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OFF-BALANCE SHEET BANKING AND ITS IMPLICATIONS FOR MONETARY TRANSMISSION: EVIDENCE FROM SOUTH ASIA WITH A SPECIAL FOCUS ON SRI LANKA

Anil Perera, Deborah Ralston, Jayasinghe Wickramanayake*

Abstract

This is the first empirical study to examine the impact of off-balance sheet banking activities on monetary transmission mechanism via the bank lending channel and hence, it contributes to both off-balance sheet banking and monetary transmission literature. Using income statement and balance sheet data for a sample of South Asian commercial banks within panel regression framework, this study reveals that off-balance sheet activity reduces the effectiveness of bank lending channel of monetary transmission. Thus, banks having more exposure to off-balance sheet activity could insulate their loan supply and they are more sheltered against a monetary policy shock. Based on sub-sample analyses, this study also suggests that highly liquid and well-capitalised banks are able to protect their lending activity from the effects of monetary policy. Focusing on the Sri Lankan context exclusively, this study also finds that increased off-balance sheet banking in Sri Lanka is a moderating factor to the effectiveness of monetary transmission via domestic, large and also poorly-capitalised banks. This buffering effect of off-balance sheet activity raises important policy issues for monetary authorities particularly with regard to the definition of monetary aggregates and evaluation of monetary policy effectiveness.

JEL Classification: E44; E5; G21; G32

Key Words: Financial disintermediation; Off-balance sheet banking; Monetary transmission; Bank lending channel; Panel estimates; South Asia; Sri Lanka

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* Anil Perera is a doctoral candidate at Faculty of Business and Economics, Monash University, Australia (corresponding author - Tel.: +61-3-9903-2765; Fax: +61-3-9903-4116; Email: anil.perera@monash.edu; anilraa@yahoo.com). Deborah Ralston is the executive director of Australian Centre for Financial Studies and a professor at Faculty of Business and Economics, Monash University. Jayasinghe Wickramanayake is a senior lecturer at Monash University. The authors are grateful to Dr. P.N. Weerasinghe, Mrs. Swarna Gunaratne, Mr. D. Kumaratunge, Dr. Chandranath Amarasekara, Dr. P.K.G. Harischandra, Ms. Dimuthu Samaratunga, Ms. Manisha Wimalasuriya and Mrs. Erandi Liyanage of Central Bank of Sri Lanka for the encouragement. The authors would like to thank Mr. Dhammika Nanayakkara, Mrs. D.V.S. Dayawansa, Mr. Prinyantha Thilakaweera, Mr. Kamal Munasinghe, Mrs. Diana Padmaperuma, Mr. Dilhan De Silva, Ms. Lasantha Wijerathna, Mrs. Thasani Wijesundara, Mr. Waruna Wikumsiri and Mrs. Bhagya Senaratne of Central Bank of Sri Lanka and Ms. Jennifer Hua and Mr. Phu Quoc Pham of Monash University for their support. Also, the authors especially thank the discussant Dr. D.S. Wijesinghe, Dr. Koshi Mathai, anonymous referees of the original submission, and conference participants for helpful comments and suggestions. The usual disclaimer applies.

1. Introduction

Financial systems across countries have experienced important changes over the last few decades as a result of financial deregulation and innovation. More significantly, financial systems have become more market-based, as corporates have increased the use of direct means of financing compared to indirect (or intermediated) financing. This has led to developments in financial disintermediation - sometimes called disaggregation of financial services (Merton, 2003). This process of disintermediation is believed to have led to a reduction in the bank-dependency of borrowers and reduced the constraints in the availability of loanable funds from banks (Roldos, 2006). As a result, the banking industry is moving away from its traditional core activities such as accepting deposits and extending loans (Zakaria and Ismail, 2009).

Whilst financial disintermediation can occur in different forms of activity such as broad capital market participation, providing non-financial services by banks, etc. off-balance sheet (OBS, hereafter) transactions in commercial banks are considered one of the major forms of financial disintermediation.[1] In recent decades, OBS credit facilities provided by commercial banks have been one of the most rapidly growing financial instruments both within advanced and emerging countries (Glick and Plaut, 1989; Fung and Cheng, 2004; Nachane and Ghosh, 2007). Thus, nowadays, an important portion of banking profits and cost elements are associated with dis-intermediated or OBS assets and liabilities. The surge in OBS banking and its prominence have encouraged researchers to focus on different dimensions and effects of OBS activities. These research includes, for example, investigations on the relationship of OBS transactions with banking sector profitability (Angbazo, 1997), leverage (Breuer, 2002), X-efficiency (Clark and Siems, 2002), risk-return trade-off (Calmès and Théoret, 2010), asset

[1] Off-balance sheet banking refers to banking products and practices not reflected in traditional forms of portfolio activity, which earn a fee income and these transactions are not recorded on the bank's balance sheet as on balance sheet items (Hassan, 1993; Hassan, Karels, and Peterson, 1994).

portfolio risk (Boot and Thakor, 1991) and information complementarity and market competition (Fung and Cheng, 2004), etc.

A financial system links monetary policy and the real economy, and particular segments of financial markets, for example, credit markets serve as important conduits to transmit the monetary policy actions (Brunner and Meltzer, 1988). There is a broad consensus that changes and developments in a financial system (thus in credit markets) impact the ability of central banks to affect the real economy using their policy tools and hence, the monetary transmission (Boivin, Kiley, and Mishkin, 2010; Aysun and Hepp, 2011). More broadly, financial sector reforms and resultant changes such as financial deregulation, innovation, increased competition etc., which have led to transform the landscape of financial markets, particularly the credit markets and banking sectors, suggest that monetary transmission, mainly through the broad credit channel may have altered to a greater extent.

Similarly, the decline in traditional banking activity as reflected in the drop of banks' share of total financial intermediary assets, i.e. surge in 'financial disintermediation' as reflected in OBS activities, raises important policy issues in the context of macroeconomic management and central banking (Flannery, 1989; Edwards and Mishkin, 1995). Since the role of OBS facilities is to provide liquidity to bank customers and hence, to act as a substitute for on-balance sheet liquidity, OBS banking could weaken the relationship between money, interest rates and other variables of concern to policy makers (Glick and Plaut, 1989). To that end, the present study attempts to empirically examine the role played by increased OBS banking on the effectiveness of monetary policy, specifically focusing on the bank lending channel as the monetary policy transmission channel within the context of emerging country setting. As per the understanding of the authors, this is the first study to examine whether OBS banking manifests in higher growth in bank lending and creates a buffering effect on the impact of monetary policy actions via the bank lending channel of monetary

transmission after controlling for a host of bank-specific and country-level factors. Unlike many other studies in the same area, this study focuses on the entire OBS banking portfolio while employing different indicators of OBS banking activities. The empirical exposition of OBS banking, bank lending channel of monetary transmission and emerging country context is motivated due to several reasons.

First, despite the importance of the relationship between different attributes of financial disintermediation and monetary policy, so far, limited number of research has been done in this area. For exmaple, on the one hand, Alamsyah, Zulverdy, Gunadi, Idris, and Pramono (2005), Roldos (2006) and Tan and Goh (2009) investigate the effectiveness of monetary policy in the context of banking disintermediation and argue for a decline in the relative importance of the bank lending channel. On the other hand, limited number of studies focuses on a specific aspect of OBS transactions. For example, Duca and Vanhoose (1990) and Sofianos, Wachtel, and Melnik (1990) examine the impact of loan commitments and Estrella (2002), Altunbas, Gambacorta, and Marques-Ibanez (2009) and Loutskina and Strahan (2009) examine the impact of securitisation. Meanwhile, Aysun and Hepp (2011) find that monetary transmission via balance sheet channel is stronger for banks that securitised assets. Although the evidence is mixed, these studies broadly suggest that the changing role of credit intermediaries has dampened the effectiveness of monetary transmission via the bank lending channel and modified banks' ability to grant loans. Although these studies represent an important contribution, OBS banking data in these studies are somewhat limited to credit commitments and securitisation.[2] However, amongst several OBS transactions, guarantees, acceptances and other contingent liabilities also deserve a special attention and it is vital to explicitly focus on the impact of entire OBS portfolio on the monetary transmission.

[2] Given the importance of securitisation as key OBS activity in advanced countries [see, for example, Goddard, Molyneux, Wilson, and Tavakoli (2007); Nwogugu (2007); Antzoulatos, Panopoulou, and Tsoumas (2011)] and also due to the rapid growth particularly in US and European banks [see, for example, Altunbas et al. (2009); Benmelech, Dlugosz, and Ivashina (2012)], existing studies may have inclined to focus mainly on securitisation.

Second, the bank lending channel is considered much discussed segment of monetary transmission mechanism receiving a considerable attention in policy deliberations (Disyatat, 2011). To the extent that bank lending channel operates, monetary policy can influence aggregate demand not only through interest rates as in the traditional money (interest rates) channel, which affect demand for loanable funds, but also through its impact on supply of loans (Bernanke and Gertler, 1995; Kashyap and Stein, 1995; Kishan and Opiela, 2000). Hence, the implication is that banks play a special role in transmitting monetary policy impulses through the bank lending channel (Disyatat, 2011; Olivero, Li, and Jeon, 2011a). Since banks continue to dominate in many financial systems in both advanced and emerging economies, it is worthwhile to examine the role of banks in transmitting monetary policy in the presence of increased OBS banking as those banking practices may allow banks to smoothen the impact of tight monetary policy. Therefore, this study adds to knowledge on banks' lending behaviour through the discussion on bank lending channel and hence, broad credit channel, which is considered much difficult channel to quantify and determine (Goddard et al., 2007; Kandrac, 2012).

Third, emerging country financial sectors have undergone substantial changes during recent decades driven by financial sector reforms, particularly financial deregulation (Brissimis and Magginas, 2005) and hence, these developments may have important implications for monetary transmission.[3] In particular, recently, a substantial surge is observed in financial disintermediation and OBS banking in emerging country banking sectors (Oh, 1997; Nachane and Ghosh, 2007) and such developments may have significant macroeconomic effects, mainly on the monetary policy front. Given the importance of the banking sector and bank lending in emerging countries,[4] there remains a vital need to

[3] As emerging countries have unique and different economic and financial characteristics compared to advanced countries, appropriate and separate modelling is deemed as essential for these countries to formulate effective monetary policies (Aleem, 2010; Frankel, 2010).
[4] See, for example, Agung (1998); Khwaja and Mian (2008).

examine the existence of bank lending channel in the context of OBS activity. Moreover, given the specific interest in dynamics of monetary transmission and banking in Sri Lanka, this study also places a special attention to the Sri Lankan context. As Sri Lankan financial market have undergone significant changes over the last few decades (Athukorala and Rajapatirana, 1993; Cooray, 2000), it provides an appropriate context to study the dynamics of monetary transmission mechanism within the emerging country setting. Also, focusing on single country perspective allows examining dynamics of monetary transmission and OBS banking more extensively.

As per the aforementioned motivations, it is intended to answer the following research preposition: *To what extent does off-balance sheet banking impact on the effectiveness of the monetary transmission mechanism?* By answering this question, it is expected to observe whether increased OBS banking activity amplifies or reduces the impact of monetary policy shocks through the bank lending channel. To examine the impact of OBS banking on the bank lending channel, this study uses annual bank-level income statement and balance sheet data for 114 domestic commercial banks operating in key South Asian countries, i.e. Bangladesh, India, Pakistan and Sri Lanka for the period 2004-2011.[5] In addition, the study also uses monetary survey data for 23 domestic and foreign commercial banks operating in Sri Lanka. The empirical methodology of this study has been designed based on previous literature of bank lending channel [for example, Mateut, Bougheas, and Mizen (2006); Altunbas et al. (2009); Aysun and Hepp (2011); Olivero, Li, and Jeon (2011b); Olivero et al. (2011a); Wu, Luca, and Jeon (2011)], which are based on the framework suggested by

[5] South Asia consists of a group of emerging economies: Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka. At a regional level, these economies have formed a regional grouping, namely 'South Asian Association for Regional Cooperation (SAARC)'. In terms of GDP, the region adds approximately 3.0 per cent to the global output and major four countries (Bangladesh, India, Pakistan and Sri Lanka) contribute to around 98 per cent of the GDP of South Asian region.

Kashyap and Stein (1995) and Ashcraft (2006). Accordingly, the study employs standard panel estimation methods with additional robustness checks.

As per the expectations, this study mainly finds that banking OBS activity reduces the importance of bank lending channel and hence, weakens the monetary transmission process. This key finding and also other evidence observed within the empirical setting provide some important policy inferences and makes a significant contribution to academic literature of OBS banking, monetary policy and transmission as well as to central banking.

The remainder of the paper is structured as follows: Section 2 conceptualises the OBS banking and developments and provides a brief discussion on South Asian banking and monetary sector. Section 3 considers theoretical underpinnings and related empirical evidence of financial disintermediation, OBS banking and its relevance to monetary policy. These discussions on institutional developments and theoretical background provide the basis for subsequent empirical analysis. In Section 4, research design is discussed including the selection of the sample, models and the econometric methodology. Section 5 presents the results and the analysis on findings while Section 6 reports on the empirical results for Sri Lanka. A discussion on conclusions and policy implications are provided in Section 7.

2. Developments in off-balance sheet banking and financial and monetary sector in South Asian countries

2.1 Developments in off-balance sheet banking

During past three decades, financial landscape across countries has undergone significant structural changes. In particular, since early 1980s, financial deepening and financial innovations led creating more market oriented financial structures. In line with these developments, firms focused more on financial markets to fund their investments (Boyd and Gertler, 1994; Calmès and Théoret, 2010). This evolution led some major changes in

corporate financing as reflected in relative decline in the share of bank loans (indirect financing) and the increase in share of capital market financing through bonds and stocks. As banks have been facing a major challenge due to decline in bank intermediation, they attempted to counter the adverse trend through financial innovations and hence, moved into activities beyond the traditional banking business (Brissimis, Kamberoglou, and Simigiannis, 2001). For example, banks began to securitise their loan products and offer fiduciary services and financial advice to investors. These non-traditional activities are loosely classified as off-balance sheet (OBS) activities, which earn commission and fee income and other noninterest income (Calmès and Théoret, 2010).[6] Generally, banks make these activities 'invisible' by taking them off the balance sheet and hence record them below the bottom line of the balance sheet.

Broadly, OBS activities can be classified into guarantees, commitments, market-related activities and advisory or management functions. Market-related activities relate to loan participation and derivative transactions such as foreign exchange contracts, forwards, futures and options, swap and credit derivatives (Hassan et al., 1994). Angbazo (1997) categorises OBS banking into lending (or credit-related) products such as loan commitments and letters of credit, and derivative (or risk-management) products. These OBS facilities provide a key source of noninterest income, especially for largest and most creditworthy banks (Fung and Cheng, 2004), and also increase the profitability (Nachane and Ghosh, 2002) and value of the banking firm (Angbazo, 1997). It is also argued that OBS might lower the asset risk of a particular banking firm (Boot and Thakor, 1991; Hassan, 1993) and may be deemed as a risk reducing tool. However, OBS banking is not free of risks and problems. For example, Avery and Berger (1991) suggest that OBS activity, for example, loan commitments increase bank risk by obligating it to issue future loans under terms it might otherwise refuse. Also, banks

[6] In finance literature and practice, these activities are also defined as 'contingent liabilities' (Kapstein, 1989) or 'non-loan financial services' (Pennacchi, 2006).

may not reveal adequate information about OBS transactions making it difficult for regulators and investors to evaluate the riskiness of bank portfolio (Kapstein, 1989). Moreover, as argued in Karim and Gee (2007), an unanticipated change in the counterparties' credit standing during the life of OBS transaction would also lead to increase credit risk of a bank. Furthermore, OBS activities may not necessarily yield straightforward diversification benefits to banks due to the associated high volatility in gains derived from such activities (Stiroh and Rumble, 2006).

Nevertheless, in recent decades, OBS credit facilities provided by banks have been one of the most rapidly growing financial instruments within the United States, Canada, Europe and also in Asia (Glick and Plaut, 1989; Boot and Thakor, 1991; Brissimis and Magginas, 2005). According to the data of Bank of International Settlements (BIS), on the basis of consolidated foreign claims and other exposures of reporting banks, guarantees have increased by about 1,104 per cent in all countries, 1,060 in advanced countries and 1,107 per cent in emerging countries during the period 2005-2012. Similarly, credit commitments have also grown considerably during the sample period.[7] In particular, considerable growth in OBS activities has outperformed the normal growth in banking business (Nachane and Ghosh, 2007). Also, OBS growth is substantially higher for large commercial banks (Jagtiani, Nathan, and Sick, 1995; Karim and Gee, 2007).[8] The increased use of OBS facilities was driven by several motives such as revenue augmentation (Brewer, Minton, and Moser, 2000; Ergungor, 2001; Nachane and Ghosh, 2002; 2007; Jonas and King, 2008), favourable policy initiatives, which encourage banks to engage in OBS banking (Nachane and Ghosh, 2007), cost control and incentives to expand activities of financial intermediaries (Siems and Clark, 1997; Jonas and King, 2008), sales of commercial loans (James, 1988); avoidance of capital adequacy

[7] Information on OBS banking is excluded from reported statistics of BIS. However, OBS can be monitored using derivative statistics particularly, guarantees and commitments (Bank of International Settlements, 2009).
[8] Small banks are largely focusing loan portfolios with small businesses and large banks are having much more extensive OBS activities, which typically involve larger firms (Ashcraft, 2006) .

requirements (Jagtiani, Saunders, and Udell, 1995; Blanchard, Dell'Ariccia, and Mauro, 2010) and regulatory taxes (Ergungor, 2001), extending the leverage (Karim and Gee, 2007; Blanchard et al., 2010) and managing interest rate exposures (Brewer et al., 2000). Overall, this surge is mainly supported by increased competition in the banking sector and technological advancement (Karim and Gee, 2007).

2.2 Financial and monetary sector in South Asian countries and off-balance sheet banking

South Asia is particularly an appropriate context to examine the relationship between financial sector changes and monetary transmission process due to several reasons. Until the early 1980s, the state of the financial sector in these countries is considered a classic example of financial repression (Athukorala and Rajapatirana, 1993; Wickramanayake, 1993; Montiel, 2003). Thus, similar to most other emerging countries, South Asian countries were (and even now to some extent) operating within repressed, underdeveloped and regulated financial systems (Braun and Raddatz, 2008; Asian Development Bank, 2009). As a result, monetary policy frameworks and monetary transmission mechanisms heavily relied on non-market approaches and credit rationing and hence, credit based channels had gained the prominence in monetary transmission (Hossain, 2009) .

