

Gulf Cooperation Council



Strengthening Liquidity Management Frameworks in Support of Stability and Growth in the GCC

Prepared by Staff of the International Monetary Fund

I N T E R N A T I O N A L M O N E T A R Y F U N D

* The views expressed herein are those of the authors and should not be reported as or attributed to the International Monetary Fund, its Executive Board, or the governments of any of its member countries.

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EXECUTIVE SUMMARY¹

Effective liquidity management is important to promote macro-financial stability in the GCC countries. Fixed exchange rate regimes provide credible nominal anchors in the GCC countries, but combined with open capital accounts, they also entail limited monetary policy independence. At the same time, high dependence on hydrocarbon revenue has made the region vulnerable to oil price-driven liquidity swings. And the latter can affect monetary policy implementation, including by exacerbating credit and asset price cycles. This highlights the importance of frameworks aimed at forecasting liquidity and ensuring appropriate liquidity levels through the timely absorption or injection of liquidity by central banks.

Over the past decade, liquidity management in the GCC countries has been based mainly on passive instruments. Abundant liquidity during times of high oil prices have placed liquidity absorption at the center of the central bank operations. Reserve requirements have helped absorb liquidity but have not been used very actively. Standing facilities, another key instrument, are more passive in nature, with the amount of liquidity absorbed or injected driven by banks rather than monetary authorities. Central banks bills or other instruments have also been used, but issuance has not systematically been based on market principles. In addition, these operations have been constrained by limited liquidity forecasting capability and the shallow nature of interbank and domestic debt markets.

With more volatile liquidity conditions over the past few years, central banks have been strengthening their liquidity management. With lower oil prices and deteriorating external and fiscal positions, liquidity conditions have become more volatile, with a marked tightening in 2015-16. Notwithstanding the steps taken to alleviate these pressures, tighter liquidity led to an increase in interbank interest rate volatility during this period, indicating a need to further develop liquidity instruments and forecasting capacity.

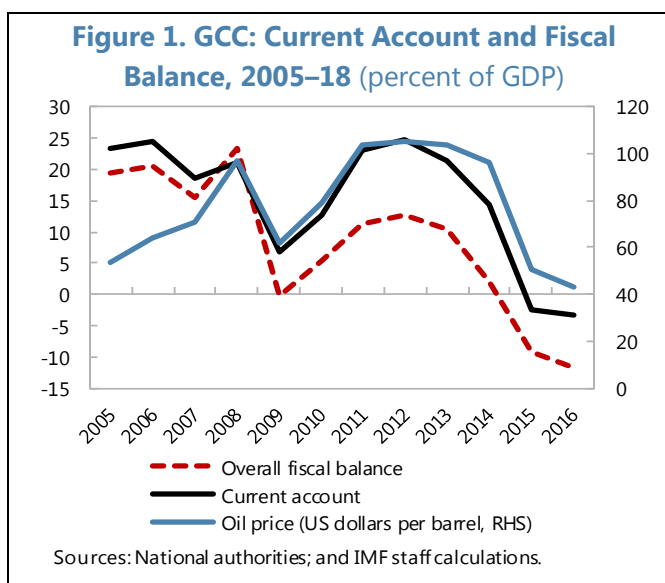
This paper supports ongoing efforts to strengthen liquidity management frameworks and offers recommendations. Central banks should stand ready to make use of a full range of liquidity management instruments, including more active use of reserve requirement ratios in case of liquidity tightening. Instruments should be reviewed to ensure their terms and pricing are well-articulated and encourage interbank market participation. A simple set of standing facilities traditionally aims at constraining overnight interest rates, while open-market operations (OMOs) are used at central bank discretion to steer term liquidity and interbank market conditions. Increased reliance on OMOs will encourage the development of interbank markets and allow for more active liquidity management on the part of central banks. In addition, developing liquidity forecasting will be key to adequately assess the scope, timing and size of liquidity management operations. Given the central role of governments in liquidity creation in the region, strong collaboration with ministries of finance, including to exchange information on government cash flows, will be critical in this respect. Coordination between macroprudential policies and liquidity management will also be important.

¹ Prepared by Aidyn Bibolov, Pilar Garcia Martinez (lead), Zhu Ling, with input from Hana Bawazir, and under the supervision of Stéphane Roudet. Research and editorial support was provided by Brian Hiland, Tucker Stone and Diana Kargbo-Sical.

A. Introduction

1. Liquidity imbalances can have a significant impact on macroeconomic and financial conditions. In this paper, “liquidity” is defined as the subset of central bank domestic currency liabilities vis-à-vis commercial banks that is readily available for payment purposes (essentially commercial bank excess reserves at the central bank).² Central banks manage liquidity to limit imbalances and ensure that short-term market interest rates reflect their policy rates and to avoid actions by banks that may run counter to their objectives. While banks typically want to hold a certain level of liquidity for payment and precautionary purposes, excess liquidity can find its way into the interbank market, translating into lower interest rates, lead to higher volumes of credit or risk-taking on the part of banks, or increased demand for foreign exchange. Tight liquidity conditions can increase the cost of funding for banks and lead to higher lending rates that curtail credit expansion with potential implications for growth and financial stability.

2. In the decade to mid-2014, GCC central banks faced abundant liquidity conditions and their consequences. Oil prices above \$100 per barrel resulted in large inflows of hydrocarbon revenues in the region (Figure 1). This, in turn, led to large fiscal and external surpluses and rapid increases in deposits by governments, corporates, and individuals into the banking system, contributing to ample liquidity and credit and asset price booms in some countries. During this period, central banks in the region largely concentrated their attention on liquidity absorption. At the same time, they developed



macroprudential tools to address mounting financial stability risks. In this environment, there was little activity in interbank markets as few banks needed to borrow. The absence of government borrowing also limited the development of domestic debt markets and the availability of collateral for interbank transactions.

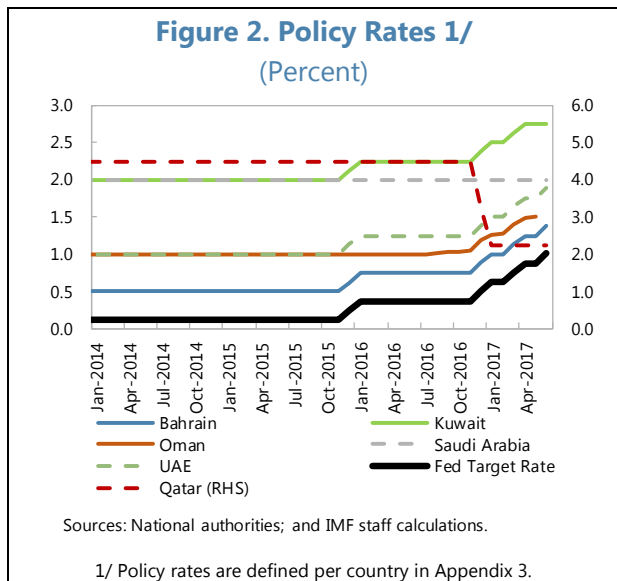
3. Lower oil prices have put liquidity management at the center of monetary policy discussions for the opposite reasons. The recent oil price decline has eroded hydrocarbon revenues to the extent that the average 2016 fiscal deficit for the GCC was close to 12 percent of GDP and the average current account deficit was more than 2 percent of GDP. Governments in the region have responded to higher fiscal financing needs by stepping up domestic securities issuance and drawing down bank deposits. At the same time, private sector depositors have been using their savings to maintain consumption or investment plans. In this environment, deposit growth has

² See Gray (2008) for a more detailed discussion.

slowed, leading to declines in excess liquidity and in some instances to upward pressures on interbank interest rates. Concerned with the tightening in the liquidity environment, several governments have adjusted their fiscal financing plans and some central banks have used available monetary instruments to manage emerging liquidity pressures. With oil prices expected to remain lower than in the period before mid-2014 and fiscal adjustment likely to proceed gradually, central banks in the region have been keen on upgrading their liquidity management frameworks to effectively address potential liquidity pressures. At the same time, with individual banks in different liquidity positions, the interbank markets should become a more effective medium for channeling liquidity from surplus to deficit institutions.

4. Increases in U.S. policy rates have also contributed to the renewed attention to liquidity issues. Against the backdrop of pegged exchange rate regimes, the ongoing monetary policy tightening cycle in the U.S. has already pushed policy rates up in most GCC countries (Figure 2).

5. This paper analyses current central bank liquidity management frameworks in the region and offers suggestions to address the above-noted challenges. It aims at answering the following questions: How has the liquidity environment changed? Are current central bank liquidity management frameworks ready for this environment? How can they be made more effective? The rest of the paper is organized as follows. The first section provides background on the role of central bank operations and other policies in influencing liquidity and on the potential macro-financial implications of liquidity imbalances.³ The following section analyses recent financial sector and liquidity developments in the GCC. The paper then assesses current liquidity management frameworks in the GCC countries, including with respect to liquidity forecasting. The last section provides policy recommendations.



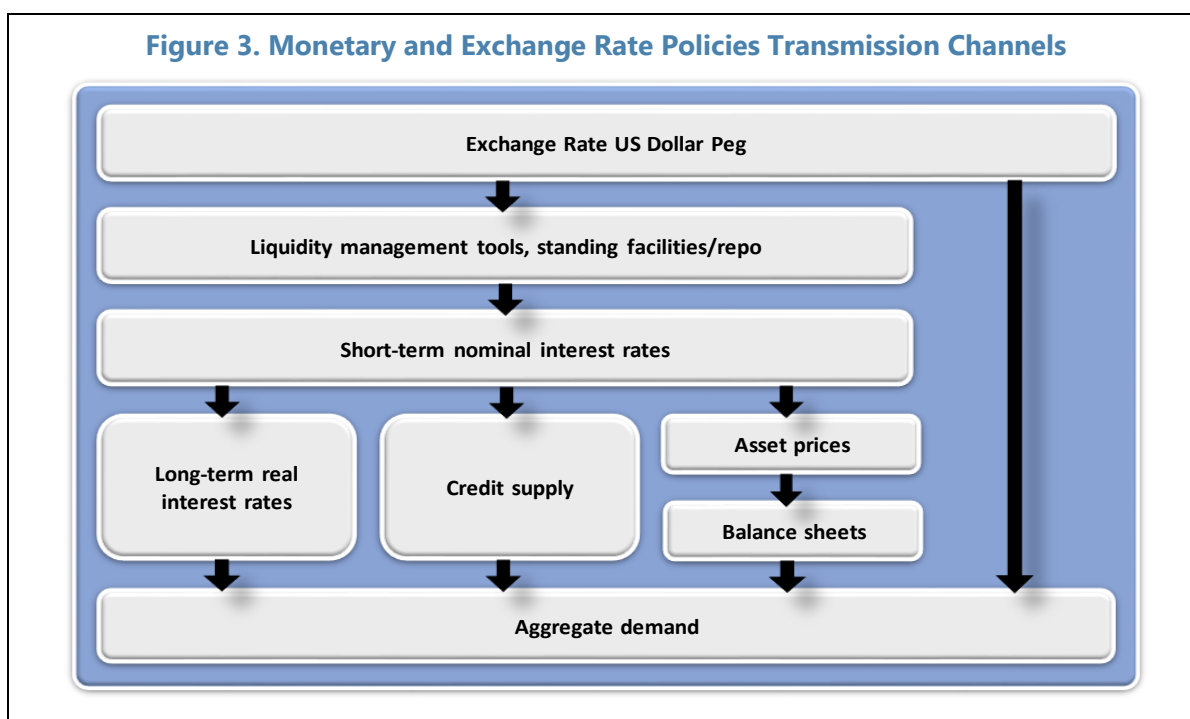
B. Liquidity Management and Macrofinancial Stability

Effective liquidity management frameworks are crucial to smooth liquidity fluctuations, facilitate monetary policy implementation, and avoid liquidity imbalances. Indeed, the latter can have significant consequences on macro-financial stability and growth by leading to pressures on interest rates and/or foreign exchange markets and encouraging suboptimal credit growth and risk-taking.

