International Journal of
Financial Studies

MDPI

Article

Profitability Determinants of Financial Institutions: Evidence from Banks in Pakistan

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Received: 25 April 2018; Accepted: 8 May 2018; Published: 18 May 2018

Abstract: The aim of this study was to analyze the impact of bank-specific, industry-specific and macroeconomic variables on the profitability of banks in Pakistan. This study applied the two-step generalized method of momentum (GMM) system estimator on an unbalanced dynamic panel of 28 banks over the latest period 2007–2016. The robust results reveal that the bank's profitability in Pakistan is explained by size, higher solvency, financial structure, operating cost, labor productivity, market power, and economic growth. We also found an inverted U-shape relationship between banks size and profitability. Herfindahl–Hirschman Index (HHI) was applied to evaluate the impact of market power and found results in support of Structure Conduct Hypothesis. On the other hand, credit quality, operational efficiency, banking sector development, inflation, and industry concentration are found to be negatively and significantly related to the profitability of banks. Further, this study found lower profitability of banks during the government transition. The Mean comparison of profitability indicates that specialized banks (SB) in Pakistan are generating higher net interest margin (NIM) than all commercial banks (ACB). However, the empirical results of this study are robust and consistent with previous literature.

Keywords: bank profitability; determinants; generalized method of momentum (GMM); Pakistan; government change

JEL Classification: C23; G21; G32; L2

1. Introduction

There are many studies about bank profitability around the world including in developed and emerging markets. Similar to other Asian emerging economies, including China, India, Indonesia, Korea, Malaysia, Philippines, Taiwan and Thailand, Pakistan has gained its status back of "emerging market", which was lost in late 2008.[1] The tremendous performance of Pakistan's energy, oil and gas, cement, fertilizers and most important the banking industry contributed to bringing Pakistan into one of the renowned stock markets around the globe. Pakistan's KSE100[2] index achieved 46% growth in 2016 and emerged as top-performing and most profitable Asian stock market. The stock market and banking sector development are likely to continue given growth in the gross domestic product (GDP) of Pakistan, which has hit an average growth of 5.2% over the past decade (Malik 2017). King and Levine (1993) suggested that financial sector development indicators have a positive and significant

[1] As per MSCI Emerging Market Index created by Morgan Stanley Capital International, which measures equity performance in emerging markets around the world.

[2] Karachi Stock Exchange (KSE) 100 Index compares the stock prices on Pakistan Stock Exchange.

influence on economic growth. Levine and Zervos (1998) earlier suggested that both sound banking system and stock market liquidity have a positive impact on capital accumulation, economic growth, and productivity, even after controlling for political and economic factors.

In the past, some studies have been done to assess the profitability determinants of banks in Pakistan. Some studies applied linear regression, and some applied ordinary least square (OLS) regression fix and random effect. In the existence of endogeneity, serial correlation and unobserved heterogeneity, the use of linear and OLS regressions produce biased and inconsistent results (Baltagi 2001). Therefore, this study applied Generalized Method of Momentum (GMM), which was first used by Arellano and Bond (1991). GMM deals with endogeneity, unobserved heterogeneity, serial correlation and profit persistence to produce unbiased and consistent results. No studies applied GMM to examine the profitability determinants of banks in Pakistan, except one study by Raza et al. (2013) on data over the period 2001–2010, which used a small sample of 18 banks, one profitability indicator, and nine explanatory variables. The current study is the first study to examine the profitability determinants of banks in Pakistan by taking sample of 28 banks over the period 2007–2016 (see Table 1 for a list); use return on assets (ROA), return on equity (ROE), net interest margin (NIM) and profit margin (PM) from Tan (2016) as profitability indicators; and categorize seventeen explanatory variables into bank-specific, industry-specific and macroeconomic variables including government transition as a dummy variable, and apply two-step GMM-system estimator. This study also intends to contribute by extending the evidence related to the impact of government transition on the profitability of banks in Pakistan. To obtain the consistent results, we considered two transition periods (2008–2009 and 2013–2014); therefore, we obtained a large dataset for 2007–2016. This is the most recent ten-year period and representative of free market operation and revival of the democratic process in the country. Further, the GMM has been criticized because, in the case of panel with very small time series (T), the estimator is inefficient if the use of instruments is weak (Arellano and Bover 1995). The use of panel with large T avoids such problems (Athanasoglou et al. 2008).

The results of this study show an inverted U-shape relationship between assets and profitability, indicating that, up to a certain level, increase in the assets has significant positive impact on the profitability, and, afterwards a further increase in the assets decreases profitability. Further, results show that the profitability of banks in Pakistan is explained by higher solvency, strong financial structure, higher labor productivity, lower operating cost, strong market power of banks and economic growth. On the other hand, the results also report that the profitability of Pakistani banks is significantly negatively affected by some important factors, including lower credit quality, operational efficiency, banking sector development, industry concentration and inflation. Our study reports new evidence related to the government transition and finds significantly lower profitability of banks in Pakistan during the government transition. The study also observes the downward trend in the profitability of banks during the election years (see Figure 1). Finally, the results report significant lower profitability of private-owned banks than government-owned banks when measured by ROA and PM and insignificant difference when measure by ROE and NIM. Further, the mean comparison indicates that specialized banks (SB) earn significantly higher profitability than all commercial banks (ACB) when measured by NIM, while ACB generate significantly higher profitability than SB when measured by ROA, ROE, and PM. In addition, private commercial banks (PCB) earn significantly higher profitability than government commercial banks (GCB) when measured by ROE and NIM.

The paper is structured as follows. Section 2 briefly reviews the banking industry in Pakistan. Section 3 reviews the relevant literature. Section 4 describes the data and methodology employed in the empirical research and defines the explanatory variables and the research hypotheses. Section 5 presents and discusses the overall findings. Section 6 concludes the paper with implications and future research directions.

Table 1. List of Local Banks in Pakistan.

Sr. No	Name	Abb.	Data of Commencement	Assets (PKR'000')	Share (%)
1	Al-Baraka Bank (Pakistan) Ltd.	ABBPL	06-04-2006	126,798,633	0.83
2	Allied Bank Ltd.	ABL	01-07-1974	1,069,614,408	6.97
3	Askari Bank Ltd.	ASBL	23-02-1992	619,139,193	4.03
4	Bank Al-Habib Ltd.	BAHL	21-12-1991	751,395,816	4.90
5	Bank Al-Falah Ltd.	BAFL	01-10-1992	917,457,053	5.98
6	Bank Islami Pakistan Ltd.	BIPL	13-03-2006	180,846,170	1.18
7	Dubai Islamic Bank Pakistan Ltd.	DIBPL	28-03-2006	152,133,399	0.99
8	Faysal Bank Ltd.	FBL	04-12-1994	444,464,661	2.90
9	Habib Bank Ltd.	HBL	25-08-1941	2,393,783,379	15.60
10	Habib Metropolitan Bank Ltd.	HMBL	26-10-2006	526,606,417	3.43
11	JS Bank Ltd.	JSBL	25-05-2006	264,700,493	1.72
12	MCB Bank Ltd.	MCBL	17-08-1948	1,051,813,681	6.85
13	MCB Islamic Bank Ltd.	MBCIL	15-10-2015	28,568,502	0.19
14	Meezan Bank Ltd.	MBL	28-03-2002	657,767,097	4.29
15	NIB Bank Ltd.	NIBL	02-10-2003	243,944,868	1.59
16	SAMBA Bank Ltd.	SAMBL	20-10-2008	101,414,491	0.66
17	Silk Bank Ltd.	SILBL	30-04-1995	135,033,822	0.88
18	Soneri Bank Ltd.	SONBL	17-02-1992	278,520,706	1.81
19	Standard Chartered Bank (Pakistan) Ltd.	SCBPL	30-12-2006	473,331,718	3.08
20	Summit Bank Ltd.	SUMBL	01-10-2007	215,022,348	1.40
21	United Bank Ltd.	UBL	09-11-1959	1,577,551,023	10.28
22	National Bank of Pakistan	NBP	08-11-1949	1,975,705,764	12.87
23	The Bank of Punjab	BOP	19-09-1994	545,214,131	3.55
24	First Women Bank Ltd.	FWBL	02-12-1989	18,520,564	0.12
25	The Bank of Khyber	BOK	19-09-1994	206,400,274	1.34
26	Sindh Bank Ltd.	SBL	14-12-2010	146,355,373	0.95
27	Zarai Tarakiati Bank Ltd.	ZTBL	18-02-1961	215,944,177	1.41
28	Punjab Provincial Co-operative Bank Ltd.	PPCBL	07-11-1955	19,173,591	0.12
29	SME Bank Ltd.	SMEBL	16-04-2005	9,378,215	0.06
	Total Assets			15,346,599,967	

Note: Foreign banks operating in Pakistan hold only 2.46% share as per SBP-2016, which are excluded from the study. To calculate the share of each local bank, we included all 29 local banks in the list, however MCB Islamic Bank Ltd. is not included in the final sample because of its incorporation during 2015.

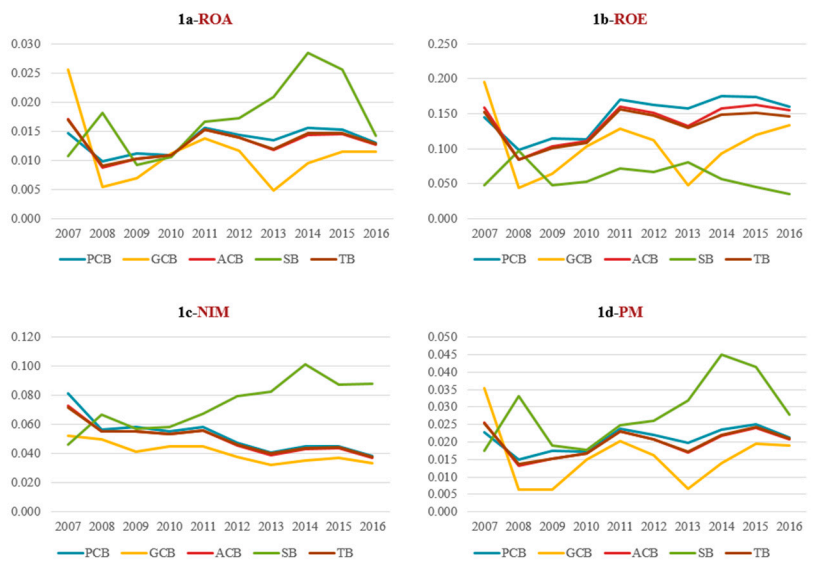

Figure 1. Profitability trend and comparison during the period under study (2007–2016). **Subfigure**, **1a** shows trend and comparison of ROA; **1b** shows trend and comparison of ROE; **1c** shows trend and comparison of NIM and **1d** shows trend and comparison of PM. In all figures, *Y*-axis represents the values of each profitability indicator, while *X*-axis represents the period (Years). PCB, Private Commercial Banks (20 Banks); GCB, Government Commercial Banks (5 Banks); ACB, All Commercial Banks (25 Banks); SB, Specialized Banks (3 Banks owned by the Government of Pakistan); TB, Total Banks (28 Banks used in this study).

