What influences bank lending in Saudi Arabia?

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Abstract

Purpose – Determinants of credit growth in Saudi Arabia are investigated.

Design/methodology/approach – A panel approach is applied to macroeconomic and bank-level data spanning 2000 -15.

Findings – Bank lending is supported by strong bank balance sheet conditions (high capital ratio, and growth of NPL provisioning and deposits), and higher growth of both oil prices and non-oil private sector GDP. Lower bank concentration also helps, likely through greater competition, so does stronger institution. Consistent with the literature, lending by Islamic banks may be more responsive to economic activity. Lending remained robust in 2015 despite oil prices having declined, helped by strong bank balance sheets and as banks reduced their holdings of "excess liquidity". To support bank lending in the period ahead, bank balance sheets need to remain strong. Fiscal adjustment and a reduced reliance on banks to finance the budget deficit would support credit provision to the private sector.

Originality/value – The paper is first to analyze in detail determinants of bank lending in Saudi Arabia applying a panel approach to bank level data, and draws critical policy implications.

Keywords Bank credit, Macro-financial linkages, Fixed-effects panel model

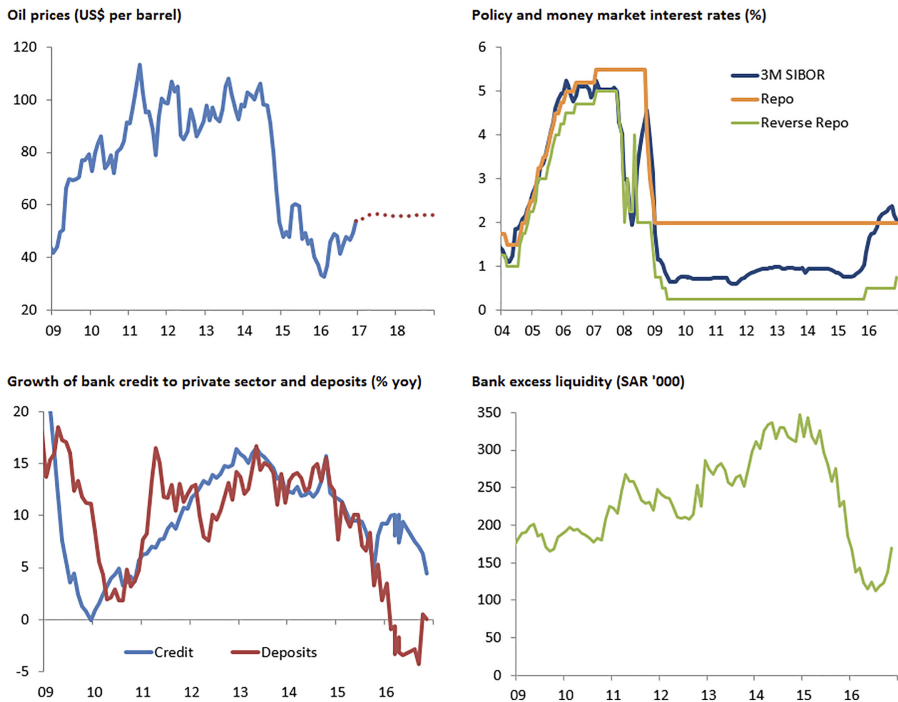**Paper type** Research paper

1. Introduction

As oil prices fell since mid-2014, inflows of oil receipts declined and fiscal spending was scaled back, weakening economic activity. Funding conditions in the banking system tightened, evidenced by the increase in the 3-month Interbank Offered Rate (SIBOR) to the highest level in many years (Figure 1, upper right panel). Lower oil prices also dampened confidence (Husain *et al.* (2015)). Deposit growth fell and remained mostly in negative territory on a year-on-year basis during 2016, but growth of credit to the private sector remained robust, particularly to the construction sector, partly reflecting efforts by businesses to manage their cash positions as government payments were delayed (Figure 1, lower left panel). Banks reduced their holdings of both excess reserves at the Saudi Arabian Monetary Authority (SAMA) and SAMA bills to help fund private sector credit and purchases of bonds, which the government restarted issuing in 2015 (Figure 1, lower right panel).

In response, SAMA undertook measures to help ease funding conditions. The central bank placed more than SAR 20 billion ($5.3 billion) of government entity deposits with the domestic commercial banks in September. It also announced the introduction of 7-, 28- and 90-day repos, which had only been overnight previously. As bank funding conditions eased, the 3-month SIBOR declined to the lowest level in six months in mid-December [1]. Deposit growth rebounded to marginally above 0 percent and bank holdings of excess liquidity rose in November. The issuance of $17.5 billion international bonds by the government in October, which was the largest by an emerging market and heavily oversubscribed, also helped ease

Oil prices (US$ per barrel)

Policy and money market interest rates (%)

Growth of bank credit to private sector and deposits (% yoy)

Bank excess liquidity (SAR '000)

Figure 1.
Oil prices and bank
funding conditions

Note(s): Updated on January 3, 2017. Oil price forecasts are calculated from futures
contracts maturing in 1 months to 6 months, 1 year, and 2 years. Excess liquidity includes
bank holdings of current and other deposits at the central bank, and central bank bills
Source(s): Haver and IMF staff calculations

funding conditions. Earlier, SAMA also relaxed the loan to deposit ratio, allowing the ratio to
exceed the 85 percent limit.

As banks face funding pressure, one key question is prospects for bank lending in Saudi
Arabia. Bank credit represents a key channel of transmission from oil prices to the real
economy in Saudi Arabia and an important driver of economic growth more generally. Cross-
country data for the past several years presented in Figure A1 in the Appendix suggest that
the nation's credit deepening (bank credit to the nonfinancial private sector relative to Gross
Domestic Product (GDP)) was broadly consistent with the stage of economic development
(GDP per capita in US dollars during 2010–2015). However, low oil prices could adversely
affect bank credit extension and economic activity. Indeed, weak bank balance sheet
conditions (e.g. higher non-performing loan (NPL) ratios and lower deposit growth) can
spillback to further weaken macroeconomic conditions (Miyajima (2017)).

Against this backdrop, this paper analyzes determinants of bank credit in Saudi Arabia. It
complements the literature, which primarily relies on cross-country panel data by single-
country estimations that account for country-specific characteristics. The paper applies a
panel econometric approach to bank-level balance sheet and macrolevel data for Saudi
Arabia spanning 2000–2015. It finds that bank lending is supported by strong balance sheet
conditions (high capital ratio and growth of provisioning and deposits), higher growth of both
oil prices and nonoil private sector GDP. Lower bank concentration helps, likely through
greater competition, so does stronger institution.