³ While the paper provides some context on the potential linkages between central bank liquidity management and macro-financial stability, it does not cover all policies (including macro-prudential policies) designed to manage macro-financial stability risks.

6. Monetary policy in the GCC countries is constrained by the fixed exchange rate regimes and open capital accounts. National currencies are pegged to the U.S. dollar—or in the case of Kuwait, to an undisclosed basket of currencies tilted towards the U.S. dollar. In practice, this means GCC countries operate under limited monetary policy independence, with the pegs maintained by managing the magnitude of the short-term interest rate differentials with U.S. interest rates in the context of free movement of capital.

7. Operational frameworks for monetary policy are therefore geared toward managing short-term interest rates. GCC central banks implement monetary policy by setting policy interest rates for key standing facilities—the rates at which they undertake direct borrowing and lending operations with banks—and using other instruments to steer short-term interbank interest rates and balance the demand and supply of domestic liquidity and foreign exchange. Through arbitrage, this influences longer-term interest rates used by banks in their transactions with the wider economy (Figure 3).



8. The operation of monetary policy is complicated by the large oil price-driven liquidity fluctuations. Large external and fiscal surpluses during periods of high oil prices have generally been associated with increases in liquidity, reversed during times of low oil prices. Spending oil revenues domestically, or saving these in the form of deposits in domestic commercial banks, has amounted to liquidity injection. In contrast, government spending retrenchment, borrowing from domestic banks, or withdrawal of deposits in domestic banks in times of low oil prices and higher fiscal financing needs have tended to reduced liquidity.

9. Against this backdrop, central bank liquidity management operations are important to facilitate monetary policy implementation. Indeed, depending on liquidity conditions, market

interest rates may deviate from policy rates. Too abundant (scarce) liquidity leads banks to offer (borrow) funds through the interbank market, entailing downward (upward) pressures on interbank rates due to too little (too much) money demand, hence generating an undesired divergence with policy rates and impeding the monetary policy transmission mechanism. Further, if the interbank market doesn't function effectively, even if in aggregate there is ample liquidity, this may not effectively be channeled to deficit institutions. Staff's analysis indicates that, in the case of GCC countries, liquidity swings have made it more difficult for central banks to steer short-term market interest rates, with liquidity imbalances reducing the pass-through of policy rates to interbank rates (Appendix 1). Moreover, against a backdrop of open capital accounts, banks may also use excess liquidity to purchase foreign exchange—entailing downward pressures on the exchange rate or reserves, while tighter liquidity conditions may bring upward exchange rate pressures. In this context, central bank standing facilities (lending and deposit) cap upward and downward overnight interbank interest rate movements, while central bank open market operations aimed at ensuring the appropriate amount of liquidity can help smooth interest fluctuations within the interest rate corridor formed by the standing facilities and facilitate monetary policy implementation.

10. Liquidity imbalances can also have significant consequences on macro-financial stability. Although fiscal policy tends to be the main driver of economic growth in the GCC, excess liquidity may potentially lead to periods of excessive credit growth, higher GDP growth, and inflation. By allowing economic operators to seek higher leverage and take on more risk, excess liquidity can encourage credit and asset-price booms detrimental to macro-financial stability. IMF (2015) discusses evidence of oil price/macro-financial linkages and systemic risks in the GCC. One example is how expanding deposit bases and high liquidity (owing to high oil prices, increases in government deposits and spending, and short-term capital inflows) resulted in credit and asset-price booms in some GCC countries before the global financial crisis.

11. Faced with tight liquidity conditions, banks may find it more difficult to source the resources needed to meet the demand for credit. Notwithstanding potential balancing inflows of capital, interbank rates may increase by a larger extent than normally entailed by policy rates, with banks in turn charging higher rates for loans, slowing down the demand for credit and consequently economic growth. Staff's analysis indicates that in GCC countries, interbank rates have indeed been influenced by liquidity conditions (Box 1), with tighter systemic liquidity pushing rates up. Faced with liquidity shortages, banks may also be tempted to turn to alternative, and sometimes more costly and volatile sources of funding (wholesale funding; nonresident deposits), reducing profitability and increasing exposure to potential capital outflows. In extreme situations of liquidity shortages—something rare, as central banks are generally able to supply sufficient cash to meet the economy's needs—disruptions to payment chains could create significant macro-financial disruptions (e.g. Lehman collapse, where the drying up of the repo market turned into a solvency crisis). In a thin interbank market and relatively small banking market, if an individual bank or group was to experience liquidity stress, this might spillover into the system quickly and possibly bring stress to the system. The contagion risk may be higher in countries where only a few banks dominate the interbank market and there is a lack of market depth.

Box 1. The Impact of Liquidity on GCC Interbank Interest Rate Spreads

This box investigates the links between liquidity and interbank interest rates in the region. More specifically, GCC interbank spreads are modelled using a dynamic panel model with the excess reserve ratio as the key explanatory variable. Excess reserve ratios are computed as the total banking system excess reserves over total banking system assets.^{1/} Country fixed effects are used to control for omitted country-specific variables, and external variables including U.S. interest rates and oil prices are included to control for common shocks. The empirical model is estimated using monthly data from January 2007 to March 2017.

The analysis indicates that interbank market spreads are correlated with excess reserves, consistent with the view that tighter liquidity conditions may push interest rates up. Based on our estimates, a 10-percentage point decline in the excess reserve ratio is associated with a 21 basis-point increase in the interbank market spread.^{2/} While the relationship between the variables is statistically robust, the magnitude of the coefficient is relatively small. This could be attributed to the period under consideration, during which GCC countries experienced ample liquidity conditions.

Determinants of GCC Interbank Interest Rates Spreads	
Variables	Interbank interest rate spread
<i>Excess reserve ratio</i>	-0.021*** (0.008)
<i>Constant</i>	0.052 (0.159)
Country fixed effects	Yes
Observations	591
Number of GCC countries	6
R-squared	0.83
Note: Other explanatory variables include logged oil price, effective federal funds rate, and 12 lags of the dependent variable, whose coefficients are omitted to save space. Driscoll-Kraay standard errors robust to both cross sectional correlation and autocorrelations are reported in the parentheses. *** p<0.01, ** p<0.05, * p<0.10.	

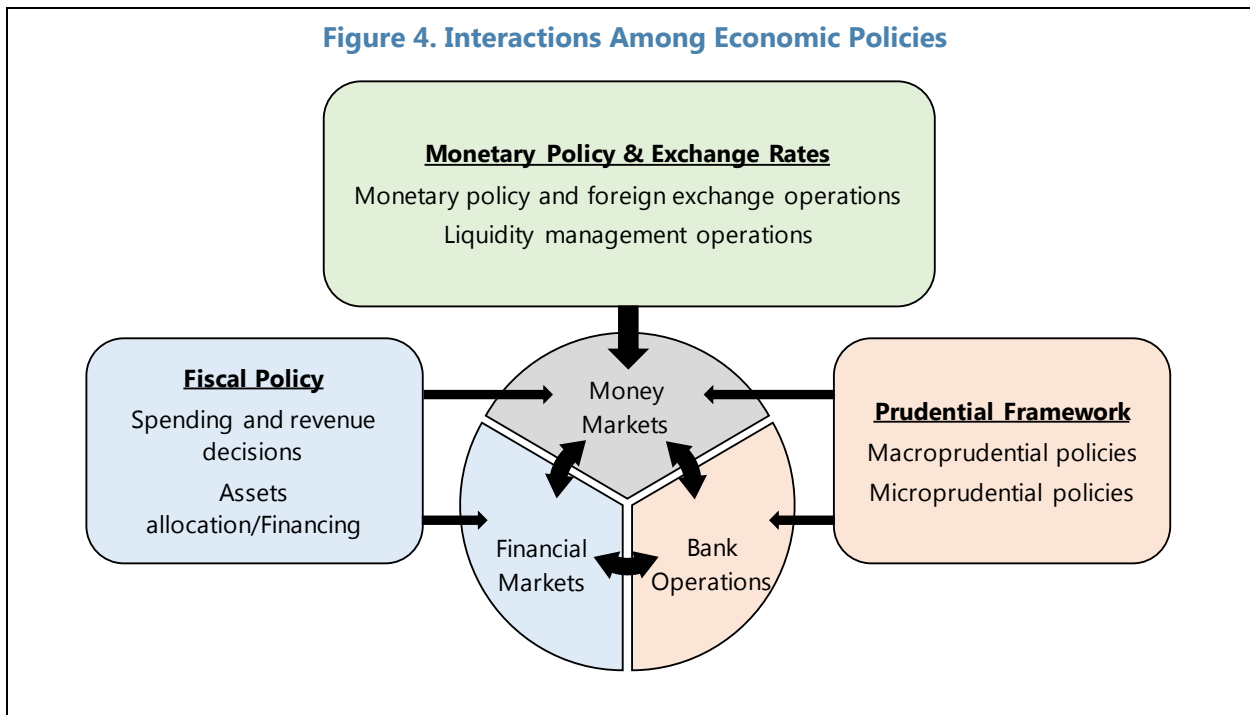
1/ Kuwait has no reserve requirement, so all bank reserves are considered excess reserves in Kuwait. Results are robust to using alternative measures of liquidity based on Kuwait's liquid asset requirements. See appendix for a more detailed discussion.