2. Review of the Pakistani Banking Industry

The existence of a sound and stable domestic banking industry in Pakistan has remained very important for its economic growth and development in the last decade. Although foreign banks were dominant in the Pakistani banking system when this country achieved independence in 1947, as of December 2016, domestic banks of Pakistan have 98.53% share in terms of total assets.[3] From 2007 to 2016, bank deposits increased by 299% (from 2919 to 11,646 billion rupees); investments in capital and money market, forex, etc. boosted with an increase by 877% (from 739 to 7236 billion rupees); advances, including loans, cash credits, running finance, etc. grew by 160% (from 2099 to 5453 billion rupees); total assets increased from 3716 to 15,346 billion rupees, which are 52% of total GDP; and equity increased by 215% (from 410 to 1294 billion rupees).[4] Despite this, the profitability of the Pakistani banking system: ROA decreased by 0.41% (from 1.69% to 1.28%), ROE decreased by 0.62% (from 15.21% to 14.60%), NIM decreased by 3.36% (7.16% to 3.80%), and PM decreased by 0.44% (from 2.54% to 2.10%) over the past decade (Figure 1). Considering this, it is relevant to examine what determines the profitability of banks in Pakistan. Insight into favorable and unfavorable factors of bank profitability allows bank management and policy makers to control and/or boost the variables associated with profit growth in banks, generating funds to grant more credit to the economy, guaranteeing more flexible capital ratios and leading to fair returns for its shareholders (Trujillo-Ponce 2013).

3. Literature Review

Although there is abundant literature analyzing the determinants of bank profitability in emerging economies, the system-GMM estimator, developed for dynamic panel models by Arellano and Bover (1995) and Blundell and Bond (1998), has only been used in recent studies. This methodology accounts for one of the main problems in assessing the drivers of bank profitability, i.e., the potentially endogenous character of certain determinants (García-Herrero et al. 2009; Trujillo-Ponce 2013). In addition, the system-GMM estimator considers the persistence of profits and some characteristics of banks that affect their profitability, which are difficult to measure or identify in an equation (the so-called unobserved heterogeneity).

However, some recent and older studies have been done either on bank's performance analysis of more than one emerging countries or on bank performance of a single emerging country, which used Generalized Method of Momentum, fix and random effect methodologies. In the study of more than one emerging countries, Elisa and Guido (2016) determined the sources of profitability on a sample of 35 top European commercial banks and found positive impact of size and capitalization on profitability. Lee et al. (2015) studied the impact of bank-specific, industry-specific and macroeconomic variables on a sample of 418 regional banks of United States for the period 1994–2013 using GMM. Djalilov and Piesse (2016) studied the profitability determinants of unbalanced panel data of 275 banks of 16 transition economies during 2000–2013 by applying both GMM and random effect regression. Saona (2016) applied GMM to study internal and external profitability determinants of 156 banks from seven Latin American countries. He used NIM as a profitability measure and found size, loan loss ratio ns loan to asset ratio are positively and significantly related to the profitability while GDP growth has negative impact on NIM. Another recent study of 105 banks from 16 OIC countries over the period 14 years found a positive impact of capital adequacy, credit quality, deposit to asset ratio, and diversification, and a negative impact of management efficiency and equity to total assets on bank profitability (Sun et al. 2017).

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[3] Data accessed from SBP (State Bank of Pakistan, which is the central bank of the country), available at (http://sbp.org.pk/publications/q_reviews/qpr.htm).

[4] Author's estimations based on available Audited Financial Reports.

In addition to the above-mentioned literature, there are many studies that determined the sources of profitability of European banking sector (Molyneux and Thornton 1992; Goddard et al. 2004b; Staikouras and Wood 2004; Staikouras and Wood 2003; Căpraru and Ihnatov 2014; Maudos 2017; Goddard et al. 2004a; Elisa and Guido 2016; Pasiouras and Kosmidou 2007). The first study to find the determinants of European bank's profitability was conducted by Molyneux and Thornton (1992), who found a negative relationship of liquidity and profitability in their study of profitability determinants of European banks for the period 1986–1989 on a sample of 18 European countries. Apart from European studies, there are many studies on profitability determinants using panel of different emerging countries (Smirlock 1985; Rhoades 1985; Berger 1995a; Short 1979; Bourke 1989; Islam and Nishiyama 2016; Angbazo 1997; Athanasoglou et al. 2006; Micco et al. 2007; Hassan and Bashir 2005; Demirgüç-Kunt and Huizinga 1999).

Studies have also been performed on Chinese bank's profitability (Tan and Floros 2012c; Tan 2016; Tan and Floros 2012a, 2012b; García-Herrero et al. 2009; Heffernan and Fu 2008; Sufian and Habibullah 2009). A Study by Tan (2016) used ROA, ROE, NIM and PM as profitability indicators and categorized explanatory variables into bank-specific, industry-specific and macroeconomic variables in his study of 41 Chinese banks including joint-stock, state-owned, and city commercial banks over the period 2003–2011. He applied GMM regression and found a positive impact of labor productivity, overhead cost, banking sector, growth in GDP and inflation on profitability. The profitability of Chinese banks is affected by large size, tax payments, and increase in the equity to assets ratio, while profitability grows with the development in the banking sector and stock market (Tan and Floros 2012a). Dietrich and Wanzenried (2011) extended their study of unbalance dynamic panel data of 372 commercial banks of Switzerland over the period 1999–2009 and applied GMM technique to analyze the profitability determinants before and during crises. They used ROA, ROE, and NIM as profitability indicators and categorized explanatory variables into bank-specific, industry-specific, and macroeconomic variables. They found profitability of Swiss banks is affected by operational efficiency and share of interest income in total income before and during crises. Furthermore, they found that funding cost has a negative impact on ROA and ROE and positive impact on NIM. Sinha and Sharma (2016) examined the profitability determinants and persistence of Indian banks over the period 2000–2013 on a sample of 42 Indian scheduled banks by applying GMM-regression and found that HHI, GDP, deposit growth, capitalization, and diversification are positively related to ROA, while inflation rate and poor asset quality have a negative effect on Indian bank's profitability.

A recent study of the determinants of profitability of banks in Tunisia found that the profitability, capitalization and liquidity have a positive relationship, whereas corruption has a positive impact on ROA but it has a negative and insignificant impact on ROE (Bougatef 2017). Athanasoglou et al. (2008) applied GMM to study the impact of bank-specific, industry-specific and macroeconomic variables on the profitability of Greek commercial banks over the period 1985–2001. They concluded that good capitalization is important in explaining the profitability; poor credit quality adversely affects the profitability; profitability of Greek commercial banks is increased as labor becomes more productive; control of operating expenses is an important element to enhance profitability; and increase in inflation is not a good indicator for the Greek banking sector. Trujillo-Ponce (2013) applied GMM to analyze the profitability determinants of Spanish banks over the period 1999–2009 on a sample of 89 banks, among bank-specific variables, liquidity and deposit to liability ratio are important in explaining the profitability. Furthermore, GDP growth and HHI from industry-specific and macroeconomic variables have a positive impact on ROA and ROE. He also found that large size and operational efficiency of Spanish banks adversely affect their profitability. There are many other studies on profitability determinants associated with single country, including UK, Kenya, Philippines, and Tunisia (Neely and Wheelock 1997; Berger et al. 1987; Naceur and Goaied 2001; Saeed 2014; Kosmidou et al. 2004; Kosmidou et al. 2006; Williams 2003; Sufian and Chong 2008; Tarusa et al. 2012). In addition, some recent studies applied GMM technique to examine the profitability determinants of

the single country including Ghana (Alhassan et al. 2016), Malaysia (Siew Peng and Mansor 2017), and India (Ahamed 2017).

Finally, most studies that have analyzed the determinants of profitability in the Pakistani banking industry used simple statistical methodologies. However, Raza et al. (2013) used GMM estimator. The authors found that size, credit quality, liquidity, taxation, and diversification are negatively related to banks' profitability, whereas capitalization, stock market development, and inflation are positively related to profitability.

4. Data and Methodology

4.1. Sample and Data

At present, 33 schedule banks are operating in Pakistan, including 16 private conventional banks, 5 Islamic banks, 4 foreign banks, 5 government-owned commercial banks, and 3 specialized banks (SB) which are also under state ownership. All foreign banks have been excluded from this study due to the non-availability of required data. The MCB Islamic bank limited (MCBIL) was established during 2015, so it was also omitted from the study. Finally, this study used a sample of 28 banks out of total 33, the detailed summary of the sample is presented in Table 1.

Data for this study cover the latest period of 2007–2016, which is taken from both consolidated and unconsolidated audited financial statements of all banks from the databases maintained by each bank, and the database maintained by State Bank of Pakistan (SBP) which is the central bank of Pakistan. The data taken from financial statements are used to calculate the bank-specific and industry-specific variables while the data for macroeconomic indicators are taken from the World Bank database. All data sources used to obtain data for the current study are considered reliable and authentic to execute empirical financial research. Sindh bank limited (SBL) was established in 2011, so the data of SBL were used over the period 2011–2016.

4.2. Variables Selection and Hypothesis Developments

4.2.1. Profitability Indicators

The study applies four profitability indicators considering their importance: return on assets (ROA), return on equity (ROE), net interest margin (NIM) and profit margin (PM). No study has ever applied four profitability indicators as dependent variables over the banking industry of Pakistan. A recent study evaluated the determinants of profitability of Chinese banks by using ROA, ROE, NIM, and PM as dependent variables (Tan 2016).

ROA is the ratio between the profit after taxation and total/average assets, which is widely used as profitability indicator that determines the efficient utilization and revenue generation proficiency of/from the assets of any enterprise. ROA has previously been studied by Bougatef (2017), Williams (2003) and Haris et al. (Haris et al.). Figure 1a describes the ROA trend and compares private commercial banks (PCB), government commercial banks (GCB), all commercial banks (ACB), and specialized banks (SB). Whereas GCB have a higher ROA than PCB in 2007, the profitability of GCB decreased during sub-prime crises and remained lower than PCB over the period 2009–2016. The profitability of SB remained higher than ACB except in 2007 and 2009. A drastic decrease was found in 2008 and 2013 in ROA of total banks (TB), due to 2008 subprime crises and government change[5] during both 2008 and 2013. Overall mean ROA of GCB is higher than PCB with an insignificant mean difference and mean ROA of SB is negative and less than ACB with a significant mean difference (see Table 2).

[5] Years 2008 and 2013 refer to government transition periods because of elections in the country.

Table 2. Means comparison: profitability indicators.

