Charter Value and Risk-taking: Evidence from Indian Banks

Saibal, Ghosh
Reserve Bank of India

01. August 2009

Charter Value and Risk-taking: Evidence from Indian Banks

Saibal Ghosh

1. Introduction

A central problem with banks is that of moral hazard: with deposit rates being less responsive to bank risk-taking owing to deposit insurance, banks could be tempted to lower capital asset ratios and increase asset risk, thereby increasing the probability of default and extracting wealth from the deposit insurance system.

However, the prediction of moral hazard theory that banks assume extreme risks contrasts with the behavior of banks in real world. First, banks typically hold capital buffer in excess of the regulatory minimum capital requirements. And second, the majority of banks seem to have a low probability of default and therefore, they extract virtually no wealth from the deposit insurance system.

These findings have inspired the literature to search for an incentive that could moderate the moral hazard behavior of banks. Such an incentive has been found in banks charter value (Marcus, 1984). The charter value is the net present value of future rents. This value would be lost in case of bankruptcy and hence, represents the bank's private cost of failure. In case of over-extension by a bank, equity holders can sell their shares, putting pressure on share prices and placing bank management under increased scrutiny. Therefore, charter value is also referred to as self-discipline in the literature (Agusman *et al*., 2006).

An increasing number of articles have examined the disciplining effect of charter value on banks' risk-taking, which is measured either as default risk, asset risk or leverage risk. Keeley (1990) finds that US banks with higher charter value have a low leverage risk (measured as capital to asset ratio on a market-value basis) and lower default risk, as reflected in lower risk premia on large, uninsured CDs. Demsetz *et al.* (1996) also reports that US banks with higher charter value have lower default risk, their

measure of default being based on banks' stock return volatility. Gropp and Vesala (2004) uncover evidence that EU banks with higher charter values have lower leverage risk (defined as book value of liabilities over market value of assets). More recent evidence for US banks also confirms the disciplining effect of charter value (Furlong and Kwan, 2005).[1]

In addition to examining the nexus between charter value and bank risk, the literature has also studied the effect of competition on charter value. Hellmann *et al* (2000) present a theoretical model which shows that if competition erodes the bank's charter value, banks decrease capital-to-asset ratios and increase asset risk. Keeley (1990) provides empirical evidence supporting this hypothesis: the liberalization of branching restrictions and multi-bank holding company expansion laws in US had a negative effect on banks' charter value. The conclusion reached veers towards the view that increased competition diminishes charter value.

A number of factors make the banking sector in India an interesting case to study the interlinkage between bank risk and charter value. First, over the 1990s, India has undergone liberalization of the banking sector with the objective of enhancing efficiency, productivity and profitability (Government of India, 1991). Second, the banking sector witnessed important transformation, driven by the need for creating a market-driven, productive and competitive economy in order to support higher investment levels and accentuate growth' (Government of India, 1998). Third, most studies on charter value pertain to developed country markets (Keeley, 1990; Gropp and Vesala, 2004; Furlong and Kwan, 2005). The issue as to the interplay between charter value and bank risk in emerging markets as India where the financial system is pre-dominantly bank-based and government-owned remains a moot issue. Fourth, in tandem with the process of financial sector reforms, the capital base of state-owned banks has been broad-based

[1] Another strand of the literature argues that depositor discipline is a useful alternate to curb bank risk-taking, since banks perceived to be risky from the depositors' standpoint would pay higher deposit interest rates. Evidence on this count suggest that banks hold adequate capital buffers to compensate for possible risk of default (Nier and Baumann, 2006). More recently, Ghosh (2008) finds that charter value, depositor discipline and bank risk-taking are intertwined: whereas charter value is a nonlinear determinant of market discipline, the latter is found to positively impact charter value. Additionally, higher risk-taking is found to exert a weakening effect on market discipline.

through infusion of equity capital from the market, while still retaining majority government holding, a process commonly referred to as *equity privatization* (Boubakri *et* al., 2005). The issue as to whether such privatizations impact charter value is as yet an unexplored aspect and is empirically explored in the paper. Finally, prudential norms in India have gradually been brought on par with international best practices. Therefore, whether and as to how regulatory changes impact charter value in an emerging economy remains an interesting topic of empirical research. The findings so obtained may have implications for the design of regulatory policies in other emerging economies.

The present article contributes to the empirical literature in several distinct ways. First, it is perhaps the first study to explore the interlinkage between charter value and bank risk-taking for India. Second, in addition to investigating the disciplining effect of charter value on banks' risk taking, we also examine the determinants of charter value, placing a particular emphasis on competition. To do so, we use a two-step approach. In the first-step, we regress banks' charter value on bank-specific variables approximating the degree of competition. In the second step, we regress banks' risk-taking on charter value. Hence, this approach models the link between competition and banks' charter value explicitly. Finally, in addition to conventional measures of risk, we employ an accounting measure of the distance to default, the *Z-score* (Furlong and Kwan, 2005; Mercieca *et al*, 2007). [2] Since the number of standard deviations that an institution is away from risk can measure insolvency risk, we also employ the Z score to assess the insolvency risk.[3]

The reminder of the article continues as follows. Section 2 provides an overview of Indian banking. Section 3 describes the empirical model and the methodology. The variable definitions and their expected effect on risk-taking are provided in Section 4, followed by the data (Section 5) and results (Section 6). The final section concludes.

---

[2] De Nicolo (2000) employs the term 'insolvency risk' instead of *Z-score*.

[3] Let $\mu \equiv$ expected earnings, $\sigma \equiv$ standard deviation and k ≡ capital to asset. Then Z-score≡$(k+\mu)/\sigma$ is the number of standard deviation below the mean earnings that just wipes out capital. A higher Z score indicates improved risk-adjusted performance.

2. Indian banking sector: An overview

The Indian banking system is characterized by a large number of banks with mixed ownership[1]. The commercial banking segment presently comprises 28 public sector banks in which Government has majority ownership of over 51%, 27 private sector banks and 29 foreign banks. Total bank assets constituted a little over 80% of GDP in 2005-06. Public sector banks had roughly three-quarter share in the assets of the banking system in 2005-06, while private and foreign banks constituted the remaining. In 1991, public sector banks share in the total assets of the banking system was over 90%.