2/ The result is robust when we orthogonalize the excess reserve ratio to oil price and effective federal funds rate variables to control for possible multicollinearity between domestic liquidity condition and global variables.

12. Liquidity swings themselves can also entail significant macro-financial costs. Liquidity fluctuations can generate volatility in short-term interest rates. In these circumstances, banks can be reluctant to take on longer-term positions, impeding the development of the longer end of the market and implying higher premiums and bank lending costs. Similarly, liquidity swings can also stymie the development of financial markets by generating increased volatility in asset prices.

13. Effective coordination between liquidity management and macroprudential policy frameworks is key. Macroprudential policies influence banks' behavior to avoid the buildup of systemic financial risks. Coordination is important given the linkages between certain

macroprudential tools and liquidity developments (Figure 4). For example, increasing countercyclical liquidity buffers (reserve requirements and liquid asset ratios) in good times to reduce the procyclical feedback between asset prices and credit and increase the resilience of the financial system will tend to reduce excess liquidity, putting upward pressure on interbank rates. In contrast, a relaxation of these buffers will help banks navigate periods of tighter liquidity.



C. Liquidity Developments in the GCC

Banks have operated in an environment of ample liquidity over the past decade. Liquidity conditions have become more volatile over the past few years, with a marked tightening in 2015-16. The latter contributed to a slowdown in credit growth and prompted banks to adjust their funding sources. Tighter liquidity has also impacted interbank rates and lending rates.

14. During the oil price boom, central banks' balance sheets expanded, leading to an increase in excess commercial bank reserves. High external surpluses led to an accumulation of central bank foreign assets and an expansion in their balance sheets. This was particularly the case in Saudi Arabia—where SAMA's foreign assets increased from 46.6 percent of GDP in 2005 to 82.5 percent of GDP in 2016—as oil wealth is accumulated as foreign reserves at the central bank as opposed to a distinct sovereign wealth fund (Kuwait, U.A.E., Oman, and Qatar). As a counterpart to this increase in foreign assets, liabilities to banks increased substantially in Kuwait, Oman and the U.A.E. (Table 1). Required reserves increased naturally as bank deposits expanded (Figure 5). Central

banks issued paper and certificates of deposits to absorb part of the liquidity. Nonetheless, excess reserves also increased substantially peaking at an estimated \$67 billion at end-2014 (3¾ percent of total banking sector assets; see Appendix 2, Figure 1, for country-by-country developments).

15. With the decline in oil prices after mid-2014, central bank liabilities to banks decreased significantly. Of note is the decrease in the stock of central bank paper held by banks, which helped prevent too large a squeeze in liquidity. While holdings of

central bank paper and certificates of deposit (CDs) had reached more than \$100 billion in December 2014, CDs holding were reduced by more than \$50 billion by end-2016. This reduction was particularly marked in Saudi Arabia as SAMA injected liquidity by decreasing the amount of outstanding SAMAs bills.

Figure 5. GCC Central Bank Liabilities Held by Commercial Banks: January 2007–March 2017
(Billions of US dollars)

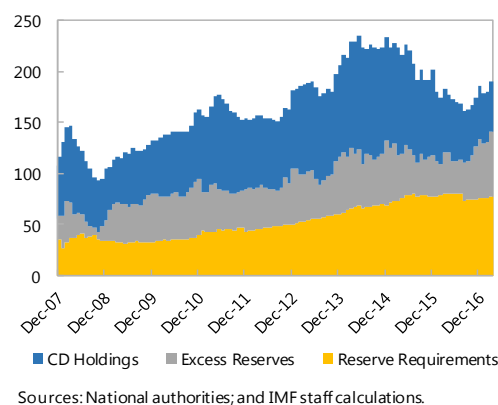


Table 1. Components of the Central Banks' Balance Sheet

	Saudi Arabia			Bahrain			Kuwait			Oman			Qatar			UAE		
	05	14	16	05	14	16	05	14	16	05	14	16	05	14	16	05	14	16
<i>Percent of total CB Assets</i>																		
Lending to banks	0	0	0	20	19	13	0	0	0	1	0	0	2	26	27	0	0	0
Foreign reserves	93	98	96	67	33	33	95	99	98	97	96	90	96	73	71	97	84	85
Securities ¹	7	2	4	13	48	53	5	1	2	2	4	10	1	0	2	3	16	15
<i>Percent of total CB Liabilities²</i>																		
Currency	12	6	10	21	22	24	22	13	15	27	24	19	20	7	10	26	22	21
Bank's reserves ³	3	3	5	34	55	39	25	49	21	4	26	28	27	19	24	29	39	41
Government deposits	40	57	43	1	0	0	20	7	11	10	8	13	2	16	1	1	1	0
Capital and other liabilities ⁴	45	33	43	45	24	36	32	31	53	60	42	40	51	58	66	44	38	37
<i>Percent of GDP</i>																		
Total CB assets	50	98	86	19	22	23	11	19	27	15	21	34	11	28	29	12	29	29

Sources: National authorities; and IMF staff calculations.

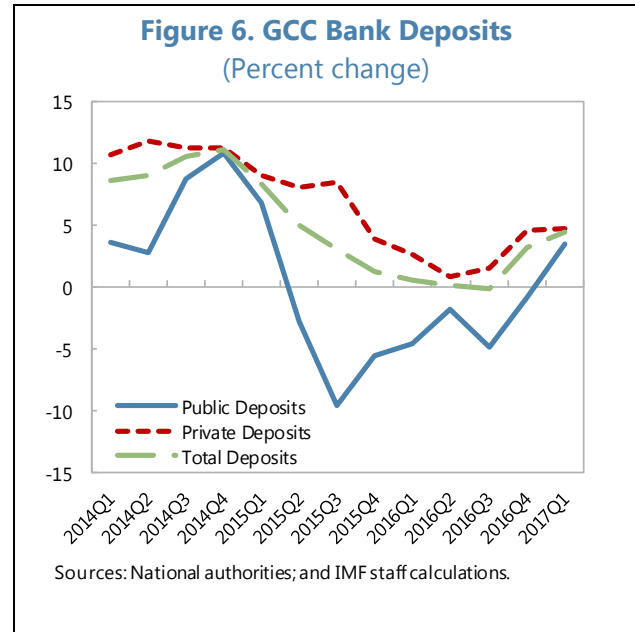
¹Refers to debt securities issued by residents.

²CB liabilities includes central bank capital and reserves.

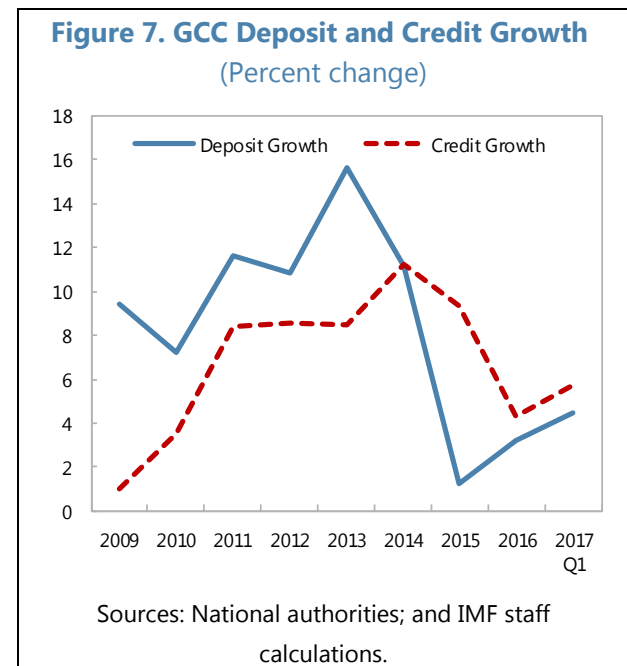
³Includes cash in vault at local banks.

⁴Calculated as the residual term.

16. In this environment, bank deposit growth slowed significantly, especially government deposits. One direct consequence of the lower oil price has been that many governments across the region have had to rely more on their deposits held with banks to finance growing fiscal deficits. Indeed, aggregate public deposits in the region fell by almost \$52 billion between 2014Q3 and 2016Q3, but have since recovered somewhat. This decline was most pronounced in Qatar where public deposits were halved by January 2017 from their peak in 2014Q3 (the declines across various periods range from 15 percent for Bahrain to 50 percent for Qatar). Public deposits also decreased in most other GCC countries, except in Kuwait and Oman (Appendix 2, Figure 2). While private deposits have continued to grow since mid-2014, they have done so at a much slower rate (Figure 6).