However, commencing early 1990s, these economies pursued a range of financial sector reforms with a view to enhance the efficiency of the financial sector contributing to broad economic performance in these countries.[9] The reforms mainly include measures of interest rate deregulation, exchange rate liberalisation, privatisation and deregulation of financial institutions, capital market relaxations as well as institutional reforms in monetary policy frameworks including statutory amendments. In terms of operational and prudential changes,

[9] In order to review the experiences of each countries, see, for example : Hossain (2010); Hossain (2012); Uddin and Suzuki (2011) for Bangladesh, Ahluwalia (2002); Wadhva (2004); Mohan (2005); Sharma (2008) for India, Iimi (2004); Bonaccorsi di Patti and Hardy (2005) for Pakistan and Cooray (2000); Central Bank of Sri Lanka (2005); Edirisuriya (2007) for Sri Lanka.

technological upgrading and strengthening of prudential norms and market discipline; adoption of international benchmarks; management of organisational changes and consolidation can also be identified (Asian Development Bank, 2009). As a result, banking markets in South Asian region underwent gradual regulatory and structural changes commencing early 1990s (Perera, Skully, and Wickramanayake, 2007; 2010). At the same time, monetary policy frameworks have also been modified to a greater extent (Mohan, 2008; Central Bank of Sri Lanka, 2010). Driven by such regulatory reforms and structural changes, South Asian financial sectors now record considerable developments as indicated by several indicators, i.e. stock market liberalisation to GDP, broad money to GDP, etc.[10] However, banking system in these countries still plays a considerable role in the financial system despite gradual developments in non-bank financial intermediation and disintermediation (Asian Development Bank, 2009).

Similar to the developments in OBS banking practices in advanced and other emerging countries, banking sector in South Asian countries also record a substantial growth in OBS credit facilities. In particular, the surge in OBS banking activity is driven by the phenomenal increase in OBS credit facilities provided by Indian banks, which had picked up in mid-1990s (Nachane and Ghosh, 2002). At the same time, although the relative size is small, a substantial growth in OBS banking is observed in other South Asian countries as well. Some stylised statistics of lending and OBS activity in key South Asian countries are presented in Table 1 and the following is observed.

[10] For example, stock market capitalisation to GDP in South Asia increased from 11 per cent in 1990 to 82 per cent by 2010 (Asian Development Bank, 2009).

Table 1

Stylised statistics of lending and off-balance sheet activities in key South Asian countries, 2004 - 2011.

		Gross Loans			Off Balance Sheet (OBS) Items										
Sample: Banks	**Total Assets**	**Total**	**Share of Total Assets (%)**	**Average Growth (%)**	**Total**	**Share of Total Assets (%)**	**Average Growth (%)**	**Guarantees**	**Share of Total OBS (%)**	**Acceptances**	**Share of Total OBS (%)**	**Commitments**	**Share of Total OBS (%)**	**Other Contingent Liabilities**	**Share of Total OBS (%)**
All	**25,398.57**	**14,728.43**	**0.58**	**26.81**	**16,954.12**	**0.67**	**28.41**								
Bangladesh	1,189.48	752.14	0.63	20.94	337.10	0.28	30.95	55.05	0.16	25.00	0.07	75.69	0.22	181.36	0.54
India	19,641.98	11,204.13	0.57	22.81	15,543.32	0.79	31.23	1,499.80	0.10	1,631.09	0.10	n.a.	-	12,412.44	0.80
Pakistan	2,910.59	1,586.91	0.55	38.55	641.07	0.22	21.58	170.60	0.27	110.85	0.17	296.89	0.46	62.73	0.10
Sri Lanka	1,656.53	1,185.25	0.72	24.96	432.63	0.26	29.85	126.30	0.29	122.87	0.28	123.13	0.28	60.33	0.14
Ownership															
State-Owned	21,361.87	12,981.64	0.61	19.95	8,711.60	0.41	26.27	1,512.29	0.17	1,611.80	0.19	404.64	0.05	5,182.86	0.59
Privately-Owned	4,036.70	1,746.79	0.43	23.88	8,242.53	2.04	32.30	488.35	0.06	690.71	0.08	139.57	0.02	6,923.89	0.84
Listing															
Listed	11,247.63	6,749.42	0.60	23.94	8,267.41	0.74	29.18	1,040.55	0.13	1,046.35	0.13	150.28	0.02	6,030.23	0.73
Non Listed	14,150.94	7,979.01	0.56	15.38	8,686.71	0.61	36.50	192.60	0.02	1,501.40	0.17	310.24	0.04	6,682.47	0.77
Size															
Large	21,678.81	12,491.01	0.58	18.22	22,326.08	1.03	23.31	2,460.30	0.11	2,704.92	0.12	400.98	0.02	16,759.88	0.75
Small	3,719.76	2,237.42	0.60	22.88	1,673.56	0.45	32.49	249.94	0.15	272.78	0.16	86.04	0.05	1,064.79	0.64
Liquidity															
High Liquid	5,662.83	3,377.69	0.60	24.39	5,070.79	0.90	36.37	353.88	0.07	1,184.28	0.23	143.04	0.03	3,389.60	0.67
Less Liquid	19,735.74	11,350.74	0.58	21.70	8,313.71	0.42	27.42	1,004.48	0.12	1,010.22	0.12	222.22	0.03	6,076.79	0.73
Capital															
Well-Capitalised	6,086.31	3,439.43	0.57	22.59	11,416.30	1.88	38.86	815.10	0.07	642.65	0.06	92.10	0.01	9,866.44	0.86
Poorly-Capitalised	19,312.26	11,289.00	0.58	26.07	5,537.82	0.29	27.91	997.92	0.18	992.86	0.18	195.72	0.04	3,351.32	0.61
Profitability															
Highly Profitable	10,503.86	6,252.61	0.60	22.85	8,597.10	0.82	31.30	1,085.80	0.13	1,136.93	0.13	181.20	0.02	6,193.17	0.72
Less Profititable	14,894.71	8,475.82	0.57	28.11	4,579.96	0.31	27.67	425.20	0.09	948.89	0.21	190.25	0.04	3,015.62	0.66

Notes:

1. This table reports total assets; size, share and average growth of gross loans; size, share and average growth of OBS items; and the components of OBS items for domestic commercial banks of key South Asian countries. All variables are in millions of US dollars except for growth rates and shares, which are presented in percentage terms. Statistics are on average basis for the period 2004-2011.
2. Components are based on reporting of OBS banking activity in the Bankscope database.
3. Disaggregated statistics are reported for sub-samples based on ownership, stock market listing, size, liquidity, capital and profitability of banks.

First, for the period 2004-2011, domestic commercial banks in South Asia, on average report relatively high growth in OBS credit facilities in comparison to lending. Similarly, the relative size of OBS portfolio is larger than the loan portfolio. Second, growth in OBS activity is higher for all categories of banks irrespective of the ownership, listing, size, liquidity, capital and profitability. Importantly, though private banks have a higher OBS growth, state-owned banks also report a growth of around 27 per cent in OBS banking. Third, the size of OBS portfolio is larger in private, listed, large, highly-liquid, well-capitalised and highly profitable banks. Fourth, Indian banks dominate the OBS banking activity. In particular, around 92 per cent of OBS activity in the region is recorded for Indian banks and also they report a significant growth. It is noteworthy that some commercial banks predominantly focus on providing OBS credit facilities as indicated by their OBS credit portfolio, which is higher than assets.[11] These key observations point to the significance of OBS banking activity in South Asian banks.

3. Theoretical underpinnings: Bank lending channel and off-balance sheet banking

Monetary transmission that operates through the impact of interest rates on components of aggregate demand is considered the traditional channel of monetary transmission (Bernanke and Blinder, 1988; Morris and Sellon, 1995). This traditional view claims that changes to the central bank monetary policy stance influence the real economic activity through interest rates affecting the opportunity cost of capital. However, it has been argued that the policy induced changes in the cost of capital are insufficient to explain size, timing and composition of the economic responses to a monetary policy shock (Bernanke and Gertler, 1995; Kandrac, 2012). Hence, interest rate view has been debated in research in

[11] Although it is not evident in Table 1, some prior research point to a significant growth in OBS banking activity in public sector banks in India [for example, Jaiswal (2010)].

recent decades and it is established that market imperfections play a pivotal role in monetary transmission through the so-called 'credit channels' (Kashyap and Stein, 1995; Mateut et al., 2006). In particular, it is argued that financial factors—including constraints in the availability of loanable funds to banks and corporates may cause or reinforce real economic fluctuations (Mateut et al., 2006).[12] These credit market frictions depend on several features of the financial system and also the size and the state of the banking system, which is the main conduit of transmission process. This notion deserves further discussion in relation to this study.

Financial market imperfections amplify the effects of monetary policy mainly through two distinct sub-channels, i.e. broad credit channel can be studied under two sub-strands: 'bank lending channel' and 'balance sheet channel' (Mishkin, 1995; Boivin et al., 2010). As described in Bernanke and Blinder (1988), the bank lending channel predicts a reduction in aggregate level of credit extended by banks in response to a monetary tightening. Hence, the bank lending channel is based on the view that banks play a special role in the financial system and also in the transmission as they are the key players who deal with borrowers.[13] Unlike the interest rate channel of monetary transmission, this channel however operates through the asset side of banks' balance sheet (Bernanke and Blinder, 1988; Kashyap and Stein, 1995) and its existence is predicted on capital market imperfections arising *inter-alia* from asymmetric information. [14] The existence of a bank lending channel has important

[12] As this channel arise because of credit market imperfections, credit channel is referred to as 'non-neo classical transmission mechanism' (Boivin et al., 2010).

[13] Banks are well suited to deal with certain types of borrowers, especially small firms where the problems of asymmetric information can be pronounced. Generally, large firms can directly access the credit markets through stock and bond markets without going through banks.

[14] According to the traditional IS-LM model (pure money view of monetary transmission), a reduction in money supply is immediately translated into a higher equilibrium interest rate in the money market, and this ultimately affects the real sector through a reduction in investment. On a bank's balance sheet, a reduction in deposits on the liability side is matched by a reduction in the bank's holding of bonds and loans on the asset side. As in the traditional Keynesian framework, if bonds and loans are perfect substitutes, there will be a proportionate reduction in the bonds and loans portfolios. However, in this framework, the impact of monetary policy on the asset composition of the banks (and the borrowers) is of no interest. Generally capital markets are imperfect and when the bonds and loans are imperfect substitutes, for example, some banks might find it easier to both build

implications for monetary transmission as it enhances its effects on real economic activity beyond the effect from the traditional interest rate channel (Brissimis et al., 2001).

In general, two conditions must be fulfilled for a bank lending channel to exist (Bernanke and Blinder, 1988). First, borrowers are not able to fully insulate their real spending from a decline in the availability of bank loans, i.e. bank loans are imperfect substitutes for other means of financing. Second, banks are not able to fully insulate their loans supply from a monetary policy-induced change in their reserves, i.e. there are no perfect substitutes for loans in bank portfolios. As banks are institutional devices to deal with the informational asymmetries between lenders and borrowers and banks loans are not perfectly substitutable by other forms of external finances, in the event of monetary tightening, banks will have to curtail their lending activity ultimately affecting the real economy (Olivero et al., 2011a). [15] As such, the bank lending view argues that contractionary monetary policy that decreases bank reserves and deposits would force banks to directly alter the supply of loans, i.e. to reduce the loan supply amplifying the traditional demand-side interest rate channel (Olivero et al., 2011a).

It has also been established that, after a monetary tightening, the response of supplied lending will be severe for small, less liquid and poorly-capitalised banks (Kashyap and Stein, 1995; Peek and Rosengren, 1995; Kishan and Opiela, 2000; Van den Heuvel, 2002). The reason is, for example, large and well-capitalised banks are in a better position to have more access to markets for uninsured funding and highly-liquid banks may be able to utilise cash and securities to offset the impact of monetary tightening (Altunbas et al., 2009). Similarly,

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up and unwind their loans portfolios than their bonds portfolios. In the presence of such imperfections in capital market access, a contractionary monetary policy leads to a much greater reduction in loan supply than in the sale of (or a drop in the demand for) bonds. The literature on the bank lending channel of monetary policy transmission considers this change in the asset composition of banks (Bhaumik, Dang, and Kutan, 2011) .

[15] If banks are unable to insulate the loan supply by substituting non-reservable liabilities for reservable deposits or reducing deposits, then loan supply will decrease. With the drop of bank credit, borrowers will reduce investment, employment and output (Jonas and King, 2008). Schematically, reduction in money => reduction in deposits => decline in bank loans => reduction in investment => lower output (Mishkin, 1995).

well-capitalised banks are generally perceived as less risky by the market and are better able to mobilise uninsured deposits and hence the reduction in lending is lower after a monetary tightening (Gambacorta, 2005).

However, as a result of ongoing process of financial developments, which causes changes in the structure of financial markets, issues have been raised about the importance of bank lending view (Edwards and Mishkin, 1995; Mishkin, 1995). It is argued that structural changes, particularly in the banking industry, may have altered the monetary transmission mechanism and made it harder to implement monetary policy (Morris and Sellon, 1995). However, evidence drawn through empirical expositions in this regard is mixed and inconclusive. For example, some studies find that changes in the banking sector (for example: increased competition, consolidation, disintermediation, etc.) interrupt or weaken the monetary transmission via bank lending channel [for example: Altunbas et al. (2009); Olivero et al. (2011a; 2011b)]. In addition, some studies find evidence for the other main facet of broad credit channel, i.e. balance sheet channel and financial sector changes. For example, Aysun and Hepp (2011) find that balance sheet channel is stronger for banks that securitise their assets. Moreover, Weber, Gerke, and Worms (2011) argue that despite the fact that financial innovation makes banks less important, then financial frictions they create would be reduced, and the bank lending channel would be weakened, in a way, the same channel could have been strengthened by the financial sector developments. This is because, if financial development enhances competition among banks and also between banks and other financial market segments, bank lending channel could be strengthened due to the loosing importance of this 'house-bank principle'.

In this background, growing OBS activities of commercial banks, which is one of the major financial innovations, provides an appropriate context to study the changes in monetary transmission process through the bank lending channel.

As already defined, OBS activities are the banking products and practices, which earn fee income streams. Although OBS transactions are not recorded in the balance sheet as on-balance sheet items, these transactions significantly modify the on-balance sheet claims (Bank of International Settlements, 2009). In particular, OBS facilities may be regarded as providing bank customers with a stock of liquidity, which is potentially a substitute for money providing a medium of exchange capacity and acting as a substitute for on-balance sheet liquidity (Glick and Plaut, 1989). To that end, the substitutability between money and OBS liquidity has important implications for monetary policy and in particular, for monetary transmission (Glick and Plaut, 1989).

As argued in Glick and Plaut (1989), the channels through which monetary policy operates are considerably more complex when both 'types of liquidity' (on and off-balance sheet liquidity) coexist. This is because, since the OBS liquidity is created through private-sector contracting between financial institutions and their customers, the total stock of liquidity (on- and off- balance sheet) could be beyond the control of central banks. To that end, an attempt to alter liquidity through open market operations may lead to countervailing adjustments in OBS liquidity. Hence, in the presence of large exposure to OBS activity (for example, heavy reliance on securitisation), banks may be less responsive to monetary policy as they can create a less interest-sensitive portfolio (Disyatat, 2011). This indicates that since the OBS activity serves as an additional/substitute mean of liquidity and provides some insurance against the monetary policy changes, the lenders and also the borrowers may be eligible to avoid the impact of monetary policy. As argued in Altunbas et al. (2009), for example, securitisation allows banks to bundle together loans into tradable securities and sell them on to the secondary market having major consequences for the standard monetary transmission mechanism. Moreover, Glick and Plaut (1989) argue that increased volatility

stems from the rapid growth in OBS liquidity reduce the correlation between monetary base and total liquidity.

Monetary literature also attempts to connect OBS credit facilities with monetary policy through the credit rationing and credit availability prepositions (Glick and Plaut, 1989). First, to the extent that credit rationing exists, it may provide a direct channel of monetary policy, i.e. credit channel (Morris and Sellon, 1995). However, as argued in Sofianos et al. (1990), growth in OBS liquidity may explain the weakness of credit rationing. They empirically examine the relation of credit utilised under loan commitments with monetary policy and real economic activity and argue that such loan contracts provide some insurance for bank customers against the credit rationing. As such, loan commitments affect monetary policy by eliminating the quantity availability restraints for borrowers. Hence, OBS contracts enable firms to avoid credit rationing, thereby reducing the potency of monetary policy (Duca and Vanhoose, 1990).

Second, according to the credit availability doctrine, changes in monetary policy may work partly by directly affecting the supply of bank loans. Hence, monetary policy has substantial effects through its impact on the credit availability and the growing OBS banking poses implications on monetary transmission through the credit availability (Glick and Plaut, 1989; Morris and Sellon, 1995). For example, as Morris and Sellon (1995) argue, if a credit channel exists, increased use of OBS facilities (for example, loan commitments) may tend to lengthen the lags in monetary policy transmission because firms can borrow under a commitment and delay the impact of a policy tightening. [16] The existence of significant lags in monetary policy in the context of loan commitments is also pronounced by Agung (1998) and Ergungor (2001).

[16] Morris and Sellon (1995) argue that two institutional changes that may have affected the transmission mechanism are the secular decline in bank lending to business and the growing use of bank loan commitments.

As such, there are several ways in which banking OBS may impact on the effectiveness of monetary policy. In particular, OBS would mainly affect to weaken the bank lending channel of monetary transmission. Thus, in order to examine whether increased OBS activity in banking amplifies or reduces the impact of monetary policy shocks via bank lending channel, following hypotheses are formed and would be empirically investigated in this study:

(i) Off-balance sheet banking is positively related to bank lending, and

(ii) Interaction between monetary policy indicator and off-balance sheet banking indicator is positively related to bank lending

The first hypothesis searches for an upward bias in loan supply due to OBS banking while the second hypothesis investigates the buffering effect of OBS activities that protects and insulates the loan supply against a monetary policy shock. Overall, it is assumed that OBS banking would weaken the effectiveness of bank lending channel of monetary transmission.