Prior to the initiation of financial sector reforms in 1992, the Indian financial system essentially catered to the needs of planned development where the Government sector had a predominant role in every sphere of economic activity. The pre-emption of a large proportion of bank deposits in the form of reserves and an administered interest rate regime resulted in high cost and low quality financial intermediation. The existence of a complex structure of interest rates arising from economic and social concerns of providing concessional credit to certain sectors resulted in cross subsidization, which implied that higher rates were charged from non-concessional borrowers. The system of administered interest rates was characterized by detailed regulatory prescriptions on lending and deposit, leading to a multiplicity of interest rates. As a result, the spreads between deposit and lending rates of commercial banks increased, while the administered lending rates did not factor in credit risk. The lack of recognition of the importance of transparency, accountability and prudential norms in the operations of the banking system led also to a rising burden of non-performing assets. On the expenditure front, inflexibility in licensing of branches and management structures constrained the operational independence and functional autonomy of banks and raised overhead costs. The environment in the financial sector during this period was characterized by segmented and underdeveloped financial markets. This resulted in distortion of interest rates and the inefficient allocation of scarce resources.

The period 1992-97 laid the foundations for reforms in the banking system. It witnessed the implementation of prudential norms pertaining to capital adequacy, income recognition, asset classification, provisioning and exposure norms. While these reforms were being implemented, the world economy also witnessed significant changes, 'coinciding with the movement towards global integration of financial services' (Government of India, 1998). Against such backdrop, a second Government-appointed Committee on banking sector reforms provided the blueprint for the current reform process (Government of India, 1998).

Critical and noteworthy reforms in the financial system during the reform period included (Bhide *et al*., 2001; Mohan, 2004; Reddy, 2006):

(a) Lowering of statutory reserve requirements from their erstwhile high levels;
(b) Liberalizing the interest rate regime, allowing banks the freedom to choose their deposit and lending rates;
(c) Infusing competition by allowing more liberal entry of foreign banks and permitting the establishment of new private banks;
(d) Introducing micro-prudential measures (capital adequacy requirements, income recognition, asset classification and provisioning norms for loans, exposure norms, accounting norms);
(e) Diversifying ownership of public sector banks by enabling the state-owned banks to raise up to 49 per cent of their capital from the market. Nineteen state-owned banks accessed the capital market and raised around Rs 110 billion till end-March 2006.

As a consequence of the reforms, the share of public sector banks in total assets of the banking system reduced from 90% to less than 75% between 1991 and 2006. The five bank asset concentration ratio declined from 0.51 in 1991-92 to 0.44 in 1995-96 and thereafter to 0.42 in 2005-06 (Table 1).

Table 1: Summary of the banking industry: 1990-91 to 2005-06

Year /	1990-91			1996-97			2005-06		
Bank Group	SOB	Pvt.	Forgn.	SOB	Pvt.	Forgn.	SOB	Pvt.	Forgn.
No. of banks	28	25	23	27	34	42	28	28	29
Total asset	2929	119	154	5563	606	561	20149	5716	1994
Total deposit	2087	94	85	4493	498	373	16225	4285	1137
Total credit	1306	50	51	2202	281	265	11063	3130	976
Credit-deposit ratio	0.63	0.52	0.60	0.49	0.56	0.71	0.68	0.73	0.86
Share (in per cent)									
Total asset	92	4	4	83	9	8	72	21	7
Total deposit	92	4	4	84	9	7	75	20	5
Total credit	93	4	3	80	10	10	73	21	6
Total income	246	11	15	536	74	76	1598	433	177
of which:	239	9.3	12.7	465	64	62			
interest income							1379	352	123
Total expenditure	241	10.7	13	540	61	56	1432	383	146
of which:	183	6.3	8.9	309	31.7	32			
interest expenses							805	215	51
Net profit	5	0.3	2	71	13	20	165	50	46

Amount in Rs. billion

SOB. State-owned Banks; Pvt. Private Sector Banks; Forgn: Foreign Banks

Source: RBI

3. Empirical specification

The econometric analysis proceeds in two stages. First, it examines the effect of banks' charter value on their risk-taking behavior, appropriately taking on board the Indian market realities. And second, it analyzes the determinants of banks' charter value and hence, the factors that ultimately drive banks' risk-taking. Accordingly, we employ a two-stage regression procedure: where the determinants of charter value are studied (step 1) and subsequently, the impact of charter value on banks' risk-taking (step 2) is examined.

Since the charter value of banks mirrors market power, which is built up over several periods, we employ a dynamic specification for bank *i* at time *t* as given by (1):

$$q_{i,t} = \alpha_o + \alpha_1 q_{i,t-1} + X_{i,t}\beta + u_{i,t} \qquad \textbf{(1)}$$

where q is the charter value of the bank, $\boldsymbol{X}$ is a vector of bank-specific and macroeconomic variables. The error term is assumed to comprise of a bank-specific component μ_i and white noise, $\varepsilon_{i,t}$, such that $u_{i,t} = \mu_i + \varepsilon_{i,t}$ where $\mu_i \sim$IID $(0, \sigma_u^2)$ and $\varepsilon_i \sim$IID $(0, \sigma_\varepsilon^2)$, independent of each other and among themselves.

In the second stage, we regress banks' risk-taking on their charter value and a set of controls. As banks may adjust risk over several periods, the following specification is postulated as given by (2):

$$RISK_{i,t} = \gamma_o + \gamma_1 RISK_{i,t-1} + \gamma_2 \hat{q}_{i,t} + \gamma_3 Z_{i,t} + w_{i,t} \quad \textbf{(2)}$$

where *RISK* is the measure of bank risk, $\hat{q}$ (*q-hat*) is the predicted charter value as obtained from (1), $\boldsymbol{Z}$ is a vector of bank-specific control variables. The error term, as earlier, is assumed to comprise of a bank-specific component η_i and white noise, $\nu_{i,t}$, such that $w_{i,t} = \eta_i + \nu_{i,t}$ where $\eta_i \sim IID\ (0, \sigma_\eta^2)$ and $\nu_i \sim IID\ (0, \sigma_\nu^2)$, independent of each other and among themselves. In order for bank charter value to discipline bank risk taking, charter value in (2) is expected to have a positive effect on *BUF*, *CAP*, *LLP* and *Z-score* and a negative effect on *NPL* and *RISK*.