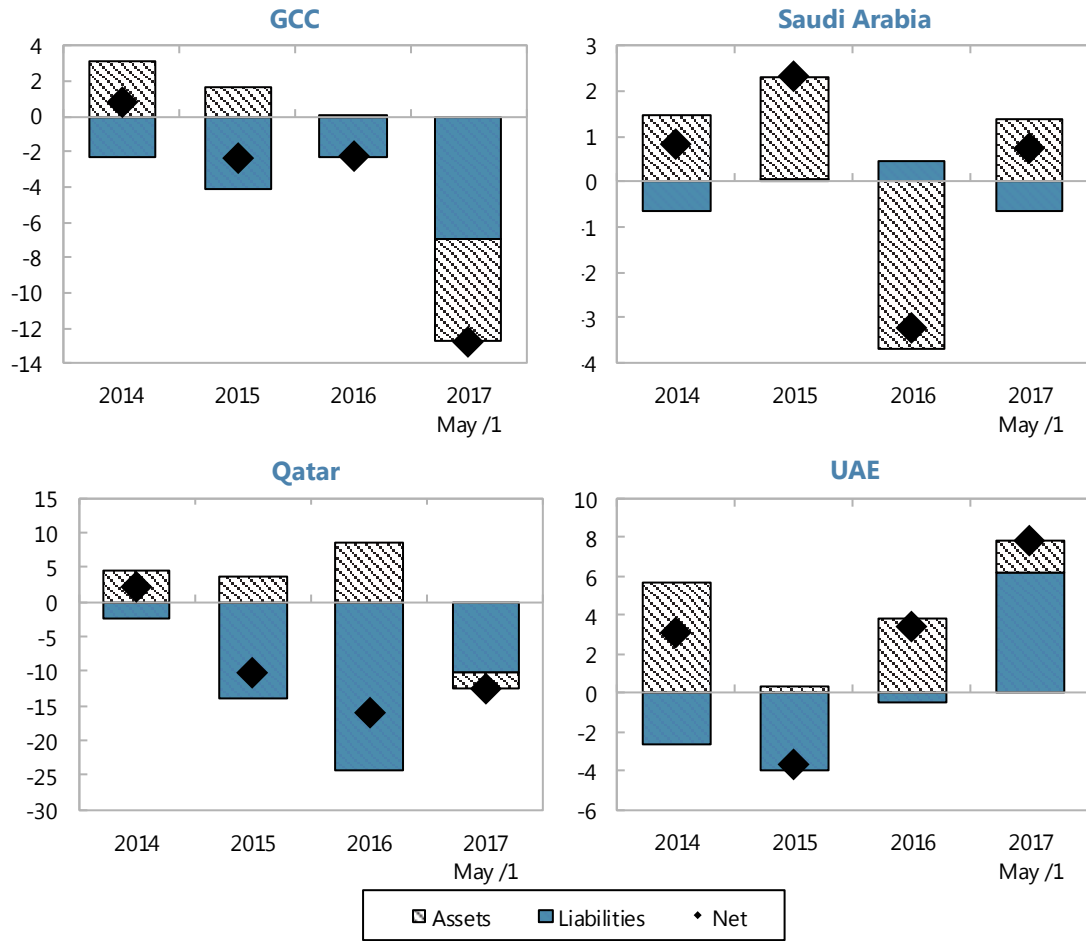


17. As deposit growth slowed, so did credit (Figure 7). Staff's analysis of bank balance sheet data identifies a credit supply channel linkage between the oil price shock, lower deposit growth and associated tighter liquidity conditions, and the slowdown in bank lending (Box 2). Notwithstanding the deceleration in credit growth, a gap between deposit and credit growth rates emerged in 2014 creating additional funding needs for banks. In 2016 and 2017 with the pickup in oil prices, the credit-deposit gap narrowed as credit growth continued to moderate and deposit growth recovered.



18. GCC banks have increasingly relied on foreign funding. Commercial banks' foreign liabilities have increased as percentage of total bank assets since 2014, most notably in the U.A.E. (Figure 8). In the U.A.E., bank foreign liabilities grew faster than foreign assets in 2015, but the pattern has reversed since 2016. Many banks in the region, especially larger ones, have established active Eurobond issuance programs that help them to tap additional funding as needed.

Figure 8. Change in Bank Foreign Assets and Liabilities, 2014–May 2017
 (Annual change, percent of total bank assets)



Sources: National authorities; and IMF staff calculations.
 1/ Excludes Bahrain. Annualized change from end-2016.

Box 2. Impact of Lower Oil Prices on Bank Lending in the GCC

This box investigates the impact of the oil price decline on bank lending in the GCC. Following Bawazir (2017, forthcoming), it examines balance sheet data for 69 GCC banks (representing 94 percent of the GCC banking sector in terms of assets at end-2016) with the goal of identifying the credit supply implications of the oil price drop.

Bank-level data shows that the growth in banks' deposits as well as loans slowed down significantly after 2014. The average growth in bank loans declined from 10 percent during 2011–13 to 7½ percent during 2014–16. A possible explanation of this deceleration in bank lending may be the tighter liquidity conditions brought about by the oil-shock-induced slowdown in domestic deposits. Indeed, during 2014–16, deposits in the sample of banks under consideration grew by less than 6½ percent on average annually, compared to close to 13 percent in 2011–13.

An empirical modeling exercise confirms the linkages between the oil price shock, the tighter liquidity conditions, and the slowdown in bank lending. To analyze the role of liquidity pressures in the transmission of the shock, the annual growth of bank lending is modelled using an oil-shock dummy variable (equal to 1 post-2014) and the ability of banks to deal with liquidity pressures (proxied by banks' liquid asset ratios at the beginning of 2011) as key explanatory variables along with other variables that control for other bank characteristics, including the strength of their balance sheets. The empirical results confirm that banks with lower liquid asset ratios have tended to exhibit larger loan growth slowdowns after the oil-price shock (Table). The negative and significant coefficient on the post-shock dummy variable implies that the shock lowered loan growth across all banks. The positive and significant coefficient on the interaction between the liquidity ratio and the post oil-shock dummy suggests a stronger initial liquidity position helped some banks maintain higher credit growth. Therefore, a higher ratio of liquid assets could put banks in a stronger position in the face of a decline in deposit growth.

Determinants of Bank Lending

	Bank loan growth rate
Post oil-shock dummy	-13.19 ** (4.52)
Interaction between liquid asset ratio and post oil-shock dummy	0.27 *** (0.076)
Constant	-269.1 (135.4)
Observations	394
R-squared	0.54

Notes: The regression results are estimated from a sample of 69 GCC banks from 2011–16. Robust standard errors clustered at bank level are reported in parentheses. The panel regression is with fixed effects and controls for size, capital, Z-Score, NPLs, Allowances, ROA, oil prices, non-oil GDP. The fixed effects include bank fixed effects, country fixed effects and the interactions of year and country fixed effects.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Data source: Fitch-Connect database and World Economic Outlook database (WEO).

19. Liquidity, measured by commercial banks' excess reserves, decreased in 2015 in most GCC countries following the oil price drop, but has since bounced back as oil prices recovered. The situation, however, varied across countries (Table 2 and Figure 9). The monthly volatility of bank excess liquidity also increased sharply from mid-2015 and has remained higher than in the period of higher oil prices.

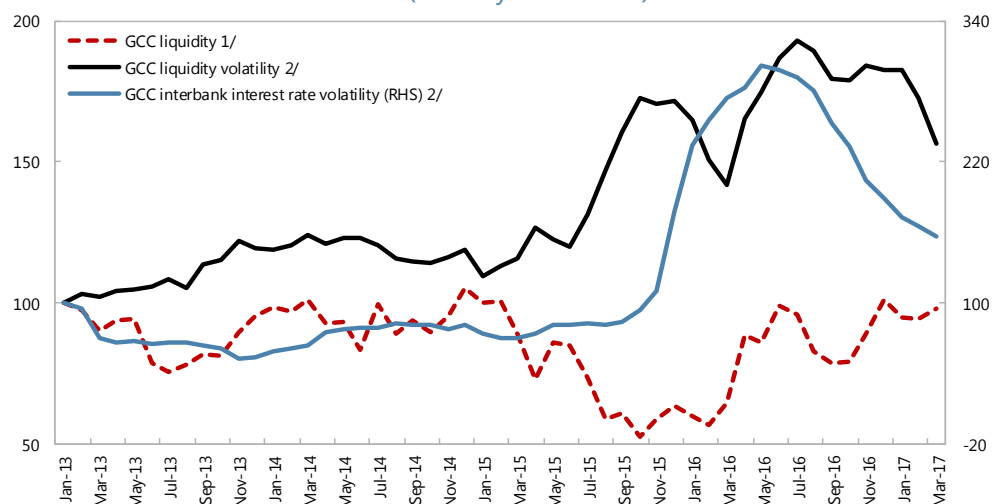
Table 2. Excess Reserves
(In percentage of banking system assets)

	BHR	KWT	OMN	QAT	SAU	UAE	GCC simple average
2013	2.9	7.3	4.9	1.0	6.3	6.1	4.8
2014	3.7	7.6	5.9	1.5	5.7	5.7	5.0
2015	2.3	5.3	2.5	0.6	2.2	7.2	3.4
2016	1.8	3.1	6.6	0.8	6.2	5.5	4.0
2017Q1	2.1	3.8	5.2	1.0	6.6	5.7	4.1
2017Q2	2.7	2.4	4.0	1.8	6.1	5.5	3.8

Source: Haver; national authorities; and IMF staff calculations.

Note: Excess reserve is measured by the bank reserves in excess of the reserve requirements. In Kuwait, the minimum reserve requirement is zero.

Figure 9. GCC Liquidity and Interbank Interest Rate Volatility
(January 2013=100)

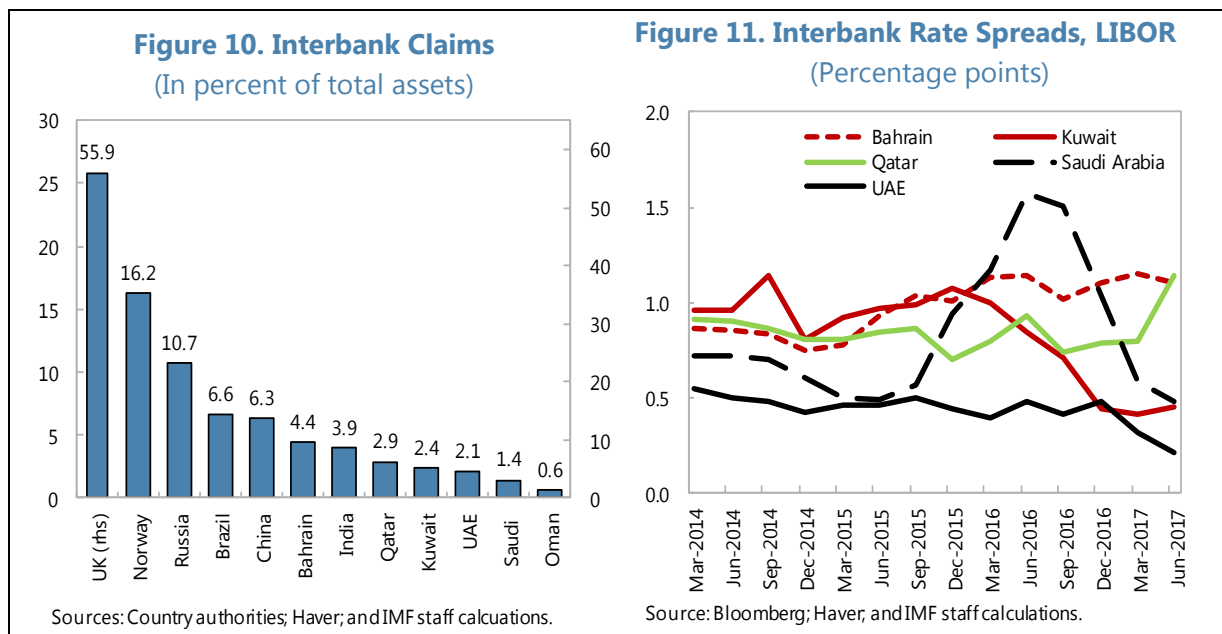


Source: Haver; national authorities; and IMF staff calculations.