The rest of the paper is organized as follows. Section II reviews the literature and Section III describes the methodology and data. Section IV discusses results. Section V extends the baseline model to address several questions key to Saudi Arabia. Section VI concludes.

2. Literature

Bank credit is one important element of financial development, which enhances economic growth. A vast literature finds that greater financial development helps spur economic growth (see, e.g Levine (1997, 2005) and Demirguc-Kunt and Levine (2008), for an extensive survey of the literature). However, more recent studies provide nuanced messages. Sahay et al. (2015) argue that many benefits in terms of growth and stability can be reaped from further financial development in most emerging market economies but that the effect of financial development on economic growth is bell-shaped and weakens at higher levels of financial development.

Some studies, however, have suggested the effects of financial development on growth are weak in oil exporting countries. For example, Naceur and Ghazouani (2007) analyze the Middle East and North Africa (MENA) countries, including Bahrain, Kuwait, Oman and Saudi Arabia and find no significant relationship between the development of the banking sector or the stock market and economic growth [2]. Barajas et al. (2013) argue that the beneficial effect of financial deepening (including private credit) on economic growth is generally smaller in oil exporting countries and lower-income countries due to weaker regulatory and supervisory characteristics and more limited access to financial services. Hakura (2004) argues that, in the MENA, where oil revenues are significant (including the GCC countries), large governments have likely limited private sector growth and diversification. However, such cross-country, panel data analyses may fail to capture Saudi Arabia's country-specific characteristics and can be usefully complemented by single-country estimations. Indeed, Miyajima (2017) finds that higher bank lending strengthens real GDP growth in Saudi Arabia.

Given the importance of bank credit, a large volume of literature focuses on its determinants. One strand of literature studies the issue in the context of monetary policy transmission or the bank lending channel, which has attracted particular attention after the global financial crisis. These studies find that bank-specific characteristics, such as size, liquidity, capitalization and lenders' default probabilities, have a large impact on the provision of credit (for instance, Altunbasa et al. (2010); Gambacorta and Marques-Ibanez (2011); Guizani (2015); Gambacorta and Shin (2016)). For emerging markets, global factors increased in importance in affecting the bank lending channel as capital flows became larger and more volatile against the backdrop of very easy global monetary conditions (Kohlscheen and Miyajima (2015)).

Another strand of literature more directly focuses on determinants of bank credit in emerging markets, including the GCC countries. Focusing on a sample of emerging economies, Chen and Wu (2014) confirm the importance of strong balance sheet conditions and banking regulation in supporting robust credit growth. Moreover, state-owned banks played a counter cyclical role during the global financial crisis in 2008–2009, particularly in Latin America and emerging Europe. That is, credit by state-owned banks grew faster than credit by private banks. More generally, emerging economies displayed remarkable resilience during the global financial crisis in 2008–2009 compared with their experience in previous crises, such as those in the late 1990s, partly as bank balance sheet conditions were stronger (BIS, 2010). Saudi Arabia was not materially affected either owing to a range of buffers, including the conservative supervisory framework and a strong banking system (Al-Hamidy, 2010). Guo and Stepanyan (2011) examine a large number of emerging economies for a decade and identify several key determinants of bank credit: domestic economic activity, bank

balance sheet conditions, domestic and external monetary conditions, and foreign funding. Amidu (2014) analyses determinants of bank lending in 24 countries in Sub-Saharan Africa using both bank and country-level data and finds linkages between bank balance sheet health and lending. Barajas *et al.* (2010) find that bank characteristics (capitalization and loan quality) help explain bank credit slowdown among MENA countries in the aftermath of the global financial crisis in 2008. Studies zooming in on the Gulf Cooperation Council (GCC) banks identify a range of determinants affecting bank credit (Ghosh (2013); Gani and AlMuharramil (2016)): bank capital, concentration, financial deepening (credit to GDP), economic growth, and institutional quality (enforcement, regulatory quality and rule of law).

Islamic banks tend to increase credit more rapidly than non-Islamic banks, according to results based on a larger sample of GCC banks and the classification of banks by type provided by Bankscope. Barajas *et al.* (2010) conjecture that Islamic banks' business models are geared more toward investments and lending in high growth areas such as real estate.

3. Methodology and data

3.1 Methodology

As commonly done in the literature, determinants of real growth of bank-level credit are modeled using the following multivariate panel data specification for bank i in year t [3].

$$\text{rcg}_{i,t} = \sum_j \alpha_{1,j}\text{Bank}_{j,i,t-1} + \sum_k \alpha_{2,k}\text{Macro}_{k,t} + \sum_k \alpha_{3,l}\text{Macro}_{l,t-1} + \sum_l \alpha_{4,m}\text{time}_m + \theta_i + \varepsilon_{i,t}$$

(1)

where $\text{rcg}_{i,t}$ is real growth of bank credit to the private sector and $\text{Bank}_{j,i,t-1}$ is bank level variables ($j = 1, 2, \ldots$) lagged by one period to reduce potential endogeneity issues. That is, banks may adjust balance sheet composition in response to lending activity. $\text{Macro}_{k,t}$ represents macro level variables ($k = 1, 2, \ldots$), which are contemporaneous on the premise that these variables are exogenous to balance sheet conditions of individual banks. $\text{Macro}_{l,t-1}$ also represents macro level variables ($l = 1, 2, \ldots$) and are lagged by one period to reduce potential endogeneity issues. Time dummies for 2008 and 2009, time_m ($m = 1, 2$) help capture the potential effects of defaults of two large family-owned domestic conglomerates on loans [4]. Finally, θ_i is bank fixed effects and $\varepsilon_{i,t}$ is random errors.

3.2 Data

A range of bank- level and macrolevel explanatory variables are considered to explain bank-by-bank real credit growth guided by the literature [5]. All data are annual and span 2000–2015. Bank-level balance sheet data from Bankscope are available for longer history, back to 1987 but with limited data availability. There are 12 domestic Saudi banks, but the analysis focuses on 10 of them dictated by data availability (Table 1). The 10 banks together represent more than 90% of the size of the banking system. All variables are expressed in real terms except for ratios. Figure 2 visually summarizes the data, while Table 2 presents summary statistics. Table A1 in the Appendix reports detailed description of the data.

