Bank lending and macroprudential policies: are Islamic banks differentially affected?

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Abstract

Purpose – The purpose of the paper is to study the relevance of macroprudential policies (MPPs) in influencing bank lending in small open economies with dual banking systems.

Design/methodology/approach – In the analysis, the author employed the dynamic panel data methodology as compared to alternate techniques since it is able to address potential endogeneity challenges.

Findings – Using quarterly data from the period 2002–2020, the author finds that MPPs are highly effective in containing the growth of public credit, whereas its impact on private credit is much less effective. The disaggregated findings reveal that macroprudential measures are less effective in containing the growth of private credit by Islamic banks.

Originality/value – The majority of studies on MPPs are focused on emerging and advanced economies, limiting their policy appeal from the standpoint of small open economies. In this connection, this paper contributes to the literature on the relevance of such policies for a small open economy with a dual banking system and significant hydrocarbon exports. The paper's analysis therefore holds relevance for similar economies, both in the region and elsewhere, on the role and relevance of MPPs with emphasis on Islamic banks.

Keywords Banking, Macroprudential, Islamic, Qatar

Paper type Research paper

1. Introduction

The stability of the banking sector remains a paramount concern for policymakers. Indeed, disruptions in banking stability can significantly jeopardize systemic stability and engender significant economic and welfare losses (Laeven and Valencia, 2020). This is more relevant in bank-based financial systems where banks play a substantial role in financial intermediation. Thus, if bank credit is impaired – owing to disruptions in economic activity or some external shock – this can adversely impact the flow of credit to deserving sectors, with implications for economic growth and stability.

To ensure that the banking system remains on even keel, research has taken two approaches. One line of thinking has adopted a proactive approach by analyzing the association of credit booms and bank-level indicators (Demirguc Kunt and Detragiache, 2005; Mendoza and Terrones, 2012; Chen and Svirydsenka, 2021). Based on the extant evidence, the evidence identifies several variables which serve as 'early warning' indicators.

The other strand of thinking has focused on the role and relevance of policy measures that can address systemic instability (Lim *et al.*, 2013b; IMF, 2013a, b; Cerutti *et al.*, 2017). In this context, the role and relevance of macroprudential policies (MPPs) have gained prominence. Simply put, MPPs address the build-up of risks and help prevent their build-up from

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impacting the financial system more broadly or becoming systemic. This is because, if such risk were to materialize, this could lead to sharp and sudden disruption of economic activity. It could ultimately derail growth and throw economic activity out of gear. These effects were vividly demonstrated during the global financial crisis of 2008–2009 wherein a crisis that erupted in the US had systemic ramifications, spreading to other parts of the globe and thereby leading to substantive financial and economic losses.

Consistent with the adoption of such policies elsewhere, several Middle East and North Africa (MENA) countries have also undertaken a whole host of such policies to ensure financial stability (Prasad *et al.*, 2016). Several such policies both on the lending and borrowing sides were implemented during the heydays of the global financial crisis. Even after, several countries implemented such policies to safeguard domestic financial stability from time to time. Concurrently, as a move toward transparency and disclosure, countries also began publishing an annual report on financial stability highlighting the risks and vulnerabilities in the financial system and relatedly, the role and relevance of macroprudential measures (Cihak *et al.*, 2012; Comelli and Ogawa, 2021).

In this context, this paper focus on the case of Qatar and in particular, the efficacy of MPPs in addressing credit behavior. The focus on the Qatar's economy assumes relevance for several reasons. First and more generally, the country is a small open economy with an overwhelming dominance of banks: bank asset account for over 200% of GDP. Second, like several other countries in the region, Qatar has also implemented an entire range of MPPs from time to time, for both the borrowers and lenders. The relevance of these policies on bank credit remains an open question. Third, the country has been buffeted by a series of shocks over the past two decades, some generalized and others more specific to the country. Starting with the global financial crisis of 2008, there were declines in oil prices during the period 2014–2015 and subsequently the economic blockade by several neighboring countries in 2017, culminating finally in the COVID-19 pandemic of 2019–2020. Each of these shocks presented significant challenges to the policy authorities as how best to secure financial stability in the face of significant headwinds. The relevance of MPPs assumes increasing prominence since the country also has a significant presence of Islamic banks, accounting for around a quarter of financial system assets. With the lending policies of these banks being either asset-backed or asset-based, it remains a moot question as to how well did MPPs fare in shielding these banks from potential systemic distress. And finally, there is no systematic study available for Qatar which looks at the stability aspect of the banking sector in Qatar as also Islamic banks more specifically, necessitating the need for careful empirical analysis.

The rest of the analysis unfolds as follows. The study starts by delineating the relevance of macroprudential measures in what follows. Subsequently, it focus on the macroprudential measures undertaken in Qatar. This is followed by the data and empirical strategy, followed by the results including robustness checks and concluding remarks, while teasing out several policy implications that follow from the analysis.