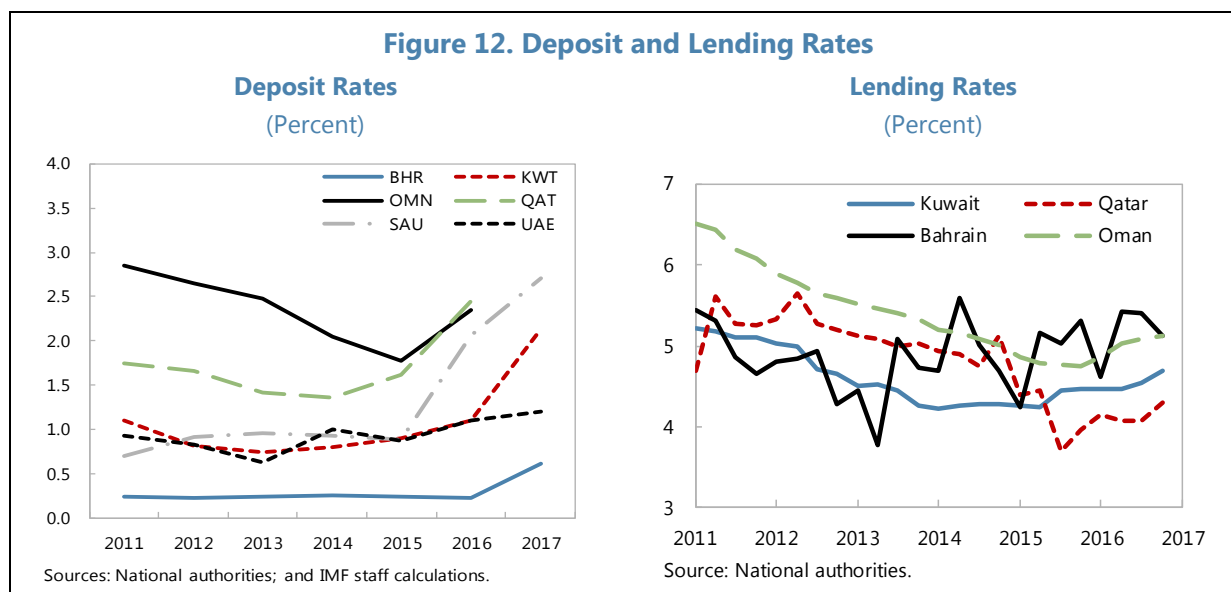
1/ GCC liquidity refers to the simple average of monthly excess reserve ratio, measured by the share of excess reserves in total banking assets.

2/ GCC liquidity/interbank interest rate volatility is the simple average of monthly volatility of the excess reserve ratio/interbank interest rates, computed as the standard deviations in the current and preceding 11 months.

20. In the tighter liquidity environment, interbank markets became more volatile and interest rates increased in some countries. The decrease in liquidity was associated with an increase in average GCC interbank interest rate volatility after mid-2015 (Figure 9). There was also an increase in interbank rate spreads over Libor in some countries, indicating increased demand for bank liquidity. The most pronounced increases in spreads were observed in Saudi Arabia, Bahrain and Qatar (especially in the most recent period). Following a significant pick up in Saudi Arabia in 2015-16 due in the main to the accumulation of government payment arrears and the drawdown of bank deposits in response, spreads have decreased significantly since mid-2016 (Figure 10). However, interbank markets are not very active in GCC countries. Compared to other emerging and advanced economies, interbank claims are low, in most cases less than 5 percent of total assets (Figure 11). This low level of activity likely means that interbank markets are not very effective at redistributing liquidity and may contribute to interest rate volatility.



21. The combination of lower deposit growth and higher policy rates has also led to an increase in bank deposit and lending rates. Deposit rates have increased since 2014 as banks have been competing more aggressively for domestic private deposits. Most GCC central banks have followed the U.S. and raised policy interest rates since the Federal Reserve decided to raise its policy rate. The higher policy rates have increased interbank rates and put pressure on the lending rates (Figure 12).



D. Current Liquidity Management Frameworks and Policies

Considering the ample liquidity environment experienced over the past decade, GCC central banks' liquidity management operations have been mainly geared towards liquidity absorption. Faced with a tightening in liquidity in 2015-16, central banks have taken steps to ease conditions, using existing and developing new instruments, and through enhanced coordination between monetary, fiscal and macroprudential policies. Nonetheless, the increase in interbank interest rate volatility during this period indicates a need to further develop liquidity instruments and forecasting.

22. Abundant liquidity placed liquidity absorption at the center of the central bank operations in the GCC region for many years, although existing liquidity management instruments can also be relied upon for liquidity injection. GCC central banks have used a number of instruments—including reserve requirements, standing facilities (deposit and lending), and CDs and central bank bills (Appendix 3)—to manage liquidity. However, even though they have occasionally had to inject liquidity, and notwithstanding policy reactions to the liquidity tightening since mid-2014, these tools have over the past decade been used mainly to absorb liquidity. As a result, the outstanding volume of liquidity-providing instruments has been modest compared to the absorption instruments.

23. Reserve requirement ratios have been used to absorb liquidity, but could be used to inject liquidity when needed. All GCC central banks, apart from Kuwait, require banks to abide by certain reserve requirements.⁴ These reserve requirements, remunerated or not, are usually defined as a percentage of the average of commercial banks' deposits for a given period, and vary from

⁴ Banks in Kuwait are required to maintain a certain liquid asset ratio, consisting of a certain proportion of their deposit base to be maintained as assets that can be rapidly converted into reserve balances held at the central bank to meet liquidity needs. This ratio includes current accounts at the central bank, along with liquidity management instruments issued by the central bank and government T-bills and bonds.

4.75 percent in Qatar to 14 percent for term deposits in the U.A.E.⁵. Some central banks differentiate among different types of deposits (Saudi Arabia, U.A.E.); some also include foreign currency deposits in the calculation (Qatar, U.A.E.). Most central banks require banks to keep their required reserves at the required level every day⁶. Averaging of reserve balances within the maintenance period is not allowed or penalized, although this would enhance banks' day-to-day liquidity management efforts and encourage interbank activity. Reserve requirements have helped absorb liquidity over the past decade. The ratios were increased in 2008 in Qatar and Saudi Arabia in response to rapid liquidity growth and to help moderate credit expansion. Even when reserve requirements remained unchanged—and most GCC countries have not modified them since 2008—by construction, required reserves increased at the same pace as bank deposits. Looking ahead, reserve requirements could be relaxed to avoid too abrupt tightening in liquidity, as was done in Saudi Arabia during the global financial crisis.

24. Standing facilities have helped central banks to provide a floor and ceiling to interbank rates of same maturities, but could benefit from streamlining in some cases. All GCC central banks have deposit and lending facilities in place. Lending facilities have been relied upon to inject liquidity and ensure that banks can always fulfill their payment obligations. They are available in most GCC countries overnight or 7-day maturity, with pre-specified interest rates. Longer maturities are also possible in Kuwait, the U.A.E., and in Saudi Arabia, where a 3-month credit facility was recently introduced.^{7,8} Yet a simple lending and deposit standing facilities is traditionally better suited to help manage overnight liquidity, with term liquidity managed through OMOs. Indeed, too many standing facilities can send conflicting signals to banks and discourage interbank market participation. Interbank markets are in turn important to provide liquidity price-discovery mechanisms. At the same time, high reliance on central banks for liquidity provision can discourage banks from managing their liquidity soundly and make central banks take on more credit risk than necessary. standing facilities are also more passive instruments in nature than OMOs since they are activated at the initiative of banks within the parameters set by central banks.

25. Central banks in the region have made periodic use of OMOs, but there is scope to increase reliance on these operations. Outright sales/purchases of securities and reverse transactions based on central bank and government bills or CDs are available in most GCC countries and have been used to absorb liquidity over the past decade. However, they have not been used frequently. Indeed, in cases where overall liquidity has remained abundant, issuing central bank paper could help bolster the stock of instruments that can be used to inject liquidity when needed, while encouraging interbank market development—as a more balanced liquidity situation would

⁵ The reserves requirements ratio for the UAE is 14% on Demand deposits and 1% on time deposits. The average ratio is around 7% of total deposits.

⁶ The U.A.E. allows reserve averaging during the reserve maintenance period.

⁷ Collateral requirements vary from country to country, but they are normally linked to the maturity length (U.A.E., Saudi Arabia) or the type of instrument (Bahrain).

⁸ In an environment of abundant liquidity, deposit facilities have been used more frequently. In Qatar, for example, the value of standing deposit facilities amounted to about QR 700 billion in 2016 while the value of standing lending reached about QR 7 billion.

increase the likelihood of having banks on both sides of the trade. Some central banks have reduced the size of their outstanding central bank bills in response to the tighter liquidity environment (Saudi Arabia) and as governments stepped up domestic bond issuance (Kuwait). In cases where the outstanding stock of central bank paper is low (Bahrain, Qatar, Oman), central banks could purchase other risk-free market instruments (such as government bonds) to inject liquidity. Overall, in an environment where more active liquidity management will likely be needed on the part of central banks, increased reliance on operations that are activated at the initiative of central banks may be useful.

26. OMOs have not been systematically implemented through market-based mechanisms.

For example, in the U.A.E., the central bank offers a TAP facility daily to the banking system to access CDs on a fixed-rate-full-allotment basis. The CDs may be redeemed early at the owner's discretion, which also makes them more passive instruments, akin to a standing deposit facility.⁹ The central bank of Kuwait tenders bonds for different maturities, but at pre-determined rates. Saudi Arabia issues SAMA bills on a weekly basis that follow interbank market rates but are set at a percent of the latter determined by SAMA based on market conditions, with quantities pre-determined by the central bank (and adjusted only occasionally). As central banks in the region develop their liquidity forecasting capability, they will be able to better determine the appropriate size and timing of OMOs. This will in turn allow for more effective smoothing of interbank market rates. In this context, auction-based mechanisms that allow for market-price discovery would also ensure more transparent and effective liquidity allocation and encourage interbank market development.

27. GCC countries have made efforts to develop Shari'ah-compliant liquidity management instruments aimed at addressing the specific needs of Islamic banks.

Indeed, given the increasing importance of Islamic finance institutions in the region, central banks have created dedicated standing facilities and central bank bills to help Islamic banks manage liquidity. For example, in Bahrain Al-Salam Sukuk and, since 2015, Wakalah have been used to engage Islamic banks in short-term central bank monetary operations and absorb liquidity. In Kuwait, the commodity-based instrument Tawarruq is used to help banks to obtain or place liquidity. In Saudi Arabia and the U.A.E., Murabaha is used for collateralized transactions (see Basu, et al., 2015). In Qatar, the ministry of finance issues Ijarah Sukuk for liquidity management. Oman is also working to develop liquidity provision tools for Islamic banks.

28. With tighter and more volatile liquidity conditions over the past couple of years, policymakers have been keen on developing more active liquidity management.