In the first step, we test whether more efficient banks have higher charter value and whether banks generate rents in the deposit or loan market. The main hypothesis is that competition decreases banks' charter values. Therefore, taking as null the hypothesis that competition does not affect banks' charter value, we test the following hypothesis:

H1: Competition has a negative effect on banks' charter value

Besides, following from our previous discussion, we also test the following hypothesis.

H2: Tightening of prudential regulations has a negative effect on banks' risk taking.

With respect to the second-step regressions, we test whether charter value has a moderating effect on banks' risk-taking behavior. In line with the empirical literature (Keeley, 1990; Gropp and Vesala, 2004), we test whether banks with higher charter values have a low probability of default, as given by higher capital (buffers) and lower

asset risk. Hence, taking as the null hypothesis that charter value does not have an effect on banks' capital and asset risk, we test the following hypothesis:

H3: Banks charter value has a positive (negative) effect on capital (asset risk)

Since several state-owned banks have been privatized at different time points over the sample period, we examine whether the process of partial privatization has had any impact on bank charters. To the extent that induction of private shareholding has implications for shareholders' values, such as market capitalization, representation on the board and interests of minority shareholders, it seems likely that such a process would tend to contain bank risk taking. This leads to the following hypothesis for state-owned banks:

H4: The extent of partial privatization has a salutary effect on banks' risk taking

Given the empirical model in (1) and (2), we employ dynamic panel data techniques that control for bank-specific effects μ_i and η_i . We present only the two-step GMM estimates, since they are asymptotically more efficient. Finally, as bank's charter value may be endogenous, we use the GMM-style instruments for q. The first-step regressions justify this procedure, as lagged q is found to be significant in the regression for q_i. Hence, lagged levels of q_i contain information on q_i and can serve as instruments for q_i.

4. Variables and methodology

In the present analysis, a bank's charter value (*CV*) is defined as the net present value of future rents that a bank earns while in business. Definitionally, it equals the market of a bank's assets *minus* its replacement cost. We take the aggregate of market value of equity (MVE) and book value of liabilities as a proxy for market value of assets, since the latter is not readily available,. Likewise, the replacement cost of assets is proxied by their book value. Accordingly, the definition of bank's charter value in the present set up is as provided by expression (3):

$$CV_{i,t} = Equity\,capital_{i,t}^{market\,calue} + Liabilities_{i,t}^{book\,value} - Assets_{i,t}^{book\,value} \quad \textbf{(3)}$$

After some re-arrangement, (3) can be re-written as:

$$q_{i,t} = \frac{CV_{i,t}}{Assets_{i,t}^{book\,value}} + 1 = \frac{Equity\,capital_{i,t}^{market\,calue} + Liabilities_{i,t}^{book\,value}}{Assets_{i,t}^{book\,value}} \quad \textbf{(4)}$$

where all measures are taken at end of year *t*.

The assumption is that the charter value is capitalized into the market value of equity, but not into the book value of assets. Hence, a bank with high charter value should have higher *q*. Notwithstanding the limitations, it provides a operational measure of a bank's charter value, as it takes on board both the asset and liabilities sides of the balance sheet: greater market power in loan (asset) and deposit (liabilities) markets would be reflected in higher *q*.[4]

With respect to risk-taking, we use several measures that capture different aspects of risk. First, we use the banks' absolute capital buffer *BUF*. The idea is that *BUF* is a measure of banks' distance to default. In addition, we decompose the absolute capital buffer into capital and risk-weighted assets, as they measure two different aspects of banks' risk-taking. Fourth, banks' asset risk is also determined by the quality of its loan portfolio. Hence, we use the ratio of gross non-performing loans to total loans (*NPL*). And finally, we use the banks' *Z-score* as a measure of bank soundness (Boyd and Runkle, 1993; Beck and Laeven, 2006). The relevance of this measure stems from the fact that it is directly related to the probability of a bank's insolvency, *i.e.*, the probability that the value of its assets becomes lower than the value of the debt.

In step 1, we regress banks' charter value on its determinants. To account for bank efficiency, we include the banks cost-income ratio, *CIR*. As banks with higher efficiency are expected to earn higher rents, *CIR* is included with an expected negative

[4] It needs to be borne in mind that such a measure is not without its shortcomings. The first is possible measurement errors in both the numerator and denominator. For instance, the book value of liabilities is a good proxy for market value of equity when liabilities comprise primarily of short-term debt. If banks rely more on market-based sources of funding, the market value of liabilities could become more sensitive to interest rate changes, not captured in the book value. Second, the book value of assets is measured as historical cost, not at current replacement costs. Hence, when *q* is observed to be different from unity, the difference may be due to asset return realization rather than to banks' market power.

sign (Berger and DeYoung, 1997). Second, we use the ratio of current and savings deposits to total assets (*CORE*) and loans to asset (*LOAN*) ratio to test whether banks extract rents in the deposit and loan markets. We include the variable NIC to capture whether banking organizations earn rents from providing financial services that generate non-interest revenues (Furlong and Kwan, 2005). Finally, bank size may affect charter value, as large banks may have greater market power. To incorporate this possible, the natural logarithm of total bank asset *SIZE* is included with an expected positive sign (De Nicolo, 2000).

In order to explore the effect of competition on charter value, we include the Herfindahl index of concentration in the deposit market.[5] This variable has been employed by Petersen and Rajan (1995) as a measure of loan market power. As market concentration increases, economic theory suggests that competition declines. This line of discussion derives from the economics of increased market power with a larger share of the market concentrated in one or a few firms. As a result, *Herfindahl* is inversely related to the degree of competition. Therefore, for hypothesis *H1* to be valid, the coefficient on the concentration variable is expected be positive. We also control for monetary policy conditions by employing the yield on 364-day T-bills (*YLD364*). At the macro level, we include the real GDP growth rate and the orientation of the financial system (Ergungor, 2004).