2. Literature and evidence

The impact of MPPs has been well-investigated and studied after the global financial crisis, primarily because of failure of MPPs in safeguarding systemic stability. In an early exercise, using cross-national data, Lim *et al.*, 2013b found that the macroprudential instruments effectively reduce systemic risk over time. Subsequently, Cerutti *et al.* (2017) noted that MPPs lower credit growth. However, the impact of MPPs was manifest primarily in emerging market economies (Aysan *et al.*, 2015, 2016, 2017), while their efficacy in advanced and financially open economies was less compelling. Within a dynamic panel framework, Akinci and Ohmstead-Rumsey, 2017 computed an index of macroprudential measure and found that macroprudential tightening led to lower growth in bank credit and especially, housing credit.

Another interesting aspect of MPP is available in the literature where it is shown that MPPs can reduce the incidence of general credit booms and decrease the probability that booms end up badly (Dell'Ariccia *et al.*, 2012). Another cross-country study conducted by Claessens *et al.*, 2014) found that changes in balance sheets of individual banks in 48 countries (during 2000–2010) were found sensitive to specific policies such as loan-to-value (LTV), debt-to-income (DTI) caps, credit growth and foreign currency lending limits. They had also found that countercyclical buffers also help mitigate increases in bank leverage and assets.

Another strand of literature focused on MPPs that could strengthen the banking structure and promote economic development. Within a cross-national setup, Gimet and Lagoarde-Segot (2012) used advanced statistical techniques and found the interconnection between financial inclusion and MPP. The author observed that macroprudential regulations, besides the capital market developments and competitiveness are the useful drivers to reinforce financial stability; however, macroprudential measures hurts financial inclusion as it lowers credit mobilization.

One strand of literature focused on the dual banking system (conventional and Islamic banks) and role of macroprudential measures. To avoid regulatory arbitrage, the Islamic financial institutions are also mandated to follow MPPs, despite having different business model as compared to conventional banks (Zulkhibri, 2019). With reference to the Islamic banks, many studies assess the link between MPP, the stability of the Islamic financial system and the systematic risk (Al-Khouri and Arouria, 2015; Ali and Ariffin, 2016; Blundell-Wignall and Roulet, 2014; Louati and Boujelbene, 2015). More broadly, the results indicate that the impact of credit quality is starker at Islamic banks than conventional banks. After the crisis, Islamic banks are more exposed to high credit risk when compared to their status before the crisis. Ismal and Hidayat (2016) examining the financial stability issues of Islamic banks in Indonesia recommended the macroprudential tools specific to liquidity. Accordingly, they suggested that loan (financing) to deposit ratio has to be in the range of 77%–109% and Required Reserve ratio has to be at 5% so that Islamic banks in Indonesia can build up enough liquidity reserve to mitigate short- and long-term liquidity mismatches. Other within-country studies observed that macroprudential instruments such as LTV and DTI were effective in lowering credit countries in Asian economies with significant Islamic banking presence such as Malaysia and Indonesia (Zhang and Zoli, 2016).

In a case study of Iranian banking system, Hadian (2016), observed that Islamic banks are also required to be subjected to MPP like conventional banks to uphold the financial stability (Yoshida, 2016). Hadian (2016) argued that the finance provided by Islamic banks can lead to systemic risk and imbalances in the financial institutions since to a certain extent they are also exposed to externalities like conventional banks. Dauda *et al.* (2021) notes that the financing contracts, like mushārakah and muḍārabah are exposed to capital risk since operating losses suffered by the enterprises with whom the profit sharing contracts are made may leads to erosion in capital of Islamic banks. Based on this argument they stress the importance of studying the Islamic bank's responses to policy changes on macroprudential measures especially targeted to household sector.

Indicating the importance of the MPPs and its associated instruments in establishing financial stability for a set of MENA banks, Ghosh (2017) investigated the role played by the Central Banks' Governors in implementing MPPs that impact the performance of the banks by disaggregating the MPP index into its subcomponents. It was found that Central Bank Governors played a vital role in influencing loan growth though the impact on bank stability and non-core liabilities was not significant. The paper argued that the macroeconomic consideration mostly drives the decision of central Banks' Governor to implement MPP. In related research, Ghosh (2020) examined the relevance of MPPs using data for a set of MENA banks for the period 2000–2016 in establishing market discipline. The paper established that MPP has significant role in influencing market discipline.

Macroprudential measures have gained the center stage in the financial sector policy toolkit in Qatar and the rest of the world. Over the years, MPP assumes relevance for Qatar as volatility from oil exports revenue tends to expose the central bank's balance sheet and commercial banks to US dollar and energy prices (Prasad *et al.*, 2016). The country has undertaken several policy actions during the last two decades by adopting MPP regulations targeted toward lenders and borrowers to address vulnerabilities amplified by financial and real economic shocks. In hindsight, four discernible events appear that had a significant impact on the banking sector in Qatar. First, the global financial crisis in 2008 created a severe liquidity shortage in the banking system due to capital outflows toward safe haven destinations. Secondly, the oil price shock of 2014 resulted in a decline in net foreign assets as oil revenue plummeted, adversely impacting government deposits in banks and in turn, lowering banks' lendable resources. Third, the economic blockade imposed on the country during 2017–2020 resulted in a sudden outflow of non-resident deposits, creating challenges for banks' funding liquidity. Lastly, the COVID-19 pandemic period, wherein the central bank undertook both conventional and unconventional policy actions to de-stress the banking sector from risks of default on account of income shock caused by lockdown measures. Despite having a chequered history of successfully dealing with so many crisis, limited literature is available for Qatar with a focus on the role of MPPs, in general, for ensuring financial stability at the one end of the policy framework, without much sacrificing the developmental goal toward economic diversification of the economy.