4. Data and methodology

4.1 Data and sample

The main empirical analysis in this study is carried out using disaggregated bank-level data. Disaggregated data are useful to understand the monetary transmission mechanism than aggregate data for two reasons (Dedola and Lippi, 2005). First, distributional effects of monetary policy, i.e. heterogeneity can be easily detected by exploiting a wide cross-sectional variation in disaggregated data (Kandrac, 2012).[17] Second, disaggregated data allow addressing the identification problems that limit the study of the monetary transmission, because it offers a richer set of controls. Furthermore, bank-level data allow better identifying the supply side credit channels of monetary transmission from the demand side interest rate

[17] Heterogenic response of banks to a change in monetary policy is an important element in the transmission of policy through banks. Using a disaggregated dataset elucidate the sources of differences in the response of banks to change in policy interest rates by disaggregating the impact down to the individual bank level.

channels (Olivero et al., 2011a). Accordingly, this study employs a bank-level panel dataset to identify shifts in the loan supply curve in response to changes in monetary policy with a view to exploit the heterogeneity amongst banks. This panel dataset allows identifying and measuring effects that are simply not detectable in pure cross-sections or pure time-series data.[18]

The sample of the study consists of domestic commercial banking institutions of major South Asian countries (Bangladesh, India, Pakistan and Sri Lanka). Annual-unconsolidated bank-level income statement and balance sheet data for the period of 2004-2011 are used and data are retrieved from the Bankscope database of Bureau van Dijk.[19] The sample period covers episodes of significant growth in OBS activities in these four countries. The other four countries (Afghanistan, Bhutan, the Maldives and Nepal) are excluded due to data limitations. Also, other entities such as investment banks, savings or specialised banks, cooperative banks and other non-bank financial intermediaries are also excluded due to different regulatory arrangements in comparison to commercial banks (Perera et al., 2007; Nguyen, Skully, and Perera, 2012). Accordingly, the initial sample consists of 198 commercial banks operating in Bangladesh, India, Pakistan and Sri Lanka.[20]

Several data filters are applied to ensure the comparability and consistency of the dataset. First, following the similar banking research for South Asian economies [for example, Perera, Skully, and Wickramanayake, 2006; Perera et al., 2010; Nguyen et al. 2012], foreign-owned banks are excluded due to the limited availability of unconsolidated financial data as most foreign banks in South Asia publish only their world-wide consolidated financial statements. Hence, only domestic commercial banks are considered. Second, banks that are not covered

[18] See for example, Baltagi (2005) for advantages of panel data.
[19] Though a more frequent dataset (for example, quarterly data) is desirable, annual frequency is sufficient to capture the heterogenic adjustments of lending to monetary policy (Gambacorta, 2005).
[20] Indian banks report their financial position and performance as at 31 March, while banks in other countries use 31 December. This mismatch of financial year-end dates poses an empirical issue when using pooled bank-year observations. However, following the standard practice [for example, Standard and Poor's (2011)], financial year ending 31 March is treated as financial data of prior calendar year.

by the Bankscope database are excluded. Third, the sample is also filtered excluding banks with insufficient observations, i.e. when less than 50 per cent of consecutive annual observations is available and when data on main variables of interest is not available. Fourth, following the similar research on bank lending channel [for example, Olivero et al. (2011a; 2011b)], outlier observations (for example, loan growth exceeding 300 per cent) are also excluded. Hence, the final sample consists of 114 commercial banks with unbalanced panel of 912 bank-year observations and all data are presented in US dollar millions and are adjusted for inflation.

In addition to data for main variables, country specific data for control variables is obtained from World Development Indicators of the World Bank. Money market interest rate data are obtained from the International Financial Statistics of International Monetary Fund and those series are checked for accuracy with respective the central banks, i.e. Bangladesh Bank, Reserve Bank of India, State Bank of Pakistan and Central Bank of Sri Lanka.[21]

4.2 Methodology

4.2.1 Empirical models and variable selection

The relationship between bank lending channel and OBS activity and its impact on monetary transmission process is estimated using a standard panel regression model as specified below:

$$Y_{i,c,t} = \alpha + \beta X_{i,c,t} + \varepsilon_{i,c,t} \qquad (1)$$

where $i = 1,2, \ldots, N$ refers to a cross section unit (each individual bank), $c = 1,2, \ldots, C$ indexes each country, and $t = 1,2, \ldots, T$ denotes time period. Constant α represents the

[21] Sample and descriptions of data for Sri Lankan banks are given in Section 6.

bank-level fixed effects. $Y_{i,c,t}$ is the dependent variable and $X_{i,c,t}$ is the explanatory variable. $\varepsilon_{i,c,t}$ represents the error term.

The dependent variable of this study is the annual growth rate of real gross loans of bank i, in country c , in year t, which is given by $\Delta(L)_{i,c,t}$. Following prior empirical literature, for example, Altunbas et al. (2009); Bhaumik et al. (2011); Olivero et al. (2011a; 2011b); Wu et al. (2011), percentage change in loans is used as the dependent variable instead of the volume of loans. This helps avoiding the large impact on the volume of loans in larger markets in response to change in the monetary policy indicator given the substantial differences in market size in these countries (Olivero et al., 2011b). In the initial baseline regression model, the dependant variable, $\Delta(L)_{i,c,t}$ is regressed using a measure of OBS activity, $OBS^{m}_{i,c,t}$ where $m = 1,2, \ldots, M$, represents the relevant measure of OBS activity. Hence, the particular model can be written as:

$$\Delta(L)_{i,c,t} = \alpha + OBS^{m}_{i,c,t-1} + \varepsilon_{i,c,t} \qquad (2)$$

Studies of OBS banking employ different indictors to measure the extent of OBS banking activity. For example, some studies rely on an aggregate measure defined as the share of OBS activity against total assets (Ioannidou, 2005; Zakaria and Ismail, 2009).[22] At the same time, some studies use the share of non-interest income to total bank income as a measure of OBS banking activity (Jonas and King, 2008; Antzoulatos et al., 2011). For example, Edwards and Mishkin (1995) use a measure defined as the share of non-interest income derived from OBS as a percentage of total income. Similarly, Calmès and Théoret (2010) use the share of non-interest income generated by OBS activities, i.e. activities related to fee and commission income as a ratio of net operating income. Peek and Rosengren (1995) also use ratio of fee income to the sum of total interest and fee income. Moreover, non-interest income as a share

[22] Similarly, Altunbas et al. (2009) define an aggregate securitisation activity indicator: flow of securitised lending as a percentage of total assets.

of total assets is also used as a popular measure, particularly in the discussions of revenue diversification through fee-generating activities [for example, Clark and Siems (2002); Ioannidou (2005); Maudos and Solís (2009); Nguyen et al. (2012)]. Nachane and Ghosh (2007) use the same measure with slight alteration to state as amount of OBS activity divided by total on-balance sheet plus off-balance sheet items. Considering different definitions and also based on some primary investigations, three OBS indicators are adopted in this study.[23] Accordingly, $OBS^{m}_{i,c,t}$ in Eq. (2) represents one of these alternative measures, i.e. (i) $OBS^{1}_{i,c,t}$ defined as OBS items as a percentage of total assets, (ii) $OBS^{2}_{i,c,t}$ defined as non-interest income as a percentage of total assets, and (iii) $OBS^{3}_{i,c,t}$ defined as OBS items as a percentage of total on balance sheet assets plus OBS items.[24] Using alternative measures inter-changeably will ensure the robustness of each measure and will also serve to establish the robustness of the empirical estimates. Moreover, OBS banking activity in a given period, which is recorded as a contingent liability, indicates that the transaction is not realised and may be realised with a delay having an impact on the balance sheet and loan growth with a certain lag. Hence, to capture the delayed impact of OBS activity, OBS indicator is lagged by one year. Accordingly, $\Delta(L)_{i,c,t}$ is regressed on one-period lagged OBS indicator, i.e. $OBS^{m}_{i,c,t-1}$. A positive relationship is expected between real loan growth, $\Delta(L)_{i,c,t}$ and the OBS indicator $OBS^{m}_{i,c,t-1}$.

Next, the baseline model is extended to incorporate other explanatory variables. Accordingly, in the extended regression models, $\Delta(L)_{i,c,t}$ is regressed on a measure of OBS activity, monetary policy indicator and other covariates to control for country- and bank-specific characteristics and relevant interactions. The extended bank lending model can be written as follows:

[23] The selection strategy broadly follows similar studies, for example Altunbas et al. (2009).
[24] Results for each measure are presented column-wise in tables and for the convenience of presentation; these measures are notated as OBS^{1}, OBS^{2} and OBS^{3}, respectively.

$$\Delta(L)_{i,c,t} = \alpha + \beta OBS^{m}_{i,c,t-1} + \delta\Delta(MP)_{c,t-1} + \gamma\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1} + \phi X_{i,c,t} + \varepsilon_{i,c,t} \quad (3)$$

where, real growth rate of loans is given by $\Delta(L)_{i,c,t}$. The constant α represents the bank-level fixed effects. $OBS^{m}_{i,c,t-1}$ is one-period lagged measure of OBS activity. $\Delta(MP)_{c,t-1}$ is the change in monetary policy indicator lagged by one period, i.e. change in the money market rate in the previous year. Interaction term, which is the product of the monetary policy indicator and the OBS activity indicator, i.e. $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$ measures the marginal impact of OBS banking on the effects of monetary policy on the loan growth. The vector $X_{i,c,t}$ controls for macroeconomic conditions and bank-specific attributes and the vector includes key variables such as $\Delta GDP_{c,t}$, $SIZ_{i,c,t-1}$, $LIQ_{i,c,t-1}$ and $CAP_{i,c,t-1}$. The variable $\Delta GDP_{c,t}$ is real GDP growth rate, $SIZ_{i,c,t-1}$ is one-period lagged log of total assets, $LIQ_{i,c,t-1}$ is one-period lagged liquidity as proxy by liquid assets to total deposit and short-term funding, and $CAP_{i,c,t-1}$ is one-period lagged capital as proxy by equity to total assets. $\varepsilon_{i,c,t}$ is the error term.

In Eq. (3), monetary policy indicator $\Delta(MP)_{c,t-1}$ captures the impact of monetary policy changes of the central bank. This is based on the assumption that monetary policy tends to shift banks' marginal cost by affecting the interest rates they must pay for loanable funds. Following the prior literature, for example, Altunbas et al. (2009); Bhaumik et al. (2011); Olivero et al. (2011b), the short-term market rate is used as the monetary policy indicator. Also, since a change in monetary policy in a given period is likely to affect the disbursal in bank loans with a certain time lag (Bhaumik et al., 2011), $\Delta(L)_{i,c,t}$ is modelled as a function of monetary policy change in the previous year. Hence, $\Delta(MP)_{c,t-1}$ measures sensitivity of the growth rate of loans to the one-period lagged changes in monetary policy and a negative coefficient is expected for $\Delta(MP)_{c,t-1}$. Depending on the coefficient for OBS indicator, coefficient for interaction term, $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$, can be positive or negative. The

positive coefficient for interaction term would mean that the sensitivity of bank lending to monetary policy is smaller as OBS activity increases. This indicates an existence of a buffering effect of OBS activity on the transmission of monetary policy. In that case, the evidence that would be provided by the coefficient for OBS indicator would be further justified. In addition, the model is controlled for business cycle fluctuations. It is a standard practice to capture the changes in loan demand due to dynamics of the business cycle using the economic growth rate or industrial growth rates. Thus, Eq. (3) includes growth rate of real gross domestic product, $\Delta GDP_{c,t}$ to control for the country-specific loan demand shifts due to macroeconomic activity. This also contributes to identification of the supply side bank lending channel from the demand side interest rate channel (Ashcraft, 2006; Olivero et al., 2011b). A positive coefficient is expected for $\Delta GDP_{c,t}$.

Based on the standard academic literature, the model also includes proxies for bank-specific characteristics such as size, liquidity and capitalisation, which also capture the potential problems associated with asymmetric information (Kashyap and Stein, 1995; Kashyap and Stein, 2000; Kishan and Opiela, 2000). These controls found to be most important in explaining loan supply movements, and hence the bank lending channel (Altunbas et al., 2009). As summarised in the prior literature, for example, after a tightening of monetary policy, the drop in the supply of bank loans is expected to be larger for: (i) small banks, which are financed almost exclusively from deposits and equity (Kashyap and Stein, 1995)[25]; (ii) less liquid banks, which cannot protect their loan portfolio against monetary tightening simply by drawing down cash and liquidating securities (Stein, 1998; Kashyap and Stein, 2000; Gambacorta, 2005), and (iii) poorly-capitalised banks, which might be below their target capital and have less access to markets for uninsured funding (Peek and Rosengren, 1995; Kishan and Opiela, 2000; Van den Heuvel, 2002; Gambacorta, 2005).

[25] However, according to Gambacorta (2005), bank size is not relevant.

Considering these arguments, a measure for total assets, $SIZ_{i,c,t-1}$, defined as log of total assets; a measure of liquidity, $LIQ_{i,c,t-1}$, defined as liquid assets to deposits and short-term funding, and a measure of capitalisation, $CAP_{i,c,t-1}$, defined as equity to total assets are included in the models. These bank specific characteristics refer to $t-1$ in order to avoid any potential endogeneity bias (Altunbas et al., 2009; Olivero et al., 2011b). A negative coefficient is expected for $SIZ_{i,c,t-1}$ and positive coefficients are expected for $LIQ_{i,c,t-1}$ and $CAP_{i,c,t-1}$. These controls are expected result in more efficient estimates of the coefficients on the variable for monetary policy indicator and the interaction term (Olivero et al., 2011b).

Next, as per the most recent literature of bank lending channel [for example, Altunbas et al. (2009); Aysun and Hepp (2011); Bhaumik et al. (2011); Olivero et al. (2011a); Kandrac (2012)], the model is augmented to include additional controls. The appended model is given in Eq.(4):

$$\begin{aligned}\Delta(L)_{i,c,t} = \quad & \alpha + \beta OBS^{m}_{i,c,t-1} + \delta\Delta(MP)_{c,t-1} + \gamma\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1} + \phi X_{i,c,t} \\ & + \theta\Delta(MP)_{c,t-1} * SIZ_{i,c,t-1} + \kappa\Delta(MP)_{c,t-1} * LIQ_{i,c,t-1} + \lambda\Delta(MP)_{c,t-1} \\ & * CAP_{i,c,t-1} + \rho\Delta(MP)_{c,t-1} * ROA_{i,c,t-1} + \zeta\Delta(MP)_{c,t-1} * CR_{c,t} \\ & + \sigma FC_{c,t} + \varepsilon_{i,c,t} \qquad (4)\end{aligned}$$

where, $\Delta(L)_{i,c,t}$ is real growth rate of loans, α is constant, $OBS^{m}_{i,c,t-1}$ is the one-period lagged measure for OBS activity, $\Delta(MP)_{c,t-1}$ is the change in monetary policy indicator lagged by one period, $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$ is the interaction term for the monetary policy indicator and the OBS activity indicator, $X_{i,c,t}$ is the vector for country- and bank-specific controls, which includes $\Delta GDP_{c,t}$ (real GDP growth rate), $SIZ_{i,c,t-1}$ (one-period lagged log of total assets), $LIQ_{i,c,t-1}$ (one-period lagged liquidity as proxy by liquid assets to total deposit and short-term funding), $CAP_{i,c,t-1}$ (one-period lagged capital as proxy by equity to

total assets), $ROA_{i,c,t-1}$(one-period lagged return on average assets), $LLP_{i,c,t-1}$ (one-period lagged loan loss provision as a percentage of total loans), $CR_{c,t}$ (banking sector concentration), and $FD_{c,t}$ (overall financial development). $FC_{c,t}$ is a dummy for financial crisis.$\Delta(MP)_{c,t-1} * SIZ_{i,c,t-1}$,$\Delta(MP)_{c,t-1} * LIQ_{i,c,t-1}$,$\Delta(MP)_{c,t-1} * CAP_{i,c,t-1}$, $\Delta(MP)_{c,t-1} * ROA_{i,c,t-1}$ and $\Delta(MP)_{c,t-1} * CR_{c,t}$ are interaction terms between the monetary policy indicator and key country- and bank specific characteristics. $\varepsilon_{i,c,t}$ is the error term.

Inclusion of some additional variables allows controlling the model for some important country- and bank-specific covariates. For example, as described in Van den Heuvel (2002), changes in bank profitability affects bank lending through the ‘‘bank capital’’ channel, i.e. when bank profits decline, if equity capital is low, and it is costly to issue shares, banks may reduce lending. Also, Bhaumik et al. (2011) and Brissimis and Delis (2010) observe that highly profitable banks have a tendency to increase the lending portfolio. Kandrac (2012) also considers bank profitability in the bank lending model. Hence, the model given in Eq.(4) includes an additional control for bank profitability, $ROA_{i,c,t-1}$ and a positive coefficient is expected for $ROA_{i,c,t-1}$. The variable $LLP_{i,c,t-1}$ (loan loss provisions as a percentage of total loans) controls the model for credit risk faced by the particular banking firm. This variable is quite standard in the literature and represents an ex-post accounting measure of credit risk (Altunbas et al., 2009; Wu et al., 2011). As per the arguments in Altunbas et al. (2009), the riskiness of the credit portfolio has a negative impact on banks’ capacity to increase lending and hence, a negative coefficient is expected for $LLP_{i,c,t-1}$. Both $ROA_{i,c,t-1}$ and $LLP_{i,c,t-1}$ are lagged by one-period to address potential endogeniety issue.

The model also includes a variable to control for market structure. Academic research points to a negative relationship between increased concentration and bank lending channel [for example, Cecchetti (1999); Olivero et al. (2011b)]. Since the banking systems in South Asian countries are dominated by a few banks, it is important to control the model for

concentration. Hence, Eq. (4) includes a measure to incorporate the impact of concentration, i.e. $CR_{c,t}$, which is defined as the share of assets held by the largest three banks. The use of three-bank concentration ratio is in line with banking and finance research for South Asian countries (for example, Perera et al., 2010) Despite the arguments against the concentration ratio as a measures for competition, still it can be used to gauge the competitive forces in the banking sector since concentration and competition is directly linked [for example, see Mahathanaseth and Tauer (2012)]. To that end, the concentration ratio used in the model adeqatly controls for both market structure and competition and a negative coefficient is expected for $CR_{c,t}$. Furthermore, the variable $FD_{c,t}$ is used to control for overall financial development and is defined as the stock market capitalisation as a percentage of GDP (Krause and Rioja, 2006; Nguyen et al., 2012). In order to control for the impact of global fianncial crisis, which had occurred during the sample period, a dummy variable, $FC_{c,t}$ is also included in the model. Interaction terms, which are the products between monetary policy indicator and country-and bank-specific characteristics, measure the marginal impact of such characteristics on the effects of monetary policy changes on loan growth and positive coefficients are expected for them. Moroevr, the model given in Eq.(4) also includes time- and country-specific dummies. The final set of variables included in the main empirical analysis is listed in Table 2 along with descriptive statistics.

Table 2
Empirical model variables and descriptive statistics for the sample of South Asian banks.