Banks Type	*Obs.*	ROA	ROE	NIM	PM
Mean of PCB	*200*	5.3244×10^{-3}	7.06965×10^{-2}	4.36819×10^{-2}	9.29×10^{-3}
Mean of GCB	*46*	6.0281×10^{-3}	-8.533×10^{-4}	3.77404×10^{-2}	8.8675×10^{-3}
Diff.		$\mathbf{-7.037 \times 10^{-4}}$	$\mathbf{7.15499 \times 10^{-2}}$ **	$\mathbf{5.9415 \times 10^{-3}}$ **	$\mathbf{4.225 \times 10^{-4}}$
p-value		4.01×10^{-1}	3.10×10^{-2}	2.10×10^{-2}	4.56×10^{-1}
Mean of ACB	*246*	5.4559×10^{-3}	5.73173×10^{-2}	4.25709×10^{-2}	9.211×10^{-3}
Mean of SB	*30*	-4.1319×10^{-3}	-7.35293×10^{-2}	7.53001×10^{-2}	1.759×10^{-3}
Diff.		$\mathbf{9.5879 \times 10^{-3}}$ ***	$\mathbf{1.308466 \times 10^{-1}}$ ***	$\mathbf{-3.27292 \times 10^{-2}}$ ***	$\mathbf{7.452 \times 10^{-3}}$ *
p-value		6.0×10^{-3}	2.0×10^{-3}	*0.000*	6.1×10^{-2}

***, **, * indicate the significance level at 1%, 5% and 10%, respectively.

ROE is articulated as the ratio of profit after tax to total/average equity. This ratio is widely used as profitability indicator which determines the ability of a bank to utilize money invested by shareholders to generate profits. In the past, ROE was widely studied by Bougatef (2017), Dietrich and Wanzenried (2011), Trujillo-Ponce (2013), Haris et al. (Haris et al.) and many others. The results of ROE are presented in Figure 1b. ROE of TB also decreases in 2008 and 2013 due to subprime crises and government change in both 2008 and 2013. Similar to ROA, ROE of GCB increased in 2008 and then remained lower than PCB during the period 2009–2016. The ROE of SB remained lower than ACB except in 2008. On the other hand, mean ROE of GCB is negative and less than PCB with a significant mean difference and ROE mean of SB is negative and less than the mean value of ACB with a significant mean difference (see Table 2).

NIM is calculated as the difference between interest income earned from borrowers and interest expense paid to depositors relative to the total/average amount of interest-bearing assets. NIM determines the ability of a bank to make investment decisions to generate interest income after compensating the fund cost. NIM has also been studied in previous literature (Saona 2016; Ho and Saunders 1981). As per Figure 1c, NIM of domestic banking industry of Pakistan has a downward trend due to intense competition and consistently decreased interest rate by SBP over the period under analysis. SB has a higher NIM than ACB except in 2007 and 2009 and GCB has a lower NIM than PCB during the period under analysis. The mean NIM of GCB is less than the mean value of PCB having a significant mean difference, while, on the other hand, SB has a higher mean value of NIM than ACB with a significant mean difference (see Table 2).

PM measures the ratio between profit before tax and the average/total assets. It is similar to ROA, but it shows the actual profit generated from operations because it evades the effect of corporate tax applied to profits earned from operations. In the past, few studies have used PM as a profitability measure (Tan 2016; Molyneux and Thornton 1992; Bourke 1989). Figure 1d shows a downward trend in PM during the period of subprime crises and government change (2008 and 2013). The profitability of SB is higher than ACB during the period 2008–2016 except in 2007. GCB has a lower position in terms of PM than PCB over the period under analysis except in 2007. The PM mean value of GCB is less than PCB with an insignificant mean difference and PM mean value of SB is less than ACB with a significant mean difference (see Table 2).

4.2.2. Profitability Determinants

This study utilizes bank-specific variables and some control variables categorized into the industry-specific variable and macroeconomic indicators and uses one dummy variables of government change to analyze their impact on the profitability of banks in Pakistan. The details of independent variables are given below.

Bank Size (SIZE): The natural logarithm of total assets as a proxy for size was used in this study as well as previous studies (Ahamed 2017; Bougatef 2017; Siew Peng and Mansor 2017). Banks with large asset size are expected to produce a higher profitability due to having more chances to create a diversified portfolio of interest-earning sources which reduce risk and to enjoy cost reduction due to economies of scope and scale (Smirlock 1985; Molyneux and Thornton 1992; Bourke 1989). The impact

of size on profitability could be non-linear[6] because small banks can achieve economies of scale while growing their asset size up to a certain level; after that, increase in assets leads to lower profitability due to bureaucratic and some other reasons (Eichengreen and Gibson 2001; Athanasoglou et al. 2008; Berger and Humphrey 1994). Depending on the above-mentioned arguments, we are not certain about the relationship of size and profitability.

Solvency (SOLV): It measures shareholder equity divided by total assets. It signifies the amount of residual claim by shareholders over assets. It also epitomizes the capitalization position of a bank; banks with more equity relative to liabilities enjoy higher profitability. A bank with a higher solvency ratio intends to borrow less which leads to diminishing the fund cost (Molyneux 1993). Further, higher equity to assets ratio leads to prudent lending and higher profitability due to cushion available to make risky investment decisions (Tan and Floros 2012a). A bank with a lower solvency ratio intends to bear high bankruptcy cost, while a bank can lower interest cost by increasing equity ratio (Berger 1995b). In the past, some studies have found positive impact (Goddard et al. 2004a; Tan 2016; Trujillo-Ponce 2013; Haris et al.) and some have found negative impact (Sun et al. 2017; Tan and Floros 2012b) of equity to assets ratio on the profitability. Considering the above arguments, this study expects a positive impact of solvency on profitability.

Credit Quality (CQ): It measures loan loss provisions to net loan ratio. The higher ratio indicates poor credit quality which leads to reducing the profitability. Although loan loss provisions give protection to a bank from many factors caused by loan losses and customer defaults, it reduces the earning assets size and profitability due to adjustment of loan loss reserves. Further, an increase in the loan loss provisions depends upon the non-performing loan, an increase in provisions indicates higher non-performing loans which lead to poor credit management of a bank. Previously, Miller and Noulas (1997) argued that higher loan loss ratio indicates risky exposure, which leads to lower profitability of a bank. In the Past, Dietrich and Wanzenried (2011), Lee et al. (2015) and many others found a negative impact of poor credit quality on profitability. In the light of the evidence, we expect an indirect relationship between credit quality and profitability.

Liquidity (LIQ): Total loans to assets ratio is used as a proxy for liquidity in this study. The higher ratio indicates the inability of banks to meet liquidity requirement which leads to overnight borrowing. However, the higher loan ratio can lead to higher profitability because of holding more interest-bearing assets, if the bank has a sound risk management. A positive relationship between the higher liquidity ratio and profitability has been found in the literature (Bourke 1989; Moualhi et al. 2016; Trujillo-Ponce 2013), while, on the other hand, banks holding more liquid assets (lower loan to asset ratio) may suffer from lower profitability (Molyneux and Thornton 1992; Demirgüç-Kunt and Huizinga 1999). We do not have any prior expectations regarding the relationship between liquidity and profitability.

Operational Efficiency (OE): It measures the cost to income ratio. The higher ratio indicates inefficient management of operational cost which adversely affects the profitability. Kosmidou et al. (2006) argued that higher expenses lead to lower profitability. We expect an indirect relationship between profitability and higher cost to income ratio, which is consistent with some previous studies (Dietrich and Wanzenried 2011; Moualhi et al. 2016; Trujillo-Ponce 2013).

Financial Structure (FS): Deposit to equity ratio is used as a proxy for financial structure. García-Herrero et al. (2009) argued that having more equity is the riskier decision for a bank due to the expectations of higher return on equity invested by shareholders. On the other hand, Admati et al. (2010) concluded that higher equity is not an expense source for banks and the financial system can be stabilized with effective capital regulations. Deposits increase the funding cost and expected

[6] We use the square of the natural logarithm of total assets to check the non-linear relationship between size and profitability. The significant positive coefficients of assets and significant negative coefficients of assets-square affirm the inverted U-shape relationship between size and profitability. It indicates that an increase in the assets up to a certain level has a positive impact on the profitability, but after, hitting a certain level, a further increase in the assets adversely affects the bank's performance (see Tables 7 and 8).

bankruptcy cost relative to equity. In other words, the increase in demand deposits which bear no interest cost can lead to more profitability. We are not certain about the impact of deposit to equity ratio on profitability.

Diversification (DIV): Non-interest income to gross income ratio is used as a proxy for diversification. Income generated from non-interest bearing sources, including fees, commission, etc., are sources to generate more income for the bank. In the past, some studies have found a positive impact of diversification (Chiorazzo et al. 2008; Jiang et al. 2003), while some have found a negative impact on the profitability (Tan and Floros 2012a; Demirgüç-Kunt and Huizinga 1999). Considering the mix evidence, we do not expect any certain relationship.

Funding Cost (FC): FC is determined by interest payment over average deposits. Siew Peng and Mansor (2017) argued that the banks with a higher cost of funds are expected to adjust the cost by setting a higher lending rate because the deposits are the major source of funding for a bank and found a positive impact on profitability. On the other hand, funding cost can be increased due to an intense competition, prevailing market interest rates and customer preferences (Garcia and Guerreiro 2016). Previously, Islam and Nishiyama (2016) and Dietrich and Wanzenried (2011) found a negative impact of a higher FC ratio on ROA and ROE. Our study expects a negative impact of FC on the profitability of banks in Pakistan.

Operating Cost (OC): It is measured as the ratio of operating expenses to average assets. In previous literature, many studies have found a positive relationship between operating expenses and profitability (Tan and Floros 2012a; Siew Peng and Mansor 2017; Lee et al. 2015; Molyneux and Thornton 1992). Their findings also supported the efficiency wage theory, which suggests that higher labor productivity is due to higher wages and salaries, which leads to increasing operating expenses, but profitability is increased more than operating expenses. Our study expects a positive relation of OC with profitability.

Labor Productivity (LP): The ratio of gross revenue to average number of employees is used as a proxy to measure the labor productivity. This profitability determinant is used by many studies (Tan 2016; Tan and Floros 2012a, 2012b; Athanasoglou et al. 2008). Well compensated and well-developed labor generates more revenues for a bank which ultimately leads to a higher profitability, if a bank has better risk and cost management structure. This study predicts a positive impact of labor productivity on profitability.

Bank Type (BTYPE): In this study, we have either private-owned banks or government-owned banks. The ownership structure has an effect on the corporate performance (Kočenda and Hanousek 2012). The use of this variable is important to catch the impact of different ownership types of banks on their performance. However, there is no consistent evidence to support the theory that private banks are more profitable than government banks. In the past, some studies have found insignificant differences in the profitability of private and government banks (Athanasoglou et al. 2008; Molyneux and Thornton 1992) while some have found that private banks are more profitable than government banks (Iannotta et al. 2007). We add a dummy variable that equals to 1 if a bank is privately owned and 0 otherwise and we do not expect any prior results.