In the second-step regressions (eq. 2), we regress risk-taking on charter value and bank-specific control variables. The impact of the bank-specific variables on the measure of risk-taking can be summarized as follows.

Financial liberalization is expected to exert a direct effect on bank risk-taking: banks retain part of their earnings, thereby increasing their ratio of capital to assets and their capital buffer. Hellmann *et al.* (2000) contend that financial market liberalization reduced profitability and franchise value of domestic banks and prompted greater risk

[5] The Herfindahl index is defined as the sum of squares of market shares. Another possibility could be to utilize the Panzar-Rose H-statistics.

taking, which was an important factor behind the East Asian crisis. To address this aspect, we include the banks' net interest margin (*NIM*) with an expected negative sign.

Bank size can have direct effect on their risk-taking behavior. On the one hand, since large banks are assumed to have general capability to diversify their risks, this would suggest a negative relationship (Demsetz *et al,* 1996). On the other hand, the 'too-big-to-fail' theory suggests that large banks have a higher probability of being bailed out in distress given the possible systemic ramifications (Galloway *et al*., 1997). These considerations prompt us to include the natural logarithm of total asset *SIZE* with ambiguous expectations regarding the estimated sign.

Market discipline may exert a moderating effect on banks' risk-taking, as uninsured debtors may force banks to have more capital, less risk-weighted assets, higher capital buffers, better asset quality and better overall soundness (Park and Peristiani, 1998; Goldberg and Higgins, 2002). We approximate this by employing the ratio of sub-ordinated debt to total asset (*SDEBT*).

We also control for the impact of banks' risk-management skills. The idea is that banks with higher charter values may have superior skills in risk management and therefore, better control their probability of default. Hence, they can afford to have less capital, lower capital buffers, asset quality and soundness as also higher risk-weighted assets (Casu and Molyneux, 2003). The ratio of off-balance sheet activities to total assets (*OBS*) is included to capture this aspect with an expected positive sign on banks' risk-taking.

Apart from indirect effects through charter value, efficiency could have a direct effect on risk-taking, as banks with a low degree of efficiency may also exhibit higher default probability. Therefore, following from Agusman *et. al.* (2006) and Furlong and Kwan (2005), we include the banks' cost income ratio *CIR* with an expected negative sign. Finally, year dummies (not reported) are included to capture year-specific effects not directly incorporated into the analysis.

5. Data description

The time period of the study spans 1996-2006 and comprises of 33 banks including 19 state-owned, 4 *de novo* private and 10 old private banks, comprising, on average around 85% of banking sector assets over the sample period. The data for the analysis are drawn primarily from *Statistical tables relating to banks in India*, a yearly publication by the Indian central bank that reports bank-wise balance sheet and profit and loss numbers. The prudential ratios for banks are culled out from *Report on trend and progress of banks in India,* a statutory publication by the Indian central bank that provides bank-level prudential and financial ratios. Taken together, these two publications account for almost all of the bank-level variables employed in the analysis. The macro variables for the study come from the *Handbook of Statistics on Indian economy*, another annual central bank publication that reports time-series data on monetary and macro variables.

As explained earlier, the computation of charter value involves calculating the market value of equity, which is extracted from the *Prowess* database, a firm-level database of manufacturing and services companies (CMIE, 2007). We extract the NSE closing share price and multiply it by the number of outstanding shares of listed banks, which yields the market value of equity.[6] Given that banks became listed at different time points over the sample, we are consequently left with an unbalanced panel of banks, comprising of a minimum of 9 in the beginning year of the sample to a maximum of 33 in 2006.

The empirical definition of the variables along with the summary statistics is provided in Table 2. The table shows that banks' average charter value ranges equals 1.05 with high standard deviation. Hence, the average bank seems to exhibit a low degree of market power.

[6] National Stock Exchange (NSE) is the state-of –the-art exchange for listed companies in India, which commenced operations in November 1994.

Table 2: Variables and summary statistics

Variable	Empirical definition	Obs.	Mean	Std.Devn.
Bank-level				
q	(Market value of equity + book value of liabilities)/Book value of asset	359	0.986	0.081
BUF (a)	(Actual CRAR – Regulatory minimum CRAR)/Regulatory minimum CRAR	363	0.464	1.107
CAP	Regulatory capital/Total asset	363	0.071	0.052
RISK	Risk weighted asset/Total asset	363	0.564	0.205
CIR	Cost income ratio = Operating expense/(Total income - interest expense)	363	0.552	0.152
CORE	Savings and term deposits/Total asset	363	0.681	0.091
LOAN	Loan/Total asset	363	0.451	0.076
RoA	Return on asset=Net profit/Total asset	363	0.008	0.007
NIM	(Interest income – interest expense)/Total asset	363	0.028	0.007
SIZE	Natural log of total asset	363	9.614	1.293
NPL	Non-performing loans/Total loans	363	0.091	0.056
LLP (b)	Loans loss provisions*100/Total loans	330	0.093	0.216
SDEBT	Sub-ordinated debt/Total asset	363	0.013	0.037
OBS	Off-balance sheet items/Total asset	363	0.416	0.456
Z-score	Measure of bank soundness = [(RoA+CAP)/Std. Devn. (RoA)]/100	363	0.230	0.200
NIC	Non-interest income/(Non-interest income + Net interest income)	363	0.349	0.108
Banking-industry				
HHI deposit	Herfindahl index of deposit market concentration	363	0.067	0.005
HHI credit	Herfindahl index of loan market concentration	363	0.066	0.008
YLD364	Real yield on 364-day T-bills	363	0.063	0.014
Macroeconomic				
GDPGR	Real GDP growth	363	0.064	0.015
Orientation	Log (Stock market capitalisation/bank credit)	363	0.170	0.129
dy SOB	Unity if bank is state-owned, else zero	363	0.576	0.494
dy NPB	Unity if bank is new private, else zero	363	0.152	0.359
dy OPB	Unity if bank is old private, else zero	363	0.273	0.446

(a) Regulatory minimum CRAR was 8 per cent till 1999 and 9 per cent thereafter
(b) Data is available from 1997 onwards

6. Regression Analysis

6.1 Charter value

In both specifications (1)and (2), the inclusion of lagged dependent variable (LDV) renders static panel estimation inconsistent. As a consequence, we resort to the Generalised Method of Moments (GMM) estimator in Arellano and Bond (1991) to obtain consistent estimates of the above model. Such data techniques enables to control for potential endogeneity of privatization and the persistence in performance measures. Following the recommendation by Arellano and Bond (1991), their two-step GMM estimator is applied for interference on model specification. Specifically, with respect to the validity of instruments, we conduct a Sargan test for the null hypothesis that the over-identifying restrictions are valid. We use the lags of all variables (in levels) from the second lag as instruments.