Variable	Variable Code	Description	Source	Descriptive Statistics				
				No. of Obs.	Mean	Std. Dev.	Min	Max
Dependent Variable								
Growth in real gross loans	Δ(L)	Year on year change in real gross loans (total of residential mortgage loans, other mortgage loans, other consumer/retail loans, corporate and commercial loans and other loans)	Calculated based on Bankscope data	846	26.81	23.79	-57.28	202.49
Key Explanatory Variables								
Indicators for Off-Balance Sheet Activity								
Indicator 1	OBS^1	Total off-balance sheet items/total assets	Calculated based on Bankscope data	862	38.53	59.61	0.00	511.01
Indicator 2	OBS^2	Total non-interest income/total assets	Calculated based on Bankscope data	862	1.58	0.98	-0.64	6.72
Indicator 3	OBS^3	Total off-balance sheet items/ (total assets + off-balance sheet items)	Calculated based on Bankscope data	862	21.83	15.99	0.00	83.63
Monetary Policy Indicator	Δ(MP)	Change in short-term money market rate	Calculated based on IFS and Central Banks' data	903	0.004	8.14	-21.51	28.50
Control Variables								
Bank-Specific Characteristics								
Size	SIZ	Log of total assets of the bank	Calculated based on Bankscope data	862	7.84	1.69	3.64	12.52
Liquidity	LIQ	Liquid assets /deposit & short-term funding	Bankscope	862	18.28	26.61	0.44	357.81
Capital	CAP	Equity / total assets	Bankscope	862	8.14	6.30	-12.94	62.92
Profitability	ROA	Return on average assets	Bankscope	862	0.94	1.55	-14.84	6.06
Risk	LLP	Loan loss provision/Total loans	Calculated based on Bankscope data	852	0.98	1.46	-4.82	14.31
Country-Specific Characteristics								
Real Economic growth	ΔGDP	Year on year change in real GDP	WDI/Central Banks and Statistical Authorities	853	6.98	1.96	1.60	9.82
Banking sector concentration	CR	Share of assets held by the 3 largest banks	Calculated based on Bankscope data	904	39.70	9.75	30.84	66.56
Financial development	FD	Market capitalisation of listed companies/GDP	WDI	791	47.51	39.47	5.04	146.42
Other Control Variables								
Financial Crisis Dummy	FC	Dummy variable for financial crisis, which equals 1 for the year of crisis and 0 otherwise						
Year Dummies	D04 to D10	Number of dummies for years (n-1)						
Country Dummies	C1 to C3	Number of dummies for countries (n-1)						

Notes:
1. This table presents details of dependent, key explanatory and other controls variables used in the empirical models and relevant descriptive statistics.
2. Central Banks and Statistical Authorities include Bangladesh Bank, Reserve Bank of India, State Bank of Pakistan, Central Bank of Sri Lanka and Bangladesh Bureau of Statistics.
3. IFS – International Financial Statistics, 2011
4. WDI – World Development Indicators, 2012

As per descriptive statistics presenetd in Table 2, it is observed that average loan growth remains around 27 per cent, relatively higher rate in comparison to the loan growth in advanced countries. This higher lending growth indicates that bank financing remains a dominant funding source in South Asain countries, and hence, banks might be playing a key role in transmitting monetary policy impulses.[26] On the other hand, as these countries record a relatively higher economic growth of around 7 per cent, on average, high loan growth appears to be normal on the basis of higher demand for bank lending. Moreover, on average, the first OBS indicator, i.e. OBS^1 (total OBS items as a percentage of total assets) remains around 39 per cent, and the third indicator, i.e. OBS^3 (total OBS items as percentage of both total assets and OBS items) reports an average of around 22 per cent. The second OBS indicator, i.e. OBS^2 which is a relative measure of non-interest income against total assets hovers around 1.6 per cent. This figure can be compared with the total interest revenue of 2.9 per cent as a percentage of total assets.

4.2.2 Estimation methods and robustness

Empirical methodology of this study is designed based on prior empirical studies on bank lending channel [for example, Mateut et al. (2006); Altunbas et al. (2009); Bhaumik et al. (2011); Olivero et al. (2011a; 2011b); Wu et al. (2011)], which are based on the framework in the spirit of Kashyap and Stein (1995) and Ashcraft (2006) examining whether banks react differently to monetary policy shocks. Accordingly, in this study, the impact of OBS activity on monetary transmission via bank lending is estimated using a standard panel model, which allows for more degrees of freedom due to pooling of data and greater sample variability improving the efficiency of estimates (Greene, 2011).

[26] For example, Aleem (2010) suggests increasing importance of the banking sector in the Indian economy.

Following similar studies of securitisation [for example, Altunbas et al. (2009); Aysun and Hepp (2011); Wu et al. (2011)], first, pooled ordinary least squares (OLS) estimations are carried to detect the expected outcomes.[27] However, the main methodological approach of this study relies on fixed effects estimates. Accordingly, models discussed in the previous section are estimated using bank-level fixed effects and robust standard errors as in the prior literature of bank lending channel [for example, Gambacorta (2005); Altunbas et al. (2009); Bhaumik et al. (2011); Olivero et al. (2011b)]. The choice of fixed effects is determined based on the standard Hausman test, which suggests that fixed effect estimator is consistent.[28] At the same time, robustness of the empirical model and results are justified based on an alternative estimation method. In particular, following banking lending channel literature, [for example, Olivero et al. (2011b)] and OBS banking literature [for example, Hassan (1993); Hassan et al. (1994)], as a robustness test, and since the panel data combine a cross section and time series dimension, models are estimated using the generalised least squares (GLS) method. This method allows for autocorrelation within panels and heteroscedasticity across panels. Also, different measures of OBS activity, i.e. OBS^1, OBS^2 and OBS^3 ensure the robustness of results as they are consistent across majority of models. Although results are not reported, it is observed that results are consistent and robust for different control variables, for example, industrial growth, liquid assets to total assets and five firm concentration ratios, etc.

[27] Results for pooled OLS estimates are not presented, however are available upon request.
[28] Hausman test is rejected (the null hypothesis is that the differences in the coefficients are not systematic) calling for the use of fixed effects. Results of Hausman tests are available upon request.

5. Results and discussion for South Asian banks

Before moving to the proper empirical investigations, correlation coefficients are examined in order to detect any relationship between the explanatory variables.[29] It appears that multicollinearity among the regressors is not a concern since high values of correlation coefficients are not observed between explanatory variables. Although high correlation coefficients are observed amongst OBS measures, it is not a concern because they will not enter into the same regression. To further ensure that multicollinearity will not be an issue, variance inflation factors (VIF) are estimated for each variable. Although results are not reported, none of the VIFs comes close to the benchmark of 10 indicating that right hand-side variables are not subject to potential multicollinearity problem.

Thereafter, empirical models are estimated and first, the results for benchmark regression model specified in Eq. (1) is summarised in Table 3. Columns 1-3 of Table 3 present results for fixed effects (FE) estimates and columns 4-6 present results for generalised least squares (GLS) estimates. Columns 1 and 4 present results for OBS^1, columns 2 and 5 present results for OBS^2 and columns 3 and 6 presents results for OBS^3. As per the coefficients for these OBS indicators, banking sector non-loan financial activity, i.e. OBS activity is positively related to bank lending proving the first part of the hypothesis. That is, banks that engage in OBS activity to a greater extent, which may include activities such as securitisation, guarantees, bills of exchange, acceptances, committed credit lines, etc., may report a higher growth rate in their lending portfolio, on average. These results are robust across different OBS indicators and also for GLS estimates. Hence, evidence is broadly consistent with the argument that OBS banking is a source of liquidity and hence, serves as additional funding channel that can be used by banks to expand their lending activity and probably to shelter the adverse impact of monetary policy change.

[29] Pearson's correlation matrix of variables concerned is not reported and is available upon request.

Table 3
Regression results for South Asian banks:
Off-balance sheet activities and the bank lending channel of monetary transmission
Dependent variable: Growth rate of real loans [Δ(L)]

Variable	Fixed Effects (FE) Estimates			Generalised Least Squares (GLS) Estimates		
	1	2	3	4	5	6
	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3
OBS measure	0.164***	88.49***	4.555***	0.148***	53.11***	2.517***
	(0.006)	(9.326)	(0.636)	(0.004)	(5.523)	(0.385)
Constant	16.74***	-109.3***	-67.38***	18.41***	-52.01***	-22.03**
	(4.487)	(16.150)	(15.320)	(4.315)	(10.950)	(10.750)
Observations	842	842	842	842	842	842
R-sq (overall)	0.584	0.099	0.048			
R-sq (within)	0.468	0.110	0.066			

Notes: This table presents results for fixed effects (FE) and generalised least squares (GLS) estimates for Eq.(2), which examines the impact of off-balance sheet (OBS) activity on growth rate of real loans without controlling for additional explanatory variables and controls:

$$\Delta(L)_{i,c,t} = \alpha + \beta OBS^{m}_{i,c,t-1} + \varepsilon_{i,c,t} \qquad (2)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank), $c = 1,2,\ldots,C$ indexes each country, and $t = 1,2,\ldots,T$ denotes time period. Constant α represents the bank-level fixed effects. $\Delta(L)_{i,c,t}$ is annual growth rate of real gross loans. One-period lagged measure for OBS activity is given by, $OBS^{m}_{i,c,t-1}$ where $m = 1,2,\ldots,M$ represents the relevant measure of OBS: OBS^1 (total OBS items/total assets), OBS^2 (total non-interest income/total assets) and OBS^3 (total OBS items/total assets + OBS items). $\varepsilon_{i,c,t}$ is the error term. Columns 1-3 present results for FE estimates and columns 4-6 present results for GLS estimates. Columns 1 and 4 present results for OBS^1, columns 2 and 5 present results for OBS^2 and columns 3 and 6 present results for OBS^3 .Standard errors are in parentheses. Significance levels are given by * p<0.10, ** p<0.05, *** p<0.01.

However, in order to confirm this observation, it is required to examine whether this relationship holds in the presence of host of other key explanatory variables and whether there is any impact of OBS activity on the effects of monetary policy. In other words, it is important to examine the response of OBS activity for the monetary policy change while controlling for a set of factors that affect the bank lending process. To fulfil this objective, the model given in Eq.(2) is expanded to include an indicator for monetary policy, a proxy for loan demand, bank-specific characteristics: size-liquidity and capital and also interaction

between monetary policy and OBS activity. The augmented model is specified in Eq.(3) and Table 4 reports the relevant estimation results.

The coefficients on the OBS measures are statistically significant with a positive sign suggesting that the supply of loans grow at a positive rate in the presence of higher OBS activity. As per the first part of the hypothesis, this observation is the basic justification for weakening bank lending channel of monetary transmission. This indicates that in the presence of OBS activity, the change in monetary policy may not pass-through to the aggregate demand and the economy through the adjustments in supply of bank loans as it continues to grow at a positive rate. In order to better justify this observation, it is required to specifically focus on the interaction of OBS activity with the monetary policy indicator. First of all, the coefficient on monetary policy indicator as given by $\Delta(MP)_{c,t-1}$ is negative and statistically significant. This indicates that whenever there is monetary tightening, i.e. increase in policy interest rate, loan supply declines potentially after a certain lag. Olivero et al (2011b) argues that this is an evidence of the importance or the existence of bank lending channel. Accordingly, after isolating the effect on the supply side of the bank lending market, a negative and consistently significant coefficient on the monetary policy indicator serves as part of evidence for the bank lending channel of monetary policy transmission in these countries.

Hence, a negative monetary shock induces banks to reduce their loan supply, however depending on the financial constraints in terms of size, liquidity, capital, etc. This evidence is broadly in line with monetary transmission literature, especially on bank lending channel in South Asian countries. For example, Pandit, Mittal, Roy, and Ghosh (2006); Aleem (2010); Bhaumik et al. (2011) present evidence for the importance of the bank lending channel to transmit monetary policy shocks to the real sector in India. Similarly, Gupta (2004) supports the presence of a significant bank lending channel for both India and Pakistan.

Table 4
Regression results for South Asian banks:
Off-balance sheet activities and the bank lending channel of monetary transmission
Dependent variable: Growth rate of real loans [Δ(L)]

Variable	Fixed Effects (FE) Estimates			Generalised Least Squares (GLS) Estimates		
	1	2	3	4	5	6
	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3
OBS measure	0.136***	93.44***	3.691***	0.140***	62.78***	2.539***
	(0.004)	(6.043)	(0.639)	(0.003)	(4.019)	(0.301)
$\Delta (MP)_{t-1}$	-2.156***	-2.943***	-4.752**	-2.019***	-2.888***	-2.367***
	(0.272)	(0.417)	(1.809)	(0.301)	(0.551)	(0.602)
$\Delta (MP)_{t-1}$ * OBS measure	0.0547***	0.0648***	1.673*	0.0550***	0.0626***	0.0585***
	(0.001)	(0.002)	(0.658)	(0.001)	(0.002)	(0.002)
ΔGDP_t	9.330***	10.59***	14.61***	4.019***	12.40***	8.465***
	(1.574)	(2.405)	(4.216)	(1.280)	(2.323)	(2.568)
SIZ_{t-1}	4.626	-2.556	5.212	-4.401***	14.03***	-3.531
	(3.759)	(5.737)	(10.040)	(1.632)	(3.062)	(3.327)
LIQ_{t-1}	1.776***	2.234***	5.250***	-0.286**	-0.927***	-0.672***
	(0.250)	(0.386)	(0.650)	(0.119)	(0.216)	(0.237)
CAP_{t-1}	4.009***	9.216***	4.451*	3.067***	13.95***	13.81***
	(0.712)	(1.057)	(1.783)	(0.494)	(0.800)	(0.884)
Constant	-147.3***	-292.5***	-326.6***	6.005	-362.8***	-155.2***
	(34.23)	(52.70)	(91.67)	(14.82)	(28.99)	(28.88)
Observations	801	801	801	801	801	801
R-sq (overall)	0.822	0.121	0.112			
R-sq (within)	0.892	0.216	0.228			

Notes: This table presents results for fixed effects (FE) and generalised least squares (GLS) estimates for Eq.(3), which examines the impact of off-balance sheet (OBS) activity on growth rate of real loans controlling for key explanatory variables and including county- and bank-specific controls:

$$\Delta(L)_{i,c,t} = \alpha + \beta OBS^{m}_{i,c,t-1} + \delta\Delta(MP)_{c,t-1} + \gamma\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1} + \phi X_{i,c,t} + \varepsilon_{i,c,t} \quad (3)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank), $c = 1,2,\ldots,C$ indexes each country, and $t = 1,2,\ldots,T$ denotes time period. $\Delta(L)_{i,c,t}$ is annual growth rate of real gross loans and the constant α represents the bank-level fixed effects. One-period lagged measure for OBS activity is given by $OBS^{m}_{i,c,t-1}$ where $m = 1,2,\ldots,M$ represents the relevant measure of OBS: OBS^1 (total OBS items/total assets), OBS^2 (total non-interest income/total assets) and OBS^3 (total OBS items/total assets + OBS items). $\Delta(MP)_{c,t-1}$ is the change in monetary policy indicator lagged by one period. Interaction term, $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$ measures the marginal impact of OBS banking activity on the effects of monetary policy on the loan growth. The vector $X_{i,c,t}$ includes $\Delta GDP_{c,t}$ (real GDP growth rate), $SIZ_{i,c,t-1}$ (one-period lagged log of total assets), $LIQ_{i,c,t-1}$ (one-period lagged liquidity as given by liquid assets to total deposit and short-term funding), and $CAP_{i,c,t-1}$ (one-period lagged capital as defined by equity to total assets). $\varepsilon_{i,c,t}$ is the error term. Columns 1-3 present results for FE estimates and columns 4-6 present results for GLS estimates. Columns 1 and 4 present results for OBS^1, columns 2 and 5 present results for OBS^2 and columns 3 and 6 present results for OBS^3. Standard errors are in parentheses. Significance levels are given by * p<0.10, ** p<0.05, *** p<0.01.

Interaction between monetary policy and OBS activity as indicated by the positive coefficient for $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$ suggests the weakening bank lending channel. In other words, the positive and statistically significant coefficient on the interaction term shows that increased OBS activity in the banking sector augurs the marginal impact of OBS activity on the supply of bank loans making monetary transmission weaker. This confirms the existence of a buffering effect of OBS activity on the monetary transmission via bank lending. The results are broadly consistent and robust across different OBS measures and also for FE and GSL estimates.

In addition, the change in economic conditions as represented by real economic growth, i.e. $\Delta GDP_{c,t}$ reports the expected positive coefficient indicating the demand-side effect on bank lending. In other words, better economic conditions and business cycle provide an environment to increase the number of viable projects that become profitable in terms of expected net present value and therefore encourage the demand for bank credit (Kashyap, Stein, and Wilcox, 1993; Altunbas et al., 2009). Furthermore, coefficients for bank-specific characteristics provide interesting results.

First, the coefficients for the impact of size of the banking firm provide mixed results. On the one hand, positive and significant results for size variable, i.e. $SIZ_{i,c,t-1}$ would mean that as the bank is having a large asset base, there is no impact of monetary policy to reduce the lending activity. In other words, small banks may not be able to offset a drain in reservable deposits due to contractionary policy, and hence may have to curtail their lending activity (Kishan and Opiela, 2000). On the other hand, this observation is consistent with the view that bank size does not affect banks' reaction to a monetary policy impulse. As per Gambacorta (2005), this situation can be explained by a closer customer relationship, which provides an incentive for small banks to smooth the effects of a tightening on supplied credit.

Second, although academic literature strongly argues that highly liquid banks that can buffer their loan portfolio against monetary tightening simply by drawing down cash and securities, would not curtail their lending activity, South Asian bank sample provides some mixed results. For example, as per FE estimates, a positive and statistically coefficient is observed for the proxy for liquidity as represented by $LIQ_{i,c,t-1}$. This indicates that highly liquid banks are able to withstand a monetary policy shock and continue to increase the loan supply. Hence, liquidity appears to remain a significant factor enabling banks to attenuate the effect of a decrease in reservable deposits on lending. However, these results are not consistent across different estimates for South Asian banks as indicated by the results for GLS estimates. Hence, it may be concluded that there is an ambiguous impact of size and liquidity on loan growth.

Third, the view that bank capital has important implications for the understanding of the monetary transmission mechanism is supported by these results. In particular, as given by the consistently positive and significant coefficient for $CAP_{i,c,t-1}$, bank capital can be considered an indicator for informational asymmetries (Altunbas et al., 2009) and appears to be playing an important role in bank loan supply (Van den Heuvel, 2002).

As highlighted in the methodology section, the contemporary academic literature focuses on some additional bank-specific characteristics such as bank profitability and risk. At the same time, market structure, competition and the level of financial development also play important roles in explaining bank loan supply. Moreover, although the impact was not severe like in advanced countries, global financial crisis emerged in 2007 also would have some consequences on the loan demand in these countries due to decelerated growth in economic activity and exports. Therefore, the model specified in Eq. (4) incorporates these additional control variables and interactions between key country- and bank-specific characteristics and monetary policy indicator along with time- and country-specific dummies.

Based on the Eq. (4), Table 5 presents results for the relationship between lending growth and OBS activity.

According to Table 5, the validity of the relationship between bank lending and OBS activity still holds supporting the first part of the hypothesis. In particular, positive and significant coefficients observed for the majority of models confirm the hypothesis that OBS activity leads to weaken the bank lending channel as OBS transactions tend to insulate the loan supply. Similarly, majority of interaction terms between monetary policy indicator and OBS activity indicators reports the positive coefficients strengthening the argument that OBS activity is used as a shield to attenuate the impact of monetary policy shock. This supports the second part of the hypothesis that OBS banking is having a buffering effect. Similar to other models, variable for economic activity is significantly positive for majority of models and size and liquidity variables provide ambiguous results across models. Again, bank capital remains an important determinant of loan supply of these countries, and hence it well explains the bank lending channel. Similar to the findings of Bhaumik et al. (2011) and Kandrac (2012), it is observed that bank profits play some role in the bank loan supply and lending channel although results for $ROA_{i,c,t-1}$ are not consistent across models. As expected, the riskiness of the credit portfolio, as indicated by the coefficient for variable $LLP_{i,c,t-1}$ has a negative effect on banks' capacity to induce lending although results are not significant for each model. Similar to the argument that profitability affects via bank capital, this again is related to banks' capital position. As per Altunbas et al. (2009), this relationship indicates that higher loan loss provisions reduce profits, banks' capital levels and therefore have negative consequences on loan supply, *ceteris paribus*.[30]

[30] Since both profitability and loan loss provisions have consequences on bank capital and subsequently loan supply, one might raise an issue of including both variables in the same regression with the variable for capital. However, it is a standard practice to include these variables in the same regression model [for example, Altunbas et al. (2009) and Bhaumik et al. (2011), and the lagged variable addresses the issue of potential endogeneity. Further, a lower correlation is observed for these variables and hence, there seems no potential multicollinearity problem.