Four bank level balance sheet variables, standard in the literature, capture bank characteristics (which perhaps represent supply factors): the capital ratio, growth of NPL provisions, deposit growth and net income growth [6]. Higher capital allows bank to lend more while maintaining the same level of capital ratio. Higher NPL provisions would negatively affect capital and could reduce lending but would also improve the bank's credit risk, lower funding cost and allow the bank to lend more. Higher deposits increase resources to lend. Finally, higher profitability could encourage the bank to lend more. A lagged

Name	Percent share of total banking system assets 2015
1. National Commercial Bank	20.7
2. AI Rajhi Bank	14.5
3. Samba	10.8
4. Riyad Bank	10.3
5. Banque Saudi Fransi	8.5
6. Saudi British Bank	8.7
7. Arab National Bank	7.9
8. Saudi Hollandi Bank	5.0
9. Saudi Investment Bank	4.3
10. Bank Aljazira	2.9
Sum of above	93.6
Source(s): Bankscope and author's calculations	

Table 1.
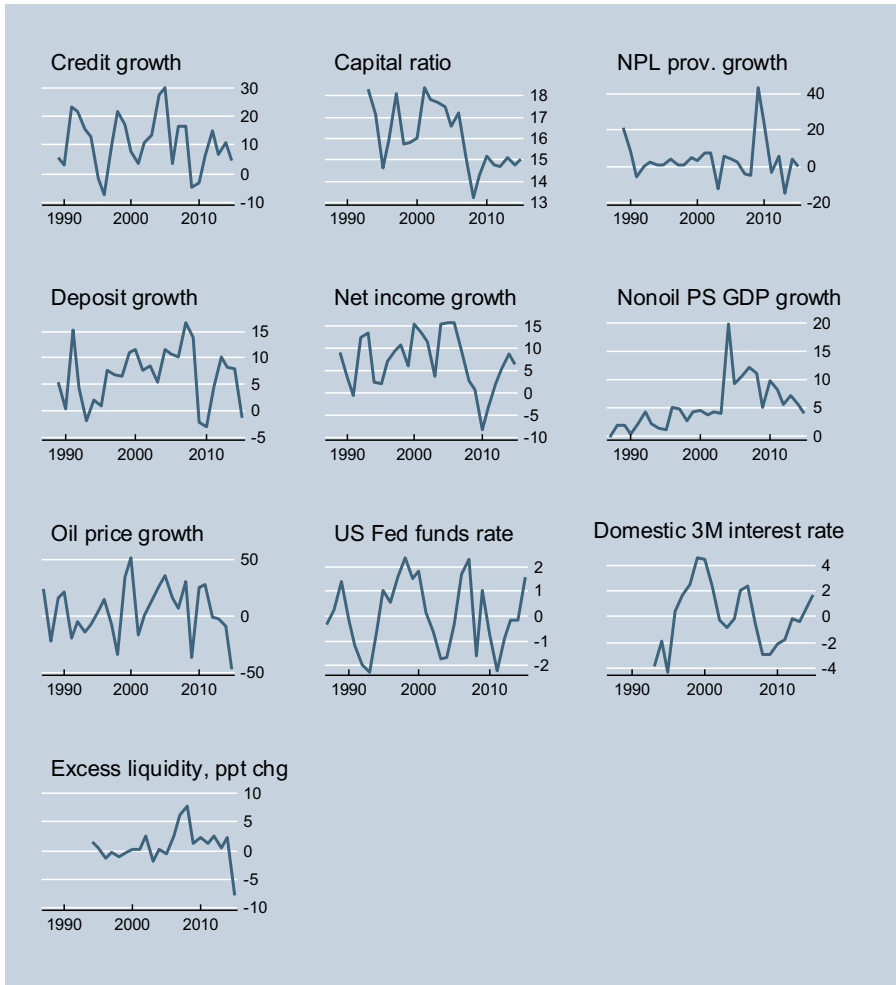Saudi Arabian
domestic banks
analyzed

dependent variable, bank-level credit growth, is often included in the literature but not in this paper's analysis because its coefficient is generally statistically insignificant. Therefore, the rest of the paper considers a standard panel fixed-effects model [7]. However, to help account for remaining potential endogeneity issues, the models are also estimated using a system generalized method of moments (GMM) approach as robustness checks.

Five macrolevel variables control for key global and domestic developments (which could perhaps represent a combination of supply and demand factors.) Oil price growth captures an important external shock given the nation's large reliance on oil exports. Oil revenues affect the nonoil sector through government spending on domestic goods and services and payment of government wages. The US Fed funds rate aims at controlling for changes in global monetary conditions which, given the Saudi riyal's peg to the US dollar, are expected to impact domestic monetary conditions. Nonoil private sector GDP growth captures domestic economic activity not directly affected by oil price movements. Domestic money market interest rates (3-month SIBOR) are expected to capture domestic monetary conditions and bank profitability [8]. Bank holdings of excess liquidity (sum of bank holdings of excess reserves at the central bank and those of central bank bills) represent banks' liquidity conditions.

Figure 2 summarizes the behavior of the explanatory variables. As far as bank-level variables, real growth of bank credit rose in the early 2000s but declined to negative territory in the late 2000s, primarily due to defaults of two large domestic conglomerates, rather than spillovers of international financial shocks. Saudi banks have been very well capitalized, with the Tier 1 ratio remaining at around 15%. NPLs was very well provisioned, by about 1.6 times in Q4 2015 [9]. Banks increased the pace of NPL provisioning as NPLs rose in the late 2000s. It fell as NPLs have fallen and remained very low. Deposit growth has behaved broadly in line with credit growth, as banks rely primarily on customer deposits to fund their assets (the size of balance sheets has grown in line with deposits). Saudi banks are profitable, but net income growth started to moderate on low oil prices, tightening funding conditions and weaker economic activity.

Turning to macrolevel variables, oil prices registered the worst performance in at least 3 decades, which in turn dampened nonoil private sector GDP growth. It fell to the lowest level since the early 2000s. As the US Federal Reserve started to gradually normalize its policy rate from very low levels and as domestic liquidity conditions have tightened, the 3-month money market rate has surged. Bank holdings of excess liquidity (in percentage point change of bank assets) declined notably. The US and domestic interest rates are both detrended using liner time trend to help reduce issues of spurious coefficients.

