10	−0.42	−4.96
BUSSINESS CYCLE	0.53**	12.79	0.53**	12.65	0.52**	14.81	0.58**	14.60
FINANCIAL DEVELOPMENT	0.06***	0.11	0.02***	0.03	0.38***	0.76	−0.13***	−0.25
CONSTANT	−0.81	−0.59	−1.20	−0.92	−0.15	−0.14	−0.25	−0.22
Adjusted R-squared	0.49		0.49		0.50		0.50	
F-statistic	28.07		28.03		39.33		34.31	
Total panel (unbalanced) observations	483		480		660		560	

Note: The reported t-statistics are corrected for heteroskedasticity using robust standard errors in STATA software.

* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

3.3.1. Alternative test for endogeneity – the Granger causality test

As rationalised by Hill et al. (2007), if the instruments used in the Durbin-Wu-Hausman test are weak, the estimator can suffer large biases and standard errors. Thus, a Granger causality test is employed as an alternative test for endogeneity. One of the test assumptions is that the two series to be tested are stationary. Therefore, a unit root test was used to verify this key assumption and the series proved stationary. As the Granger causality test values are below 0.05, there is causation between bank market power and non-interest income. Thus, the Granger causality test results confirm our Durbin-Wu-Hausman endogeneity test findings.

3.3.2. 5k-CONCENTRATION ratio in place of 3k-CONCENTRATION ratio

One drawback of *3k-CONCENTRATION* ratio is that there is no rule for determining of the value of *k*. Since assigning a value of 3 to *k* is arbitrary (Claessens and Laeven, 2004), a *5k-CONCENTRATION* ratio was then used in Eqs. (1)––(3). These results, available upon request, confirm that banks with higher market power earn more income from non-traditional activities and banks with greater market power are more stable when they diversify their revenue.

3.3.3. RR-ROA and RR-ROE in place of Z-score

Following Mercieca et al. (2007) and Turk-Ariss (2010), we utilised risk-adjusted return for each bank as an alternative measure of bank stability. Thus, Eq. (3) was re-estimated and the results are broadly consistent (in regards to hypotheses tested in this study) with those with the primary bank *Z-score* estimation.

4. Conclusion

This paper investigated the association between bank market power and revenue diversification and whether revenue diversification interacts with market power affecting bank stability. These research issues were explored in the context of 151 commercial banks from four South Asian countries (Bangladesh, India, Pakistan and Sri Lanka) over 1998–2008. We find that South Asian banks with higher market power generate less income from non-traditional activities. In other words, these banks' market power in lending markets has not translated into higher income from non-traditional activities. In contrast, those banks characterised by (1) higher capital ratios and credit losses and (2) Sharia-compliant Islamic banking windows focus more on fee and commission generating activities. At the country level, banks in better performing economies with greater financial development generate higher shares of non-interest income.

Our results also indicate that South Asian banks with greater market power are more stable when they diversify into non-traditional activities. Moreover, high market concentration seems to generate increased competitive pressure resulting in enhanced lending to low-creditworthy customers. This then is manifested in higher non-performing asset ratios for less stable banks. Overall, our findings are not influenced by the Asian Financial Crisis and the Global Financial Crisis as evidenced by robustness checks.

These findings provide important implications for bank managers, investors, regulators and policy makers. For bankers, it shows that activity restrictions hinder banks' ability to earn non-interest income through revenue diversification strategies. For investors, our findings highlight South Asian banks better revenue diversification strategies. Large, well-capitalised banks and banks offering Islamic products fall into this category. For the regulators and policy makers, our findings emphasize the positive impact of regulation on bank stability.

Appendix A.

Table A1
Domicile and ownership of sample banks.

	Bangladesh	India	Pakistan	Sri Lanka
No. of commercial banks	30	78	30	13
Of sample banks				
State-owned	3	20	1	2
Private-owned	27	58	29	11
Foreign owned (>50% shares)	0	8	5	0
Domestic owned	30	70	25	13
Listed	25	58	26	7
Non-listed	5	20	4	6

Source: Compiled by the authors from respective central bank reports and the *BankScope* database.
Note: This table details the number of sample banks (after excluding foreign branches that do not produce separate financial reports) in four South Asian countries (Bangladesh, India, Pakistan and Sri Lanka) and their ownership.

References

Aleem, A., 2010. Transmission mechanism of monetary policy in India. Journal of Asian Economics 21, 186–197.

Agoraki, M., Delis, M.D., Pasiouras, F., 2011. Regulations, competition and bank risk-taking in transition countries. Journal of Financial Stability 7, 38–48.

Arellano, M., Bover, O., 1995. Another look at the instrumental variable estimation of error-components models. Journal of Econometrics 68, 29–51.

Barth, J.R., Caprio, G., Levine, R., 2004. Bank regulation and supervision: what works best? Journal of Financial Intermediation 13, 205–248.

Barth, J.R., Caprio, G., Levine, R., 2008. Bank regulations are changing: for better or worse? Comparative Economic Studies 50, 537–563.

Barth, J.R., Dopico, L.G., Nolle, D.E., Wilcox, J.A., 2002. Bank safety and soundness and the structure of bank supervision: a cross-country analysis. International Review of Finance 3, 163–188.

Beck, T., Demirgüç-Kunt, A., Levine, R., 2006. Bank concentration, competition and crises: first results. Journal of Banking and Finance 30, 1581–1603.