Industry Concentration (IC_5): Total assets of five largest banks over total assets of domestic banking industry is used as a proxy, because top five banks are dominant over the banking industry of Pakistan and they determine the KIBOR-Karachi Inter-Bank Offer Rate (Benchmark rate used to quote a market interest rate) and all top five banks jointly hold a 52.57% share in terms of assets. The banking industry of Pakistan is highly concentrated by five banks, which represent their monopolistic position to influence the market, and the profitability of other banks can be affected by concentrated banks. In the past, Naceur (2003) and Tan and Floros (2012a) found a negative impact of concentration on profitability. In light of the evidence, this study intends to have a negative impact of concentration ratio on the profitability of banks in Pakistan.

Banking Sector Development (BSD): It is calculated as the total assets of the banking industry to GDP ratio. This variable is widely used in the literature (Lee et al. 2015; Tan 2016; Tan and Floros

2012a, 2012b, 2012c). The more developed banking sector indicates the demand for banking product and services which attracts more competition, and banks can increase their profitability with effective strategies (Tan and Floros 2012a). On the other hand, banks are expected to compromise on profit margin in a more competitive banking structure, as argued by Demirgüç-Kunt and Huizinga (1999). We are not certain about any specific effect of banking sector development over profitability.

Market Power (MP): As per structure–conduct hypothesis (SCP), the market power of a bank leads to more profits due to collusion behavior in quoting lending and borrowing interest rates (Ye et al. 2012). Following the past literature (Dietrich and Wanzenried 2011; Djalilov and Piesse 2016; Trujillo-Ponce 2013; Sinha and Sharma 2016), we apply and expect a positive impact of market power on profitability, which is calculated by Herfindahl–Hirschman Index (HHI) as the sum of the square of market share of individual banks (Equation (1)):

$$HHI = \sum_{i=1}^{n} \left(\frac{Assets_{it}}{Assets_{nt}}\right)^2 \tag{1}$$

where $Assets_{it}$ are the assets of the individual bank and $Assets_{nt}$ represents the assets of all banks (28 banks). $Assets_{it}$ divided by $Assets_{nt}$ determines the market share of an individual bank.

GDP Growth (GDPR): This variable is the indication of economic growth. The banks are expected to deal with more operational activities including lending, borrowings, and non-interest bearing services during the economic growth. One can expect its positive relationship with the profitability of a bank, which is consistent with previous studies (Sinha and Sharma 2016; Athanasoglou et al. 2008; Dietrich and Wanzenried 2011; Trujillo-Ponce 2013). Therefore, we also expect a positive impact of economic growth over profitability.

Inflation (INF): Annual change in the consumer price index is used as a proxy. We found mixed evidence in previous literature: Moualhi et al. (2016) found a negative relationship of inflation and profitability; Lee et al. (2015) found a positive relationship with ROE and negative with ROA and NIM; and Djalilov and Piesse (2016) found a negative relationship with profitability of early transition countries and positive relationship in late transition countries. In light of the mixed evidence, we do not expect any prior relationship between inflation and the profitability of banks in Pakistan.

Government Change (GOV): Government change affects the economy overall, because the elections may influence the monetary instruments and outcomes through injecting money to support the need of an expensive election campaign due to the political manipulation (Joarder et al. 2016). Previously, Micco et al. (2007) supported the political view of government banks, that higher amount of lending during the election years (Dinç 2005) relates to lower prices which tend to reduce their profitability. We therefore, control the impact of government change in Pakistan on the profitability of banks. For that, we create a dummy variable of government change and assign value 1 to the period of government transition[7] and 0 otherwise. The value 1 was assigned to 2008 and 2009 (transition period, including the election period) and 2013 and 2014 (transition period, including the election period), and 0 otherwise. Figure 1 shows a downward trend of all profitability indicators during the election years (2008 and 2013). Therefore, we expect a lower profitability of banks during government transition.

Further, refer to Table 3, for a detailed summary of all dependent and independent variables along with their definitions and expected results.

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[7] Government elections took place in the country during 2008 and 2013, therefore, value 1 was assigned to 2008–2009 (transition from Pakistan Muslin League-Quaid to Pakistan People's Party, political parties in the country) and 2013–2014 (transition from Pakistan People's Party to Pakistan Muslim League-Noon, political parties in the country) and 0 otherwise. This study intends to assess the impact of government change only rather changing in the political parties.

Table 3. Variables of Study with Hypothesis.

Variables	Notation	Description	Expected Results
DEPENDENT			
Profitability	ROA	Profit after tax to average assets	
	ROE	Profit after tax to average equity	
	NIM	Interest income—interest expense/average earning assets	
		Earning assets defined as investment, advances, lending to financial institutions	
	PM	Profit before tax to average assets	
INDEPENDENT			
Bank Specific			
Size	SIZE	Logarithm of total assets	+/−
Solvency	SOLV	Total shareholder's equity to total assets	+
Credit Quality	CQ	Loan loss provisions to net advances	−
Liquidity	LIQ	Total advances to total assets	+/−
Operational Efficiency	OE	Total operating expenses to gross income	−
Financial Structure	FS	Total deposits to total equity	+/-
Diversification	DIV	Non-interest income to gross income	+/−
Funding Cost	FC	Interest paid to average total deposits	−
Operating Cost	OC	Operating expense to average assets	+
Labor Productivity	LP	Gross income to average number of employees	+
Bank Type-Dummy	BTYPE	Equals to 1 if a bank is private owned and 0 otherwise.	+/−
Industry Specific			
Industry Concentration	IC_5	total assets of largest five banks to total assets of all banks in study	−
Banking Sector Development	BSD	Assets of all banks to GDP	+/−
Market Power	MP	Herfindahl–Hirschman Index: calculated as the sum of squares of market shares of each bank	+
Macroeconomics Specific			
Economic Growth	GDPR	GDP growth rate	+
Inflation	INF	Change in consumer price index rate	+/−
Government change-Dummy	GOV	Equal to 1 if the government transition (2008–2009 and 2013–2014) and 0 otherwise	−

Note: The largest five banks are HBL, NBP, UBL, ABL and MCB, and they hold 15.60%, 12.87%, 10.28%, 6.97% and 6.85% share relevant to assets, respectively (see Table 1).

4.3. Econometric Methodology

Many previous studies have used ordinary least square (OLS) fixed and random effect to determine the profitability indicators of banks. An empirical researcher has to face the problem of endogeneity when determining the profitability of a bank, e.g., equity to assets ratio can be higher for the most profitable banks due to retaining more reserves, which leads to increase the equity and profitability in the future (Athanasoglou et al. 2008; Tan 2016). Another problem of unobserved heterogeneity is also critical for the researcher, which is difficult to measure. For example, in Pakistan, the profitability of banks can be affected due to difference in corporate governance of state-owned and private-owned banks. Further, the profitability of Pakistani banks can be persistent due to highly political interference, especially in the case of state-owned banks (Tan and Floros 2012a; García-Herrero et al. 2009) or bank performance can be affected by a bank manager's (Black and Gallemore 2013) attitude towards risk and internal policies (Saona 2016). These three problems make the fixed and random effects unsuitable for the estimation of profitability determinants because these methods make estimates inconsistent and biased (Baltagi 2001).

The current study uses Generalized Method of Momentum (GMM), which is used by many previous studies to determine the bank profitability of different countries (Black and Gallemore 2013; Djalilov and Piesse 2016; Saona 2016; Tan and Floros 2012a; Trujillo-Ponce 2013; Athanasoglou et al. 2008; Tan 2016). GMM for dynamic panel data, which was first used by Arellano and Bond (1991), allows using the lagged dependent variable on the left side and lagged of all strictly exogenous variables to address the unobserved fixed effect by differencing, so-called difference GMM. Later, Arellano and Bover (1995) and Blundell and Bond (1998) improved the efficiency of GMM by introducing the use of more instruments in a system of both difference and level equations, and built a system of two equations, so-called System GMM. The GMM system estimator allows instrumenting the lagged of dependent variables in both differences and levels and also allows instrumenting the lagged of others variables which could suffer from potential endogeneity (Dietrich and Wanzenried 2011). Our study used GMM two-step system estimator, which is efficient due to the use of orthogonality

conditions and deals with the unobserved heterogeneity, serial correlation, and endogeneity (Roodman 2009; Baum et al. 2003).

The study followed Tan (2016) and Athanasoglou et al. (2008) to deal with endogeneity. Therefore, the study treated equity to asset ratio (used as a proxy to measure the solvency) as an endogenous variable and instrumented using two-year lag. The ratio of loan loss provision (used as a proxy of credit risk) was treated as a predetermined variable and instrumented using one-year lag. The GMM allows using instruments, therefore, to validate the use of instruments, GMM calculates the Hansen J statistics of the over-identifying restrictions under the null of joint validity of exogenous instruments. Further, GMM also calculates the difference-in-Hansen test (also called C-statistics) under the null of exogeneity of instrument subset (Roodman 2009). The GMM also addresses the Arellano and Bond (1991) first-order autocorrelation (AR1) and second-order autocorrelation (AR2) under the null of no serial correlations. However, the absence of AR(2) makes GMM valid. Further, in the choice between first-difference transformation and orthogonal deviation, our study prefers the latter because, in unbalanced panel data, it does not magnifies the gap as it subtracts the average of future available observations of a variable in the transformed data (Arellano and Bover 1995).

Although the GMM system estimator produced efficient results and reduce small sample biased, Windmeijer (2005) showed in Monte Carlo studies that estimated asymptotic standard errors can be downward biased in a small sample while using the efficient two-step GMM. The sample of current study is based on 28 banks over the period of 2007–2016 with 276 bank-year observations. Since the sample of the study is not very large, the study applies Windmeijer (2005) corrections to the standard error to avoid any potential bias in the estimated asymptotic standard errors and thus lead to more robust and corrected inference.