Results from a correlation analysis suggest both bank-level and macrolevel variables affect bank credit growth. Table 3 reports correlation coefficients which are statistically significant at the 5% level. Credit growth increases when bank funding (deposit growth) and profitability (net

Credit growth

Capital ratio

NPL prov. growth

Deposit growth

Net income growth

Nonoil PS GDP growth

Oil price growth

US Fed funds rate

Domestic 3M interest rate

Excess liquidity, ppt chg

Figure 2.
Saudi Arabia:
Macroeconomic and
bank-level variables

Note(s): Regressions rely on data spanning 2000–15. See Annex Table 1 for data description.
The US Fed funds rate and 3-month SIBOR are detrended

Source(s): IMF staff calculations

income growth) improve. It also strengthens with economic activity (nonoil private sector GDP growth). Bank profitability improves as short-term interest rates increase. Deposit growth is positively correlated with economy activity, bank profitability and liquidity conditions (bank holdings of excess liquidity). Domestic money market rates rise with the US Fed funds rate and as liquidity conditions tighten (lower excess liquidity and oil prices).

4. Results
4.1 Bivariate regressions
To start the analysis, bivariate panel fixed-effects regressions of bank credit growth are estimated on each one of the independent variables (see Table 4). Bank-level data are lagged

Variable	Obs	Mean	Std. Dev.	Min	Max
Bank-level data					
Credit growth	244	10.4	12.2	−10.8	35.3
Capital ratio	163	16.2	3.2	11.8	23.6
NPL provision growth	225	3.7	17.3	−26.6	43.3
Deposit growth	245	8.2	8.8	−5.7	27.8
Net income growth	237	7.3	10.2	−10.4	28.3
Macro-level data					
Oil price growth	29	7.5	42.2	−61.8	130.3
Nonoil private sector GDP growth	29	5.2	4.2	−0.4	19.6
US Fed funds rate, detrended	29	0.0	1.4	−2.3	2.3
Saudi 3M interest rate, detrended	23	0.0	2.4	−4.4	4.6
Excess liquidity, ppt chg.	22	0.9	2.9	−7.7	7.6

Note(s): Data for 2000–2015. See Appendix Table A1 for data description
Source(s): Author's calculation

Table 2.
Data summary

by one period to reduce issues of reverse causality. Macrolevel data are introduced contemporaneously, except for nonoil private sector GDP growth, which can be contemporaneously affected by bank lending and therefore is lagged by one period. All models control for time effects for 2008 and 2009.

Results confirm the importance of bank balance sheet and macroeconomic conditions. A rise in the capital ratio increases the bank's capacity to lend. A higher growth rate of NPL provisioning reduces resources for additional lending and leads to a decline in credit growth. Higher deposit growth increases resources to fund bank lending. Higher growth of oil prices and nonoil private sector GDP creates tailwinds for lending. Interest rates, net income growth and bank holdings of excess liquidity do not systematically affect lending growth [10].

4.2 Multivariate regressions
We subsequently proceed to the multivariate panel fixed effects models of bank credit growth by combining all variables [11].

Empirical evidence confirms that bank credit is affected by bank characteristics and macroeconomic conditions (Table 5). Starting from bank characteristics, the supply of bank credit improves as the capital ratio increases and deposit growth strengthens. An increase in Tier 1 capital by 1% point of risk-weighted assets leads to 0.5%–1.0% increase in credit growth. Around 0.2–0.4 of a rise in deposit growth in real terms is transmitted to credit growth [12]. Credit supply weakens as banks provision for NPLs. Every 1% growth in NPL provisions in real terms reduces credit growth by 0.1%–0.2%. Net income growth does not systematically affect credit growth as it may capture offsetting factors, both funding cost and profitability.

Turning to macrolevel variables, bank lending increases as oil price growth accelerates and activity in the nonoil private sector strengthens (Table 5). A 10% increase in oil price growth leads to 0.8%–1.0% increase in credit growth. A 1% rise in nonoil private sector economic growth leads to 0.8%–1.2% increase in credit growth. Lower bank holdings of excess liquidity support credit extension. In some specifications, a 1% point reduction in the variable accelerates credit growth by 0.4%–0.6%. Interest rates do not systematically affect credit growth either probably as the variables are capturing a combination of both profitability and cost of capital.

The results are broadly unchanged when the model is estimated using system GMM. In the ordinary least squares (OLS) regression discussed above, bank-level variables and nonoil private sector GDP growth are all lagged by one period in a bid to reduce endogeneity issues. To check whether coefficients are biased due to remaining endogeneity issues, we apply

	1. Credit growth	2. Capital ratio	3. NPL provision growth	4. Deposit growth	5. Net income growth	6. Oil price growth	7. Nonoil private sector GDP growth	8. US fed funds rate, detrended	9. Saudi 3M interest rate, detrended	10. Excess liquidity, change
1. Credit growth	1.00									
2. Capital ratio	…	1.00								
3. NPL provisions growth	…	…	1.00							
4. Deposit growth	0.65	…	…	1.00						
5. Net income growth	0.39	…	…	0.43	1.00					
6. Oil price growth	…	…	0.28	…	…	1.00				
7. Nonoil private sector GDP growth	0.37	…	…	0.28	…	…	1.00			
8. US Fed funds rate, detrended	…	…	…	…	0.28	…	…	1.00		
9. Saudi 3M interest rate, detrended	…	…	…	…	0.54	−0.28	…	0.51	1.00	
10. Excess liquidity, change	…	…	…	0.27	…	…	0.37	…	−0.41	1.00

Note(s): "…" when estimated correlation coefficients are not statistically significant at the 5 percent level. See Appendix Table A1 for data description.
Source(s): IMF staff calculations

Table 3.
Correlation Coefficient
(Significant at the 5
percent level)