Berger, A., Klapper, L., Turk-Ariss, R., 2009. Bank competition and financial stability. Journal of Financial Services Research 35, 99–118.

Bikker, J.A., Haaf, K., 2002. Competition, concentration and their relationship: an empirical analysis of the banking industry. Journal of Banking and Finance 26, 2191–2214.

Boyd, J.H., DeNicoló, G., 2005. The theory of bank risk-taking and competition revisited. Journal of Finance 60, 1329–1343.

Brissimis, S.N., Delis, M.D., Papanikolaou, N.I., 2008. Exploring the nexus between banking sector reform and performance: evidence from newly acceded EU countries. Journal of Banking and Finance 32, 2674–2683.

Blundell, R., Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics 87, 115–143.

Carbó-Valverde, S., Rodríguez-Fernández, F., 2007. The determinants of bank margins in European banking. Journal of Banking and Finance 31, 2043–2063.

Claessens, S., Laeven, L., 2004. What drives bank competition? Some international evidence. Journal of Money, Credit and Banking 36, 563–583.

Chong, B.S., Liu, M.H., 2009. Islamic banking: interest-free or interest-based? Pacific-Basin Finance Journal 17, 125–144.

Delis, M.D., Tsionas, E.G., 2009. The joint estimation of bank-level market power and efficiency. Journal of Banking and Finance 33, 1842–1850.

DeYoung, R., Rice, T., 2004. Noninterest income and financial performance at U.S. commercial banks. Financial Review 39, 101–127.

Fitch Ratings, Bureau van Dijk, 2011. BankScope: Electronic for Publishing. World Banking Information Service, Singapore.

Fiordelisi, F., Marques-Ibanez, D., Molyneux, P., 2011. Efficiency and risk in European banking. Journal of Banking and Finance 35, 1315–1326.

Fonseca, A.R., González, F., 2010. How bank capital buffers vary across countries: the influence of cost of deposits, market power and bank regulation. Journal of Banking and Finance 34, 892–902.

Havrylchyk, O., 2006. Efficiency of the Polish banking industry: foreign versus domestic banks. Journal of Banking and Finance 30, 1975–1996.

Hill, R., Griffiths, W., Lim, G., 2007. Principles of Econometrics, 3rd edition. Wiley, United States.

International Monetary Fund, 2011. International Financial Statistics CD ROM 2009. Washington, DC.

Jiménez, G., Saurina, J., 2004. Collateral, type of lender and relationship banking as determinants of credit risk. Journal of Banking and Finance 28, 2191–2212.

Karim, R.A.A., 2001. International accounting harmonization, banking regulation and Islamic banks. International Journal of Accounting 36, 169–194.

Koutsomanoli-Filippaki, A., Mamatzakis, E., 2009. Performance and Merton-type default risk of listed banks in the EU: a panel VAR approach. Journal of Banking and Finance 33, 2050–2061.

Lensink, R., Meesters, A., Naaborg, I., 2008. Bank efficiency and foreign ownership: do good institutions matter? Journal of Banking and Finance 32, 834–844.

Lepetit, L., Nys, E., Rous, P., Tarazi, A., 2008a. Bank income structure and risk: an empirical analysis of European banks. Journal of Banking and Finance 32, 1452–1467.

Lepetit, L., Nys, E., Rous, P., Tarazi, A., 2008b. The expansion of services in European banking: implications for loan pricing and interest margins. Journal of Banking and Finance 32, 2325–2335.

Lozano-Vivas, A., Pasiouras, F., 2010. The impact of non-traditional activities on the estimation of bank efficiency: international evidence. Journal of Banking and Finance 34, 1436–1449.

Maudos, J., Fernández-de-Guevara, J.F., 2004. Factors explaining the interest margin in the banking sectors of the European Union. Journal of Banking and Finance 28, 2259–2281.

Maudos, J., Fernández-de-Guevara, J.F., 2007. The cost of market power in banking: social welfare loss vs. cost inefficiency. Journal of Banking and Finance 31, 2103–2125.

Maudos, J., Solís, L., 2009. The determinants of net interest income in the Mexican banking system: an integrated model. Journal of Banking and Finance 33, 1920–1931.

Mercieca, S., Schaeck, K., Wolfe, S., 2007. Small European banks: benefits from diversification? Journal of Banking and Finance 31, 1975–1998.

Perera, S., Skully, M.T., Wickramanayake, J., 2007. Cost efficiency in South Asian banking: the impact of bank size state ownership and stock exchange listings. International Review of Finance 7, 35–60.

Rogers, K., Sinkey, J.F., 1999. An analysis of non-traditional activities at U.S. commercial banks. Review of Financial Economics 8, 25–39.

Sapienza, P., 2002. The effects of banking mergers on loan contracts. Journal of Finance 57, 329–368.

Schaeck, K., Cihak, M., Wolfe, S., 2009. Are competitive banking systems more stable? Journal of Money, Credit and Banking 41, 711–734.

Stiroh, K., 2004. Diversification in banking: is non-interest income the answer? Journal of Money, Credit and Banking 36, 853–882.

Stiroh, K., Rumble, A., 2006. The dark side of diversification: the case of US financial holding companies. Journal of Banking and Finance 30, 2131–2161.

Sturm, J.-E., Williams, B., 2008. Characteristics determining the efficiency of foreign banks in Australia. Journal of Banking and Finance 32, 2346–2360.

Turk-Ariss, R., 2010. On the implications of market power in banking: evidence from developing countries. Journal of Banking and Finance 34, 765–775.