3. Qatari banking sector and macroprudential measures

The financial system in Qatar remained bank-based, dominated by few banks. Following several rounds of consolidation, at present, the financial system comprises a total of 16 banks which includes five conventional banks, four Islamic banks and seven foreign banks. Banks remain the mainstay of financial intermediation in the country, with bank asset-to-GDP having doubled over 200% in 2020 as compared with 100% in the early 2000s.

Regarding asset size, the conventional banks' assets constitute nearly 70% of total commercial bank assets, while Islamic banks hold around 27% and foreign banks account for the rest. The ownership structure in Qatar indicates that the banking sector is mainly domestically-owned. Private domestic segment comprises overwhelming three-quarters of total ownership, with the share of public and quasi-public ownership being around 21%.

Despite the number of financial and non-financial crises emanating from the global economy including in the Arab region, Qatar's banking sector remains healthy and well capitalized, thereby maintaining high asset quality. As noted by the IMF article IV review of Qatar, banks had high capitalization (CAR of 16%) as on end-September 2018, with strong profitability (ROA of 1.6%) and low non-performing loans (ratio of 1.7%). This underscores the need for a reasonable provisioning ratio of 83%.

After the global financial crisis, Qatar Central Bank (QCB), the central bank in the country, has tightened prudential regulation by raising capital and liquidity requirements, with timely of implementing Basel III standards on capital, liquidity and leverage. QCB has established a separate Financial Stability Department with dedicated section on MPP and monitoring through Early Warning System. QCB also conducts periodic stress testing of banks, focusing on credit risks, solvency, and market risks. Thus, unlike many other MENA countries, the financial stability surveillance system is quite robust and developed in a calibrated manner.

The three major regulators of the financial system in the country – Qatar Central Bank, Qatar Financial Market Authority and Qatar Financial Centre Regulatory Authority – work in close coordination to monitor Qatar's financial system. The Financial Stability Risk Control Committee focuses upon various financial sector issues and developments and initiates timely policy actions to address any vulnerabilities emerging in the financial system. Over the years, they have played an important role in the implementation of both micro-prudential

and macroprudential measures for the financial sector in Qatar. The empirical research on the Qatari banking sector is an under-researched area, especially with regard to bank lending and riskiness and even more, from their ability to withstand financial stress. In view of the dominance of banks in the financial sector, it calls for careful assessment from an analytical standpoint. The approach of the study will include macro variables and bank-specific characteristics to model bank behavior under MPPs.

4. Data and variables

Three types of data are collected for the purpose of empirical analysis. The first is the bank-level balance sheet data. The second is published data reported by Qatar Central Bank in its monthly and quarterly publications and, third, other macroeconomic variables such as real GDP growth obtained from the Planning and Statistics Authority, the statistical agency in the country responsible for collating and reporting macroeconomic statistics.

Bank-level data: The key database is the bank-wise balance sheet and profit and loss data statements obtained from the data dump at the Qatar Central Bank. Using this data dump, appropriate data is carefully filtered and apply validation checks – based on quarterly and half-yearly information provided by the respective banks to QCB – and build a longitudinal bank-level database on a quarterly basis. The data are comparable across banks because the central bank as the regulator requires banks to submit information on a regular basis for most of the broad heads of the balance sheet and income-expenditure items. In addition, several banks became operative at different time points in the sample or alternately, there were several mergers during the period, which are suitably account for in the data. After this filtering and adjustments, the study have data on a maximum of 17 banks, including 6 conventional banks, 4 Islamic banks and the remaining foreign banks. The data begins in 2002: q1 (the first quarter for which consistent data is available) and ends in 2020: q4. Given the high degree of outliers, all bank-specific variables are winsorised at 1% at both ends of the sample.

Other banking data: Using various quarterly and monthly publications from the QCB website, information on other variables such as QCB deposit and lending rates as well as the share of each bank in total banking asset are extracted, using which a Herfindahl index of banking concentration is computed. The concentration–fragility hypothesis states that greater concentration exerts a destabilizing effect because banks exploit their monopoly power in the loan market and create moral hazard, raising overall borrower riskiness (Boyd and De Nicolo, 2005; De Hannan and Poghosyan, 2012). In contrast, the concentration–stability hypothesis contends that banks tend to be more prudent in terms of their approach toward risk-taking and as a result greater concentration exerts a salutary impact (Keeley, 1990; Berger and Bouwman, 2013).

Macroeconomic variables: Using the website of the Planning and Statistics Authority, the official statistical agency in the country, information on macroeconomic variable such as real GDP growth during the year is extracted.

The key independent variable of the study is the macroprudential index (MPI). Taking on board the country-specific policies adopted and the measures undertaken by the central bank, a set of 10 MPPs, 6 on the borrowers' side and the remaining on the lenders' side are considered. Accordingly, the study include the following measures for the borrowers: DTI, LTV, limit on household consumption credit (HOU-CON), single borrower limits (SBL), limits on mortgagee risk (Mortg_risk) and absolute credit limit (CR_LT). The measures considered under the lenders side include: dynamic provisioning (DP), interbank exposure limits (INTR), leverage ratio (LR) and required reserves (RR). A detailed description is provided in Table 1.