Model number	1	2	3	4	5	6	7	8	9	Lagged
Bank characteristics										
Capital ratio	0.881** *0.016*	⋯	⋯	⋯	⋯	⋯	⋯	⋯	⋯	Y
NPL provisions, real growth	⋯	−0.162*** *0.000*	⋯	⋯	⋯	⋯	⋯	⋯	⋯	Y
Deposits, real growth	⋯	⋯	0.271* *0.095*	⋯	⋯	⋯	⋯	⋯	⋯	Y
Net income, real growth	⋯	⋯	⋯	0.092 *0.433*	⋯	⋯	⋯	⋯	⋯	Y
Macro variables										
Oil prices, real growth	⋯	⋯	⋯	⋯	0.128*** *0.002*	⋯	⋯	⋯	⋯	N
Nonoil PS GDP.real, growth	⋯	⋯	⋯	⋯	⋯	0.863 *0 002*	⋯	⋯	⋯	Y
Domestic mm rate, real, detrended	⋯	⋯	⋯	⋯	⋯	⋯	−0.332 *0.579*	⋯	⋯	N
Fed funds effective, real, detrended	⋯	⋯	⋯	⋯	⋯	⋯	⋯	−0.829 *0.239*	⋯	N
Excess liquidity, ppt change	⋯	⋯	⋯	⋯	⋯	⋯	⋯	⋯	0.140 *0.490*	N
_cons	−2.560 0.614	12.242*** 0.000	9.006*** 0.000	10.993*** 0.000	10.471*** 0.000	4.656** 0.010	11.390*** 0.000	11.328*** 0.000	11.138*** 0.000	N
Bank fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
N	142	145	145	142	155	155	155	155	155	⋯
r2_a	0.171	0.202	0.167	0.143	0.219	0.211	0.125	0.131	0.124	⋯

Note(s): Dependent variable is real bank credit growth. Using OLS. *, ** and *** indicate statistical significance at the 1%, 5% and 10% level. *p*-values underneath coefficients. See Table A1 for variable definition
Source(s): Author's calculation

Table 4.
Determinants of real bank credit real growth–bivariate regressions

Table 5.
Determinants of bank credit real growth

Model number	10	11	12	13	14	15	16	17	18	Lagged
Bank characteristics										
Capital ratio	0.969**	0.947***	0.834***	0.913**	0.850**	0.705**	0.664*	0.694**	0.544*	Y
	0.010	0.007	0.006	0.035	0.019	0.043	0.059	0.039	0.071	
NPL provisions, real growth	−0.126***	−0.131***	−0.161***	−0.127***	−0.139***	−0.179***	−0.151***	−0.151***	−0.181***	Y
	0.005	0.005	0.002	0.004	0.002	0.001	0.002	0.002	0.001	
Deposits, real growth	0.382***	0.395***	0.287***	0.314***	0.333***	0.233***	0.297***	0.311***	0.190*	Y
	0.000	0.00	0.039	0.000	0.000	0.044	0.000	0.000	0.053	
Net income, real growth	−0.082	−0.052	...	−0.12	−0.054	...	−0.138	−0.101	...	Y
	0.440	0.671		0.311	0.700		0.230	0.442		
Macro variables										
Excess liquidity, ppt change	0.129	0.072	−0.011	−0.045	−0.218	−0.500***	−0.431*	−0.423*	−0.586***	N
	0.470	0.683	0.943	0.793	0.171	0.001	0.058	0.053	0.000	
Nonoil PS GDP. real, growth	...	...	...	0.900***	1.071***	1.167***	0.755**	0.877***	0.892**	Y
				0.001	0.000	0.000	0.012	0.004	0.023	
Oil prices, real growth	...	...	...	...	...	...	0.101**	0.076*	0.086	N
							0.030	0.098	0.135	
Domestic mm rate, real, det.	...	...	−0.771	...	...	−2.124**	...	...	−0.955	N
			0.379			0.033			0.494	
Fed funds, real, det.	...	−0.812	...	...	−1.983**	...	...	−0.997	...	N
		0.425			0.045			0.293		
	−6.097	−6.054	−3.497	−10.876	−11.683*	−8.895	−5.865	−7.5	−4.616	N
	0.283	0.242	0.469	0.135	0.063	0.134	0.339	0.218	0.380	
Bank fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
2008, 09 dummies	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
N	138	138	141	138	138	141	138	138	141	...
r2_a	0.302	0.303	0.266	0.385	0.412	0.381	0.423	0.423	0.392	...

Note(s): Dependent variable is real bank credit growth. Using OLS. *, ** and *** indicate statistical significance at the 1%, 5% and 10% level. p-values underneath coefficients. See Table A1 for variable definition
Source(s): Author's calculation

system GMM approach proposed by Arellano and Bover (1995) and Blundell and Bond (1998). Estimated results summarized in Table 6 shows that the coefficients are similar to those summarized in Table 5 in terms of sign, size and statistical significance. Therefore, in the rest of the paper, we proceed with OLS estimations [13].

4.3 Model predictions
Model predictions help understand why credit growth remained robust through 2015, despite oil prices having fallen. Figure 3 plots the actual average credit growth and the model prediction (using Model 16). It also shows contributions to the change in the predicted credit growth

The result plotted in Figure 3 suggests that the sharp decline in credit growth around the global financial crisis was due to a combination of bank specific factors (a lower capital ratio, weaker deposit growth) and macroeconomic factors (lower growth of oil prices and nonoil private sector GDP). In addition, time dummy variables are required to fully capture the magnitude of the fall in credit growth, consistent with the view that defaults of two large domestic conglomerates dented market confidence around the global financial crisis [14]. Credit growth held up well in 2015 despite a large fall in oil prices, supported by resilient bank balance sheet conditions and economic activity but also by a reduction in bank holdings of excess liquidity. Looking ahead, credit growth could slow further, reflecting lagged effects of slower deposit growth, and if the capital ratio declines, provisioning for NPLs accelerates and economic activity slows further.

5. Considering additional factors
Additional factors are considered to account for a range of characteristics. These are bank holdings of government bonds, lending by specialized credit institutions (SCIs), banking system concentration, state ownership, regulation and governance, and Islamic versus other banks.

First, bank lending can slow as domestic banks continue absorbing bonds after the Saudi government restarted issuing debt securities. The government used to issue domestic bonds actively during previous periods of low oil prices (see Figure 4). For instance, Bloomberg reports that during 1997–2007, the Saudi government issued 17–18 bonds per year on average. The maturity ranged from one year to 10 years [15]. As a result, the amount outstanding of Saudi government bonds peaked at close to SAR 700 billion in the early 2000s. Domestic banks held 10%–20% of the total amount outstanding during the 1990s and early 2000s. Bank holdings of government bonds as a share of total bank assets peaked at close to 30%. From the early 2000s, the share continued to decline until the Saudi government restarted domestic bond issuance in mid-2015 (Figure 5, first panel).