Table 5
Regression results for South Asian banks:
Off-balance sheet activities and the bank lending channel of monetary transmission
Dependent variable: Growth rate of real loans [Δ(L)]

Variable	Fixed Effects (FE) Estimates			Generalised Least Squares (GLS) Estimates		
	1	2	3	4	5	6
	OBS[1]	OBS[2]	OBS[3]	OBS[1]	OBS[2]	OBS[3]
OBS measure	0.135***	63.32***	2.76	0.139***	86.17***	2.392***
	(0.00)	(20.39)	(1.74)	(0.00)	(7.44)	(0.41)
$\Delta(MP)_{t-1}$	-2.112	-5.431	-4.388	-5.209	-6.020***	-4.493***
	(3.78)	(4.18)	(3.76)	(4.13)	(1.15)	(1.21)
$\Delta(MP)_{t-1}$ * OBS measure	0.0551***	7.319	5.133	0.0555***	7.665***	4.009***
	(0.00)	(5.51)	(4.67)	(0.00)	(1.29)	(1.32)
ΔGDP_t	12.71***	4.439	8.311**	8.280***	1.512	11.93**
	(2.13)	(5.69)	(4.01)	(2.06)	(5.20)	(5.40)
SIZ_{t-1}	4.697	28.47*	15.77	-1.465	11.76**	-2.882
	(4.14)	(16.90)	(12.61)	(2.06)	(5.12)	(5.48)
LIQ_{t-1}	1.769***	4.618*	5.466*	-0.449***	-0.804**	-0.689**
	(0.28)	(2.68)	(3.21)	(0.13)	(0.32)	(0.34)
CAP_{t-1}	4.140***	2.982	2.833	4.008***	11.59***	12.24***
	(0.93)	(3.34)	(3.36)	(0.58)	(1.27)	(1.35)
ROA_{-1}	8.747***	-10.73**	1.252	0.522	-6.839	22.20***
	(3.29)	(4.65)	(6.84)	(2.45)	(6.53)	(6.32)
LLP_{t-1}	2.801	-22.93***	-15.53**	-4.822**	-10.1	9.083
	(2.82)	(7.81)	(6.43)	(2.41)	(6.17)	(6.28)
CR_t	1.258	6.968*	4.126	0.837***	3.036***	1.793**
	(0.86)	(4.06)	(3.08)	(0.30)	(0.75)	(0.78)
FD_t	-0.288	0.993	0.652	-0.280**	1.224***	-0.0297
	(0.18)	(0.96)	(0.81)	(0.13)	(0.33)	(0.33)
$\Delta(MP)_{t-1}$ * SIZ_{t-1}	-0.084	2.977	2.279	0.126	3.120***	2.103**
	(0.35)	(2.16)	(1.90)	(0.38)	(0.96)	(1.01)
$\Delta(MP)_{t-1}$ * LIQ_{t-1}	0.026	0.029	0.061	0.009	-0.03	-0.007
	(0.02)	(0.14)	(0.14)	(0.03)	(0.06)	(0.06)
$\Delta(MP)_{t-1}$ * CAP_{t-1}	-0.076	1.766	1.599	-0.031	1.521***	1.270***
	(0.12)	(1.44)	(1.36)	(0.12)	(0.30)	(0.32)
$\Delta(MP)_{t-1}$ * ROA_{t-1}	1.351***	-1.386	-0.728	0.915**	-0.131	1.45
	(0.41)	(2.00)	(1.77)	(0.41)	(1.10)	(1.15)
$\Delta(MP)_{t-1}$ * CR_t	-0.009	0.108	0.072	0.033	0.217**	0.182*
	(0.04)	(0.15)	(0.14)	(0.04)	(0.10)	(0.11)
FC_t	-16.69*	-31.02**	-23.01*	-10.05	-16.33	20.04
	(9.05)	(14.13)	(13.82)	(8.16)	(20.42)	(21.42)
Constant	-13.14	-83.22	107.2	139.6	-380.7	-87.3
	(73.07)	(216.00)	(220.10)	(102.10)	(248.10)	(270.00)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	739	739	739	739	739	739
R-sq (overall)	0.824	0.147	0.109			
R-sq (within)	0.893	0.298	0.284			

Notes: This table presents results for fixed effects (FE) and generalised least squares (GLS) estimates for Eq.(4), which examines the impact of off-balance sheet (OBS) activity on growth rate of real loans including additional explanatory variables, interactions and year and country effects:

$$\Delta(L)_{i,c,t} = \alpha + \beta OBS^{m}_{i,c,t-1} + \delta\Delta(MP)_{c,t-1} + \gamma\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1} + \phi X_{i,c,t} + \theta\Delta(MP)_{c,t-1} * SIZ_{i,c,t-1} + \kappa\Delta(MP)_{c,t-1} * LIQ_{i,c,t-1} + \lambda\Delta(MP)_{c,t-1} * CAP_{i,c,t-1} + \rho\Delta(MP)_{c,t-1} * ROA_{i,c,t-1} + \zeta\Delta(MP)_{c,t-1} * CR_{c,t} + \sigma FC_{c,t} + \varepsilon_{i,c,t} \quad (4)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank), $c = 1,2,\ldots,C$ indexes each country, and $t = 1,2,\ldots,T$ denotes time period. $\Delta(L)_{i,c,t}$ is annual growth rate of real gross loans and the constant α represents the bank-level fixed effects. One-period lagged measure for OBS activity is given by $OBS^{m}_{i,c,t-1}$ where $m = 1,2,\ldots,M$ represents the relevant measure of OBS: OBS[1] (total OBS items/total assets), OBS[2] (total non-interest income/total assets) and OBS[3] (total OBS items/total assets + OBS items). $\Delta(MP)_{c,t-1}$ is the change in monetary policy indicator lagged by one period. Interaction term, $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$ measures the marginal impact of OBS banking on the effects of monetary policy on the loan growth. $X_{i,c,t}$ is the vector for country- and bank-specific controls, which includes $\Delta GDP_{c,t}$ (real GDP growth rate), $SIZ_{i,c,t-1}$ (one-period lagged log of total assets), $LIQ_{i,c,t-1}$ (one-period lagged liquidity as given by liquid assets to total deposit and short-term funding), $CAP_{i,c,t-1}$ (one-period lagged capital as defined by equity to total assets), $ROA_{i,c,t-1}$(one-period lagged return on average assets), $LLP_{i,c,t-1}$ (one-period lagged loan loss provision as a percentage of total loans), $CR_{c,t}$ (banking sector concetration defined as 3 bank concetration ratio), and $FD_{c,t}$ (overall financial sector development given by stock market capitalisation to GDP). $FC_{c,t}$ is a dummy for financial crisis. $\Delta(MP)_{c,t-1} * SIZ_{i,c,t-1}$, $\Delta(MP)_{c,t-1} * LIQ_{i,c,t-1}$, $\Delta(MP)_{c,t-1} * CAP_{i,c,t-1}$, $\Delta(MP)_{c,t-1} * ROA_{i,c,t-1}$ and $\Delta(MP)_{c,t-1} * CR_{c,t}$ are interaction terms between monetary policy indicators and key country- and bank specific characteristics. The regression model also included year and country dummies. $\varepsilon_{i,c,t}$ is the error term. Columns 1-3 present results for FE estimates and columns 4-6 present results for GLS estimates. Columns 1 and 4 present results for OBS[1], columns 2 and 5 present results for OBS[2] and columns 3 and 6 present results for OBS[3]. Standard errors are in parentheses. Significance levels are given by * p<0.10, ** p<0.05, *** p<0.01.

Results in Table 5 point to a positive relationship between bank loan supply and concentration as given by the coefficient for $CR_{c,t}$ despite some of them are not being significant. This observation contrasts with the findings of Olivero et al. (2011b) that suggests a negative relationship between bank concentration and bank loan supply for some Asian and Latin American countries. The implication is that lending growth in South Asian banks is driven by a handful of banks. Also, it is possible to justify the same observation by the fact that some large banks reporting substantially higher growth rates for the loan supply. The same is consistently confirmed by the interaction variable between concentration and monetary policy indicator, $\Delta(MP)_{c,t-1} * CR_{c,t}$ reporting positive and significant coefficients. Although results are not consistent across models, this interaction term indicates that as concentration in banking increases, the bank lending channel is weakened leading the monetary transmission to be less effective. Further, financial sector developments represented by the variable $FD_{c,t}$ does not yield consistent results and the financial crisis dummy, i.e. $FC_{c,t}$ indicates a negative impact on the banking sector lending activity. Moreover, as

expected, the interactions terms between size, liquidity and capitalisation and monetary policy indicator report positive signs despite them are not being significant for some models. The notion that large, liquid and well-capitalised banks are able to buffer their lending activity against shocks affecting the availability of external finances is not well confirmed in the context of size and liquidity variables, but for capital. However, in order to examine the role played by these financial constraints, it requires further investigations as provided in the subsequent sections of this paper.

To investigate whether there are significant differences in the effects of increased OBS activity on the strength of monetary transmission through the bank lending channel via different banks, next, sub-sample analysis is conducted. As argued in the prior academic literature [for example, Kashyap and Stein (1995); Cecchetti (1999); Kashyap and Stein (2000); Kishan and Opiela (2000); Ashcraft (2006) among others], banks constrained by different financial conditions respond to monetary policy differently. In other words, banks facing different degrees of financial constraints adjust their loan supply at different magnitudes.[31] At the same time, prior studies argue that ownership also matters through the bank lending channel. For example, Bhaumik et al. (2011) examine the impact of ownership of banks and suggest that there are considerable differences in the reactions of different types of banks to monetary policy.

To that end, moving forward, the entire sample in this study is split to different sub-samples to exploit the bank-level variation and distributional effects of monetary policy. This helps to examine whether the positive impact of banking OBS activity on bank loan supply and its buffering effect on monetary transmission through the bank lending channel remain valid for banks with heterogeneous corporate and financial structures. To that end, it is intended to consider different categories of banks in terms of corporate attributes such as

[31] Cecchetti (1999) shows that both financial structure and monetary transmission mechanism are interconnected to the legal structure.

ownership (state- and privately-owned) and stock market listing (listed and non-listed) and also their financial attributes such as size (large and small), liquidity (high- and less-liquid), capitalisation (well- and poorly-capitalised) and profitability (high- and less-profitable) and to investigate which types of banks have the most significant impact due to the OBS activity. The large and small bank sub-samples contain banks with total assets above or below the sample mean in each country. Also, the high- and less-liquid banks category contains those banks with a degree of liquidity above or below the sample mean. The same criterion is used to define sub-samples for well- and poorly-capitalised banks and high- and less-profitable banks. The analysis relies on the model given by Eq. (3), which examines the relationship between OBS activity and bank loan supply controlled for key variables. The main interest is placed on the coefficients for OBS activity, i.e. $OBS^{m}_{i,c,t-1}$ given by OBS^{1}, OBS^{2} and OBS^{3} and their interactions with the monetary policy indicator, i.e. $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$.

Tables A1 to A6 in the Appendix present results for different sub-samples using FE and GLS estimation methods. Table 6 presents a summary of these empirical results and the subsequent discussion relies on this summary table. According to Table 6, a number of observations can be made. Generally, growth in OBS activity exceeds the growth in loan supply indicating an outperformance in non-loan or direct financial activity recorded off the balance sheets. In particular, OBS growth is higher for private, non-listed, small, high-liquid, well-capitalised and high-profitable banks in the sample countries having potential impact on the bank loan supply. Such impacts can be observed through the model estimates, which provide coefficients for OBS activity indicator and the interaction between monetary policy indicator and OBS activity measure. These coefficients yield some interesting results in relation to the hypothesised outcome of this study.

Table 6
Summary of estimates for South Asian banks:
Impact of off-balance sheet (OBS) activity on bank lending channel across banks with different corporate and financial characteristics.

Corporate/financial characteristics	No. of banks	No. of observations	Memo items		Model estimates: Impact of OBS banking			
					Postive impact on loan supply		Buffering effect on bank lending channel	
			Average growth in gross loans (%)	Average growth in OBS activity (%)	FE Estimates	GLS Estimates	FE Estimates	GLS Estimates
Ownership								
State-owned	38	261	19.95	26.27	YES	YES	YES	YES
Privately-owned	76	540	23.88	32.30	YES	YES	YES	YES
Listing								
Listed	92	660	23.94	29.18	NO	YES	NO	NO
Non-listed	22	134	15.38	36.50	YES	YES	YES	YES
Size								
Large	29	210	18.22	23.31	NO	NO	YES	YES
Small	85	591	22.88	32.49	YES	YES	YES	YES
Liquidity								
High-liquid	30	212	24.39	36.37	YES	YES	YES	YES
Less-liquid	84	603	21.70	27.42	NO	NO	NO	NO
Capitalisation								
Well-capitalised	36	240	22.59	38.86	YES	YES	YES	YES
Poorly-capitalised	78	605	26.07	27.91	NO	NO	NO	NO
Profitability								
High-profitable	74	535	22.85	31.30	YES	YES	NO	NO
Less-profitable	40	273	28.11	27.67	YES	YES	YES	YES

Notes:
1. This table summarises results presented in Tables A1 through to A6 on the relationships between off-balance sheect activity and bank loan supply.
'YES' represents the confirmation of expected significant results, i.e. positive and significant coefficient for at least one OBS measure at the highest significance level.
'NO' denotes the absence of the expected significant relationship, i.e no positive and significant coefficients or more negative relationships.
2. Postive impact on loan supply - positive and significant coefficient for OBS indicator.
3. Buffering effect on bank lending channel - positive and significant coefficient for interaction between monetray policy indicators and OBS indicator.

First, coefficients on OBS indicators and the interaction terms are positive and significant for both state- and privately-owned banks. This indicates that OBS activity leads to an upward bias in the loan supply and creates a buffering effect on monetary policy transmission through the bank lending channel and it is valid for all banks regardless of the ownership structure. Second, there remains an upward bias of the OBS activity on loan supply and a buffering impact on bank lending channel in non-listed banks. In particular, a closer look on data shows that these non-listed banks engage in OBS activity in a large scale, which is also proved by the higher growth rates for OBS transactions. For some non-listed banks, particularly for Indian banks, total OBS activity exceeds their total assets indicating high

exposure to OBS banking beyond the traditional banking activity.[32] Third, the upward bias in loan supply is substantial for small banks in the sample countries. More importantly, buffering effect of OBS banking on monetary transmission operates mainly through the response of small banks to the monetary policy shocks. Although the change in monetary policy stance has a negative impact on bank loan supply across all banks suggesting the existence of bank lending channel in the sample countries, results for interaction term suggest that the strength of bank lending channel is weakened when engaging in OBS activity, particularly the small banks. Fourth, the role of liquidity is pronounced by the sub-sample analysis. The results suggest that high-liquid banks can induce a higher loan growth through large exposure to the OBS activity and hence, they are better able to tolerate a monetary policy shock. [33] In line with the arguments of Stein (1998); Kashyap and Stein (2000), this result supports the view that high-liquid banks can protect their loan portfolio against monetary tightening, and hence, offset a drain in reservable deposits.

Fifth, it is revealed that increased OBS activity in well-capitalised banks causes increases in the loan supply and also helps to protect the lending activity from the monetary policy shocks. These banks also record a higher growth in OBS activity. In order words, poorly-capitalised banks are unable to withstand the impact of monetary tightening and hence, respond to the shock by way of curtailing their loan supply activating the bank lending channel of monetary transmission. This view is broadly in line with foremost observations of Peek and Rosengren (1995); Kishan and Opiela (2000); Van den Heuvel (2002), all are suggesting the view that impact of monetary policy is severe for poorly-capitalised markets. Moreover, although there are contending views about the risk of OBS banking, these results may suggest that well-capitalised banks can absorb any potential losses emanating from risky OBS activity and hence, fearlessly engage in such activities in a large scale having

[32] Angbazo (1997) suggests that one measure of the growth in OBS banking is that the combined value of the items exceed the recorded assets of banks.
[33] Gambacorta (2005) shows that on average, small banks are more liquid.

implications on the monetary policy. Finally, a significant upward bias in loan supply is observed due to OBS activity in banks with low profitability. Similarly, such banks enjoy a buffering effect of OBS activity on monetary transmission mechanism.

Overall, considering the most important financial characteristics that explain informational asymmetries and hence, affect the lending process of banks, it can be concluded that mainly high-liquid, and well-capitalised banks are better able to protect their loan portfolio against a monetary policy shock causing some weakening in the bank lending channel. Accordingly, in sum, both aggregate and bank-wise analyses support the hypotheses: (i) Off-balance sheet banking is positively related to bank lending, and (ii) Interaction between monetary policy indicator and off-balance sheet banking indicator is positively related to bank lending, thereby weakening the effectiveness of bank lending channel of monetary transmission.

6. Sri Lankan experience

Although the panel data analysis, which is the main empirical exploration of this study, uses data for OBS activity in Sri Lankan commercial banking market, this particular section extends the same analysis exclusively for Sri Lanka. Such analysis would help to explore the dynamics of monetary transmission process in the context of financial sector changes in Sri Lanka.

Sri Lanka provides a good context to study this issue as Sri Lankan economy commenced the financial liberalisation process as early as 1977 (Perera and Paudel, 2009). As these financial reforms were followed by a remarkable improvement in the degree of financial deepening in the Sri Lankan economy (Athukorala and Rajapatirana, 1993), monetary transmission process may have altered to a greater extent. Moreover, as most recent research, for example Nguyen et al. (2012), points to significant efforts taken to diversify bank revenue

sources via engaging in non-traditional banking activities, particularly in OBS transactions, it is worthwhile to examine the Sri Lankan context extensively.

The data used in this analysis is somewhat different from the data of the South Asian sample. First, in order to preserve the degrees of freedom and hence to obtain more robust results based on a single country perspective, this analysis relies on more frequent data. In particular, this study employs an inflation-adjusted quarterly dataset spanning from Q2: 2004 to Q2: 2012. The data are mainly sourced from monetary survey data of Economic Research Department of Central Bank of Sri Lanka (CBSL). This dataset only serves to construct key covariates of the analysis and it cannot be used to identify some additional variables such as profitability, loan loss provisions, etc. which are mainly relevant in the context of prudential supervision of banks by CBSL. However, this limitation does not preclude the possibility of obtaining robust and representative empirical results. On the one hand, as monetary survey data allows identifying and constructing most required and important variables for the empirical exposition such as total assets, OBS transactions, components of liquid assets and capital. On the other hand, in comparison to the Bankscope database, this dataset is rich in terms of the coverage of banking institutions. Since foreign banks are required to submit unconsolidated balance sheets for the purpose of monetary survey, this dataset allows considering the operations of foreign banks separately. Hence, the analysis is extended to both domestic and foreign commercial banks operating in Sri Lanka. In the process of data filtering, two foreign commercial banks are excluded due to insufficient observations as these banks have commenced their operations only in 2011. Hence, the final sample includes 23 commercial banks (11 domestic banks and 12 foreign banks).