The consistency of the estimates also depends on the absence of serial correlation in the error terms. This will be the case if the differenced residuals display significant negative first order serial correlation and no second order serial correlation. We present tests for first-order and second-order serial correlation related to the estimated residuals in first differences. The test statistics are asymptotically distributed as standard normal variables. The null hypothesis here relates to insignificance, so that a low p-value for the test on first-order serial correlation and a high p-value for the test on second-order serial correlation suggest that the disturbances are not serially correlated.

We first detail the first-step regressions, which study the determinants of banks' charter value. The results, reported in Table 3 show that we are not able to reject the Sargan test. Moreover, we are not able to reject the null hypothesis of no second-order serial correlation. In other words, this suggests that the GMM model is well specified.

As one of the reasons for running the first-step regressions is to see whether lagged levels of q are suitable instruments for q in the second-stage regressions, we first estimate a pure autoregressive model. Specification 1 shows that the coefficient on lagged q is positive and significant at the 0.01 level, with a point estimate equal to 0.37, suggestive of a persistence effect. A Wald test rejects the hypothesis that the coefficient equals one, indicating that banks charter value does not follow a random walk. Hence, lagged values of q seem to provide information on q and are, thus, suitable instruments for q.

Models 2-6 sequentially introduces the concentration measures for deposit and loans (Models 2 and 3) financial market conditions (Model 4), macroeconomic variables (Model 5) and bank-specific factors (Model 6). The idea is to ascertain the effect of each of these variables on banks' charter value in isolation, uncontaminated by other factors.

Higher values of *HHI deposit*, which is tantamount to lower competition, dampens charter value, consistent with *H1* (Model 2). Given that retail deposits are the mainstay of banks' funding, greater reliance on stored liquidity is viewed as banks being better equipped to handle exigencies, with a positive effect on charter values. On the other hand, higher loan market concentration positively impacts charter value (Model

3). This is consistent with the structure-conduct-performance hypothesis which argues that high competition allows for non-competitive behavior and greater intermediation margin, that results in higher profits for firms. Besides the economic significance, the magnitude is important as well. In case of deposit, a one standard deviation increase in *HHI deposit* produces a 0.06 standard deviation decline in charter value. In case of *HHI loans* on the other hand, a one standard deviation rise in *HHI loan* improves charter value by 0.04 standard deviation.

Table 3: Determinants of banks' charter value

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Lag *q*	0.365 (0.005)***	0.339 (0.0006)***	0.319 (0.001)***	0.336 (0.001)***	0.321 (0.001)***	0.258 (0.012)***
HHI deposit		-1.029 (0.048)***				
HHI credit			0.403 (0.061)***			
YLD364				0.406 (0.006)***		
GDPGR					0.253 (0.011)***	
Orientation					0.014 (0.001)***	
CIR						-0.062 (0.012)***
CORE						-0.002 (0.007)
LOAN						-0.149 (0.039)***
SIZE						-0.028 (0.004)***
NIC						0.047 (0.015)***
dy SOB	-0.002 (0.0006)***	-0.002 (0.0006)***	-0.003 (0.0005)***	-0.003 0.0005)***	-0.002 (0.0006)***	-0.002 (0.001)**
dy NPB	0.003 (0.0008)***	0.003 (0.0007)***	0.004 (0.0006)***	0.003 (0.0007)***	0.004 (0.0005)***	0.008 (0.002)***
Constant	0.012 (0.0007)***	0.004 (0.0002)***	0.002 (0.0004)***	0.001 (0.0004)***	0.0007 (0.0003)**	0.022 (0.002)***
Year dummies	Yes	No	No	No	No	Yes
Observations	293	293	293	293	293	293
# banks	33	28	33	33	33	33
Sargan test	0.998	0.893	0.897	0.901	0.902	0.978
AR (1) test	0.084	0.070	0.065	0.079	0.081	0.079
AR (2) test	0.186	0.204	0.179	0.218	0.238	0.233

Standard errors within parentheses

***, ** and * denote statistical significance at 1, 5 and 10%, respectively

AR (1) and AR (2) are the first-and second-order autocorrelation and follow N(0, 1)

In Model 4, the coefficient on *YLD364* is positive and significant. In other words, a monetary tightening (increase in yields), negatively impacts charter value. The macroeconomic variables, *GDPGR* and *Orientation* both exhibit correct signs, as expected.

Regarding the relationship of traditional banking activities with charter value, the empirical results indicate that higher share of core deposits (*CORE*) boost charter value ratios. This is consistent with findings for US banking industry that higher shares

of transactions deposits contributed to higher Q-values (Keeley, 1990). The effect of lending on charter value indicates that banks with higher loan portfolio exhibit lower charters. While this may be odds with the theory that banking firms have information advantage in relationship lending to their business borrowers, it is consistent with competition faced by these organizations serving larger businesses with access to money and capital markets.

CIR has a highly significant and negative effect, indicating that inefficient banks have lower charter values. The results may reflect the ability of more efficient (lower cost) organizations to retain rents. It also may be because more efficient firms are viewed as more likely to survive and continue to earn rents. Indeed, Berger and Mester (2003) found that better performance of US banks during the 1990s was, among others, the outcome of their improved efficiency. Non-interest income (NIC) shares appear to have had a strong and growing positive effect on charter value ratios, indicating that banking firms earn rents from providing financial services that generate non-interest revenues.