As discussed above, liquidity has tightened in most GCC countries and has become more volatile. In response, central banks have taken proactive liquidity management steps. In particular, Saudi Arabia introduced 90, 28 and 7-day repos, provided SAR 20 billion of government entity deposits to banks and deposited SAR 15 billion of SAMA funds into banks. The U.A.E. has taken steps to develop its framework for liquidity forecasting. In December 2016, following the increase in policy rates in line with the U.S. Fed, Qatar reduced its repo rate and shortened the maturities from 14 to 7 days to

⁹ The U.A.E. does not have a deposit facility so there is no real corridor for the interbank market rate.

incentivize its use, while Oman increased the repo rate in line with Fed Fund rate. To promote interbank market development, the Omani authorities also introduced an interbank benchmark rate.

29. The new environment has also prompted enhanced coordination between monetary, fiscal, and macroprudential policies. With the increased fiscal financing needs across the region, coordination has increased between central banks and ministries of finance regarding the appropriate balance between various financing options (i.e. domestic borrowing versus draw down of domestic deposits and external borrowing), considering the implications for domestic liquidity and macro-financial consequences. In Kuwait, a Debt Management Committee was created with participation of various relevant parties, including the central bank. In the U.A.E. monitoring of sovereign debt, including state-owned entities, is being strengthened by the different Emirates. In Saudi Arabia, a Debt Management Office has been established in the Ministry of Finance and is coordinating with the central bank. Debt management offices have been also established in Kuwait, Oman, Qatar, and strengthened in Abu Dhabi and Dubai. In some countries, the relevant authorities have been reviewing some of their macroprudential tools to avoid liquidity-driven negative macro-financial spillovers from the tighter liquidity environment. For example, the loan-to-deposit ratio was eased in Saudi Arabia in 2016 and steps to develop a macro-prudential framework have been taken in Bahrain and the U.A.E.

30. Notwithstanding these efforts, the tightening in liquidity experienced in 2015-16 has led to a significant increase in interbank market rate volatility, indicating some remaining challenges as far as the liquidity management framework is concerned. These developments appear to indicate that the instruments available for liquidity provision have not been sufficient to address the increased demand for liquidity on the part of banks, and/or that the new environment and its impact on liquidity conditions had not been fully anticipated, with costs in terms of interest rate volatility. At the same time, the combination of abundant liquidity over the past decade, reliance on passive instruments for liquidity management, and the lack of development of domestic debt markets and instruments (and hence of available collateral) has led to the absence of deep and dynamic interbank markets, also contributing to higher interbank market volatility.

E. Liquidity Forecasting

Considering the evolving liquidity challenges in the region, GCC central banks have identified liquidity monitoring and forecasting as an important area for strengthening. Well-structured and accurate forecasting systems are indeed important components of liquidity management frameworks as they are used to determine the scope, size, and timing of liquidity management operations. Effective liquidity forecasting in turn requires developing tools to better assess and anticipate the dynamics of the various items making up central banks' balance sheets.

31. The evolving liquidity challenges in the region have put a premium on central banks' ability to assess and anticipate liquidity developments. With liquidity having become more volatile since the mid-2014 oil price shock, there is a risk of increased interest rate volatility going forward. This highlights the need for more active liquidity management. At the same time, effective liquidity management requires a strong understanding of banks' liquidity positions and behaviors.

Central banks need to accurately anticipate demand for liquidity by banks, to adjust supply through open market operations in order to smooth out fluctuations in short-term liquidity and interest rates. This allows them to determine the scope, suitable size, and appropriate timing of these operations.

32. Against this backdrop, GCC central banks have identified liquidity monitoring and forecasting as an important area for strengthening. Central banks in the region have started strengthening their efforts to monitor liquidity trends by assessing banks' positions more frequently and developing relevant indicators.

33. Liquidity forecasting is based on a forecast of the central bank balance sheet dynamics. The demand for—and supply of—liquidity can be illustrated using the simplified central bank balance sheet presented in Table 3. The liquidity available to banks is displayed under “Current account holdings”. The other items can be classified in two broad categories, namely monetary policy instrument (“Open market operations” and “Standing facilities”) and autonomous factors (“Net foreign assets”, “Currency in circulation”, “Liabilities to general government”, and “Other autonomous factors”). When the projected changes to the autonomous factors are such that liquidity available to banks is lower (higher) than desired, central banks need to stand ready to inject (mop up) liquidity into (from) the banking system through open market operations and the standing facilities. Central banks need to identify and quantify all flows that impact the autonomous factors. This is a data-intensive task that relies in some cases on forecasting models and requires a high level of inter-agency cooperation.

Table 3. Simplified Balance Sheet of a Central Bank	
Assets	Liabilities
A. Open market operations	
1. Repo	2. Central Bank Paper and Certificate of Deposits
B. Standing facilities	
3. Lending facility	4. Deposit facility
C. Autonomous factors	
5. Net foreign assets	6. Currency in circulation
	7. Net liabilities to general government
	8. Other autonomous factors
D. Current accounts	
	9. Current account holdings
	- Required reserves (RR)
	- Excess reserves (ER)

34. Central banks need to forecast the dynamics in supply factors—i.e. the autonomous factors—which are not under their direct control.¹⁰ The main determinants underlying these factors that need to be taken into consideration for liquidity forecasting are:

¹⁰ Central banks can in practice forecast the changes to the balance sheet items relevant to liquidity changes or the levels. Both approaches have merits depending on the circumstances (Gray 2008).

- *Net foreign assets (NFA; C.5. in Table 4).* The net foreign asset positions are determined by central banks' foreign exchange sales and purchases with economic operators. In GCC countries, governments are the main suppliers of foreign exchange, as they receive and sell to the central bank foreign-currency-denominated hydrocarbon export revenues.¹¹ Imports and remittance payments constitute the main sources of demand for foreign currency. Private cross-border capital flows also play an important role in determining the accumulation of NFA.
- *Net liabilities to the general government (C.7).* These are essentially deposits of general government entities, which vary depending on the cash flows of government entities. In GCC countries, these are determined in large part by transfers of oil revenue and spending patterns. Changes in these deposits can alter liquidity significantly.
- *Currency in circulation (C.6).* In most countries, supply of cash is equal to demand as it is issued when needed and central banks take it back from banks in case of surplus. In the long run, currency in circulation is generally growing with the value of transactions in the economy (e.g. proportionally to nominal GDP), although payment system innovations can affect the stability of this link (i.e. the money velocity). In the shorter term, currency in circulation is subject to strong seasonality factors—e.g. Hajj in Saudi Arabia and Ramadan.
- *Other autonomous factors (C.8).* Depending on their size and volatility, other autonomous factors can also have an impact on liquidity.

35. Central banks also need to understand the dynamics shaping the demand for bank reserves ("Current Account Holdings", D.9.). Part of these (*Required Reserves*), are directly influenced by the monetary authorities when they set their reserve requirements (see section on current liquidity management frameworks and policies). The rest, the *Excess Reserves (ER)*, is held voluntarily—to maintain precautionary buffers or for payment systems liquidity or because there are no other investment options. Assessing the level of reserves that banks want to hold voluntarily is key to better anticipate when they may seek to get rid of too abundant liquidity or to avoid a shortfall, with potential implications for money, foreign exchange, and financial markets.

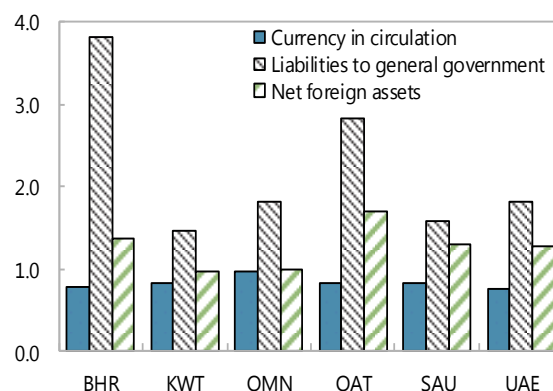
36. Identifying accurate and timely information sources and organizing inter-agency cooperation is key to the success of liquidity forecasting frameworks. Central banks' ability to forecast liquidity largely depends on the availability and quality of the time-series data on the liquidity supply and demand factors, as previous patterns are typically used to predict future movements. Forecasts are usually done daily, with a horizon matching at least the term of the most active liquidity instruments. This means relevant balance sheet data would in principle need to be

¹¹ In countries where large parts of oil revenues are transferred to sovereign wealth funds rather than the central bank (e.g. Kuwait, Qatar, the U.A.E.), central banks' balance sheets only feature a small part of the broader government NFA. In countries where the central bank manages a large part of the oil wealth (e.g. Saudi Arabia), central banks NFA find a large counterpart in liabilities to the government (see Table 1 for a comparison of GCC central banks' balance sheets).

available daily. In GCC countries, given the central role of hydrocarbon and government sectors in shaping liquidity supply factors, central banks need detailed cash flow information in these areas. The high volatility in the growth of central banks' liabilities to the government (Figure 13) makes data on upcoming government transactions vital, highlighting the need for information-sharing arrangements between finance ministries and central banks.

Figure 13. Autonomous Factors of Money Demand

(Standard deviation of annual percentage change 2006–16)



Sources: National authorities; Haver; and IMF staff calculations.

F. Conclusions and Policy Recommendations

37. GCC countries have weathered the tightening of liquidity experienced in 2015–16 relatively well, but this environment has brought to the fore the need to upgrade liquidity management frameworks and tools. The decline in oil prices after mid-2014 led to a significant decrease in liquidity, which in a context of shallow interbank markets, led to a noticeable increase in interbank interest rate volatility. While liquidity has since recovered, there is a risk that liquidity remains more volatile going forward with attendant consequences for interbank markets and broader macro-financial developments. This highlights the need for further developing liquidity management instruments and forecasting tools.

38. Central banks should stand ready to make use of a full range of liquidity management instruments. For over a decade, liquidity management frameworks in GCC countries have been geared towards absorbing liquidity. Notwithstanding efforts to develop new instruments and policies put in place in response to the liquidity tightening in 2015-16, there is room to broaden the scope of liquidity management tools. Reserve requirements, which have not been changed in most countries since 2008, could be used more actively going forward, including through a relaxation in case of a tightening in liquidity. Averaging of reserve balances within the maintenance period would also help enhance banks day-to-day liquidity management efforts and encourage interbank activity. Instruments should be reviewed to ensure their terms and pricing are well-articulated and encourage interbank market participation. A simple set of standing facilities traditionally aims at constraining overnight interest rates, and OMOs are used at central bank discretion to steer term liquidity and interbank market conditions.