4.4. Econometric Specification

The study followed the model adopted by previous literature (Athanasoglou et al. 2008; Tan 2016; Tan and Floros 2012a). This model adds one-year lag of dependent variables as a determinant of profitability to specify the dynamic nature of model because the profitability of a bank tends to persist over time (Goddard et al. 2011), which reflects the informational capacity, impediments to competition in the market and/or sensitivity to macroeconomic/regional shocks to the extent that these are serially correlated (Berger et al. 2000). This study categorizes determinants into bank-specific variables which are the internal variables, industry-specific variables and macroeconomic variables which are the external variables. The regression equation of generalized models for this study is given below:

$$P_{it} = \alpha_0 + \delta P_{it-1} + \sum_{j=1}^{J} \beta_j BSV_{it}^j + \sum_{k=1}^{K} \beta_k ISV_t^k + \sum_{l=1}^{L} \beta_l MV_t^l + v_{it} + \mu_{it} \quad (2)$$

where P_{it} is the bank profitability, expressed as ROA, ROE, NIM, and PM; BSV_{it}^j represents bank-specific variables; ISV_t^k represents industry-specific variables; and MV_t^l represents macroeconomic variables. δP_{it-1} indicates one-year lag value of profitability to make the model dynamic and δ refers to the speed of adjustment to equilibrium. The δ value ranges between 0 and 1, which indicates the profitability persistence. A value of δ closer to 0 indicates the fast adjustment speed which determines the relatively competitive market while closer 1 indicates the slower adjustment speed which determines the relatively less competitive market. Further, i denotes each bank individually and t denotes the time (year). v_{it} and μ_{it} represent idiosyncratic errors and the unobserved bank-specific effect, respectively; α is the constant term; and β is the coefficient of all profitability determinants.

This study also included two dummy variables in the model. The one dummy variable of bank type to control the ownership effect was considered as the banks-specific variable and second dummy

variable of government change controlled the impact of government transition on banks profitability. The impact of bank type and government change in the model is as follows:

$$P_{it} = \alpha_0 + \delta P_{it-1} + \sum_{j=1}^{J} \beta_j BSV_{it}^j + \sum_{k=1}^{K} \beta_k ISV_t^k + \sum_{l=1}^{L} \beta_l MV_t^l + \beta_m GOV_t + v_{it} + \mu_{it} \quad (3)$$

where GOV_t translates the effect of government change during the certain period. This study applied Augmented Dickey Fuller (ADF) fisher type test to check unit root for unbalanced panel data. The results of ADF test are presented in Table 4 where p-values of each variable rejects the presence of a unit root in data which indicates that all variables are found to be stationary. This study applied the Pearson correlation to deal with the problem of multicollinearity among all determinants. Table 5 represents the correlation coefficients of all profitability determinants. The correlation results reject the existence of multicollinearity among independent variables as all coefficient values are less than 0.8 (Kennedy 2008), so the results are robust. In addition, because there are too many bank-specific variables, the study also performed variance inflation factor (VIF) and did not find the problem of multicollinearity among the variables.[8]

Table 4. Unit root test (Augmented Dickey Fuller (ADF)).

Bank Specific Variables			Industry Specific Variables			Macroeconomics Variables			Dummy Variable		
	Coef.	***PV***		**Coef.**	***PV***		**Coef.**	***PV***		**Coef.**	***PV***
ROA	272.7805	*0.000*	BSD	128.5578	*0.000*	GDPR	119.1902	*0.000*	GOV	105.9626	*0.000*
ROE	196.7962	*0.000*	MP	114.9365	*0.000*	INF	270.2735	*0.000*	BTYPE	103.8390	*0.000*
NIM	129.1156	*0.000*	IC_5	150.8416	*0.000*						
PM	184.7018	*0.000*									
SIZE	120.3748	*0.000*									
SIZE-SQ	126.0141	*0.000*									
SOLV	160.0674	*0.000*									
CQ	155.5087	*0.000*									
LIQ	155.6284	*0.000*									
FS	97.1220	*0.001*									
OE	120.7618	*0.000*									
DIV	166.6954	*0.000*									
FC	139.4334	*0.000*									
OC	126.0168	*0.000*									
LP	119.4617	*0.000*									

[8] The VIF values of each bank-specific variable is not reported due to space constraints. However, the results are available if requested. Further, the use of GMM also deals with the problem of possible correlation among explanatory variables, see Baltagi (2001).

Table 5. Correlation Matrix.

Variables	SIZE	SOLV	CQ	LIQ	FS	OE	DIV	FC	OC	LP	BTYPE	IC_5	BSD	MP	GDPR	INF	GOV
SIZE	1.00																
SOLV	−0.48	1.00															
CQ	−0.44	0.20	1.00														
LIQ	−0.05	0.06	−0.12	1.00													
FS	0.03	−0.30	0.20	−0.06	1.00												
OE	−0.41	0.04	0.39	−0.01	0.24	1.00											
DIV	0.34	−0.11	−0.27	0.20	−0.08	−0.28	1.00										
FC	−0.29	0.20	0.21	0.27	−0.10	−0.04	0.17	1.00									
OC	−0.58	0.44	0.47	0.11	−0.03	0.65	−0.20	0.22	1.00								
LP	0.64	−0.40	−0.30	−0.37	0.01	−0.30	0.24	−0.25	−0.50	1.00							
BTYPE	0.32	−0.37	−0.35	−0.03	−0.02	0.00	−0.01	−0.35	−0.17	0.24	1.00						
IC_5	−0.18	0.07	0.01	0.12	−0.09	0.02	0.01	0.10	0.05	−0.24	0.04	1.00					
BSD	0.06	0.01	0.00	−0.05	0.10	−0.08	0.35	−0.19	−0.09	−0.01	0.03	−0.15	1.00				
MP	−0.25	0.09	0.01	0.34	−0.09	0.02	0.03	0.13	0.08	−0.34	0.06	0.67	0.06	1.00			
GDPR	0.20	−0.03	−0.01	−0.30	0.11	−0.12	0.24	−0.24	−0.17	0.20	0.01	−0.17	0.59	−0.49	1.00		
INF	−0.10	0.04	−0.01	0.28	0.04	0.03	0.05	0.01	0.03	−0.16	0.03	−0.20	0.23	0.52	−0.33	1.00	
GOV	−0.06	0.02	−0.02	0.19	−0.06	−0.04	−0.07	0.08	0.05	−0.10	0.00	0.11	−0.26	0.30	−0.15	0.27	1.00

5. Results and Discussion

5.1. Descriptive Statistics

This presents the mean and standard deviation (SD) comparison of the PCB with GCB and ACB with SB in Table 6, and also reports the means and SD of total banks (TB). PCBs are larger than GCBs in terms of size and SBs are smaller than ACBs. SOLV ratio represents the leverage and/or financial health of a bank. GCBs are found to be stronger than PCBs in terms of SOLV and SBs are found to be less risky than ACBs in terms of SOLV. The reason for higher SOLV of SBs is because SBs do not act like commercial banks, and therefore, SBs do not rely more on deposits. SOLV ratio of SBs is 0.34 which means that 34% assets of SBs are backed by the equity, while only 10% assets of ACBs are generated through equity, which means ACBs rely more on deposits and liabilities. Banks in Pakistan have an average equity to assets ratio of 0.13 which is higher than the average 0.10 equity to assets ratio of Indian banks (Sinha and Sharma 2016) and average of 4.96 of Chinese banks (Tan 2016). SB is performing worse than ACB, as the mean of CQ ratio of SB is 0.83%, which means on average SBs in Pakistan are treating 83% of total advances as provisioning of non-performing loans. Although the higher ratio of loan loss provisions indicates that ability of a bank to deal with potential losses due to loan default, while at the same time this also indicates poor credit quality which adversely affects the profitability. An average loan loss ratio of 0.17 of banks in Pakistan is higher than the average loan loss ratio of 0.06 of Ghanaian banks (Alhassan et al. 2016) and 0.01 of Chinese banks (Tan 2016) which represent the poor credit quality of Pakistani banks. The 51% average loan to assets ratio of SBs represents their poorer liquidity position than ACBs. On the other hand, 0.40 mean liquidity of GCBs indicates better liquidity than PCBs. Banks in Pakistan are found to be more liquid than Chinese banks and banks in the OIC (Tan 2016; Sun et al. 2017) and less liquid than banks in Ghana (Alhassan et al. 2016).

GCBs are generating deposits almost 10.53 times equity, which is higher than PCBs, and SBs hold deposits 9.68 times of equity which is less than ACBs. The higher mean FS of GCBs represents their earnings more volatile as they are bearing more interest expenses, because lesser deposit time capital leads to bear less interest expenses which increase net interest income. GCBs are found to be more efficient with OE mean value of 0.61 than PCBs and SBs are found to be less efficient than ACBs with an average OE mean value of 1.04 and 0.76, respectively. Banks in Pakistan are found to be less efficient than banks in the OIC and banks in Latin America (Alhassan et al. 2016; Saona 2016) and more efficient than banks in Malaysia (Siew Peng and Mansor 2017). There is no difference found in terms of earning generated from non-interest bearing sources as both GCBs and PCBs are generating only 0.14 of their income from non-traditional activities. SB generates 0.15 while ACB generates 0.14 of total income from non-traditional activities. The 0.14 mean of non-interest income to gross income ratio represents that banks in Pakistan rely less on non-traditional activities than U.S. regional banks having a mean value of 0.23 (Lee et al. 2015) and more than Chinese banks (0.13) (Tan 2016). GCBs and PCBs are bearing on average 0.07 fund cost of deposits and SBs are paying on average 0.26 fund cost on deposits while ACBs are also paying on average 0.07 interest on deposits. Banks in Pakistan bear, on average, 0.09 fund cost which is 0.02 higher than Portuguese banks, Malaysian banks and Swiss banks (Garcia and Guerreiro 2016; Siew Peng and Mansor 2017; Dietrich and Wanzenried 2011).

Table 6. Descriptive Statistics.

Variables	TB			PCB			GCB			ACB			SB		
	Obs.	Mean	SD	*Obs.*	Mean	SD	*Obs.*	Mean	SD	*Obs.*	Mean	SD	*Obs.*	Mean	SD
ROA	*276*	0.00	0.02	*200*	0.01	0.02	*46*	0.01	0.02	*246*	0.01	0.02	*30*	−0.00	0.03
ROE	*276*	0.04	0.24	*200*	0.07	0.19	*46*	−0.00	0.37	*246*	0.06	0.23	*30*	−0.07	0.25
NIM	*276*	0.05	0.03	*200*	0.04	0.02	*46*	0.04	0.02	*246*	0.04	0.02	*30*	0.08	0.05
PM	*276*	0.01	0.02	*200*	0.01	0.02	*46*	0.01	0.02	*246*	0.01	0.02	*30*	0.00	0.04
SIZE	*276*	18.84	1.41	*200*	19.13	1.16	*46*	18.72	1.61	*246*	19.05	1.26	*30*	17.03	1.28
SOLV	*276*	0.13	0.12	*200*	0.10	0.06	*46*	0.11	0.05	*246*	0.10	0.06	*30*	0.34	0.22
CQ	*270*	0.17	0.37	*198*	0.10	0.08	*45*	0.12	0.07	*243*	0.10	0.08	*27*	0.83	0.94
LIQ	*276*	0.44	0.11	*200*	0.44	0.10	*46*	0.40	0.11	*246*	0.43	0.10	*30*	0.51	0.14
FS	*276*	9.88	16.37	*200*	9.76	6.01	*46*	10.53	10.52	*246*	9.91	7.05	*30*	9.68	46.07
OE	*276*	0.79	0.68	*200*	0.79	0.60	*46*	0.61	0.69	*246*	0.76	0.62	*30*	1.04	1.04
DIV	*276*	0.14	0.07	*200*	0.14	0.05	*46*	0.14	0.07	*246*	0.14	0.05	*30*	0.15	0.13
FC	*276*	0.09	0.10	*200*	0.07	0.02	*46*	0.07	0.03	*246*	0.07	0.03	*30*	0.26	0.23
OC	*276*	0.04	0.02	*200*	0.03	0.02	*46*	0.03	0.01	*246*	0.03	0.02	*30*	0.07	0.03
LP	*276*	5018.10	2393.09	*200*	5415.90	2204.37	*46*	5444.63	2205.80	*246*	5421.23	2200.16	*30*	1712.10	852.84
IC_5	*276*	0.54	0.01												
BSD	*276*	0.47	0.03												
MP	*276*	0.08	0.004												
GDPR	*276*	3.69	1.34												
INF	*276*	0.05	0.60												