Bigger banks are observed to have lower charter values. If monopoly rents are sufficiently high for small banks, then the component of charter value driven by monopoly rent would be high, suggestive of an inverse relation between size and charter value. The evidence is in line with the cross-country evidence by De Nicolo (2000) which observes a negative size-charter value relationship for European and to a lesser extent, for US banks.

Finally, the coefficients on the dummy variable for state-owned banks (*dy_SOB*) is consistently negative, whereas that on *de novo* private banks (*dy_NPB*) is consistently positively across all specifications. This suggests that the charter value of the latter category is higher, whereas that of the former is uniformly lower as compared to old private banks (the omitted category). The results are materially unaltered when all variables are included together (Model 7).

6.2 Risk-taking

To control for potential endogeneity of *q*, charter value is modeled as an endogenous variable, as set out in Table 4. On capitalization, the fitted charter value is found to have a significantly positive effect on *CAP*, suggesting that banks with high charter values tend to hold higher capital. In general, the results show that *q* is highly significant and positive in the *BUF* and *CAP* specification, and negative and significant in the other specifications.

The effect of *q* on *CAP* is significant not only in a statistical sense, but also in the economic sense as well. More specifically, if *q* increases by 1 standard deviation, *CAP* decreases by 0.2 standard deviation. While these magnitudes are not substantial, this suggests that banks have been pro-active in augmenting their capital base. In case of *BUF*, a one standard deviation movement in *q* produces a 0.02 standard deviation rise in the capital buffer. As *q* does not have a significant effect on *RISK*, the effect of *q* on *BUF* seems to come through the positive effect of *q* on *CAP*, but not on *RISK*. Regarding credit risk, the fitted charter value is found to have a significantly negative effect on *NPL*: the magnitude of the point estimate equals -0.13. In other words, a rise in *NPL* by a percentage point lowers bank charter value by roughly 0.13 percentage points. The coefficient on *q* in both the *LLP* and *Z-score* equations are positive. Taken together, the regression results confirm that banking firms with higher charter values tend to take lower risk, consistent with earlier evidence on this aspect (Furlong and Kwan, 2005; Agusman, 2006).

The significance of the lagged endogenous variable supports the dynamic specification. By subtracting 1 and multiplying by -1, the coefficient estimates can be interpreted as the speed of adjustment in the endogenous variable. Thus, the estimated speed of adjustment of *BUF* is about 0.8 and a Wald test indicates that the speed is highly significant.

Table 4: Charter value and bank risk-taking

Variable	BUF	CAP	RISK	NPL	LLP	*Z-score*
LDV	0.175 (0.015)***	-0.075 (0.027)***	0.554 0.078)***	0.785 (0.044)***	0.933 (0.004)***	0.576 (0.052)***
q – hat	0.209 (0.094)**	0.110 (0.040)***	-0.099 (0.078)	-0.130 (0.037)***	1.093 (0.075)***	0.315 (0.098)***
RoA	0.824 (0.418)**	0.179 (0.198)	0.329 (0.370)	-0.830 (0.312)***	0.134 (0.184)	0.619 (0.198)***
CIR	-0.844 (0.206)***	-0.051 (0.008)***	-0.151 (0.086)*	0.082 (0.018)***	-0.021 (0.035)	0.102 (0.036)***
SIZE	0.055 (0.092)	0.041 (0.003)***	-0.131 (0.060)**	-0.032 (0.010)***	0.129 (0.040)***	0.025 (0.028)
SDEBT	0.005 (0.155)	0.033 (0.007)***	0.158 (0.083)**	0.021 (0.010)**	0.092 (0.030)***	0.054 (0.045)
OBS	-0.202 (0.027)***	-0.012 (0.002)***	0.0006 (0.016)	-0.004 (0.003)	-0.029 (0.007)***	-0.008 (0.010)
dy_REG	0.112 (0.022)***	-0.006 (0.003)***	0.043 (0.025)*	…	…	0.021 (0.008)***
dy SOB	-0.007 (0.012)	-0.0005 (0.001)	-0.0008 (0.006)	0.002 (0.0009)***	-0.006 (0.002)***	0.003 (0.001)*
dy NPVT	0.034 (0.018)*	0.006 (0.001)***	0.025 (0.012)**	-0.007 (0.002)***	-0.022 (0.007)***	-0.016 (0.006)***
Constant	-0.121 (0.049)***	0.015 (0.003)***	-0.020 (0.033)	-0.009 (0.001)***	0.031 (0.007)***	-0.037 (0.010)***
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N. Obs; banks	260, 33	260; 33	260; 33	260; 33	260; 33	260; 33
Sargan test	0.987	0.935	0.941	0.907	0.872	0.930
AR (1) test	0.136	0.219	0.025	0.101	0.032	0.081
AR (2) test	0.693	0.527	0.387	0.228	0.317	0.511

Standard errors within parentheses

***, ** and * denote statistical significance at 1, 5 and 10%, respectively

AR (1) and AR (2) are the first-and second-order autocorrelation and follow N(0, 1)

The findings with respect to control variables also provide interesting insights. *RoA* has a positive impact on *BUF* and *Z-score*, indicating that banks rely on retained earnings to increase capital. Further, *RoA* has a negative effect on *NPL*, which would suggest risk-averse behavior on the part of profitable banks and thereby, lower proportion of impaired loans. *SIZE* has a negative impact on *RISK* and *NPL* and a positive effect on capital. This indicates that credit risk is typically lower in bigger banks, perhaps because of diversification benefits. Evidence for the US banking industry is also supportive of such findings (Kwan and Eisenbis, 1997).

Sub-ordinated debt is found to have a positive and highly significant effect on *BUF* and *CAP*. Hence, banks that face higher market discipline seem to hold higher capital, although they also exhibit higher *NPL*. Banks' risk management skills proxied by *OBS*, is negative, whenever significant. This implies that banks more engaged in off-balance sheet activities tend to have lower asset risk.