Using these measures and akin to Cerutti *et al.* (2017), the study compute MPI as follows. Each measure is dummy coded as one if it is in place during that quarter, else zero. As a result, the maximum value of the borrower-based measure (MPI-B) in any quarter equals 6 if each of the six measures was operative and zero, if none of the measures is operative. Likewise, the

Measure	Conceptual basis	Year and magnitude
Borrower-focused		
DTI	Prudential regulation focuses on ensuring banks' asset quality, when employed in isolation. When employed in conjunction with LTV, the measure can help to dampen the cyclicality of collateralised lending by adding another constraints on household capacity to borrow	75% – Qatari, 50% – Non-Qatari since 2010
LTV	The measure imposes a down-payment constraint on household capacity to borrow. From a theoretical standpoint, the constraint limits the procyclicality of collateralised lending since housing prices and household capacity to borrow based on the collateralised value interact in a procyclical manner	LTV 65% since 2007 reduced to 60% from 2011
HOU-CON	The measure introduces a regulatory limit on the amount that private borrowers can take from banks	Consumption credit limit introduced in 2007 (QR 2.5 million) reduced to QR 2 Million in 2010
SBL	The measure introduces an overall limit that banks can extend to customers (either singly or as a group) as a percentage of its capital and reserves. In effect, the measure limits banks from getting over-exposed to a single borrower or a borrower group	As for a single customer, the total investments and credit facilities that can be granted to his borrower group must not exceed 25% of the bank's capital and reserves
Mortgage Risk	The measure introduces a limit on the amount that banks can lend as part of their real estate exposure to private borrowers	Mortgage risk 150%; Banks Capital and Reserve
CR-LT	The measure introduces a limit the overall credit to a single borrower from the banking sector as a whole	Limit increased to 8 billion in 2015 from 3 billion introduced in 2007
DP	Traditional dynamic provisioning is calibrated on historical bank-specific losses. It can also be used to dampen the cyclicality of the financial system. The provisions can be raised during an upturn to build a buffer and limit credit expansion and lowered during downturns to support bank lending	Effective 2012, a risk reserve requirement at a minimum of 2% of total direct credit facilities granted by the bank and its branches. In 2018, ECL was introduced as part of IFSR9
Inter	Interbank limits seek to reduce interconnectedness in the banking system	Interbank large exposure limits introduced in 2019
LEV	A minimum leverage ratio requirement serves as the ultimate backstop against the shortage of equity based on risk-weighted capital requirements	A minimum Tier 1 leverage ratio of 3%, effective from July 2014
RR	This measure may be employed to address systemic risks. On the one hand, it exerts a direct impact on credit growth and therefore, can be employed to dampen the credit/asset price cycle. On the other hand, it provides a liquidity cushion that can be used to alleviate systemic liquidity crunch	Introduced in December 2007 at 3.75% increased to 4.7 in December 2008 and reduced to 4.5 in 2017

Table 1.
Macroprudential measures

maximum value of the lender-based measure (MPI-L) equals 4, the minimum is zero. In aggregate, the MPI – which equals the sum of MPI-B and MPI-L, ranges from a minimum of zero to a maximum of 10. The obtained value of MPI for each quarter is scaled by 10 (i.e. the

maximum attainable) to obtain a MPI which ranges from zero to one, with higher values indicating greater stringency of MPP measures. In a similar manner, the actual values of MPI-B and MPI-L are scaled by 6 and 4, respectively to obtain a value in the unit interval, with higher values indicating greater macroprudential stringency.

Table 2 provides the variable definitions including data source and summary statistics. The key variable of significance (MPI) appears to have been mildly tightening over the period, averaging 0.58, being manifest more prominently on the lenders (average value of 0.72) as compared with borrowers (average value of 0.38).

Prior to the empirical assessment, Table 3 shows the pairwise correlation among the key variables. Macroprudential measures and credit across all categories (except public credit) are inversely related and are statistically significant. This suggests that macroprudential policy measures have desired impact on credit. Other macroeconomic variable such as GDP has positive and statistically significant impact on credit flows across private and total credit categories. The raw correlations do not account for bank-level controls or the macroeconomic environment and as a result, it is important to account for these considerations within an empirical setup.

5. Empirical strategy

To examine the impact of MPPs on bank lending and its components, while controlling for other confounding factors, for bank i at time t, regressions of the following form is estimated:

Variable	Definition	Data source	Mean	Max	Min	St dev
Real GDP	Quarterly real gross domestic product	Planning and Statistics Authority	121,486	169,640	47,556	43,387
Bank Credit	Sum of public sector and private credit	QCB bulletin	24,525,829	60,262,020	3,092,046	16,941,876
Private Credit	Private sector credit by banks	QCB bulletin	13,558,506	25,926,130	1,375,845	8,068,570
Public Credit	Public sector credit by bank	QCB bulletin	4,316,857	9,599,055	1,202,288	2,358,453
Real Estate Credit	Credit given by banks for real estate construction activity	QCB bulletin	3,882,270	7,836,526	84,364	2,780,526
Industrial Credit	Credit given by banks for industrial activity	QCB bulletin	437,185	906,441	40,265	258,245
Services Credit	Credit given by banks for services activity	QCB bulletin	2,021,341	4,576,882	99,194	1,397,975
QCB Lending Rate	Rate at which banks borrow funds from QCB	QCB bulletin	4.4	5.5	1.3	1.2
MPI_L	Macroprudential measures taken for lenders by QCB	Author calculations	4.3	6.0	0.0	2.4
MPI_B	Macroprudential measures taken against borrower by QCB	As above	1.5	4.0	0.0	1.2
MPI	MPI-L + MPI-B	As above	5.8	10	0	3.5