Second, lending by SCIs may affect bank lending [16]. SCIs lend to some of the same sectors as banks do, which may increase or reduce bank lending. SCI lending growth accelerated during the 2000s and has remained relatively high (Figure 5, second panel). The stock of lending by SCIs represents some one-fourth of that of by banks [17].

Third, greater banking system concentration may limit competition and reduce credit growth. An indicator of banking system concentration suggests that, among the GCC banking systems, Saudi Arabia's is the least concentrated (Figure A2). Moreover, concentration has been declining in recent years in Saudi Arabia (Figure 5, third panel).

Fourth, greater state ownership can affect bank lending behavior. One view is that banks with greater state ownership may lend more counter cyclically to fill the gaps left by other commercial banks as the latter reduce lending in response to a negative macroeconomic shock (Chen and Wu, 2014). Another view is that if state ownership comes with greater prudence or reduced risk taking, lending behavior may appear pro-cyclical. State ownership

| Model number	19	20	21	22	23	24	25	26	27	Lagged
Bank characteristics										
Capital ratio	1.035*	0.891*	0.835	0.668**	0.508*	0.715	0.964**	0.768**	0.748*	Y
	0.062	*0.069*	*0.286*	*0.02*	*0.059*	*0.372*	*0.013*	*0.028*	*0.056*	
NPL provisions, real growth	−0.151***	−0.156***	−0.209***	−0.166***	−0.163***	−0.232***	−0.194***	−0.181***	−0.206***	Y
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.001*	*0.000*	
Deposits, real growth	0.432***	0.466***	0.274**	0.303***	0.304***	0.328***	0.324***	0.351***	0.350***	Y
	0.000	*0.001*	*0.035*	*0.000*	*0.000*	*0.001*	*0.000*	*0.000*	*0.000*	
Net income, real growth	−0.104	−0.028	...	−0.253**	−0.221	...	−0.052	−0.101	...	Y
	0.383	*0.868*		*0.036*	*0.136*		*0.64*	*0.414*		
Macro variables										
Excess liquidity, ppt chg.	−0.023	−0.921*	−0.877***	0.38	0.097	−0.900**	−0.534*	−0.671**	−0.885**	N
	0.959	*0.098*	*0.001*	*0.102*	*0.765*	*0.011*	*0.069*	*0.02*	*0.048*	
Nonoil PS GDP, real growth	...	...	...	1.474***	1.442***	1.248***	0.848***	0.914***	1.007***	Y
				0.000	*0.000*	*0.000*	*0.007*	*0.001*	*0.005*	
Oil prices, real growth	...	...	...	...	...	0.000	0.102**	0.098**	0.085	N
							0.044	*0.023*	*0.197*	
Domestic mm rate, real, det.	...	...	−0.831	...	...	−2.750***	...	...	−1.616	N
			0.378			*0.001*			*0.298*	
Fed funds, real, det.	...	−3.298**	...	...	−1.28	...	...	−1.081	...	N
		0.044			*0.236*			*0.281*		
	−6.917	−4.604	−2.332	−10.215**	−7.447	−9.484	−11.923*	−8.825	−9.334	N
	0.420	*0.542*	*0.862*	*0.033*	*0.103*	*0.456*	*0.059*	*0.149*	*0.156*	
Bank fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
2008, 09 dummies	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
N	138	138	141	138	138	141	138	138	138	...
AR(1)	0.005	0.006	0.015	0.006	0.004	0.006	0.004	0.003	0.004	...
AR(2)	0.453	0.931	0.507	0.571	0.895	0.556	0.781	0.649	0.778	...
Hansen	0.985	1.000	0.999	1.000	1.000	1.000	1.000	1.000	1.000	...

Note(s): Dependent variable is real bank credit growth. Using System GMM approach by Arellano and Bover (1995) and Blundell and Bond (1998). *, ** and *** indicate statistical significance at the 1%, 5% and 10% level. *p*-values underneath coefficients. See Table A1 for variable definition. Treating bank-level variables and nonoil private sector GDP growth as endogenous. To help reduce the number of instruments and avoid over-fitting the model, we follow Roodman (2009) and limit lag depth and "collapse" the matrix, or drop zeros from the instrument matrix. *AR*(1) and *AR*(2) signify *p*-values associated with the null hypothesis of lack of first and second order serial correlation. Hansen signifies *p*-value associated with the null hypothesis that the instruments are exogenous
Source(s): Author's calculation

(% yoy)

Actual and predicted credit growth

Contributions to change in predicted value
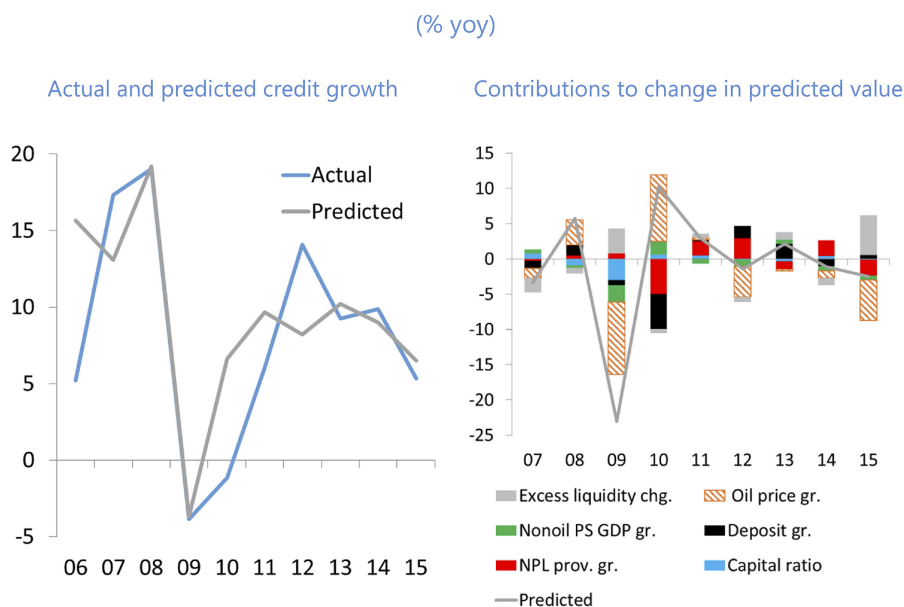
Note(s): Times dummies not shown in the right panel
Source(s): Bankscope, Haver, and IMF staff calculations