The analysis broadly relies on the same model specified in Eq. (3), which is discussed in Section 4.2. Accordingly, Eq. (5) below represents the estimated model including key explanatory and other control variables:

$$\Delta(L)_{i,t} = \alpha + \beta OBS^{1}_{i,t-4} + \delta\Delta(MP)_{t-4} + \gamma\Delta(MP)_{t-4} * OBS^{1}_{i,t-4} + \theta\Delta GDP_{t} + \psi SIZ_{i,t-4} + \kappa LIQ_{i,t-4} + \eta CAP_{i,t-4} + \varepsilon_{i,t} \quad (5)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank) and $t = 1,2,\ldots,T$ denotes time period. $\Delta(L)_{i,t}$ is quarterly growth rate of real loans at time t. The constant α represents the bank-level fixed effects. $OBS^{1}_{i,t-4}$ is four-period lagged measure of OBS activity defined as total off-balance sheet items as a percentage of total assets. $\Delta(MP)_{t-4}$ is four-period lagged change in money market rate, which is the proxy for central bank policy change. ΔGDP_t is economic growth at time t. Variables: $SIZ_{i,t-4}$, $LIQ_{i,t-4}$ and $CAP_{i,t-4}$ represent four-period lagged proxies for the bank size (measured by log of total assets), bank liquidity (measured by liquid assets to total assets)[34] and bank capital (measured by bank capital to total assets). $\Delta(MP)_{t-4} * OBS^{1}_{i,t-4}$ is the interaction term, which measures the buffering effect of OBS activity. $\varepsilon_{i,c,t}$ is the error term.

However, only private sector loans are considered in this analysis and credit to the government and public corporations are excluded. These government and corporation loans normally do not respond to monetary policy actions of CBSL and are extended mainly by state banks. Being less sensitive to changes in interest rates, loans to the government depend on the fiscal conditions, particularly the government's strategy to finance the deficit, while loans to public corporations depends mainly on their operational losses. Also, since the quarterly data are used, in order to capture the lagged impact of key variables, it is appropriate to consider four lags (Bhaumik et al., 2011). Therefore, dependent variable $\Delta(L)_{i,t}$ is modelled as a function of OBS activity, monetary policy and bank specific characteristics in the previous four quarters. The final set of variables of interest and their descriptive statistics are reported in Table 7.

[34] Altunbas et al. (2009) use the same definition for liquid assets.

Table 7
Empirical model variables and descriptive statistics for the sample of Sri Lankan banks.

Variable	Variable Code	Description	Descriptive Statistics													
			All Banks					Domestic Banks					Foreign Banks				
			No. of Obs.	Mean	Std. Dev.	Min	Max	No. of Obs.	Mean	Std. Dev.	Min	Max	No. of Obs.	Mean	Std. Dev.	Min	Max
Dependent Variable																	
Growth in real gross loans	Δ(L)	Quarter on quarter change in real private sector loans (total loans excluding loans to the government and government corporations)	635	24.43	32.99	-66.42	192.66	315	26.15	24.63	-17.42	144.83	320	22.74	39.50	-66.42	192.66
Key Explanatory Variables																	
Indicator for off-balance sheet activity																	
Indicator 1	OBS[1]	Total off-balance sheet items/ total assets	678	21.67	11.15	0.00	58.58	304	17.23	6.24	5.41	53.84	374	25.28	12.84	0.00	58.58
Monetary policy indicator	Δ(MP)	Change in short-term money market rate	758	0.002	9.53	-31.00	34.62	362	0.004	9.54	-31.00	34.62	396	0.000	9.53	-31.00	34.62
Control Variables																	
Bank-Specific Characteristics																	
Size	SIZ	Log of total assets of the bank	737	24.04	1.75	20.63	27.62	363	25.17	1.38	21.49	27.62	374	22.94	1.32	20.63	26.10
Liquidity	LIQ	Liquid assets /total assets	737	24.96	12.19	4.65	106.70	363	20.84	6.17	7.83	44.67	374	28.95	14.96	4.65	106.70
Capital	CAP	Capital/ total assets	737	13.24	12.81	0.27	89.62	363	7.38	3.67	1.80	17.96	374	18.92	15.65	0.27	89.62
Country-Specific Characteristics																	
Real economic growth	ΔGDP	Year on year change in real GDP	759	6.63	1.51	3.50	8.30										

Notes:

1. This table presents details of dependent, key explanatory and other controls variables used in the empirical model for commercial banks in Sri Lankan and relevant descriptive statistics.
2. Data are sourced from Central Bank of Sri Lanka.

As per the descriptive statistics presented in Table7, it is observed that average loan growth remains around 24 per cent for all banks whereas the degree of OBS banking activity as a per cent of total assets remains around 22 per cent, on average. It is noteworthy that these values are at around 27 per cent and 38 per cent, respectively for South Asian sample as presented in Table 2 in Section 2.2. At the same time, based on the sub-samples, it is observed that loan growth is generally higher for domestic banks (26 per cent, on average, compared to 17 per cent for foreign banks) and degree of OBS activity is higher for foreign banks (25 per cent, on average, compared to 23 per cent for domestic banks). Moreover, it is evident that domestic banks own the largest asset bases in comparison to those of foreign banks. Descriptive statistics confirm that these foreign banks are more liquid and more capitalised.[35]

Next, results obtained from fixed effects (FE) and generalised least squares (GLS) estimates are presented in Table 8. This table presents results for entire sample and also for sub-samples of domestic- and foreign-owned commercial banks. Based on the empirical results presented in Table 8, the following can be observed. First, mainly the domestic bank sample provides theoretically consistent and expected results. In particular, a positive relationship is observed between real loan growth and OBS activity measure. The coefficients on the OBS activity measures are statistically significant with a positive sign, suggesting that the supply of loans grows at a higher rate in domestic banks with high exposure to OBS banking activity. The interaction term between monetary policy indicator and OBS activity measure is also positive and statistically significant for domestic banks indicating that increased OBS banking makes monetary policy transmission via bank lending channel weaker. This confirms the existence of a buffering effect of OBS banking on the monetary policy transmission mechanism predominantly in the context of domestic banking sector in

[35] CBSL states that banking sector in Sri Lanka is well-capitalised as capital ratios are well above international and domestic regulation minimum standards. At the same time, CBSL states that banking sector needs to pay attention to address liquidity concerns (Central Bank of Sri Lanka, 2011).

Sri Lanka. This result is quite consistent with the evidence provided by the entire sample of South Asian banks.

Table 8
Regression results for Sri Lankan banks:
Off-balance sheet activities and the bank lending channel of monetary transmission in Sri Lanka
Dependent variable: Growth rate of real loans [Δ(L)]

	Fixed Effects (FE) Estimates			Generalised Least Squares (GLS) Estimates		
Variable	**1**	**2**	**3**	**4**	**5**	**6**
	All	**Domestic**	**Foreign**	**All**	**Domestic**	**Foreign**
OBS^1_{t-4}	0.547***	1.417***	0.440	0.143	0.830***	-0.0421
	(0.211)	(0.290)	(0.285)	(0.132)	(0.195)	(0.208)
$\Delta(MP)_{t-4}$	-0.477**	-0.454**	-0.541*	-0.509**	-0.492***	-0.656**
	(0.236)	(0.181)	(0.312)	(0.244)	(0.180)	(0.313)
$\Delta(MP)_{t-4} * OBS^1_{t-4}$	0.016	0.018*	0.007	0.017	0.019*	0.009
	(0.010)	(0.009)	(0.008)	(0.010)	(0.010)	(0.008)
ΔGDP_t	2.586***	4.228***	1.939	2.481***	3.985***	2.017
	(0.867)	(0.982)	(1.735)	(0.877)	(0.997)	(1.758)
SIZ_{t-4}	-17.84***	-7.379**	-27.34***	-3.715***	-3.641***	-9.184***
	(3.231)	(3.029)	(5.074)	(0.992)	(0.998)	(2.001)
LIQ_{t-4}	0.413***	-0.356	0.637***	0.0995	-0.26	0.450**
	(0.152)	(0.298)	(0.204)	(0.115)	(0.230)	(0.179)
CAP_{t-4}	0.701***	2.469**	0.659**	0.365***	-0.584	0.525***
	(0.247)	(0.959)	(0.326)	(0.141)	(0.432)	(0.194)
Constant	402.7***	156.5**	585.5***	101.0***	91.74***	206.8***
	(74.02)	(74.87)	(109.50)	(26.57)	(28.02)	(46.69)
Observations	583	263	320	583	263	320
R-sq (overall)	0.012	0.165	0.029			
R-sq (within)	0.077	0.308	0.099			

Notes: This table presents results for fixed effects (FE) and generalised least squares (GLS) estimates for Eq.(5), which examines the impact of off-balance sheet (OBS) activity on quarterly growth rate of real loans in Sri Lanka controlling for key explanatory variables and including county- and bank-specific controls:

$$\Delta(L)_{i,t} = \alpha + \beta OBS^1_{i,t-4} + \delta\Delta(MP)_{t-4} + \gamma\Delta(MP)_{t-4} * OBS^1_{i,t-4} + \theta\Delta GDP_t + \psi SIZ_{i,t-4} + \kappa LIQ_{i,t-4} + \eta CAP_{i,t-4} + \varepsilon_{i,t} \quad (5)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank) and $t = 1,2,\ldots,T$ denotes time period. $\Delta(L)_{i,t}$ is quarterly growth rate of real loans at time t. The constant α represents the bank-level fixed effects. $OBS^1_{i,t-4}$ is four-period lagged measure of OBS activity defined as total off-balance sheet items as a percentage of total assets. $\Delta(MP)_{t-4}$ is change in money market rate lagged by four-periods. Interaction term, $\Delta(MP)_{t-4} * OBS^1_{i,t-4}$ measures the marginal impact of OBS banking activity on the effects of monetary policy on the loan growth. ΔGDP_t is economic growth at time t, $SIZ_{i,t-4}$ is four-period lagged bank size (measured by log of total assets), $LIQ_{i,t-4}$ is four-period lagged bank liquidity (measured by liquid assets to total assets), $CAP_{i,t-4}$ is four-period lagged bank capital (measured by bank capital to total assets). $\varepsilon_{i,c,t}$ is the error term. Columns 1-3 present results for FE estimates and columns 4-6 present results for GLS estimates. Columns 1 and 4 present results for all banks, columns 2 and 5 present results for domestic banks and columns 3 and 6 present results for foreign banks. Standard errors are in parentheses. Significance levels are given by * p<0.10, ** p<0.05, *** p<0.01.

Second, the foreign bank sample does not yield expected results. As foreign banks focus on specific market segments, it may be argued that OBS activity does not play a significant role in driving their loan portfolios despite the fact that OBS banking continues to remain a key operation in these foreign banks. A negative and significant coefficient on the monetary policy indicator serves as part of evidence for the bank lending channel of monetary policy operating, however in the context of domestic banks. Although loan demand comes from local firms and banking regulation is equally applicable, these results may indicate that loan supply of foreign banks is not fully responsive to domestic conditions and hence, loan portfolios of foreign banks could depend on other external factors. However, this issue needs to be examined further and is left for future research.

Third, the sample for all banks, which includes both domestic and foreign banks, does not adequately provide hypothesised results. In particular, although interaction term between monetary policy indicator and OBS indicator reports a positive coefficient, it is not statistically significant. Fourth, variables for country- and bank-specific characteristics provide some interesting results. As expected, the coefficient on the growth rate of GDP is positive confirming the positive demand-side effect on loan growth. Also, model estimates yield statistically significant and negative coefficients on the bank size variable, implying that larger banks exhibit a smaller loan growth. Also, the coefficients on the measures of bank liquidity and capitalisation that serve as proxies for the strength of commercial banks' balance sheets broadly support the view that loan growth is faster in banks with a higher degree of liquidity and/or capitalisation of their balance sheets. This is particularly observable for foreign banks that generally report high liquidity levels and high capital positions.

To investigate whether there are significant differences in the effects of OBS banking activity on the strength of monetary policy transmission across banks, the entire sample is divided into sub-samples based on the key financial characteristics of banks and thereafter the

regression model given in Eq. (5) is re-estimated. This approach allows examining whether the buffering effect of OBS banking uncovered in previous estimations holds equally for banks with heterogeneous characteristics regarding the strength of their balance sheets. Table 9 presents results for FE and GLS estimates for sub-samples of banks with different size, liquidity and capitalisation levels.[36]

Based on the results reported in Table 9, the following is noted. The positive relationship between real loan growth and OBS banking activity and also the buffering impact of OBS activity, which reduces the impact of monetary policy, are observed mainly for large and poorly-capitalised banks in Sri Lanka. In other words, evidence suggests that the bank lending channel of monetary transmission would work well among small banks than large banks in Sri Lanka. Also, as a buffering effect is observed with regard to poorly-capitalised banks, it may be argued that bank lending channel is operative for well-capitalised banks than poorly-capitalised banks in Sri Lanka. This empirical evidence is well supported by the growth rates for loans and OBS transactions in respective samples. However, this observation contrasts with the results for South Asian banks where such evidence is not found. Moreover, no significant results are observed for the liquidity sub-samples. Hence, to summarise, it is evident that the buffering effects of banking OBS transactions on monetary policy transmission work through large and/or poorly-capitalised banks in Sri Lanka, but do not find strong evidence regarding the relationship between banks' degree of liquidity and the buffering effect of OBS banking. In addition, evidence for other key explanatory and control variables are broadly consistent with the results presented in Table 8.

[36] Following the prior empirical studies and also the analysis of South Asian banks, sub-samples are decided based on the mean level of total assets, liquidity levels and capital position. The terms are also used according to the academic literature in this area. However, it may not be compatible with the norms and practices of prudential regulations. For example, term 'poorly-capitalised banks' is used as per the prior literature. However, it does not necessarily imply that banks are having problems with their capital levels. Hence, such terms may be deemed as only benchmarks.

Table 9

Regression results for Sri Lankan banks:

Off-balance sheet activities and the bank lending channel of monetary transmission in across banks with different financial characteristics

Dependent variable: Growth rate of real loans [Δ(L)]

	Bank Size				Bank Liquidity				Bank Capital			
	FE Estimates		GLS Estimates		FE Estimates		GLS Estimates		FE Estimates		GLS Estimates	
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
	Large	**Small**	**Large**	**Small**	**High Liquid**	**Less Liquid**	**High Liquid**	**Less Liquid**	**Well Capitalised**	**Poorly Capitalised**	**Well Capitalised**	**Poorly Capitalised**
OBS^{1}_{t-4}	1.691***	0.527**	1.222***	-0.255	0.215	1.024***	-0.369	0.135	0.149	0.903***	0.0437	0.142
	(0.334)	(0.264)	(0.216)	(0.177)	(0.349)	(0.222)	(0.249)	(0.146)	(0.371)	(0.219)	(0.298)	(0.131)
$\Delta(MP)_{t-4}$	-0.526***	-0.409*	-0.609***	-0.440*	-0.953**	-0.285	-0.948**	-0.413*	-0.817**	-0.388**	-1.020**	-0.552***
	(0.144)	(0.165)	(0.140)	(0.184)	(0.416)	(0.200)	(0.424)	(0.216)	(0.406)	(0.162)	(0.400)	(0.167)
$\Delta(MP)_{t-4} * OBS^{1}_{t-4}$	0.0196**	-0.006	0.0239***	-0.006	-0.0363*	0.002	-0.0343*	0.005	-0.015	0.0127**	-0.0183*	0.0164**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.019)	(0.006)	(0.020)	(0.006)	(0.011)	(0.006)	(0.011)	(0.006)
ΔGDP_{t}	3.112***	2.899*	2.524***	3.205**	0.64	3.836***	0.584	3.817***	2.26	2.983***	2.653	3.010***
	(0.788)	(1.575)	(0.803)	(1.608)	(1.358)	(1.199)	(1.352)	(1.281)	(2.235)	(0.919)	(2.246)	(0.962)
SIZ_{t-4}	-7.915***	-22.30***	-3.093*	-6.697***	-17.97***	-14.46***	-3.326**	-4.465***	-25.58***	-9.428***	-12.44***	-2.630**
	(2.747)	(4.410)	(1.663)	(1.997)	(4.800)	(3.905)	(1.456)	(1.307)	(5.909)	(3.115)	(4.168)	(1.067)
LIQ_{t-4}	0.0403	0.536***	-0.0179	0.159	0.273	0.564*	0.0689	-0.255	0.570**	0.344	0.494**	-0.279*
	(0.219)	(0.197)	(0.134)	(0.158)	(0.199)	(0.292)	(0.164)	(0.283)	(0.236)	(0.239)	(0.214)	(0.160)
CAP_{t-4}	3.162**	0.698**	0.224	-0.535***	0.858***	-1.752***	0.328*	-1.499***	0.523	-0.0713	0.496**	-0.677
	(1.265)	(0.309)	(0.431)	(0.182)	(0.319)	(0.574)	(0.189)	(0.387)	(0.375)	(0.879)	(0.242)	(0.463)
Constant	202.2***	471.3***	72.28*	161.1***	413.6***	337.8***	109.5***	126.8***	534.2***	219.6***	265.1***	88.82***
	(69.62)	(95.52)	(42.73)	(46.93)	(106.70)	(92.31)	(38.04)	(36.88)	(123.50)	(75.65)	(87.13)	(29.87)
Observations	205	378	205	378	305	278	305	278	233	350	233	350
R-sq (overall)	0.240	0.006			0.007	0.076			0.021	0.042		
R-sq (within)	0.431	0.078			0.076	0.241			0.104	0.191		
Memo Items												
Loan Growth	19.77	27.05	19.77	27.05	26.17	22.49	26.17	22.49	28.87	21.32	28.87	21.32
OBS Growth	23.09	21.98	23.09	21.98	21.60	23.22	21.60	23.22	21.41	23.01	21.41	23.01

Notes: This table presents results for fixed effects (FE) and generalised least squares (GLS) estimates for Eq.(5), which examines the impact of off-balance sheet (OBS) activity on quarterly growth rate of real loans across banks with different financial characteristics in Sri Lanka controlling for key explanatory variables and including county- and bank-specific controls:

$$\Delta(L)_{i,t} = \alpha + \beta OBS^{1}_{i,t-4} + \delta \Delta(MP)_{t-4} + \gamma \Delta(MP)_{t-4} * OBS^{1}_{i,t-4} + \theta \Delta GDP_{t} + + \psi SIZ_{i,t-4} + \kappa LIQ_{i,t-4} + \eta CAP_{i,t-4} + \varepsilon_{i,t} \quad (5)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank) and $t = 1,2,\ldots,T$ denotes time period. $\Delta(L)_{i,t}$ is quarterly growth rate of real loans at time t. The constant α represents the bank-level fixed effects. $OBS^{1}_{i,t-4}$ is four-period lagged measure of OBS activity defined as total off-balance sheet items as a percentage of total assets. $\Delta(MP)_{t-4}$ is change in money market rate lagged by four-periods. Interaction term, $\Delta(MP)_{t-4} * OBS^{1}_{i,t-4}$ measures the marginal impact of OBS banking activity on the effects of monetary policy on the loan growth. ΔGDP_{t} is economic growth at time t, $SIZ_{i,t-4}$ is four-period lagged bank size (measured by log of total assets), $LIQ_{i,t-4}$ is four-period lagged bank liquidity (measured by liquid assets to total assets), $CAP_{i,t-4}$ is four-period lagged bank capital (measured by bank capital to total assets). $\varepsilon_{i,c,t}$ is the error term. Columns 1-2, 5-6 and 9-10 present results for FE estimates and columns 3-4, 7-8 and 11-12 present results for GLS estimates. Columns 1-4 present results for sub-samples based on bank size, columns 5-8 present results for sub-samples based on bank liquidity and columns 9-12 present results for sub-samples based on bank capital. Standard errors are in parentheses. Significance levels are given by * p<0.10, ** p<0.05, *** p<0.01.