All the regressions contain a dummy for regulation, *dy_REG* which equals one from 2004 onwards, else zero. This is because effective from that year, the 90-day norms for classification of loans as non-performing were introduced. The evidence presented in table 3 indicates that the coefficient on *dy_REG* is positive for *BUF* and RISK, and

negative for *CAP*; in other words, a tightening of prudential norms led banks to increased risk taking (greater loan extension), so much so that, notwithstanding the lowering of capital, the net effect was a rise in capital buffers. Since all the regressions include year dummies (not reported), it seems unlikely that the result could be driven by movements in the business cycle.

6.3 Partial privatization and risk taking: State-owned banks

To test the impact of partial privatization on risk taking by state-owned banks, we introduce three indicator variables. The first is *PGO1*, a dummy variable that equals one from the year the bank is privatized, else zero. *PGO1* measures the effect of the privatization itself. The second variable, following Boubakri *et al.* (2005), is *PGO2* that equal to the number of years since the year of privatization. While *PGO2* is included to capture the immediate effects of privatization, *PGO3* captures the average yearly performance trend in the wake of privatization. The final variable *PGO3* is the fraction of equity divested by the Government in the concerned bank. In case of state-owned banks, the average level of divestment has been to the extent of 25%.

We repeat the earlier analysis, and sequentially introduce the three variables, as indicated above. The results are set out in Table 5. In the second specification where we examine persistence of privatization, the evidence indicates that incorporating the trend variable consequent upon listing generates a significant coefficient in the *CAP* specification. This indicates that the managerial and operational autonomy provided to banks in the wake of privatization provided them the necessary leeway to improve efficiency; the upshot of the process was an improvement profitability and thereby improved capital ratios.[7]

[7] In terms of Section 17 of the *Banking Regulation Act*, 1949 which governs the functioning of banking companies in India, every banking company incorporated in India is required to create a reserve fund and transfer a sum equivalent to not less than 25 per cent of its disclosed profits, to the reserve fund every year.

Table 5: Partial privatization and risk-taking – State-owned banks

	Dep var = *BUF*			Dep. Var = *CAP*			Dep. Var = *RISK*		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
LDV	0.193	0.243	0.203	0.549	0.335	0.417	0.454	0.457	0.379
	(0.09)**	(0.09)***	(0.09)**	(0.13)***	(0.08)***	(0.08)***	(0.096)***	(0.102)***	(0.102)***
q – hat	0.992	0.820	0.641	0.020	0.023	0.119	-1.89	1.631	-1.647
	(0.49)**	(0.37)***	(0.37)*	(0.005)***	(0.007)***	(0.06)**	(0.638)***	(1.23)	(0.729)**
RoA	0.526	0.515	2.001	1.316	1.505	1.142	-1.014	-1.080	-0.761
	(0.30)*	(0.31)*	(1.60)	(0.39)***	(0.99)	(0.47)***	(0.780)	(0.867)	(0.670)
CIR	1.077	0.996	-0.149	-0.013	0.005	-0.008	-0.311	-0.338	-0.280
	(0.78)	(0.80)	(0.40)	(0.02)	(0.02)	(0.02)	(0.133)**	(0.135)***	(0.110)***
SIZE	1.083	1.059	0.269	0.031	0.029	0.029	-0.602	-0.627	-0.569
	(0.47)**	(0.48)**	(0.16)*	(0.005)***	(0.014)**	(0.007)***	(0.139)***	(0.161)***	(0.117)***
SDEBT	-1.111	-1.122	0.229	0.003	0.008	0.005	-0.129	-0.171	-0.159
	(1.33)	(1.38)	(0.09)***	(0.004)	(0.003)***	(0.003)*	(0.024)***	(0.124)	(0.056)***
OBS	0.010	-0.019	-0.428	-0.012	-0.017	-0.002	0.056	0.027	0.082
	(0.24)	(0.24)	(0.17)***	(0.009)	(0.009)*	(0.010)	(0.051)	(0.052)	(0.059)
dy_REG	0.060	0.050	0.168	0.003	0.003	0.006	0.036	0.029	0.0002
	(0.04)*	(0.03)*	(0.03)***	(0.001)**	(0.002)	(0.002)***	(0.015)***	(0.028)	(0.018)
PGO 1	0.065			-0.002			0.003		
	(0.04)			(0.002)			(0.018)		
PGO 2		0.009			0.002			-0.014	
		(0.02)			(0.0005)***			(0.018)	
PGO 3			0.449			0.025			0.030
			(0.16)***			(0.010)***			(0.049)
Constant	-0.158	-0.156	-0.159	0.004	0.006	0.0008	0.061	0.084	0.091
	(0.08)**	(0.08)**	(0.04)***	(0.002)***	(0.004)	(0.003)	(0.029)**	(0.045)*	(0.033)***
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Obs; banks	148; 19	148; 19	148; 19	148; 19	148; 19	148; 19	148; 19	148; 19	148; 19
Sargan test	0.403	0.388	0.395	0.933	0.511	0.750	0.747	0.593	0.782
AR (1) test	0.002	0.001	0.003	0.196	0.198	0.176	0.103	0.128	0.145
AR (2) test	0.281	0.210	0.865	0.238	0.302	0.156	0.270	0.286	0.250

Standard errors within parentheses

***, ** and * denote statistical significance at 1, 5 and 10%, respectively

AR (1) and AR (2) are the first-and second-order autocorrelation and follow N(0, 1)

Finally, when we consider the quantum of privatization, the evidence indicates that the coefficient on *PGO3* is positive and significant in the *BUF* equation with a point estimate equal to 0.45. This indicates that the higher the extent of privatization, the greater the capital buffer. As earlier, the positive effect of the extent of privatization on the buffer works through its effect on capital, and not through its effect on *RISK* (*PGO3* is statistically significant in the *CAP* equation, but not in the *RISK* equation). On balance, the evidence appears to indicate that the process of partial privatization exerted a beneficial impact on risk-taking behavior by state-owned banks.

7. Concluding remarks

The analysis provides empirical evidence on the determinants of banks' charter value and the effect of charter value on risk-taking behavior by banks. Towards this end, the study investigates which banking industry level and institution-specific factors influenced bank charter values, using annual data on publicly traded banks for the period 1996 through 2006.