Figure 3.
Real bank credit
growth in Saudi Arabia
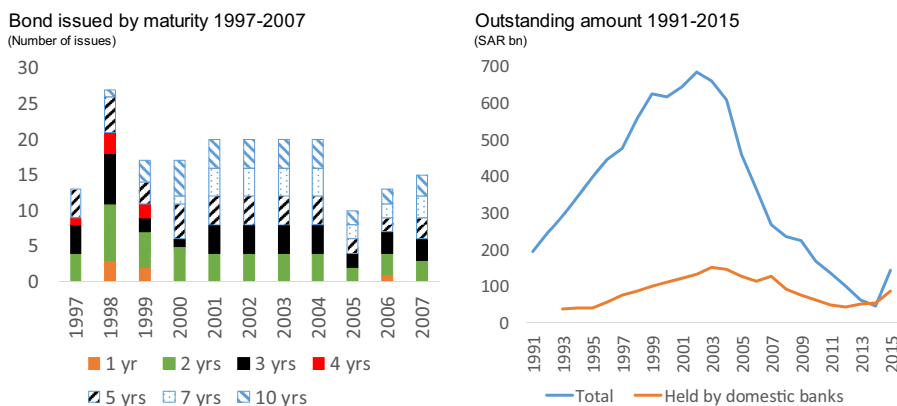
Source(s): Bloomberg, IMF WEO April 2015, and author's calculations

Figure 4.
Saudi government
bond issuance and
stock outstanding

in 2015 is estimated based on two definitions (Table 7). Under the "wide" definition, which accounts for ownership by the Saudi government, the Public Investment Fund (PIF) and two domestic pension funds (General Organization for Social Insurance (GOSI) and Public Pension Agency (PPA)), state ownership is considered to be high when it is 50% or above [18]. Under the "narrow" definition, which accounts only for the ownership by the Saudi government and PIF, the threshold above which state ownership is considered to be high is

(Percent)

Bank hdgs of gov bonds, chg

SCI lending growth

Bank concentration, chg
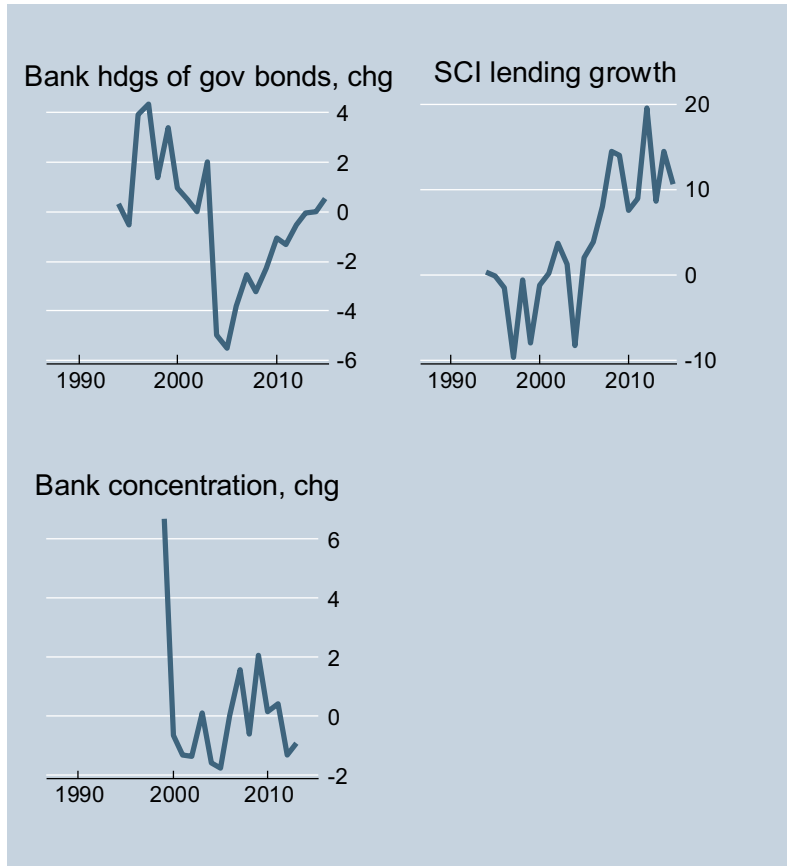
Figure 5.
Saudi Arabia:
Additional
factors(percent)

Note(s): See Appendix Table 1 for data description. Regressions rely on date for 2000–15
Source(s): IMF staff calculations

lowered to 30%. Econometrically, a dummy variable representing high state ownership is interacted with several variables.

Fifth, the stronger institution could lead to stronger credit extension. Gani and Al-Muharrami (2016) argue and find that conventional institutional quality measured by the time taken to enforce a contract, regulatory quality, the rule of law and government effectiveness are inversely correlated with the lending by the banks. We use the six components of the World Governance Indicators in a bid to capture different aspects of institutional strength [19].

Sixth, lending by Islamic banks could be more affected by economic activity relative to lending by other banks. As mentioned earlier, Barajas *et al.* (2010) conjecture that Islamic banks' business models are geared more towards investments and lending in high growth areas such as real estate. These areas may be "cyclical" sectors and more sensitive to economic activity.

	Wide	Narrow
National Commercial Bank	74	54
Samba	65	38
Riyad Bank	57	31
Saudi Investment Bank	52	17
Banque Saudi Fransi	15	15
Arab National Bank	11	0
Saudi Hollandi Bank	11	0
Al Rajhi Bank	10	0
Saudi British Bank	10	0
Bank AlJazira	0	0

Note(s): "Narrow" accounts for ownership by the Saudi
government and Public Investment Fund. "Wide"
additionally accounts for ownership by two domestic
pension funds (GOSI and PPA)
Source(s): Bankscope, and IMF staff calculations

Table 7.
State ownership of
domestic banks (2015)
(percent of total)

Results from econometric models including those variables indicate that bank characteristics and most of macro variables remain key determinants of bank credit growth (Tables 8–11). A higher capital ratio, lower provisioning growth and higher deposit growth all lead to higher bank credit growth. Similarly, higher oil price growth, which can represent higher demand, supply or confidence, support bank credit growth. A reduction in bank holdings of excess liquidity also helps.

Results also show that most of the additional macroeconomic factors affect bank credit growth. First, bank credit growth declines as banks increase their holdings of government bonds (suggesting "crowding out"). As shown in Table 8, a 1% point of bank balance sheet increase in the holdings of government bonds reduces credit growth by 1%–1.5%. However, the coefficient loses statistical significance when combined with nonoil private sector GDP growth [20].