TB, total banks; PCB, private commercial banks; GCB, government commercial banks; ACB, all commercial banks; SB, specialized banks. The financial statements of 27 banks are available over the period of 10 years (2007–2016) but we can only obtain six years of data (2011–2016) for Sindh Bank Limited because of its establishment during 2011; therefore, we have total 276 bank-year observations. Further, some data related to CQ of only few banks are not available for 2007 and 2008. Therefore, six observations of CQ are missing, i.e., 2% of the total observations. However, we use GMM with orthogonal deviation that estimates unbiased and consistent results in case of missing values (Arellano and Bover 1995).

A 0.07 average of OC indicates that SBs bear higher expenses than ACBs. On the other hand, both GCBs and ACBs bear on average 0.03 expenses of their average assets which represent their control over expenses and efficient utilization of assets. Employees of GCBs are found to be more productive than PCB employees, and SBs are less productive than ACBs. For industry variables, banking industry of Pakistan is found to be highly concentrated with an average five-bank concentration ratio of 0.54. The banking sector of Pakistan is also found to be more developed with average total assets to GDP ratio of 0.47. In terms of macroeconomic indicators, on average, 3.69 GDP growth of Pakistan is recorded, which is higher than the GDP growth in Spain, Switzerland, and U.S. (Trujillo-Ponce 2013; Dietrich and Wanzenried 2011; Lee et al. 2015) and lower than India and China (Sinha and Sharma 2016; Tan 2016) and, on average, 0.05 growth in the inflation is recorded in Pakistan.

5.2. Findings

This study has used two-step GMM system estimator to analyze the impact of different indicators on the profitability of banks in Pakistan. Our results are reported in Tables 7 and 8. Table 7 reports the impact of bank-specific variables while Table 8 reports the joint impact of bank-specific, industry-specific and macroeconomic variables on each profitability indicators. The values of F-statistics in all regressions indicate that all variables are jointly significant. The problem of first order negative correlation (AR1) was found in some models, but the study did not find a second order correlation (AR2) in all models which rejects the existence of serial correlation (Arellano and Bond 1991). However, the case of inconsistency is rejected by AR(2) error. All p-values of Hansen test are insignificant which reject the case of over-identifying restrictions and indicate the validity of instruments. The insignificant p-values of C-statistics also prove the exogeneity of instruments subset.

This study runs GMM regression twice for the robustness, first with only bank specific variables (Table 7) and then all variables jointly in a single equation (Table 8). The dynamic character of the model specification has confirmed through significant coefficients of lagged profitability indicators (ROA, ROE, NIM, and PM). The positive significant coefficients of δ are closer to 0 for ROA, NIM, and PM, indicating the lower persistency in profitability, and lead to the competitive structure of the banking industry in Pakistan, while the δ coefficient is closer to 1 for ROE, indicating the relatively less competitive banking industry. Some previous studies (Alhassan et al. 2016; Dietrich and Wanzenried 2011; Moualhi et al. 2016; Tan 2016) have also found the low persistence of profitability and competitive market structure of Ghana, Switzerland, China, and MENA region.

Bank Specific Variables (BSV): Table 7 presents the results of only BSV while Table 8 presents the joint results of BSV, ISV, MV, and government transition. Our findings report significant positive relationship between SIZE and profitability and significant negative relationship between SIZE-SQ and profitability. It affirms an inverted U-shape relationship between SIZE and profitability of banks in Pakistan. This inverted U-shape relationship indicates both linear and non-linear relationship between SIZE and profitability. It indicates that profitability of banks increases with an increase in the assets up to a certain level, and, after that, a further increase in the assets decreases profitability. The reason for the linear relationship is that large banks enjoy cost reduction due to economies of scale and earn more interest income due to the possibilities of having a large diversified portfolio (Smirlock 1985). The linear relationship is consistent with many previous studies (Ahamed 2017; Lee et al. 2015; Goddard et al. 2004a; Saona 2016; Haris et al.). Further, the non-linear relationship supports the arguments that small banks can enjoy economies of scale only up to a certain level due to bureaucratic, agency cost and some other reasons (Pasiouras and Kosmidou 2007). Out of the sample of twenty-eight banks, fifteen banks hold less than 2% share of assets. Therefore, after hitting a certain level. a further increase in assets could decrease their profitability because the smaller banks try to grow faster, even at the cost of their profitability (Athanasoglou et al. 2008). The non-linear relationship is consistent with (Tan 2016). The results of solvency (SOLV) lead to accepting our expected hypothesis, as we found a positive and significant relationship with profitability. It indicates that banks in Pakistan are highly capitalized, which leads them towards higher profitability by lowering interest costs (Berger 1995b). Here, we can

also conclude that strict implementation of different Basel accords by the SBP enabled all the banks in Pakistan to maintain an optimum level of equity. However, some recent studies also support this positive relationship between SOLV and profitability (Alhassan et al. 2016; Bougatef 2017; Dietrich and Wanzenried 2011; Sinha and Sharma 2016; Trujillo-Ponce 2013; Moualhi et al. 2016; Saona 2016; Sun et al. 2017; Tan 2016; Haris et al.). One of the most important factors among all the variables is credit quality (CQ), which is significantly negatively related to all profitability indicators in Table 7 and insignificantly negatively related in Table 8, so we accept our hypothesis that an increase in loan loss provisions decreases the profitability of banks. It indicates that banks in Pakistan are more exposed to the risky loans which later turn into non-performing loans and, thus, reduces profitability (Miller and Noulas 1997). Many other studies also found the negative relationship between CQ and bank's profitability (Lee et al. 2015; Dietrich and Wanzenried 2011; Moualhi et al. 2016; Elisa and Guido 2016; Tan 2016; Trujillo-Ponce 2013).

This study finds a positive and significant relationship between liquidity (LIQ) and profitability when only measured by NIM (see Table 7). However, we do not find any robust impact of LIQ on profitability after controlling ISV and MV (see Table 8). This insignificant impact of LIQ is due to the reason that the loan to assets ratio of banking industry decreased to 35.53% (2016) from 51.86% (2007), while the investment to asset ratio increased to 47.14% (2016) from 25.23% (2007)[9]. Here, we can say that banks in Pakistan are injecting more of their funds into money and capital investments which tend to be more secure and lower non-performing loans which lead them to higher profitability. The LIQ results are consistent with many previous studies (Alhassan et al. 2016; Moualhi et al. 2016; Elisa and Guido 2016; Tan 2016; Demirgüç-Kunt and Huizinga 1999).

In terms of financial structure (FS): Tables 7 and 8 provide almost consistent results; as an increase in the FS is significantly positively related to ROA, NIM and PM and have no impact on ROE. FS is measured by deposits to equity ratio, which considers as an important profitability indicator because higher deposits lead to the higher amount of funds which turn into interest-earning assets if a bank has the ability (Dietrich and Wanzenried 2011). On the other hand, García-Herrero et al. (2009) argued that having more equity is the more risky decision for a bank due to the expectations of higher return on equity invested by shareholders. This positive relationship between FS and profitability indicates that the banks in Pakistan have been able to convert deposit into interest-earning assets.

The significantly negative impact of operational efficiency (OE) on all profitability indicators except ROE is due to the fact that higher cost to income ratio indicates inefficiency of banks because of poor input utilization (Banya and Biekpe 2018), which decreases profitability. Our results are consistent with Dietrich and Wanzenried (2011), Sun et al. (2017), and Trujillo-Ponce (2013). The results in Tables 7 and 8 are consistent in terms of funding cost (FC) and thus lead to accepting our hypothesis. We find a negative relationship between FC and all profitability indicators except ROE which is not robust. Almost 52.57% assets (see Table 1) of the Pakistani banking sector is concentrated in only five out of twenty-eight banks, so it is evident that small banks in Pakistan are not able to pass their fund cost to the borrowers due to the competition and customer preferences towards large banks (Garcia and Guerreiro 2016) and thus higher FC lowers the profitability (Siew Peng and Mansor 2017). We find a significant negative impact of diversification (DIV) on profitability when measured by ROE and NIM, but we do not find any relationship between DIV and profitability when controlled by ISV and MV. The negative relationship of DIV is consistent with Tan (2016), Tan and Floros (2012a), and Wu et al. (2007), which means relying more on income generated from non-interest bearing sources prevent them to meet operating cost and thus experienced the lower profitability. Further, the staff of banks may lack the knowledge and experience in engaging the non-traditional services, thus leads to poor performance, this reason is already explained by Tan and Floros (2012c).

[9] Both loans to assets and investment to assets ratios of the banking industry were calculated from the available financial reports.

Table 7. GMM-System estimator (Bank specific variables).