7. Conclusions and policy implications

Following the ongoing financial sector changes and developments, practices of financial disintermediation, particularly off-balance sheet (OBS) banking have increased substantially across advanced and emerging countries. Since OBS funding serves as an additional source of liquidity, monetary policy measures could be affected and hence, may not yield expected outcomes. In particular, commercial banks serving as the prime conduit to transmit the monetary policy actions may utilise the OBS liquidity to avoid or reduce the impact of monetary policy shocks that would force them to adjust the loan supply. To that extent, the spectacular increase in OBS banking may have weakened the monetary transmission process through the bank lending channel, which is the main and much discussed segment of the broad credit channel of monetary transmission.

South Asian countries, which form a group of emerging countries, have had adopted substantial financial reforms during last few decades leading to financial deregulation and financial innovations. These developments have also encouraged commercial banks to engage in OBS banking activities mainly with a view to diversify and augment their income bases. At the same time, as these countries heavily rely on bank financing, the bank lending channel remains one of the most important channels to transmit monetary policy actions. The existence of the bank lending channel implies that ongoing structural changes in the financial system as a whole and specifically in the banking industry, could alter the monetary transmission process making it harder to implement monetary policy. To that end, the South Asian case provides an appropriate framework to examine whether increased OBS banking has a significant effect on monetary transmission. To do so, this study builds on existing transmission mechanism literature, in particular, bank lending channel and uses a representative sample of key South Asian banks exploiting data in financial statements and OBS activity.

The study mainly hypothesise that increased OBS activity weakens the monetary transmission through the bank lending channel. Overall, evidence obtained from empirical estimates is consistent with two sub-strands of hypotheses, i.e. (i) Off-balance sheet banking is positively related to bank lending, and (ii) Interaction between monetary policy indicator and off-balance sheet banking indicator is positively related to bank lending. The validation of hypothesis confirms that banking sector OBS activity have an impact to insulate the bank loan supply and to weaken the monetary transmission through the bank lending channel as banks use these activities to protect their loan portfolio against monetary policy shocks. These results are robust for alternative measures of OBS banking and also for different estimation techniques. The study also reveals that buffering effect of OBS activity on monetary transmission is substantial for small, high-liquid and well-capitalised banks having large OBS exposures. To that end, in general, it may be argued that in the presence of a monetary policy shock, bank lending is not declining, but changing.

These findings have several policy implications. This study unveils that bank lending channel is still in existence in this sample of emerging countries. This indicates that banks are playing a central role in transmitting monetary policy impulses to the real economy. To that end, monetary authorities can still induce the banking sector to adjust the supply side of the lending activity. However, as the bank lending channel is shown to be weakened due to OBS banking practices, monetary authorities may confront with several policy issues. Hence, from a policy perspective, these results suggest for a closer overseeing of OBS activity in the banking industry mainly in terms of concerns of monetary policy effectiveness. In particular, monetary authorities, who rely only on the indicators of lending activity would need to encapsulate the dynamics of OBS credit portfolio when deciding the monetary policy stance and also when assessing the monetary policy effectiveness. Further, as suggested in Glick and Plaut (1989), monetary authorities would need to redefine liquidity indicators, i.e. monetary

authorities would need to consider the amount of total liquidity including unused OBS commitments to identify the amount of total liquidity, and hence to redefine the monetary aggregates. However, this argument needs to be validated through further research. Finally, in terms of financial system and banking stability perspective, prudential authorities may have to consider the rapid growth in OBS banking in South Asian countries. Especially, the excessive securitisation in advanced country markets and also the subsequent financial crisis call for a prudent and cautious approach in supervising the growing OBS activity.

In addition to the South Asian bank sample, the single country analysis based on the Sri Lankan context broadly confirms the implications of OBS activity on monetary transmission via the bank lending channel. In particular, the evidence suggests that OBS banking transactions, which has been increasing in Sri Lankan commercial banks in recent years, is having a moderating influence on the effectiveness of monetary policy transmission mainly via domestic-large and also poorly-capitalised banks. This key observation point to an important policy issue for CBSL. This is because the commercial banks that have common characteristics, i.e. both large asset bases and capital levels below the average, dominate the Sri Lankan banking market with a significant share of 88 per cent of total assets of commercial banks. In particular, the bank lending channel may have weakened significantly and consistently via these commercial banks that engage in OBS banking activity extensively. Hence, CBSL may need to pay additional attention to the contingent liabilities of commercial banks beyond the traditional balance sheet focus when deciding and exercising its monetary policy.

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Appendix

Table A1: Regression results: Off- balance sheet activities and the bank lending channel of monetary transmission through state-and privately owned banks - Dependent variable: Growth rate of real loans [Δ(L)]

Variable	State-owned banks						Privately-owned banks					
	FE Estimates			GLS Estimates			FE Estimates			GLS Estimates		
	1	2	3	4	5	6	1	2	3	4	5	6
	OBS[1]	OBS[2]	OBS[3]	OBS[1]	OBS[2]	OBS[3]	OBS[1]	OBS[2]	OBS[3]	OBS[1]	OBS[2]	OBS[3]
OBS measure	0.198***	3.355	0.329***	0.126***	0.232	0.107	0.133***	52.56***	4.411***	0.139***	51.25***	2.727***
	(0.051)	(2.994)	(0.126)	(0.041)	(1.811)	(0.091)	(0.004)	(13.560)	(0.885)	(0.003)	(7.078)	(0.525)
$\Delta (MP)_{t-1}$	-1.303***	-0.234	-0.378	-1.375***	-0.23	-0.272	-2.144***	-5.396**	-5.089**	-2.044***	-2.968	-3.661
	(0.357)	(0.513)	(0.504)	(0.333)	(0.479)	(0.476)	(0.357)	(2.567)	(2.538)	(0.399)	(2.626)	(2.683)
$\Delta (MP)_{t-1}$ * OBS measure	0.0299***	-0.0206	0.0394	0.0338***	-0.00838	0.0155	0.0550***	1.757**	1.706*	0.0554***	0.753	1.177
	(0.010)	(0.279)	(0.275)	(0.009)	(0.257)	(0.257)	(0.001)	(0.880)	(0.871)	(0.001)	(0.890)	(0.909)
ΔGDP	3.005***	3.247***	3.310***	1.967***	2.200***	2.152***	13.15***	18.37***	21.19***	4.386**	15.06***	10.32**
	(0.610)	(0.643)	(0.635)	(0.490)	(0.515)	(0.512)	(2.343)	(6.429)	(6.393)	(1.869)	(4.772)	(4.975)
SIZ_{t-1}	4.811***	6.433***	5.525***	2.506***	2.766***	2.563***	3.675	9.516	7.046	-10.02***	5.854	-12.75*
	(1.598)	(1.667)	(1.676)	(0.783)	(0.824)	(0.824)	(5.421)	(14.820)	(14.670)	(2.745)	(7.117)	(7.544)
LIQ_{t-1}	0.071	-0.023	0.117	0.0821	0.0284	0.0462	1.851***	4.948***	5.390***	-0.456***	-0.842**	-0.651
	(0.194)	(0.203)	(0.205)	(0.111)	(0.117)	(0.116)	(0.317)	(0.867)	(0.839)	(0.154)	(0.389)	(0.400)
CAP_{t-1}	0.765**	0.950**	0.908**	0.792***	0.792***	0.823***	4.910***	3.994	4.683*	3.874***	13.37***	13.13***
	(0.348)	(0.386)	(0.382)	(0.225)	(0.242)	(0.240)	(0.964)	(2.526)	(2.411)	(0.685)	(1.505)	(1.553)
Constant	-59.03***	-73.07***	-70.40***	-27.94***	-27.69***	-27.96***	-176.4***	-391.7***	-406.9***	36.89	-308.6***	-111.0*
	(16.750)	(17.980)	(17.400)	(8.494)	(9.692)	(8.905)	(46.040)	(127.500)	(126.100)	(23.450)	(61.540)	(61.370)
Observations	261	261	261	261	261	261	540	540	540	540	540	540
R-sq (overall)	0.239	0.162	0.197				0.814	0.125	0.120			
R-sq (within)	0.268	0.176	0.197				0.898	0.231	0.247			

This table presents results for fixed effects (FE) and generalised least squares (GLS) estimates for Eq.(3), which examines the impact of off-balance sheet (OBS) activity on growth rate of real loans controlling for key explanatory variables and county- and bank-specific controls for banks with different ownership structures:

$$\Delta(L)_{i,c,t} = \alpha + \beta OBS^{m}_{i,c,t-1} + \delta\Delta(MP)_{c,t-1} + \gamma\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1} + \phi X_{i,c,t} + \varepsilon_{i,c,t} \quad (3)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank), $c = 1,2,\ldots,C$ indexes each country, and $t = 1,2,\ldots,T$ denotes time period. $\Delta(L)_{i,c,t}$ is annual growth rate of real gross loans and the constant α represents the bank-level fixed effects. One-period lagged measure for OBS activity is given by $OBS^{m}_{i,c,t-1}$ where $m = 1,2,\ldots,M$ represents the relevant measure of OBS: OBS[1] (total OBS items/total assets), OBS[2] (total non-interest income/total assets) and OBS[3] (total OBS items/total assets + OBS items). $\Delta(MP)_{c,t-1}$ is the change in monetary policy indicator lagged by one period. Interaction term, $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$ measures the marginal impact of OBS banking activity on the effects of monetary policy on the loan growth. The vector $X_{i,c,t}$ includes $\Delta GDP_{c,t}$ (real GDP growth rate), $SIZ_{i,c,t-1}$ (one-period lagged log of total assets), $LIQ_{i,c,t-1}$ (one-period lagged liquidity as given by liquid assets to total deposit and short-term funding), and $CAP_{i,c,t-1}$ (one-period lagged capital as defined by equity to total assets). $\varepsilon_{i,c,t}$ is the error term. Columns 1-3 present results for FE estimates and columns 4-6 present results for GLS estimates. Columns 1 and 4 present results for OBS[1], columns 2 and 5 present results for OBS[2] and columns 3 and 6 present results for OBS[3]. Standard errors are in parentheses. Significance levels are given by * p<0.10, ** p<0.05, *** p<0.01.

Table A2: Regression results: Off- balance sheet activities and the bank lending channel of monetary transmission through listed and non-listed banks - Dependent variable: Growth rate of real loans [Δ(L)]

Variable	Listed banks						Non-listed banks					
	FE Estimates			GLS Estimates			FE Estimates			GLS Estimates		
	1	2	3	4	5	6	1	2	3	4	5	6
	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3
OBS measure	0.0527	1.055	0.134	0.0608***	-0.0231	0.185**	0.124***	119.0***	14.03***	0.139***	149.1***	12.39***
	(0.040)	(2.503)	(0.134)	(0.019)	(1.258)	(0.074)	(0.009)	(41.670)	(2.869)	(0.007)	(21.050)	(1.807)
$\Delta (MP)_{t-1}$	-0.421	-0.557	-0.579	-0.460*	-0.534	-0.548	-2.694**	-61.85***	-54.22***	-1.474	-61.46***	-51.79***
	(0.261)	(0.375)	(0.374)	(0.259)	(0.375)	(0.371)	(1.342)	(11.680)	(10.730)	(1.532)	(10.990)	(10.930)
$\Delta (MP)_{t-1}$ * OBS measure	-0.00188	0.0314	0.0381	0.000237	0.0302	0.0329	0.0557***	33.58***	30.33***	0.0557***	34.20***	30.17***
	(0.007)	(0.129)	(0.128)	(0.007)	(0.128)	(0.126)	(0.002)	(6.223)	(5.721)	(0.003)	(5.781)	(5.764)
ΔGDP	6.549***	6.436***	6.485***	4.665***	5.000***	4.694***	27.39***	45.59*	60.54***	1.569	32.00*	24.51
	(0.831)	(0.823)	(0.825)	(0.646)	(0.642)	(0.651)	(8.631)	(23.330)	(22.110)	(7.568)	(17.290)	(17.320)
SIZ_{t-1}	4.581**	4.690**	4.448**	-1.999**	-1.665*	-1.938**	12.38	-3.917	12.35	-8.705	8.751	-4.228
	(1.969)	(1.965)	(1.979)	(0.836)	(0.909)	(0.840)	(22.410)	(60.950)	(57.260)	(9.934)	(22.330)	(23.100)
LIQ_{t-1}	0.532***	0.531***	0.538***	0.288**	0.252*	0.284**	2.535***	4.505*	6.440***	-0.565*	-1.533**	-0.905
	(0.168)	(0.169)	(0.169)	(0.132)	(0.133)	(0.133)	(0.803)	(2.290)	(2.003)	(0.339)	(0.730)	(0.751)
CAP_{t-1}	1.923***	1.916***	1.918***	2.346***	2.483***	2.422***	7.025**	3.781	-0.187	4.186**	12.34***	14.88***
	(0.415)	(0.417)	(0.416)	(0.283)	(0.284)	(0.282)	(2.708)	(7.201)	(6.575)	(1.922)	(3.751)	(3.644)
Constant	-82.44***	-82.04***	-81.90***	-17.39**	-20.21**	-20.29**	-422.4**	-617	-934.2*	51.33	-555.5***	-455.3**
	(18.200)	(18.590)	(18.160)	(8.458)	(9.991)	(8.442)	(196.700)	(535.500)	(507.400)	(91.260)	(198.500)	(201.200)
Observations	660	660	660	660	660	660	134	134	134	134	134	134
R-sq	0.098	0.093	0.095				0.781	0.281	0.277			
R-sq (within)	0.16	0.158	0.159				0.924	0.44	0.508			

This table presents results for fixed effects (FE) and generalised least squares (GLS) estimates for Eq.(3), which examines the impact of off-balance sheet (OBS) activity on growth rate of real loans controlling for key explanatory variables and county- and bank-specific controls for listed and non-listed banks:

$$\Delta(L)_{i,c,t} = \alpha + \beta OBS^{m}_{i,c,t-1} + \delta\Delta(MP)_{c,t-1} + \gamma\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1} + \phi X_{i,c,t} + \varepsilon_{i,c,t} \quad (3)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank), $c = 1,2,\ldots,C$ indexes each country, and $t = 1,2,\ldots,T$ denotes time period. $\Delta(L)_{i,c,t}$ is annual growth rate of real gross loans and the constant α represents the bank-level fixed effects. One-period lagged measure for OBS activity is given by $OBS^{m}_{i,c,t-1}$ where $m = 1,2,\ldots,M$ represents the relevant measure of OBS: OBS^1 (total OBS items/total assets), OBS^2 (total non-interest income/total assets) and OBS^3 (total OBS items/total assets + OBS items). $\Delta(MP)_{c,t-1}$ is the change in monetary policy indicator lagged by one period. Interaction term, $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$ measures the marginal impact of OBS banking activity on the effects of monetary policy on the loan growth. The vector $X_{i,c,t}$ includes $\Delta GDP_{c,t}$ (real GDP growth rate), $SIZ_{i,c,t-1}$ (one-period lagged log of total assets), $LIQ_{i,c,t-1}$ (one-period lagged liquidity as given by liquid assets to total deposit and short-term funding), and $CAP_{i,c,t-1}$ (one-period lagged capital as defined by equity to total assets). $\varepsilon_{i,c,t}$ is the error term. Columns 1-3 present results for FE estimates and columns 4-6 present results for GLS estimates. Columns 1 and 4 present results for OBS^1, columns 2 and 5 present results for OBS^2 and columns 3 and 6 present results for OBS^3. Standard errors are in parentheses. Significance levels are given by * p<0.10, ** p<0.05, *** p<0.01.

Table A3: Regression results: Off- balance sheet activities and the bank lending channel of monetary transmission through large and small banks - Dependent variable: Growth rate of real loans [Δ(L)]

Variable	Large banks						Small banks					
	FE Estimates			GLS Estimates			FE Estimates			GLS Estimates		
	1	2	3	4	5	6	1	2	3	4	5	6
	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3
OBS measure	0.0142	-14.31***	-0.026	0.0374*	-7.307***	0.136*	0.134***	51.91***	4.367***	0.139***	51.09***	3.367***
	(0.051)	(3.915)	(0.154)	(0.020)	(2.155)	(0.075)	(0.004)	(12.800)	(0.829)	(0.003)	(6.695)	(0.526)
$\Delta (MP)_{t-1}$	-0.403	-1.138*	-1.554**	-0.462*	-1.161**	-1.458**	-2.192***	-5.101**	-5.472**	-2.113***	-2.759	-4.122
	(0.294)	(0.591)	(0.602)	(0.278)	(0.563)	(0.568)	(0.345)	(2.414)	(2.390)	(0.385)	(2.485)	(2.517)
$\Delta (MP)_{t-1}$ * OBS measure	0.00712	0.439	0.730**	0.00607	0.435	0.636**	0.0548***	1.676**	1.846**	0.0553***	0.673	1.292
	(0.008)	(0.311)	(0.312)	(0.008)	(0.292)	(0.294)	(0.001)	(0.829)	(0.819)	(0.001)	(0.844)	(0.853)
ΔGDP	3.236***	3.012***	3.081***	4.190***	4.201***	4.129***	11.72***	16.53***	17.46***	4.360**	15.36***	11.55**
	(0.839)	(0.772)	(0.818)	(0.612)	(0.590)	(0.610)	(2.175)	(5.953)	(5.892)	(1.808)	(4.619)	(4.699)
SIZ_{t-1}	-5.997**	-5.247**	-6.276**	-2.803**	-3.162***	-3.127**	6.656	13.96	5.721	-5.544**	12.59*	-3.438
	(2.506)	(2.401)	(2.475)	(1.203)	(1.155)	(1.223)	(4.750)	(13.000)	(12.900)	(2.527)	(6.599)	(6.648)
LIQ_{t-1}	-0.592**	-0.517**	-0.580**	-0.226*	-0.19	-0.21	1.948***	5.067***	5.447***	-0.384***	-0.672*	-0.466
	(0.236)	(0.225)	(0.237)	(0.135)	(0.132)	(0.134)	(0.303)	(0.828)	(0.802)	(0.146)	(0.369)	(0.376)
CAP_{t-1}	0.488	0.316	0.478	0.437	0.426	0.507	4.288***	3.606	4.459**	3.607***	12.57***	12.46***
	(0.530)	(0.494)	(0.516)	(0.340)	(0.329)	(0.334)	(0.888)	(2.341)	(2.229)	(0.629)	(1.398)	(1.423)
Constant	56.19**	70.35***	60.98**	13.6	27.71**	14.81	-184.2***	-403.1***	-367.5***	7.505	-349.9***	-193.0***
	(26.510)	(25.280)	(26.520)	(11.670)	(12.230)	(11.580)	(41.240)	(114.100)	(111.900)	(20.390)	(54.780)	(51.540)
Observations	210	210	210	210	210	210	591	591	591	591	591	591
R-sq	0.179	0.235	0.161				0.815	0.122	0.122			
R-sq (within)	0.183	0.261	0.205				0.897	0.229	0.246			

This table presents results for fixed effects (FE) and generalised least squares (GLS) estimates for Eq.(3), which examines the impact of off-balance sheet (OBS) activity on growth rate of real loans controlling for key explanatory variables and county- and bank-specific controls for large and small banks:

$$\Delta(L)_{i,c,t} = \alpha + \beta OBS^{m}_{i,c,t-1} + \delta\Delta(MP)_{c,t-1} + \gamma\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1} + \phi X_{i,c,t} + \varepsilon_{i,c,t} \quad (3)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank), $c = 1,2,\ldots,C$ indexes each country, and $t = 1,2,\ldots,T$ denotes time period. $\Delta(L)_{i,c,t}$ is annual growth rate of real gross loans and the constant α represents the bank-level fixed effects. One-period lagged measure for OBS activity is given by $OBS^{m}_{i,c,t-1}$ where $m = 1,2,\ldots,M$ represents the relevant measure of OBS: OBS^1 (total OBS items/total assets), OBS^2 (total non-interest income/total assets) and OBS^3 (total OBS items/total assets + OBS items). $\Delta(MP)_{c,t-1}$ is the change in monetary policy indicator lagged by one period. Interaction term, $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$ measures the marginal impact of OBS banking activity on the effects of monetary policy on the loan growth. The vector $X_{i,c,t}$ includes $\Delta GDP_{c,t}$ (real GDP growth rate), $SIZ_{i,c,t-1}$ (one-period lagged log of total assets), $LIQ_{i,c,t-1}$ (one-period lagged liquidity as given by liquid assets to total deposit and short-term funding), and $CAP_{i,c,t-1}$ (one-period lagged capital as defined by equity to total assets). $\varepsilon_{i,c,t}$ is the error term. Columns 1-3 present results for FE estimates and columns 4-6 present results for GLS estimates. Columns 1 and 4 present results for OBS^1, columns 2 and 5 present results for OBS^2 and columns 3 and 6 present results for OBS^3. Standard errors are in parentheses. Significance levels are given by * p<0.10, ** p<0.05, *** p<0.01.