39. OMOs allow for more active liquidity management. With the liquidity dynamics changing, central banks in the region have been keen on developing more active liquidity management. In an environment of abundant liquidity and with facilities available at the discretion of banks on relatively easy terms, banks did not have much incentive to participate in interbank markets, and the latter have remained relatively shallow. As liquidity tightens and the existing

framework for accessing facilities is reviewed, banks will have more incentive to turn to the interbank markets. As interbank markets develop, this will allow central banks to make more active use of OMOs to manage liquidity conditions. At the same time, increased reliance on issuance of central bank paper to absorb liquidity in times of abundant liquidity would also encourage interbank market participation and increase the stock of instruments that can be used to actively inject liquidity when needed. Auction-based mechanisms for OMOs would ensure transparent and effective liquidity allocation and encourage interbank market development.

40. Increased reliance on market-based operations for liquidity management would also help develop domestic markets and facilitate implementation of new liquidity regulatory standards. Sterilization of liquidity surpluses through regular auctions of central bank bills at market determined interest rates would provide incentives for interbank transactions by balancing out liquidity positions across banks. It would also help develop the pool of collateral for interbank market operations. A more active interbank market would in turn provide more impetus for the development of secondary markets for government bonds and other instruments, hence encouraging activity and depth in other market segments. As the authorities in the region roll out Basel III liquidity standards, banks need to develop their own liquidity risk management frameworks. In this context, more active liquidity management on the part of the central banks will impact the way banks manage their liquidity risk, increasing the incentives to manage their liquidity more actively. Increased reliance on market-based instruments and the development of domestic markets will also be important to bolster the pool of high-quality liquid assets to meet the new prudential requirements.

41. Developing liquidity monitoring and forecasting frameworks is key to enhance liquidity management. While upgrading liquidity management instruments will give central banks the tools to inject/absorb liquidity as needed, liquidity forecasting is also essential to determine the size and timing of these operations, particularly as central banks increasingly use more active instruments to do so. Central banks need to develop the capacity to monitor, forecast and reconcile daily reserve movements in and out of their banking systems to better control the level of reserves and target their policy rate. This requires identifying accurate and timely information sources and organizing inter-agency information sharing. Forecasts should ideally be prepared daily, with a horizon matching at least the term of the most active liquidity instruments.

42. Better coordination and information-sharing among policy makers is also needed. Enhanced coordination of liquidity and domestic fiscal financing operations would help better manage liquidity. While this has de facto been the case in countries where central banks issue T-bills and domestic bonds on behalf of the government, enhanced exchanges of information on government cash-flows would also help. Indeed, given the relevance of government transactions for liquidity creation in the GCC, central banks need detailed and timely cash flow information on government transactions for accurate liquidity forecasting. Given the potential implications of macroprudential policies for liquidity, coordination of policies in these areas is critical.

Appendix I. The Impact of Liquidity on Monetary Policy Transmission in GCC

This Appendix empirically examines the impact of liquidity on monetary policy transmission in GCC countries. It finds that: higher liquidity (measured as excess reserves) is associated with lower interbank market interest rate spreads (vis-à-vis policy rates); and large liquidity imbalances, especially liquidity shortages, could weaken the pass-through of policy rates to interbank market rates.

Measure of liquidity

1. We measure liquidity as the percent of excess reserves in total bank assets, denoted as $ER_{i,t}$:

$$ER_{i,t} = \frac{\text{excess reserves}_{i,t}}{\text{bank assets}_{i,t}} \times 100,$$

where $\text{excess reserves}_{i,t}$ is the difference between the aggregate bank reserves (including bank reserves held at the central bank and cash on hand) and the required reserves in country i 's banking system at time t ; $\text{bank assets}_{i,t}$ is the aggregate banking system assets in country i 's at time t . In the case of Kuwait, excess reserves equal aggregate bank reserves because Kuwaiti banks are not subject to reserve requirements.¹

Liquidity and interbank interest rate spreads

2. This section investigates the impact of liquidity on the GCC interbank interest rate spreads. The spreads are modeled using a dynamic panel model with country fixed effects and excess reserves as an explanatory variable. Specifically,

$$\text{spread}_{i,t} = \beta_1 ER_{i,t} + \sum_{k=1}^{12} \beta_{1+k} \text{spread}_{i,t-k} + \alpha_i + \theta X_t + \varepsilon_{i,t}$$

where $\text{spread}_{i,t}$ is country i 's interbank interest rate spread at time t ; α_i captures the country fixed effects that controls for omitted slow-moving country-specific variables such as institution; and X_t is a vector of exogenous variables including US interest rates and oil prices that control for common shocks. The regression model is estimated using monthly GCC country-level data from January 2007 to March 2017. Driscoll and Kraay standard errors are estimated to control for possible error correlations both across countries and time.

¹ In Kuwait, local banks are required to maintain 18 percent of their KD private sector customer deposits in the form of balances with Central Bank of Kuwait (current account or deposits) in addition to Kuwaiti Treasury bills and bonds, or any other financial instruments issued by the Central Bank. The objectives of this minimum liquid asset requirement is identical to that of a minimum reserve requirement—to ensure banks maintain adequate liquidity. An alternative measure of liquidity—using excess liquid assets, liquid assets above the minimum requirement—is considered for Kuwait and the key findings continue to hold.

3. Our variable of interest is β_1 , the coefficient on liquidity. We expect β_1 to be negative because more excess reserves should lower interbank rates by decreasing the demand for liquidity in the interbank market. The regression results confirm our expectation (see Box 1 Table).

Liquidity imbalances and pass-through of policy rates

4. This section empirically investigates the role of liquidity on the pass-through from policy rates to interbank interest rates. We build on the work on GCC monetary policy transmission by Espinoza and Prasad (2012). They model market interest rates using a panel regression model with domestic policy rates as an explanatory variable. We extend their model by introducing a dummy that captures large swings in liquidity since we expect both large liquidity surpluses and shortages to weaken monetary policy transmission as they create excess supply of and demand for bank reserves that could disrupt market price discovery mechanism. Specifically, we consider

$$R_{i,t} = \beta_1 PR_{i,t} + \beta_2 LI_{i,t} \times PR_{i,t} + \beta_3 LI_{i,t} + \alpha_i + \gamma_t + \varepsilon_{i,t}$$

where $R_{i,t}$ is country i 's interbank interest rate at time t ; $PR_{i,t}$ is country i 's central bank policy rate at time t ; $LI_{i,t}$ is a dummy variable that equals to zero if country i 's excess reserves are within 0.75 standard deviation of its sample mean, and one otherwise.² Specifically,

$$LI_{i,t} = \begin{cases} 1, & \text{if } |ER_{i,t} - \mu_i^{ER}| > 0.75\sigma_i^{ER} \\ 0, & \text{if } |ER_{i,t} - \mu_i^{ER}| \leq 0.75\sigma_i^{ER} \end{cases}$$

as in the previous section, the regression model is estimated using monthly GCC country-level data from January 2007 to March 2017. Driscoll and Kraay standard errors are estimated to control for possible error correlations both across countries and time.

5. The key variables of interest are coefficients β_1 and β_2 . We expect β_1 to be positive as market interest rates should be positively correlated with central bank policy rates; we expect β_2 to be negative because we expect large liquidity imbalance to weaken the positive correlation between market interest rates and policy rates.³ The empirical results are reported in the first column of the table and they confirm both our expectations.

6. As an additional exercise, we differentiate liquidity surplus from liquidity shortage episodes, and re-estimate the regression model. The results are reported in the second column. We find that large liquidity shortage is associated with higher interbank interest rates, which is consistent with the findings in the previous section on the negative relationship between liquidity and interest rate spreads. Moreover, we find that it is the liquidity shortages that are associated with a weaker interest rate pass-through.

² Based on this methodology, 22 percent of the sample observations are in liquidity surpluses and 16 percent of the sample observations are in liquidity shortage.

³ The net pass-through from policy rates to market interest rates is captured by the coefficient $\beta_1 + \beta_2$ when $LI_{i,t} = 1$.

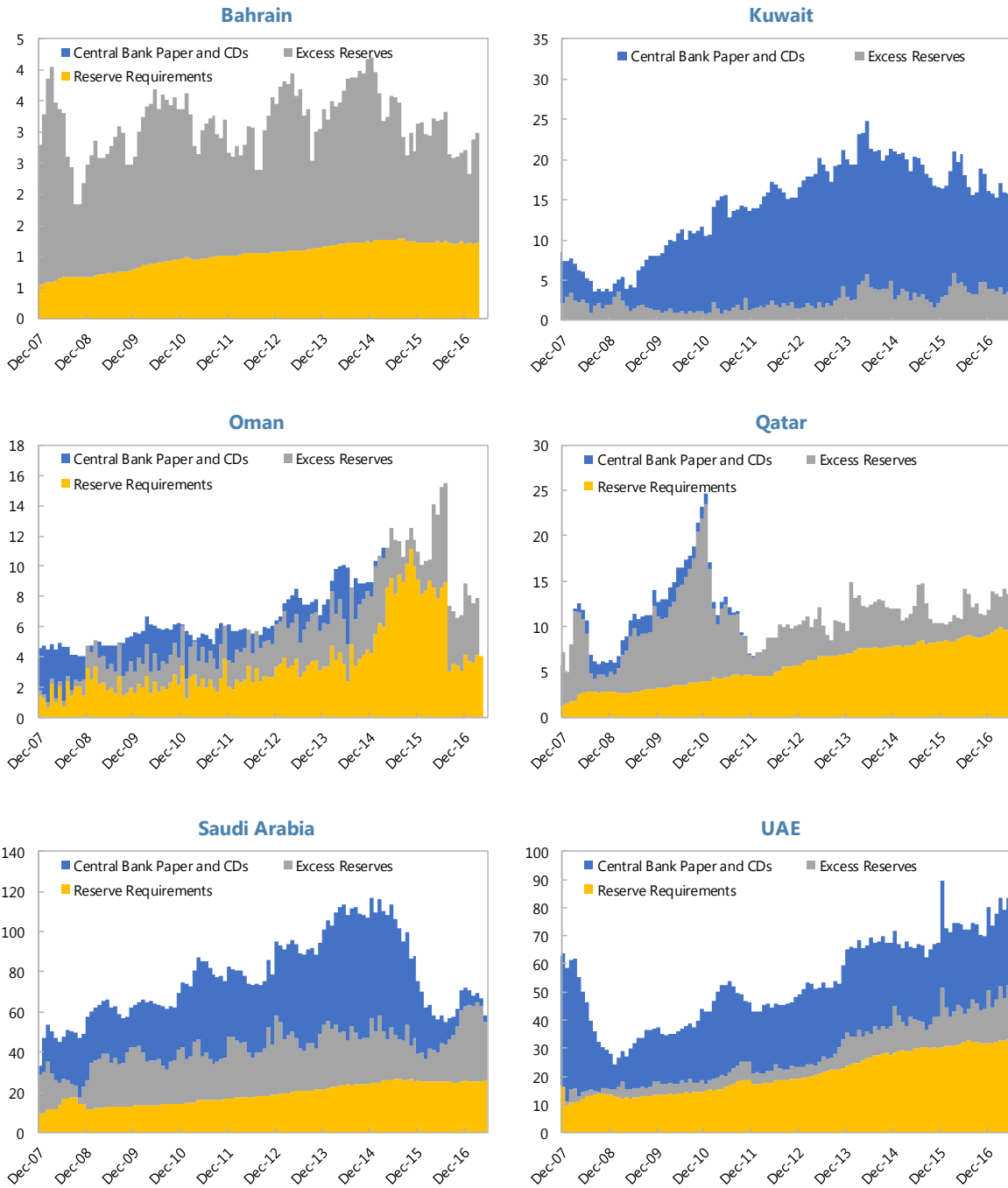
Determinants of GCC Lending Rates: Panel Regression Results