Table 2.
Summary statistics

Table 3.
Correlation analysis

	MPI	MPI-L	MPI-B	Total credit	Private credit	Public credit	Ln asset	Equity/ Asset	Fee income/ Asset	Policy rate	Real GDP growth
MPI	1										
MPI-L	0.89	1									
	(0.00)										
MPI-B	0.97	0.75	1								
	(0.00)	(0.00)									
Total credit	−0.13	−0.12	−0.12	1							
	(0.00)	(0.00)	(0.00)								
Private credit	−0.16	−0.16	−0.14	0.79	1						
	(0.00)	(0.00)	(0.00)	(0.00)							
Public credit	0.00	0.00	0.00	0.36	0.05	1					
	(0.96)	(0.93)	(0.91)	(0.00)	(0.08)						
Ln Asset	0.32	0.28	0.32	0.06	0.06	0.02	1				
	(0.00)	(0.00)	(0.00)	(0.04)	(0.06)	(0.59)					
Equity/Asset	0.20	0.15	0.21	0.06	0.08	0.02	−0.24	1			
	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.58)	(0.00)				
Fee income/ Asset	0.04	0.02	0.05	−0.10	−0.08	−0.01	−0.19	−0.17	1		
	(0.17)	(0.60)	(0.09)	(0.00)	(0.01)	(0.67)	(0.00)	(0.00)			
Policy rate (QMRL)	0.38	0.11	0.49	0.01	0.01	0.00	0.15	0.17	0.03	1	
	(0.00)	(0.00)	(0.00)	(0.80)	(0.71)	(0.97)	(0.00)	(0.00)	(0.30)		
Real GDP growth	−0.34	−0.40	−0.27	0.04	0.06	−0.02	−0.10	−0.03	0.00	0.17	1
	(0.00)	(0.00)	(0.00)	(0.17)	(0.04)	(0.41)	(0.00)	(0.35)	(1.00)	(0.00)	

Note(s): ( ) indicates *p*-value

$$y_{it} = \alpha + \beta \boldsymbol{MPI}_t + \gamma \boldsymbol{BS}_{it} + \delta \boldsymbol{IND}_t + \delta \boldsymbol{MACRO}_t + \lambda_i + \varepsilon_{it} \quad (1)$$

In (1), the dependent variable (y) is the growth rate of credit in bank i in year t, computed as first difference in logarithmic terms, MPI is the MPP index, which is the aggregate of borrower and lender-specific MPIs, BS are bank-specific controls such as size, equity and income diversity, IND and MACRO are industry and macroeconomic controls, as defined earlier and ε represents idiosyncratic error term. Provided MPI exerts a significant impact on the outcome variable, the coefficient β would be negative and statistically significant. Throughout, standard errors are clustered by bank.

This section briefly discuss the relevance of the control variables. Bigger banks are likely to extend a greater quantum of loans, consistent with the logic that they have higher capacities in information acquisition and processing (Berger and Udell, 2002; Mudd, 2012). Bank capital is expected to exert a positive impact on lending, consistent with the bank lending channel. As compared to this, the bank capital channel would suggest that there are regulatory capital requirements that limit the supply of credit (Gambacorta and Mistrulli, 2004). Higher fee income enables banks to improve their profitability and in turn strengthen their capital position, that being the case, the impact on lending can go either way.

The panel fixed effects regression may be biased and could be susceptible to endogeneity concerns. In particular, it is possible that macroprudential measures could lead banks to modulate their credit and in turn, banks could tailor their lending behavior to mitigate the potential impact of such measures.

In order to mitigate such concerns, the panel generalized method of moments (GMM) framework with bank-specific controls and macroeconomic variables is employed. The study utilize two lags of the independent variables as instrument variables. The consistency checks of the GMM are dependent on the requirement that the residuals are not serially correlated and the selected instruments are valid. In all specifications, the relevant estimation checks are performed. The first of these include tests for serial correlation. In this case, the first-order autocorrelation is usually correlated but the second-order autocorrelation should not reject the null hypothesis of second-order autocorrelation. In case of Sargan test, it should not reject the null hypothesis that over-identification restrictions are valid.

6. Results and discussion

6.1 Baseline findings

Regression results are presented in Table 4. The diagnostic checks of the panel GMM estimation such as lag 1 and lag 2 of the residual serial correlation and Sargan test for overidentifying restrictions and validity of the instruments are consistent, giving credence to the results of the system GMM estimation.