Table A4: Regression results: Off- balance sheet activities and the bank lending channel of monetary transmission through high-and less-liquid banks - Dependent variable: Growth rate of real loans [Δ(L)]

Variable	High-liquid banks						Less-liquid banks					
	FE Estimates			GLS Estimates			FE Estimates			GLS Estimates		
	1	2	3	4	5	6	1	2	3	4	5	6
	OBS[1]	OBS[2]	OBS[3]	OBS[1]	OBS[2]	OBS[3]	OBS[1]	OBS[2]	OBS[3]	OBS[1]	OBS[2]	OBS[3]
OBS measure	0.132***	83.59***	9.259***	0.146***	122.5***	7.096***	0.0761	-7.324*	0.0215	0.0191	-9.810***	-0.143
	(0.005)	(30.270)	(1.962)	(0.004)	(15.620)	(1.201)	(0.078)	(4.418)	(0.236)	(0.038)	(2.347)	(0.143)
$\Delta (MP)_{t-1}$	-2.147***	-19.69***	-17.23***	-1.503*	-17.61***	-14.84**	-0.585	-0.713	-0.683	-0.51	-0.613	-0.301
	(0.690)	(6.564)	(6.333)	(0.797)	(6.298)	(6.620)	(0.479)	(0.640)	(0.642)	(0.512)	(0.676)	(0.682)
$\Delta (MP)_{t-1}$ * OBS measure	0.0543***	8.821***	7.884***	0.0543***	8.064***	7.203**	0.00247	0.0929	0.0688	0.000786	0.076	-0.0679
	(0.001)	(2.832)	(2.730)	(0.002)	(2.687)	(2.826)	(0.013)	(0.222)	(0.223)	(0.014)	(0.233)	(0.234)
ΔGDP	14.89***	20.83	26.26**	3.906	18.54*	15.13	7.446***	7.165***	7.352***	5.271***	4.959***	5.510***
	(3.677)	(13.890)	(13.210)	(3.057)	(9.684)	(10.300)	(1.508)	(1.490)	(1.496)	(1.220)	(1.196)	(1.219)
SIZ_{t-1}	30.49***	34.31	30.72	-0.0976	17.66	-5.544	-8.082**	-8.000**	-7.785**	-6.392***	-9.166***	-6.035***
	(8.305)	(31.200)	(30.020)	(4.015)	(12.800)	(14.050)	(3.665)	(3.637)	(3.669)	(1.643)	(1.743)	(1.641)
LIQ_{t-1}	3.058***	6.318***	7.795***	0.126	-0.782	-0.349	-0.285	-0.305	-0.285	-0.557*	-0.531*	-0.579**
	(0.421)	(1.617)	(1.482)	(0.189)	(0.582)	(0.619)	(0.329)	(0.329)	(0.329)	(0.291)	(0.287)	(0.291)
CAP_{t-1}	3.268**	0.847	-2.267	0.832	10.01***	12.73***	4.850***	4.933***	4.855***	6.026***	5.933***	6.133***
	(1.477)	(5.427)	(5.033)	(0.972)	(2.636)	(2.709)	(0.730)	(0.732)	(0.732)	(0.552)	(0.539)	(0.548)
Constant	-433.4***	-668.8**	-735.3***	-20.49	-474.1***	-283.5**	4.768	21.32	5.613	4.619	46.71**	3.795
	(73.370)	(275.700)	(263.800)	(37.190)	(113.400)	(121.800)	(33.960)	(34.910)	(33.890)	(16.440)	(19.110)	(16.330)
Observations	212	212	212	212	212	212	603	603	603	603	603	603
R-sq	0.827	0.163	0.150				0.197	0.222	0.199			
R-sq (within)	0.951	0.316	0.367				0.138	0.141	0.137			

This table presents results for fixed effects (FE) and generalised least squares (GLS) estimates for Eq.(3), which examines the impact of off-balance sheet (OBS) activity on growth rate of real loans controlling for key explanatory variables and county- and bank-specific controls for high and less liquid banks:

$$\Delta(L)_{i,c,t} = \alpha + \beta OBS^{m}_{i,c,t-1} + \delta\Delta(MP)_{c,t-1} + \gamma\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1} + \phi X_{i,c,t} + \varepsilon_{i,c,t} \quad (3)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank), $c = 1,2,\ldots,C$ indexes each country, and $t = 1,2,\ldots,T$ denotes time period. $\Delta(L)_{i,c,t}$ is annual growth rate of real gross loans and the constant α represents the bank-level fixed effects. One-period lagged measure for OBS activity is given by $OBS^{m}_{i,c,t-1}$ where $m = 1,2,\ldots,M$ represents the relevant measure of OBS: OBS[1] (total OBS items/total assets), OBS[2] (total non-interest income/total assets) and OBS[3] (total OBS items/total assets + OBS items). $\Delta(MP)_{c,t-1}$ is the change in monetary policy indicator lagged by one period. Interaction term, $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$ measures the marginal impact of OBS banking activity on the effects of monetary policy on the loan growth. The vector $X_{i,c,t}$ includes $\Delta GDP_{c,t}$ (real GDP growth rate), $SIZ_{i,c,t-1}$ (one-period lagged log of total assets), $LIQ_{i,c,t-1}$ (one-period lagged liquidity as given by liquid assets to total deposit and short-term funding), and $CAP_{i,c,t-1}$ (one-period lagged capital as defined by equity to total assets). $\varepsilon_{i,c,t}$ is the error term. Columns 1-3 present results for FE estimates and columns 4-6 present results for GLS estimates. Columns 1 and 4 present results for OBS[1], columns 2 and 5 present results for OBS[2] and columns 3 and 6 present results for OBS[3]. Standard errors are in parentheses. Significance levels are given by * p<0.10, ** p<0.05, *** p<0.01.

Table A5: Regression results: Off- balance sheet activities and the bank lending channel of monetary transmission through well- and poorly capitalised banks - Dependent variable: Growth rate of real loans [Δ(L)]

Variable	Well-capitalised banks						Poorly-capitalised banks					
	FE Estimates			GLS Estimates			FE Estimates			GLS Estimates		
	1	2	3	4	5	6	1	2	3	4	5	6
	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3
OBS measure	0.130***	68.93***	7.700***	0.137***	75.86***	4.571***	0.0366	-6.088	-0.199	0.0135	-9.345***	-0.186
	(0.006)	(26.350)	(1.728)	(0.005)	(13.520)	(1.015)	(0.091)	(4.831)	(0.263)	(0.040)	(2.489)	(0.153)
$\Delta (MP)_{t-1}$	-2.233***	-8.989*	-9.114*	-1.884**	-4.126	-7.11	-0.499	-0.487	-0.46	-0.482	-0.473	-0.208
	(0.803)	(5.003)	(4.850)	(0.921)	(5.004)	(5.093)	(0.520)	(0.674)	(0.675)	(0.546)	(0.700)	(0.704)
$\Delta (MP)_{t-1}$ * OBS measure	0.0549***	3.169*	3.555**	0.0558***	1.007	2.718	-0.00044	0.00508	-0.0143	0.000555	0.0313	-0.0963
	(0.002)	(1.780)	(1.726)	(0.002)	(1.762)	(1.781)	(0.015)	(0.236)	(0.236)	(0.015)	(0.244)	(0.244)
ΔGDP	21.34***	27.16**	34.91***	6.254*	23.84**	18.50*	8.225***	8.038***	8.043***	5.390***	5.126***	5.676***
	(4.678)	(13.500)	(13.040)	(3.795)	(9.578)	(10.010)	(1.615)	(1.595)	(1.602)	(1.284)	(1.260)	(1.282)
SIZ_{t-1}	3.429	2.199	-3.309	-10.35**	-3.597	-24.03*	-1.878	-1.974	-1.453	-6.497***	-9.075***	-6.175***
	(9.362)	(27.070)	(26.290)	(4.893)	(12.600)	(14.190)	(3.836)	(3.811)	(3.833)	(1.745)	(1.848)	(1.741)
LIQ_{t-1}	2.477***	6.608***	7.041***	-0.583**	-1.309**	-1.092*	-0.46	-0.474	-0.485	-0.753**	-0.785**	-0.800**
	(0.552)	(1.600)	(1.498)	(0.248)	(0.614)	(0.631)	(0.411)	(0.412)	(0.413)	(0.359)	(0.355)	(0.359)
CAP_{t-1}	4.440***	-0.436	-0.415	4.713***	15.08***	16.16***	4.260***	4.331***	4.278***	5.804***	5.662***	5.913***
	(1.627)	(4.542)	(4.192)	(1.262)	(2.690)	(2.727)	(0.784)	(0.785)	(0.784)	(0.572)	(0.561)	(0.567)
Constant	-263.9***	-432.8*	-513.3**	11.79	-374.4***	-188.5	-41.51	-28.04	-37.31	9.298	49.34**	9.514
	(83.41)	(241.40)	(234.50)	(46.07)	(110.90)	(120.80)	(35.89)	(36.88)	(35.81)	(18.12)	(20.84)	(18.03)
Observations	240	240	240	240	240	240	605	605	605	605	605	605
R-sq	0.792	0.110	0.118				0.141	0.148	0.148			
R-sq (within)	0.912	0.274	0.318				0.104	0.107	0.105			

This table presents results for fixed effects (FE) and generalised least squares (GLS) estimates for Eq.(3), which examines the impact of off-balance sheet (OBS) activity on growth rate of real loans controlling for key explanatory variables and county- and bank-specific controls for well- and poorly capitalised banks:

$$\Delta(L)_{i,c,t} = \alpha + \beta OBS^{m}_{i,c,t-1} + \delta\Delta(MP)_{c,t-1} + \gamma\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1} + \phi X_{i,c,t} + \varepsilon_{i,c,t} \quad (3)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank), $c = 1,2,\ldots,C$ indexes each country, and $t = 1,2,\ldots,T$ denotes time period. $\Delta(L)_{i,c,t}$ is annual growth rate of real gross loans and the constant α represents the bank-level fixed effects. One-period lagged measure for OBS activity is given by $OBS^{m}_{i,c,t-1}$ where $m = 1,2,\ldots,M$ represents the relevant measure of OBS: OBS^1 (total OBS items/total assets), OBS^2 (total non-interest income/total assets) and OBS^3 (total OBS items/total assets + OBS items). $\Delta(MP)_{c,t-1}$ is the change in monetary policy indicator lagged by one period. Interaction term, $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$ measures the marginal impact of OBS banking activity on the effects of monetary policy on the loan growth. The vector $X_{i,c,t}$ includes $\Delta GDP_{c,t}$ (real GDP growth rate), $SIZ_{i,c,t-1}$ (one-period lagged log of total assets), $LIQ_{i,c,t-1}$ (one-period lagged liquidity as given by liquid assets to total deposit and short-term funding), and $CAP_{i,c,t-1}$ (one-period lagged capital as defined by equity to total assets). $\varepsilon_{i,c,t}$ is the error term. Columns 1-3 present results for FE estimates and columns 4-6 present results for GLS estimates. Columns 1 and 4 present results for OBS^1, columns 2 and 5 present results for OBS^2 and columns 3 and 6 present results for OBS^3. Standard errors are in parentheses. Significance levels are given by * p<0.10, ** p<0.05, *** p<0.01.

Table A6: Regression results: Off- balance sheet activities and the bank lending channel of monetary transmission through high and low profitable banks - Dependent variable: Growth rate of real loans [Δ(L)]

Variable	Highly profitable banks						Less profitable banks					
	FE Estimates			GLS Estimates			FE Estimates			GLS Estimates		
	1	2	3	4	5	6	1	2	3	4	5	6
	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3	OBS^1	OBS^2	OBS^3
OBS measure	0.0799*	-0.308	0.212	0.0936***	1.703	0.356***	0.125***	84.02***	6.411***	0.122***	80.40***	4.682***
	(0.041)	(2.565)	(0.149)	(0.019)	(1.320)	(0.078)	(0.006)	(25.370)	(1.457)	(0.005)	(16.680)	(1.010)
$\Delta (MP)_{t-1}$	-0.293	-0.354	-0.37	-0.339	-0.536	-0.59	-2.766***	-30.01***	-27.44***	-2.333***	-27.87***	-25.59***
	(0.269)	(0.392)	(0.391)	(0.271)	(0.403)	(0.393)	(0.748)	(5.879)	(5.699)	(0.830)	(5.589)	(5.553)
$\Delta (MP)_{t-1}$ * OBS measure	-0.006	-0.036	-0.037	-0.003	0.037	0.058	0.0550***	16.00***	14.48***	0.0556***	15.01***	13.51***
	(0.008)	(0.131)	(0.131)	(0.008)	(0.134)	(0.130)	(0.002)	(3.026)	(2.904)	(0.002)	(2.830)	(2.791)
ΔGDP	4.850***	4.583***	4.735***	2.596***	3.172***	2.518***	16.65***	22.84**	23.63**	10.26***	21.13***	22.68***
	(0.905)	(0.895)	(0.899)	(0.672)	(0.681)	(0.677)	(3.757)	(10.740)	(10.560)	(3.208)	(7.943)	(7.935)
SIZ_{t-1}	7.857***	7.856***	7.600***	-2.603***	-1.339	-2.560***	4.463	21.27	5.566	-2.694	14.39	4.367
	(2.059)	(2.063)	(2.066)	(0.828)	(0.910)	(0.833)	(9.466)	(26.990)	(26.580)	(4.361)	(10.760)	(11.210)
LIQ_{t-1}	-0.204	-0.219	-0.202	-0.246***	-0.287***	-0.254***	3.457***	6.637***	8.124***	2.082***	3.889***	6.025***
	(0.157)	(0.158)	(0.158)	(0.064)	(0.065)	(0.064)	(0.536)	(1.639)	(1.471)	(0.448)	(1.238)	(1.077)
CAP_{t-1}	1.158**	1.246***	1.206***	0.582*	0.884**	0.748**	4.176***	3.274	3.075	4.197***	10.20***	10.49***
	(0.461)	(0.464)	(0.461)	(0.340)	(0.347)	(0.338)	(1.486)	(4.054)	(3.925)	(0.946)	(2.101)	(2.099)
Constant	-80.27***	-74.90***	-79.35***	20.90***	6.319	15.71**	-225.1***	-536.2**	-466.3*	-97.03**	-474.1***	-439.4***
	(18.99)	(19.32)	(19.05)	(7.53)	(9.76)	(7.45)	(86.19)	(247.30)	(241.70)	(40.26)	(91.74)	(93.03)
Observations	535	535	535	535	535	535	273	273	273	273	273	273
R-sq	0.0389	0.029	0.023				0.908	0.427	0.420			
R-sq (within)	0.112	0.104	0.108				0.923	0.366	0.388			

This table presents results for fixed effects (FE) and generalised least squares (GLS) estimates for Eq.(3), which examines the impact of off-balance sheet (OBS) activity on growth rate of real loans controlling for key explanatory variables and including county- and bank-specific controls for banks with high and low profitability:

$$\Delta(L)_{i,c,t} = \alpha + \beta OBS^{m}_{i,c,t-1} + \delta\Delta(MP)_{c,t-1} + \gamma\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1} + \phi X_{i,c,t} + \varepsilon_{i,c,t} \qquad (3)$$

where $i = 1,2,\ldots,N$ refers to a cross section unit (each individual bank), $c = 1,2,\ldots,C$ indexes each country, and $t = 1,2,\ldots,T$ denotes time period. $\Delta(L)_{i,c,t}$ is annual growth rate of real gross loans and the constant α represents the bank-level fixed effects. One-period lagged measure for OBS activity is given by $OBS^{m}_{i,c,t-1}$ where $m = 1,2,\ldots,M$ represents the relevant measure of OBS: OBS^1 (total OBS items/total assets), OBS^2 (total non-interest income/total assets) and OBS^3 (total OBS items/total assets + OBS items). $\Delta(MP)_{c,t-1}$ is the change in monetary policy indicator lagged by one period. Interaction term, $\Delta(MP)_{c,t-1} * OBS^{m}_{i,c,t-1}$ measures the marginal impact of OBS banking activity on the effects of monetary policy on the loan growth. The vector $X_{i,c,t}$ includes $\Delta GDP_{c,t}$ (real GDP growth rate), $SIZ_{i,c,t-1}$ (one-period lagged log of total assets), $LIQ_{i,c,t-1}$ (one-period lagged liquidity as given by liquid assets to total deposit and short-term funding), and $CAP_{i,c,t-1}$ (one-period lagged capital as defined by equity to total assets). $\varepsilon_{i,c,t}$ is the error term. Columns 1-3 present results for FE estimates and columns 4-6 present results for GLS estimates. Columns 1 and 4 present results for OBS^1, columns 2 and 5 present results for OBS^2 and columns 3 and 6 present results for OBS^3. Standard errors are in parentheses. Significance levels are given by * p<0.10, ** p<0.05, *** p<0.01.