The empirical results suggest that deposit or loan market concentration both exert a perceptible influence on banks' charter value, indicating that the link between competition and charter value is quite strong. Among the traditional banking activities, it seems that bank size and operating efficiency appear to be strongly related to bank charter value. As to the bank characteristics, we find non-interest revenue shares to be a significant determinant of bank charters. These observations suggest that banking firms might be gaining some market power in non-traditional banking activities, consistent with temporary rents associated with successful innovations.

In the second-step regressions, the results provide strong evidence that bank charter value disciplined bank risk taking, consistent with the evidence for developed country banking markets. As well, the tightening of prudential regulations is found to have exerted a beneficial effect on bank charter value ratios. Focusing specifically on state-owned banks, the evidence appears to suggest that the process of partial privatization exerted a beneficial impact on their risk-taking behavior.

In terms of policy concerns, two consistent findings emerge:. The first is the negative effect of size on charter value. This assumes relevance in view of the current spate of consolidation and amalgamations that have been voiced for the banking sector. In addition, efficiency is observed to exert a strong and consistent impact on charter value. In other words, the relentless cost cutting by banking firms and their widespread adoption of newer technology platforms seem to be associated with higher rents. In effect therefore, this provides support to the role for competition in the banking sector.

References

Agusman, A., D.Gasbarro and J.K.Zumwalt (2006). Bank moral hazard and the disciplining factors of risk taking: evidence from Asian banks during 1998-2003. FMA European Conference, Stockholm.

Arellano, M., and S. Bond (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equation. *Review of Economic Studies* 58, 277-97.

Beck, T., and L. Laeven (2006). Resolution of failed banks by deposit insurers: Cross country evidence. World Bank: Washington DC.

Berger, A.N. and R.DeYoung (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking and Finance* 21, 849-70.

Berger, A.N. and L. J. Mester (2003). Explaining the dramatic changes in performance of US banks: Technological change, deregulation and dynamic changes in competition. *Journal of Financial Intermediation* 12, 57-95.

Bhide, M.G., A.Prasad and S.Ghosh., (2001). Banking sector reforms: A critical overview. *Economic and Political Weekly* (*Special Issue on Money, Banking and Finance*). February, 399-408

Boubakri, N., J.Cosset, O.Guedhami and K. Fischer, (2005). Privatization and bank performance in developing countries. *Journal of Banking and Finance* 29, 2015-41.

Boyd, J., and D.Runkle (1993). Size and performance of banking firms. *Journal of Monetary Economics* 31, 47-67.

Casu, R., and P.Molyneux (2003). A comparative study of efficiency in European banking. *Applied Economics* 35, 1865-76.

Centre for Monitoring the Indian Economy (2007). *Prowess database* (Release 2.4). CMIE: Mumbai.

De Nicolo, G. (2000). Size, charter value and risk in banking: An international perspective. *IFC Discussion Paper* No.689. Board of Governors of the Federal Reserve: Washington DC.

Demsetz, R., M.Saidenberg and P.Strahan (1996). Banks with something to lose: the disciplinary role of franchise value. *FRBNY Economic Review* 2, 1-14 (October).

Demsetz., R.S., M.Saidenberg and P.E.Strahan (1996). Banks with something to lose: The disciplinary role of franchise value. *Economic Policy Review – The Federal Reserve Bank of New York* 2 (October), 1-14.

Ergungor, O.E. (2004). Market- versus bank-based financial system: Do rights and regulations really matter? *Journal of Banking and Finance* 28, 2868-87.

Furlong, F., and S.Kwan (2005). Market-to-book, charter value and bank risk-taking: A recent perspective. Paper presented at the Basel Committee Research Task Force Conference. Vienna, April 2005.

Galloway, T., W.Lee and D.Roden (1997). Banks' changing incentives and opportunities for risk taking. *Journal of Banking and Finance* 21, 509-27.

Ghosh, S. (2009). Bank risk, charter value and depositor discipline: A simultaneous equations approach. *Applied Financial Economics Letters* 16, 239-44.

Goldberg, L.G. and S.C. Higgings,(2002). Depositor discipline and changing strategies for regulating thrift institutions. *Journal of Financial Economics* 63, 263-74.

Government of India (1991). *Report of the Committee on the Financial System* (Chairman: Shri M.Narasimham). New Delhi.

Government of India (1998). *Report of the Committee on Banking Sector Reforms* (Chairman: Shri M.Narasimham). New Delhi.

Gropp, R., and J.Vesala (2004). Deposit insurance, moral hazard and market monitoring. *ECB Working Paper* No.302. ECB: Frankfurt.

Hellmann, T. F., K. C. Murdock and J. E. Stiglitz (2000). Liberalization, moral hazard in banking, and prudential regulation: Are capital requirements enough?. *American Economic Review* 90, 147-65

Keeley, M. (1990). Deposit insurance, risk and market power in banking. *American Economic Review* 80, 1183-1200.

Kwan, S., and R.Eisenbis (1997). Bank risk, capitalization and operating efficiency. *Journal of Financial Services Research* 12, 117-31.

Marcus, A. (1984). Deregulation and bank financial policy. *Journal of Banking and Finance* 8, 557-65.

Mercieca, S., K.Schaeck and S.Wolfe (2007). Small European banks: Benefits from diversification? *Journal of Banking and Finance* 31, 1975-98.

Mohan. R., (2004). Financial sector reforms in India: Policies and performance analysis. Lecture Delivered at the IMF, Washington DC. Available at <www. rbi.org.in>

Nier, E., and U.Baumann (2006). Market discipline, disclosure and moral hazard in banking. *Journal of Financial Intermediation* 15, 332-61.

Park, S., and S. Peristiani (1998). Market discipline by thrift depositors. *Journal of Money, Credit and Banking* 30, 347-64.

Petersen, M., and R.G.Rajan (1995). The effect of credit market competition on lending relationships. *Quarterly Journal of Economics* 110, 407-43.

Reddy, Y.V. (2006), Reforming India's financial sector: Changing dimensions and emerging issues. Address Delivered at the International Center for Monetary and Banking Studies, Geneva, May. Available at <www. rbi.org.in>

Reserve Bank of India. *Report on Trend and Progress of Banking in India* (various years). RBI: Mumbai.