In case of overall bank credit, the coefficient on MPI is statistically insignificant. Looking across the two sets of MPPs, i.e. on borrowers (MPI-B) and lenders (MPI-L), the study find that the coefficient on the former is negative, while that on the latter is positive. Both are statistically significant at conventional levels and of roughly similar magnitude. In other words, total credit appears to be adversely impacted by borrower-specific macroprudential measures and positively by lender-specific measures, so that overall, there is a statistically insignificant impact. One possible way to view these results would be to suggest that any measure focused on borrowers has an immediate impact as they cut back credit demand in response to such measures. Lender-focused measures have a much more nuanced impact. To explore this in detail, it is important to focus on public and domestic private credit separately.

In case of private credit, macroprudential measures in isolation on lenders and borrowers do not appear to impact credit in any significant manner. However, when considered in conjunction, the findings indicate that borrower-focused measures lower private credit,

	Total bank credit					Private sector credit			Public sector		
Dep. Var	D(LN credit)	D(LN credit)	D(LN credit)	D(LN credit)	D(LN credit)	D(LN credit)	D(LN credit)	D(LN credit)	D(LN credit)	D(LN credit)	D(LN credit)
MPI	−0.00489				−0.00604				−0.297***		
	(0.00601)				(0.00471)				(0.0822)		
MPI-B		−0.0166**		−0.00917		−0.00957		−0.0119*		−0.278***	−0.339***
		(0.00784)		(0.00907)		(0.00672)		(0.00668)		(0.0320)	(0.0871)
MPI-L			0.0211**	0.0131			0.000951	0.0119**			−0.267**	−0.252***
			(0.00863)	(0.00946)			(0.00701)	(0.00548)			(0.115)	(0.0851)
Ln Asset	−0.0726	0.186***	−0.134	0.222***	0.00793	0.123	0.0636	0.219	5.050*	4.031**	2.930	5.279**
	(0.199)	(0.0326)	(0.184)	(0.0402)	(0.0879)	(0.0750)	(0.106)	(0.150)	(2.981)	(1.566)	(3.400)	(2.345)
Equity/Asset	−3.978	−0.659***	−4.796*	−0.603***	−1.780	−0.191	−1.081	1.008	21.63	35.25*	15.11	20.86
	(2.729)	(0.158)	(2.569)	(0.155)	(1.259)	(0.789)	(1.401)	(1.774)	(17.60)	(19.44)	(16.95)	(16.34)
Fee income/ Asset	−0.132	−0.168	−0.182**	−0.127	0.152	0.148	0.149	0.144	6.916	−1.142	−0.0974	22.13
	(0.110)	(0.102)	(0.0752)	(0.102)	(0.0985)	(0.0932)	(0.0973)	(0.0937)	(4.651)	(2.535)	(14.65)	(20.12)
Real GDP growth	−0.143	−0.162*	−0.182***	−0.169**	−0.0622	−0.0358	−0.0459	−0.0456	4.447	5.770	3.567	3.412
	(0.103)	(0.0875)	(0.0694)	(0.0806)	(0.0580)	(0.0761)	(0.0530)	(0.0764)	(4.134)	(4.312)	(3.832)	(4.303)
Lag Dependent	−0.0952	0.0472	−0.0745	−0.162*	−0.0794	0.173*	−0.141	0.159	−0.211***	−0.205***	−0.195***	−0.240***
	(0.0911)	(0.0362)	(0.0929)	(0.0913)	(0.193)	(0.0998)	(0.169)	(0.102)	(0.0103)	(0.00544)	(0.0317)	(0.0366)
AR(1)	0.0265	0.0032	0.0155	0.0491	0.0699	0.0106	0.0794	0.0103	0.0205	0.0167	0.0324	0.0264
AR(2)	0.8956	0.0848	0.9317	0.9653	0.9420	0.0776	0.7747	0.1000	0.5467	0.3275	0.4595	0.5776
Sargan test	1	1	1	1	1	1	1	1	1	1	1	1
Observations	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121

Note(s): Standard errors within brackets; ***, ** and * denote statistical significance at the 1, 5 and 10%, respectively

Table 4.
Macroprudential policies and bank credit

whereas lender-focused measures increase private credit: the magnitude on the former being roughly equal (in absolute terms) to that on the latter. Intuitively, private borrowers cut back credit in response to macroprudential measures, although these measures on lenders work in the reverse. This could be occurring because in a small, competitive and highly over-banked market, private lending to large individuals is the only option for lenders to earn significant revenues. Thus, while borrowers might cut back credit demand, banks provide 'relationship credit' to private borrowers to ensure continuity.

As compared to this, macroprudential measures are observed to be highly effective for the public sector credit. The individual regression with MPI-B and MPI-L as well the regressions with both macroprudential regressions were highly significant in reducing the credit growth. A one standard deviation increase in MPI reduces the public credit by 99% points. Similarly, one standard deviation increase in MPI-B curtails the public credit by around 78% points, while for MPI-L reduction in public credit is around 31% points. These magnitudes are very high indicating the highly effective implementation of MPI in curtailing the public credit. From an economic standpoint, over one-third of the overall credit extended by banks is toward government and government-owned entities. The interest rate on these loans is typically below market rates. As a result, with the initiation of macroprudential measures, banks cut back lending toward such entities and presumably channel the incremental funds toward private entities. This helps to serve the dual purpose of maintaining relationship credit toward such entities and also protect their bottom lines in the face of an erosion in private credit demand.