Variables	ROA		ROE		NIM		PM	
Bank Specific	**Coef.**	***S.E***	**Coef.**	***S.E***	**Coef.**	***S.E***	**Coef.**	***S.E***
DEP_{t-1}	1.64389×10^{-1}**	8.010×10^{-2}	5.57721×10^{-1} ***	1.612×10^{-1}	4.607633×10^{-1} ***	7.930×10^{-2}	1.384147×10^{-1} **	6.650×10^{-2}
SIZE	1.203318×10^{-1} **	5.210×10^{-2}	1.840871 ***	4.708×10^{-1}	8.50462×10^{-2} **	3.980×10^{-2}	1.704171×10^{-1} ***	5.570×10^{-2}
SIZE-SQ	-3.1109×10^{-3} **	1.200×10^{-3}	-4.79522×10^{-2} ***	1.270×10^{-2}	-2.1508×10^{-3} **	1.000×10^{-3}	-4.3710×10^{-3} ***	1.500×10^{-3}
SOLV	3.24038×10^{-2} **	1.590×10^{-2}	8.398323×10^{-1} **	3.313×10^{-1}	4.02585×10^{-2} **	1.550×10^{-2}	2.55279×10^{-2} *	1.483×10^{-2}
CQ	-2.1073×10^{-2} ***	7.000×10^{-3}	3.53846×10^{-2}	1.206×10^{-1}	4.6932×10^{-3}	1.130×10^{-2}	-1.8303×10^{-2} **	7.400×10^{-3}
LIQ	9.6017×10^{-3}	2.280×10^{-2}	-4.157695×10^{-1}	4.829×10^{-1}	4.31429×10^{-2} ***	1.510×10^{-2}	-2.42537×10^{-2}	1.870×10^{-2}
FS	1.431×10^{-4} ***	1.000×10^{-4}	-1.3521×10^{-3}	9.000×10^{-4}	8.5400×10^{-5} ***	0.0000	4.7200×10^{-5} *	0.0000
OE	-6.9372×10^{-3} *	3.600×10^{-3}	4.8803×10^{-3}	1.247×10^{-1}	-2.22978×10^{-2} ***	5.700×10^{-3}	-9.2356×10^{-3} *	5.000×10^{-3}
FC	-3.10499×10^{-2}	4.200×10^{-2}	1.447203 **	5.487×10^{-1}	-6.19842×10^{-2} *	3.450×10^{-2}	-1.84158×10^{-2}	5.060×10^{-2}
DIV	-2.70873×10^{-2}	2.690×10^{-2}	-2.122629 **	9.574×10^{-1}	-6.68626×10^{-2} ***	1.490×10^{-2}	-2.77043×10^{-2}	2.360×10^{-2}
OC	1.789608×10^{-1} **	8.440×10^{-2}	7.984561×10^{-1}	2.0353	9.104626×10^{-1} ***	1.852×10^{-1}	2.690379×10^{-1} **	1.218×10^{-1}
LP	1.8400×10^{-6} ***	0.0000	6.01×10^{-5} **	0.0000	1.4400×10^{-6} **	0.0000	1.78×10^{-6} *	0.0000
BTYPE	-1.58954×10^{-2} *	8.700×10^{-3}	5.19982×10^{-2}	7.330×10^{-2}	-2.7358×10^{-3}	6.600×10^{-3}	-2.51173×10^{-2} **	1.000×10^{-2}
CONST.	-1.150425 **	4.828×10^{-1}	-17.63484 ***	4.4140	-8.4619×10^{-1}	3.872×10^{-1}	-1.619994 ***	4.978×10^{-1}
Obs.	232		245		223		229	
Banks	28		28		28		28	
Instruments	26		26		28		28	
F-statistic	32.61 ***		306.27 ***		99.89 ***		18.34 ***	
AR(1)	−1.96 (*0.051*)		−2.15 (0.031)		−1.61 (*0.108*)		−1.93 (*0.053*)	
AR(2)	0.66 (*0.508*)		−1.34 (0.180)		−1.36 (*0.173*)		−0.62 (*0.537*)	
Hansen-J	15.29 (*0.169*)		8.85 (0.636)		10.99 (*0.611*)		13.99 (*0.374*)	
C-statistics	2.02 (*0.569*)		0.69 (0.875)		1.08 (*0.783*)		3.34 (*0.342*)	

Notes: GMM-system estimator with orthogonal transformation was applied to unbalanced dynamic panel data. ***, **, * indicate the significance level at 1%, 5% and 10%, respectively. S.E refers to the Windmeijer (2005) robust standard errors. To deal with endogeneity, we treated SOLV (equity to assets ratio) as an endogenous variable while CQ (ratio of loan loss provision) as a predetermined variable by following Tan (2016) and Athanasoglou et al. (2008). F-statistic indicates the joint significance of all variables used in this study. Arellano–Bond test for serial correlation was applied where AR(1) indicates the first order serial correlation and AR(2) indicates the second order serial correlation using residuals under the assumptions of no serial correlation as the null hypothesis. The value of the Hansen-J statistic indicates the over-identifying restriction in the GMM dynamic panel model. C-statistics refers to the Difference-in-Hansen test of exogeneity of instrument subset under the null of the joint validity of the full instrument set. The insignificant *p*-values of AR(1), AR(2), Hansen-J, and C-statistics are in parenthesis. We report the long-term coefficients because of having a dynamic panel dataset.

Table 8. GMM-System estimator (Bank specific, industry specific, macroeconomics variables).

Variables	ROA		ROE		NIM		PM	
	Coef.	***S.E***	**Coef.**	***S.E***	**Coef.**	***S.E***	**Coef.**	***S.E***
DEP_{t-1}	-3.795144×10^{-1}	2.8920×10^{-1}	-2.636452×10^{-1}	3.5210×10^{-1}	4.585008×10^{-1} **	2.0030×10^{-1}	-4.8449×10^{-1}	2.8990×10^{-1}
SIZE	1.996912×10^{-1} **	8.8600×10^{-2}	5.245527 **	2.4598	1.075671×10^{-1} **	4.2200×10^{-2}	2.947789×10^{-1} ***	8.4000×10^{-2}
SIZE-SQ	-5.1308×10^{-3} **	2.3000×10^{-3}	-1.345323×10^{-1} **	6.3900×10^{-2}	-2.6682×10^{-3} **	1.1000×10^{-3}	-7.3953×10^{-3} ***	2.1000×10^{-3}
SOLV	6.36889×10^{-2} **	2.6000×10^{-2}	-5.60643×10^{-1}	6.0780×10^{-1}	8.9748×10^{-3}	3.1100×10^{-2}	5.17704×10^{-2}	4.6100×10^{-2}
CQ	-1.22358×10^{-2}	1.2400×10^{-2}	-8.047776×10^{-1}	7.0390×10^{-1}	-3.1314×10^{-3}	8.0000×10^{-3}	-3.5100×10^{-3}	3.6700×10^{-2}
LIQ	3.0923×10^{-2}	3.0800×10^{-2}	-2.548268	2.0544	4.0041×10^{-2}	4.0100×10^{-2}	-1.86794×10^{-2}	7.3700×10^{-2}
FS	2.6000×10^{-4} ***	1.0000×10^{-4}	-4.5253×10^{-3}	3.3000×10^{-3}	-8.4900×10^{-5}	0.0000	1.954×10^{-4} **	1.0000×10^{-4}
OE	-2.42199×10^{-2} *	1.4400×10^{-2}	5.23202×10^{-2}	3.8040×10^{-1}	-2.1116×10^{-3}	8.9000×10^{-3}	-3.62225×10^{-2} **	1.8100×10^{-2}
FC	-9.66549×10^{-2} ***	3.1900×10^{-2}	-3.994238×10^{-1}	8.897×10^{-1}	-1.281034×10^{-1} **	5.5100×10^{-2}	-1.105473×10^{-1}	7.3600×10^{-2}
DIV	3.99372×10^{-2}	7.900×10^{-2}	-4.85191×10^{-2}	1.4731	-2.7757×10^{-3}	4.4800×10^{-2}	1.068976×10^{-1}	1.649×10^{-1}
OC	8.553423×10^{-1}	8.016×10^{-1}	15.50088	13.3738	1.426004 **	5.2970×10^{-1}	1.051571 **	4.472×10^{-1}
LP	3.08×10^{-6}	0.0000	-1.71×10^{-5}	0.0000	3.19×10^{-6} **	0.0000	6.34×10^{-6}	0.0000
BTYPE	-1.47927×10^{-2}	1.1900×10^{-2}	-7.987422×10^{-1} *	4.3470×10^{-1}	-1.49075×10^{-2} *	7.9000×10^{-3}	-1.96613×10^{-2} *	1.1000×10^{-2}
IC_5	-3.50603 *	1.9145	-139.6825 **	50.9736	-1.747991 *	9.0180×10^{-1}	-6.031554 **	2.3710
BSD	-1.716065 *	8.637×10^{-1}	-48.98037 ***	16.3815	-8.761173×10^{-1} **	3.1680×10^{-1}	-1.982288 *	1.0083
MP	26.38733 *	14.5382	704.9716 ***	213.851	8.184816	5.0902	30.77849 ***	9.4929
GDPR	4.89697×10^{-2} *	2.7200×10^{-2}	1.192715 ***	3.9380×10^{-1}	1.80814×10^{-2} **	8.4000×10^{-3}	4.9927×10^{-2} ***	1.6900×10^{-2}
INF	-2.5191×10^{-2} *	1.3800×10^{-2}	-7.743261×10^{-1} **	3.8340×10^{-1}	-4.6112×10^{-3}	8.700×10^{-3}	-4.27627×10^{-2} **	2.0600×10^{-2}
GOV	-7.82821×10^{-2} *	4.3000×10^{-2}	-1.173972 ***	4.1380×10^{-1}	-1.48819×10^{-2} *	8.700×10^{-3}	-5.26827×10^{-2} ***	1.7600×10^{-2}
CONST.	-1.521925	8.9930×10^{-1}	-11.29181	19.7902	-4.771748×10^{-1}	3.949×10^{-1}	-1.347636	1.4595
Obs.	236		233		230		223	
Banks	28		28		28		28	
Instruments	28		28		28		28	
F-statistic	14.77 ***		13.37 ***		389.71 ***		15.12 ***	
AR(1)	-0.94 (0.345)		-1.56 (0.119)		-1.68 (0.092)		-1.16 (0.244)	
AR(2)	-1.61 (0.108)		-1.05 (0.294)		0.14 (0.892)		-0.91 (0.363)	
Hansen-J	4.76 (0.783)		4.84 (0.775)		5.87 (0.661)		6.36 (0.607)	
C-statistics	3.00 (0.392)		1.30 (0.730)		1.43 (0.699)		4.31 (0.230)	

Notes: GMM-system estimator with orthogonal transformation was applied to unbalanced dynamic panel data. ***, **, * indicate the significance level at 1%, 5% and 10%, respectively. S.E refers to the Windmeijer (2005) robust standard errors. To deal with endogeneity, we treated SOLV (equity to assets ratio) as an endogenous variable while CQ (ratio of loan loss provision) as a predetermined variable by following Tan (2016) and Athanasoglou et al. (2008). F-statistic indicates the joint significance of all variables used in this study. Arellano–Bond test for serial correlation was applied where AR(1) indicates the first order serial correlation and AR(2) indicates the second order serial correlation using residuals under the assumptions of no serial correlation as the null hypothesis. The value of the Hansen-J statistic indicates the over-identifying restriction in the GMM dynamic panel model. C-statistics refers to the Difference-in-Hansen test of exogeneity of instrument subset under the null of the joint validity of the full instrument set. The insignificant *p*-values of AR (1), AR (2), Hansen-J, and C-statistics are in parenthesis. We report the long-term coefficients because of having a dynamic panel data set.