Variables	Interbank Interest Rate	
	(1)	(2)
<i>Policy rate</i>	0.76*** (0.08)	0.78*** (0.09)
<i>Liquidity imbalance dummy</i>	0.21** (0.119)	
<i>Policy rate * liquidity imbalance dummy</i>	-0.09* (0.07)	
<i>Liquidity surplus dummy</i>		0.025 (0.09)
<i>Policy rate * liquidity surplus dummy</i>		-0.008 (0.07)
<i>Liquidity shortage dummy</i>		0.59*** (0.22)
<i>Policy rate * liquidity shortage dummy</i>		-0.22** (0.10)
<i>Constant</i>	-0.36*** (0.12)	-0.41*** (0.14)
Observations	680	680
R-squared	0.6	0.62
Number of countries	6	6

Note: Driscoll-Kraay standard errors robust to both cross sectional correlation and autocorrelations are reported in the parentheses. *** $p < 0.01$, ** $p < 0.10$, * $p < 0.25$

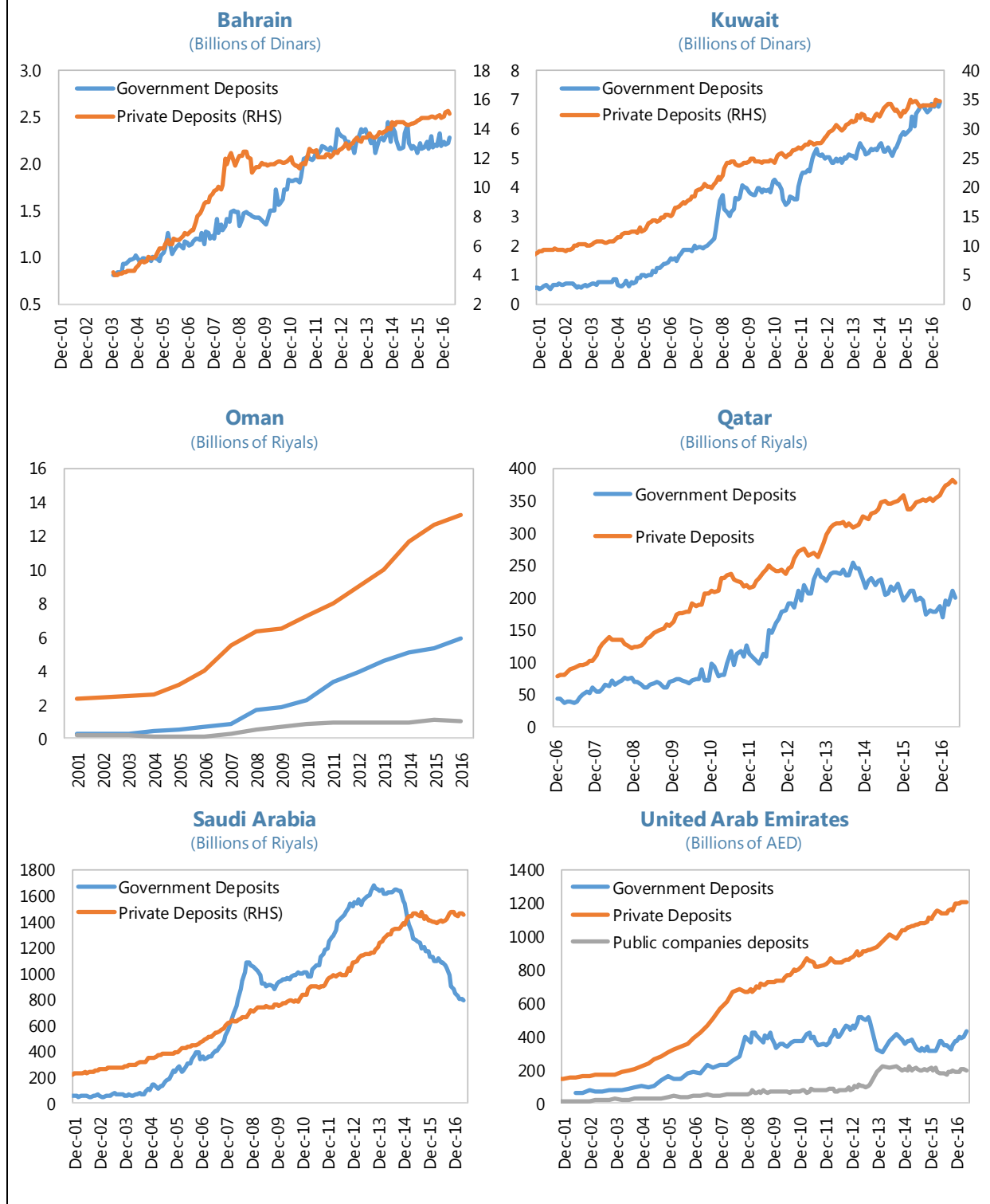
Appendix II. Central Bank Liabilities Held by Commercial Banks and Commercial Banks' Deposits

Figure 1. Commercial Bank Assets with Central Banks, December 2007–May 2017
(Billions of US dollars)



Sources: National authorities; and IMF staff calculations.

Figure 2. Commercial Bank Deposits, December 2001–May 2017



Sources: National authorities; and IMF staff calculations.

Appendix III. Monetary Policy Instruments/Prudential Ratios

Standing Facilities, ELA, and Liquidity Forecasting				
	Deposit facility	Lending facility	Emergency lending assistance	Liquidity forecasting
Bahrain	Overnight, 1-week, 1-month, and Wakalah. All are remunerated	Overnight against bank's holding of T-Bills or deposits with the central bank, 1-week against bank's holdings of government Liara sukuk	No	No
Kuwait	Overnight	Discount window. Overnight for standard credit and longer than a week for nonstandard	CBK has ELA powers but no formalized ELA policy framework	No
Oman	No	Discount of T-bills, commercial paper, Repo, and direct lending	No. In the process of developing the procedures	No
Qatar	Overnight	Overnight	No	No
Saudi Arabia	Overnight	Overnight, but since recently also 7-days, 28-days and 3-months. Against SAMA bills and government securities	No	In the process of developing a liquidity forecasting framework
U.A.E.	Yes, unremunerated	Advances up to 7 days without collateral and up to 6 months with collateral. There is also an overdraft facility at penalty rates over repo rate	No	No

Open Market Operations						
	T-bills	CDs	Repo operations	Islamic securities	FX sale	FX swaps
Bahrain	3- and 6-month, and 1 year	No	Yes	Al Salam BD Sukuk (91 days); short-term Ijara BD Sukuk (182 days); long-term Ijara USD and BD Sukuk (2 -10 years)	Yes	Yes. 1 week and 1 month.
Kuwait	Yes	CBK issues central bank bonds.	Overnight, 1-week, and 1-month repo agreement using T-bills and bonds as collateral	Tawarruq. 1-week, 1-month, 3-month, and 6-month	Yes	Yes
Oman	3- and 6-month, and 1 year	1-month CDs (weekly auctions)	Yes	Sukuk	Yes	Yes
Qatar	Yes	No (Terminated in 2011)	1-week	Ijarah Sukuk	Yes	No
Saudi Arabia	No	No. But SAMA issues central bank bills for liquidity management purposes with maturities of 1, 4, 13, 26 and 52 weeks	Yes. Both Repo and rewarehouse rate facilities	SAMA Murabaha	In both spot and forward FX markets	Yes
U.A.E.	No	Yes. A broad range of maturities below and beyond one year	Repo facilities. There is also an option for early redemption of CDs	Islamic CDs	Yes	Introduced in 2008 to mitigate the FX liquidity effects of the global financial crisis

Monetary/Prudential Policy Ratios

	Liquidity requirements	Reserve requirements	Placement of central bank and government deposits at commercial banks	Macroprudential ratios	Interest rate controls	Main policy rate
Bahrain	No. Implementation of LCR and NSFR by January 2018	Yes. No RR on Foreign currency deposits	Yes	Voluntary loan to deposit ratios, concentration limits, debt service to income limited at 50 percent of gross income, with cases above the threshold monitored by the central bank	No	1-week deposit rate
Kuwait	Yes. Liquid asset requirement, LCR, and NSFR	No	Yes	Banks are required to comply with five liquidity indicators, including the LCR, a Loan to Deposit ratio, limits on maturity mismatches, a regulatory liquidity ratio of 18 percent and NSFR	Yes, lending rate ceilings are set at a specified margin over the reference (discount) rate	Discount rate
Oman	Yes. LCR implemented in 2015 and NSFR will become effective in 2018	Yes. Single reserve requirements rate on both national and foreign currency deposits	Yes	Loan/deposit ratio and ceiling on bank lending to households	Ceiling on consumer lending rate	Discount rate
Qatar	Yes	Yes	Yes	Capital conservation buffer, domestically systemically important banks buffer, countercyclical capital buffer, leverage, credit ratio, credit to deposit ratio, ratio of overdraft to credit facilities, ratio of foreign currency assets to foreign currency liabilities, net open position in foreign currency and ratio of fixed assets for bank's use to bank's capital and reserves	Lending rate ceiling on personal loans assigned to salary, and overall limit on such loans	Central Bank deposit and lending rates
Saudi Arabia	Yes	Yes	Yes	Loan to deposit ratio, liquid assets to short-term liabilities ratio, lending restrictions on consumer loans, countercyclical and conservation capital buffer, leverage ratio, dynamic/general provisions requirement, counterparty exposure, reserve requirements	No	Repo rates
U.A.E.	Yes. Liquid assets ratio; and LCR since 2017. NSFR planned from 2018	Yes	Only during the global financial crisis	Credits cannot exceed stable resources, defined as 85% of customer deposits of less than 6 months, 100% of deposits and market funding over 6 months, and free own funds	No	1-week CD rate

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