6.2 Response of sectoral credit

To better understand the behavior of private credit, the study examine the response of its key components. To be more specific, Table 5 provides, estimate of the impact of MPP measures on key disaggregated sectoral components such as real estate, industry, services sector and consumption credit.

To provide a sense of the numbers, during this period on average, roughly one-third of private credit was toward real estate and contractors and close to 30% was toward consumption. A quarter of such credit was for services, while the industry received a miniscule 3% of credit, on average. This behavior of private credit masks their shifting dynamics. Thus for example, credit to real estate increased gradually over this period peaking at 40% in 2011 before ebbing to 27% by 2020. In contrast, consumption credit, which comprised between 40 and 50% of total private credit during the initial couple of years declined to about half that number by the end of the sample period. Reflecting the growing focus on services, the share of credit to this sector, which was less than 10% at the beginning of the period, increased over four-fold to touch 42% by 2020. The impact of the MPPs on the credit components needs to be viewed in this context.

The macroprudential measures on industrial credit are highly effective, but for the real estate credit and contractors' credit, macroprudential measures have not shown any economically significant relationship. The aggregate index of macroprudential is found to be positive and statistically significant for services credit growth, while it is negative for consumption credit. From an economic standpoint, in the run-up to the World Cup 2022, significant infrastructural activities had to be taken in roads, ports, rails and airport sectors, negating any potential impact of macroprudential measures on this segment. While consumption credit was significantly and adversely impacted, banks appear to have diverted such credit toward services (e.g. hotels, transportation, health, communication, etc.) to maintain revenues in the face of growing domestic competition and the challenges in the economic environment.

6.3 Impact on Islamic banks

Next, the impact of macroprudential measures on Islamic banks in Qatar as they play an important role in the financial intermediation with focus on asset creation and real estate

Dep. Var	D(LN credit)	Real estate D(LN credit)	Real estate D(LN credit)	D(LN credit)	D(LN credit)	Industrial credit D(LN credit)	Industrial credit D(LN credit)	D(LN credit)	D(LN credit)	Services credit D(LN credit)	Services credit D(LN credit)	D(LN credit)	D(LN credit)	Consumption credit D(LN credit)	Consumption credit D(LN credit)	D(LN credit)
MPI	0.0275				0.00317				0.130				−0.151**			
	(0.0457)				(0.00906)				(0.0804)				(0.0642)			
MPI-B		0.107		−1.839		−0.00590		−0.0129		0.244***		0.642**		−0.227		−0.125
		(0.0830)		(2.248)		(0.0126)		(0.0143)		(0.0769)		(0.263)		(0.151)		(0.184)
MPI-L			7.068	16.69			0.0415*	0.0247			0.181	−0.0615			−0.225***	−0.163***
			(13.19)	(19.82)			(0.0221)	(0.0480)			(0.190)	(0.226)			(0.0846)	(0.0587)
Bank Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Macro Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
AR(1)	0.0132	0.0135			0.0362	0.0363	0.0284	0.0458	0.0101	0.0015	0.0000		0.0008	0.0001	0.0004	0.0005
AR(2)	0.8615	0.8147			0.5198	0.4935	0.3889	0.5189	0.1244	0.2850	0.0765	0.3685	0.6722	0.3664	0.5061	0.7102
Sargan test	1	1			1	1	1	1	1	1	1	1	1	1	1	1
Observations	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121

Note(s): Standard errors within brackets; ***, ** and * denote statistical significance at the 1, 5 and 10%, respectively

Table 5.
Impact of macroprudential measures on sectoral credit (GMM)

development is estimated. It would have been useful had the study observed separate variables for Islamic banks, on their asset and liability sides. Since such data is not separately reported, the study employ a dummy for Islamic banks. The advantage of such a dummy is that it will imbibe the *Shariah*-compliant financing of these banks and provide evidence as to whether there exists any discernible impact of these banks on their lending behavior. Since Qatar does not permit Islamic windows of conventional banks, this ensures that there is no co-mingling of activities across these bank types and as a result, the Islamic bank dummy faithfully captures the *Shariah* nature of transactions of these banks. The coefficient on interest is the interaction term of the macroprudential measure with the Islamic dummy: this shows the differential impact of such measures on the credit behavior of Islamic banks.

Table 6 shows that for the total bank credit and public credit, the coefficient on the interaction term is not statistically significant and so, macroprudential measures are less effective in addressing the exuberance of public credit extended by Islamic banks. As observed earlier, given the infrastructure boom in the run-up to the World Cup 2022 driven by the government, all banks (including Islamic ones) wanted their 'share of the pie', thereby rendering MPPs less effective.

The macroprudential measures focused on Islamic banks are observed to be less effective in dissuading the growth of private credit. The interaction terms of Islamic with the macroprudential variable – both at the aggregate and at the individual level – are highly significant. To provide an example, the coefficient on MPI*Islamic for private credit is 0.069, indicating that a one standard deviation increase in MPI raises private credit by 24%, which is quite a significant number. Similar increases are observed when the disaggregated components of MPI are taken into account. Economically, a major part of the private credit extended by Islamic banks is toward real estate, which is either asset-backed or asset-based. A cutback in credit in response to macroprudential measure could lead to the project not getting completed, increasing the banks' delinquent loans. To negate such an adverse outcome, Islamic banks prefer to keep the project rolling, notwithstanding the macroprudential measure.