This study found a significant positive impact of operating cost (OC) on profitability, which is robust when measured by ROA, NIM and PM (see Tables 7 and 8), and found no impact on ROE (see Tables 7 and 8). The lower OC ratio increases efficiency due to the expense management, which raises profitability (Dietrich and Wanzenried 2011). Our findings are consistent with previous literature (Molyneux and Thornton 1992; Tan and Floros 2012b; Bouzgarrou et al. 2018; Tan 2016; Bishnoi and Devi 2017). Our findings support the efficiency wage theory which suggests that higher labor productivity is due to higher wages and salaries, which leads to increased operating expenses, but profitability is increased more proportionately than the increase in operating expenses. Thus, profitability increases with the increase in OC. The labor productivity (LP) is the last bank-specific variable used in this study, which is positively related to the all profitability indicators (see Tables 7 and 8). We accept our hypothesis that banks in Pakistan have a well-developed and -compensated labor force who are efficient and generate higher profitability due to the better cost and risk management structure (Tan 2016). The LP results are consistent with Athanasoglou et al. (2008) for Greek banks and with Tan (2016) for Chinese banks. Finally, we found significantly lower profitability of private-owned banks than government-owned banks when measured by ROA and PM (see Table 7) and when measured by ROE, NIM and PM (see Table 8). Our results contradict Iannotta et al. (2007) who found private banks are more profitable than government banks. Previously, Micco et al. (2007) stated that it is not necessarily true that private banks are more profitable than government banks. Further, we find insignificant differences in the profitability of private and government banks when measured by ROA (see Table 8) and measured by ROE and NIM (see Table 7) which is consistent with Athanasoglou et al. (2008) and Molyneux and Thornton (1992).

Industry Specific Variables (ISV): The results of ISV are presented in Table 8 along with other explanatory variables used in this study. Industry concentration (IC_5) is found to be significantly negatively related to all profitability indicators. The negative impact of concentration on the profitability of banks in Pakistan indicates that the higher concentration leads to lower profitability due to the monopolistic position of largest five banks. The higher concentration of few banks leads to the higher market power of concentrated banks to remain more profitable (Tan 2016). Similarly, the interest spread is lower where the industry is concentrated by a few banks (Smirlock 1985). Out of 28 banks, the banking industry of Pakistan is concentrated by only top five banks, having a ten-year average concentration ratio of 54.41%. Therefore, the small banks in Pakistan reduce their margin to compete and to sustain their market share and thus profitability reduces. Previously, Tan and Floros (2012a), García-Herrero et al. (2009) and Naceur (2003) also suggested that the profitability of banks decreases due to the increase in the concentration ratio of few banks.

No matter which profitability indicator is used, the banking sector development (BSD) is found to be significantly negatively related to profitability (see Table 8). Previously, Demirgüç-Kunt and Huizinga (1999) found that BSD has a significant negative impact on bank margin and profitability. They suggested that higher assets to GDP ratio indicates the more intense interbank competition, which adversely affects the profitability of banks. Similarly, Lee et al. (2015) also found a negative relationship between NIM and BSD. The market power (MP), which is determined by Herfindahl–Hirschman index (HHI), has a positive significant impact on all profitability indicators except NIM which also has positive impact but insignificant. Our findings suggest that the increase in market power (MP) weakens the monopolistic position of concentrated banks, which positively affects the profitability of non-concentrated banks, leading to increased profitability by lowering competition. Our findings provide some support to the structure-conduct-hypothesis (SCP) that the market power of a bank leads to more profits due to collusion behavior in quoting lending and borrowing interest rates (Gilbert 1984). Further, SCP suggests that increasing the market power (MP) enables firms to earn an abnormal profit by lowering competition (Tan 2016). Previously, many studies found a direct relationship between MP and profitability, including, Sinha and Sharma (2016), Djalilov and Piesse (2016), Trujillo-Ponce (2013), Dietrich and Wanzenried (2011), and Goddard et al. (2004b).

Macroeconomic Variables (MV): The results of MV are reported in Table 8. Overall, the study found a significant positive impact of GDPR on all profitability indicators. The positive impact of GDPR indicates the economic growth in the country which is the reason to increase profitability due to the higher demand for loans. Previously, Athanasoglou et al. (2008) suggested a positive association between profitability and economic boom which increases the demand for credit transaction and also improves the solvency of a bank's customer. Further, Bouzgarrou et al. (2018), Esther et al. (2016); and Tan (2016) found a significant positive relationship between GDPR and bank's profitability. On the other hand, Alhassan et al. (2016) also found a positive significant relationship between GDPR and profitability when measured by ROA and ROE, thus leading to accept our hypothesis. The coefficient values of inflation (INF) are found to be significantly negatively related to all profitability indicators except NIM which also has a negative but insignificant impact, thus leading to accept our hypothesis. Our findings suggest that the banks management in Pakistan was not capable of anticipating future inflation during the period under analysis. Previously, Perry (1992) suggested that careful anticipation of inflation enables banks management to adjust the interest rate accordingly, if the inflation is not anticipated, then the cost grows faster than the revenues which reduces the profitability. However, our findings are consistent with Lee et al. (2015) and Moualhi et al. (2016). Both studies found a significant negative association between inflation (INF) and profitability.

Government Change (GOV): This study has analyzed the bank's profitability during the government transition including election period. The significant results of government change (GOV) leading to accept our hypothesis. The significant negative coefficients of GOV-dummy in each model indicating the lower profitability of banks in Pakistan during the government transition. The lower profitability during the government transition is because most banks in Pakistan are politically dominated and some private banks also suffer due to political connections. Both private and government banks inject a higher amount of money to the government departments, projects and to government personnel due to political connections, which leads to loan default because of government change. The politically-captured banks are less efficient because politicians who are connected with the banks are only interested in maximizing their personal objectives (La Porta et al. 2002). Previously, Khwaja and Mian (2005) stated that, during the elections, in Pakistan, the state-owned banks lend more to politically-connected firms, which leads to the higher default rate. Later, Micco et al. (2007) supported the political view of government banks, i.e. higher amount of lending on lower prices during the election years tends to reduce profitability. If we focus on Figure 1, the profitability of both PCB and GCB and even total banks (TB) profitability are reduced during the election period (2008 and 2013), based on the analysis, we may suggest that during the government transition the default rate of the customers of private banks increases due to the shifting of their money supply towards political parties to support their election campaigns and thus reduces the profitability of private banks as well. Hence, the period of government change is really a serious threat to the banking industry of Pakistan.

6. Conclusions

An unbalanced dynamic panel of 28 banks over the period 2007–2016 was used to analyze the impact of bank-specific, industry-specific and macroeconomic variables on return on assets, return on equity, net interest margin, and profit margin of banks in Pakistan. This study used a Two-Step Generalize Method of Momentum (GMM) system estimator, which deals with endogeneity, unobserved heterogeneity, and serial correlation, as well as considers the bank profit persistence. This study also controlled the impact of government change on the profitability.

First, we applied only bank-specific variables alone and then applied all independent variables combined in a single equation for the robustness to analyze the joint impact of all variable used in the study on all profitability indicators (see Tables 7 and 8). We find significant and positive coefficient values of lag dependent variables, which lead to lower profit persistence and competitive structure of the banking industry in Pakistan relevant to ROA, ROE, and NIM and find less competitive banking industry of Pakistan relevant to ROE.

Overall, we find an inverted U-shape relationship between banks size and profitability, which indicates that an increase in the assets up to a certain level has a positive impact on the profitability, but after that profitability reduces due to a further increase in the assets. The higher solvency, financial structure, operating cost, labor productivity, market power and economic growth are found to be positively related to the profitability. The banking profitability of Pakistan is found to be significantly negatively affected by the lower credit quality, operational efficiency, funding cost, banking sector development, industry concentration and inflation. We do not find any robust relationship between liquidity, diversification, and profitability when controlled by industry-specific and macroeconomic variables. We also find that government banks are more profitable than private banks when measured by ROA and NIM.

We find the consistent results related to the government change. The profitability of banks in Pakistan is significantly negatively affected by the change in the government. GMM results of government change are also consistent with Figure 1, where all profitability indicators have a downward trend during the election years (2008 and 2013).

The results of this study are useful to academics, bank managers, investors and other stakeholders. This study has some policy implications relevant to the profitability. First, Pakistani banks are still weak in credit management because the mean loan loss ratio of Pakistani banks is higher than mean loan loss ratio of banks in other emerging countries such as China (Tan 2016) and Ghana (Alhassan et al. 2016). They should avoid disbursing the riskier loans to strengthen the profitability. Second, the banks should invest more in human capital to further increase their productivity, which has the potential to further strengthen the revenues. Third, to enhance the profitability of the banking sector, the banks and the government of Pakistan should collaborate to control the mechanism to repay the debt by the government entities during government transition. Fourth, the banks in Pakistan should anticipate the future inflation to avoid its negative impact on banking profitability, as already suggested by Perry (1992). Fifth, specialized banks in Pakistan are found to be more profitable than commercial banks relative to ROA, NIM, and PM, even though the SME bank is operating with the lowest amount of equity. The government of Pakistan should inject more equity and focus more on expansions to/on specialized banks to generate more income. Higher capitalized banks have cushion available to observe negative shocks, to make riskier investment decisions, and to reduce their borrowing cost, thus can enjoy more profitability. Finally, operating expenses should be controlled to improve the bank's profitability, they should avoid needless expenses to increase their efficiency, or at least ensure the comparable positive variations in the profitability and operating expenses, to sustain or boost their operational efficiency.

Although the study included large fraction of all domestic banks operating in Pakistan and considered the important determinants of bank profitability as well as the government transition, it has certain limitations. The study is limited to the banking industry of Pakistan; we suggest that the same study be replicated in other emerging markets[10] that remain untouched. This study used total operating expenses to gross income to measure the operational efficiency, while further studies may utilize some other efficiency measures such as cost and technical efficiency. Further, we used five-bank concentration ratio to examine the impact of competition and ratio of loan loss provisions to measure the bank risk, however, future studies may use Lerner index to measure the competition and standardized z-score to measure the bank risk, as already used by Tan et al. (2017) and Tan (2016) for the Chinese banking industry. In addition, it is also suggested that some important factors related to corporate governance, e.g., board members, independence and political-connections of directors, may be considered in future studies in understanding the bank's profitability through the application of GMM. The current study finds that government transition harms the profitability of banks in Pakistan,

[10] Authors can find the list of emerging and developed markets at https://www.msci.com/market-classification.

however, future studies in other countries may analyze the impact of government transition due to the change in political and governance structure.

Author Contributions: H.Y. supervised and improved the draft. M.H. carried out literature, data curation, empirical analysis, and complied the original draft. G.T. helped with data curation, writing and editing.

Acknowledgments: The authors would like to thank the anonymous referees very much for their valuable comments and suggestions. This work was supported by the National Natural Science Foundation of China no. (71701082 and 71271103). This work would not have been possible without their support. We also thank all those who contributed in diverse ways in making the work complete.

Conflicts of Interest: The authors declare no conflict of interest.

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