7. Concluding remarks and policy implications

In the post-global financial crisis period, central banks have devoted a significant amount of attention toward better understanding the macro-financial linkages. Such a focus is motivated by the fact that a build-up of systemic risks in the financial sector can morph into real sector weaknesses, with potential destabilizing effects on the macroeconomy.

In this regard, the study employs disaggregated data on Qatari banks and assess the impact of MPPs on credit as well as its sectoral components. By adopting panel GMM, the study find that macroprudential measures are statistically significant as well as reducing the private sector credit. For total credit, it is found that macroprudential measures taken on the borrower side have statistically significant impact, while the results are not significant in case of macroprudential measures taken for lender side. The paper also analyze the impact of macroprudential measures on Islamic banks in Qatar and show that such measures combined as well as targeted toward borrowers and lenders are found to be statistically less significant in reducing private sector credit growth and real estate credit growth, alike. The overall broad conclusion reached in the analysis is that macroprudential measures might not always be effective in containing credit expansion.

In terms of policy suggestions, as noted by the IMF, maintaining financial stability requires flexible and adaptive MPPs. Ideally, MPP should encompass a system of early warning indicators, aided by a set of policy tools that can help contain risks at an early stage along with building of buffers to absorb shocks. It is worth highlighting that QCB plays a paramount role as an institutional framework to for close monitoring and mitigation of systemic risks by timely implementation of MPPs.

Table 6. Impact of macroprudential policies on credit by Islamic banks (GMM)

	Total bank credit				Private sector credit				Public sector			
Dep. Var	D((LN credit)	D((LN credit)	D((LN credit)	D((LN credit)	D((LN credit)	D((LN credit)	D((LN credit)	D((LN credit)	D((LN credit)	D((LN credit)	D((LN credit)	D((LN credit)
MPI	0.00845				0.00546				−0.515**			
	(0.00591)				(0.00548)				(0.203)			
MPI-B		0.00852		0.00486		0.00623		0.00786		−0.541		−0.340*
		(0.00710)		(0.00684)		(0.00990)		(0.0109)		(0.643)		(0.177)
MPI-L			0.0258***	0.0193**			0.0234***	0.000748			−0.297**	−0.195**
			(0.00907)	(0.00982)			(0.00647)	(0.0138)			(0.144)	(0.0838)
Islamic												
MPI*Islamic	−0.0701				0.0686**				0.277*			
	(0.0551)				(0.0345)				(0.148)			
MPI-B*Islamic		−0.104		−0.111		0.141**		0.131**		0.206		−0.230
		(0.0824)		(0.0853)		(0.0563)		(0.0650)		(0.341)		(0.242)
MPI-L*Islamic			−0.00121	−0.0101			0.0840***	−0.0169			0.633	0.266
			(0.0292)	(0.0274)			(0.00975)	(0.0286)			(0.557)	(0.343)
Ln Asset	0.188***	0.191***	−0.110	0.230***	0.194	−0.0303	0.198	0.0298	10.39	7.941	−0.273	4.904
	(0.0352)	(0.0360)	(0.156)	(0.0429)	(0.155)	(0.100)	(0.156)	(0.129)	(6.567)	(13.23)	(6.760)	(4.765)
Equity/Asset	−0.640***	−0.642***	−4.528**	−0.618***	0.719	−2.497*	0.818	−2.128	34.18	26.81	−23.38	−4.830
	(0.175)	(0.181)	(2.171)	(0.184)	(1.861)	(1.491)	(1.874)	(1.790)	(22.81)	(45.93)	(40.17)	(26.29)
Fee income/ Asset	−0.140	−0.123	−0.101	−0.0639	0.161*	0.204**	0.135	0.196*	10.33*	4.677	8.414	−7.791
	(0.0994)	(0.0825)	(0.106)	(0.0961)	(0.0979)	(0.0986)	(0.108)	(0.106)	(5.721)	(3.901)	(27.81)	(7.822)
Real GDP growth	−0.167**	−0.163**	−0.111	−0.128	−0.0339	−0.00657	−0.0416	−0.0250	4.216	2.078	2.512	3.302
	(0.0851)	(0.0829)	(0.0948)	(0.0997)	(0.0868)	(0.0874)	(0.0876)	(0.0869)	(4.168)	(4.150)	(3.120)	(4.744)
Lag Dependent	−0.000769	−0.0231	−0.112	−0.0335	0.102	−0.205	0.130	−0.360	−0.224***	−0.219***	−0.175***	−0.180***
	(0.0409)	(0.0526)	(0.0856)	(0.0733)	(0.161)	(0.225)	(0.161)	(0.271)	(0.0176)	(0.0265)	(0.0402)	(0.0651)
AR(1)	0.0052	0.0058	0.0282	0.0104	0.0206	0.2382	0.0182	0.5887	0.0258	0.0123	0.0292	0.0382
AR(2)	0.1445	0.1754	0.9375	0.2405	0.2586	0.6262	0.2181	0.2952	0.7748	0.9707	0.7718	0.6758
Sargan test	1	1	1	1	1	1	1	1	1	1	1	1
Observations	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121

Note(s): Standard errors within brackets; ***, ** and * denote statistical significance at the 1, 5 and 10%, respectively

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