Second, lending by SCIs does not appear to systematically complement commercial bank lending (Table 8). The estimated negative coefficients in most models allude to the existence of competition rather than complementarity between these institutions and banks in the segments of the market they work in. In one specification, the estimated coefficient is not statistically significant. More research is needed to understand the role of SCI lending.

Third, higher banking system concentration leads to lower bank lending growth (Table 9) [21]. The recent decline in concentration in domestic banking system should have helped improve credit growth. When the index of concentration is interacted with bank-level and macrolevel variables, results suggest that the negative impact of excess liquidity holdings on lending declines with concentration, probably as banks have more leeway to mitigate the impact.

State ownership does not appear to systematically affect bank lending growth (Table 10). However, tentative evidence, which is statistically significant at the 10% level, suggests that lending by banks with greater state ownership appears procyclical with respect to oil price

Model number	Government bond holdings				SCI lending				Lagged
	28	29	30	31	32	33	34	35	
Bank characteristics									
Capital ratio	1.145**	0.839**	0.689*	0.688*	0.708**	0.554**	0.5	0.503	Y
	0.014	*0.037*	*0.081*	*0.058*	*0.027*	*0.047*	*0.158*	*0.148*	
Provisions growth	-0.128***	-0.151***	-0.148***	-0.151***	-0.124***	-0.148***	-0.135***	-0.136***	Y
	0.007	*0.002*	*0.002*	*0.003*	*0.005*	*0.002*	*0.003*	*0.004*	
Deposit growth	0.379***	0.363***	0.312***	0.301***	0.353***	0.348***	0.278***	0.276***	Y
	0.000	*0.000*	*0.000*	*0.000*	*0.001*	*0.001*	*0.001*	*0.001*	
Net income growth	-0.041	-0.08	-0.139	-0.132	-0.135	-0.143	-0.197*	-0.194	Y
	0.711	*0.469*	*0.253*	*0.279*	*0.175*	*0.154*	*0.091*	*0.102*	
Macro variables									
Bank holdings of gov. bonds, ppt chg.	-1.532**	-1.180*	-0.013	-0.171	…	…	…	…	N
	0.018	*0.092*	*0.985*	*0.812*					
SCI credit growth	…	…	…	…	-0.402**	-0.25	-0.446**	-0.425**	N
					0.02	*0.129*	*0.017*	*0.031*	
Oil prices growth	…	0.091**	0.079*	0.101**	…	0.087**	0.034	0.042	N
		0.025	*0.051*	*0.031*		*0.015*	*0.397*	*0.404*	
Nonoil PS GDP growth	…	…	0.741**	0.706***	…	…	0.943***	0.936***	Y
			0.015	*0.021*			*0.006*	*0.008*	
Excess liquidity, ppt chg.	…	…	…	-0.443*	…	…	…	-0.098	N
				0.063				*0.653*	
Dummy variables									
Bank	Y	Y	Y	Y	Y	Y	Y	Y	N
2008	Y	Y	Y	Y	Y	Y	Y	Y	N
2009	Y	Y	Y	Y	Y	Y	Y	Y	N
Constant	-8.695	-4.02	-6.481	-5.895	1.502	2.525	-0.969	-1.087	N
	0.221	*0.519*	*0.334*	*0.344*	*0.613*	*0.877*	*0.859*		
N	138	138	138	138	138	138	138	138	…
r2_a	0.348	0.386	0.412	0.418	0.343	0.373	0.453	0.449	…

Note(s): Dependent variable is real bank credit growth. Using OLS. *, ** and *** indicate statistical significance at the 1%, 5% and 10% level. *p*-values underneath coefficients. See Table A1 for variable definition.
Source(s): Author's calculation

Table 8.
Determinants of bank
credit growth-
additional factors

Model number	36	37	38	39	40	41	42	43	44	45	46	Lagged
Bank characteristics												
Capital ratio	0.910***	0.706***	0.752**	0.654**	0.950***	0.712***	0.886**	0.649**	0.751**	0.576*	0.559*	Y
	0.006	0.006	0.027	0.025	0.007	0.006	0.026	0.057	0.028	0.055	0.047	
Provisions growth	-0.107**	-0.112***	-0.112**	-0.114**	-0.091*	-0.109***	-0.102**	-0.085***	-0.112**	-0.098***	-0.087**	Y
	0.018	0.007	0.011	0.011	0.067	0.007	0.035	0.007	0.02	0.006	0.028	
Deposit growth	0.344***	0.342***	0.284***	0.275***	0.372***	0.337***	0.276***	0.217**	0.284***	0.221***	0.221***	Y
	0.004	0.001	0.001	0.001	0.005	0.001	0.002	0.01	0.001	0.003	0.004	
Net income growth	-0.054	-0.124	-0.14	-0.135	-0.045	-0.126	-0.101	-0.165	-0.14	-0.179	-0.165	Y
	0.576	0.158	0.146	0.184	0.661	0.163	0.33	0.139	0.148	0.108	0.166	
Macro variables												
Concentration index, ppt chg.	-2.831**	-2.974**	-2.912**	-1.724	-5.737	-3.825	-4.489	-7.409***	-2.852	-5.074*	-8.114*	N
	0.04	0.03	0.035	0.254	0.223	0.149	0.294	0.006	0.477	0.07	0.069	
Oil prices growth	…	0.137**	0.096	0.146**	…	0.150**	…	…	0.096*	0.097	0.137	N
		0.015	0.124	0.032		0.026			0.097	0.161	0.413	
Nonoil PS GDP growth	…	…	0.721**	0.685**	…	…	1.071*	…	0.712	0.428	1.015*	Y
			0.016	0.021			0.072		0.228	0.115	0.077	
Excess liquidity, ppt chg.	…	…	…	-1.186**	…	…	…	-0.951*	…	-1.312**	-2.016*	N
				0.034				0.064		0.017	0.081	
Interaction with concentration index (CI)												
Capital ratio * CI	…	…	…	…	0.115	…	…	…	…	…	…	Y
					0.635							
Provisions growth * CI	…	…	…	…	0.037	…	…	…	…	…	…	Y
					0.479							
Deposit growth * CI	…	…	…	…	0.070	…	…	…	…	…	…	Y
					0.407							
Oil prices growth * CI	…	…	…	…	…	0.025	…	…	…	…	0.028	N
						0.619					0.825	
Nonoil PS GDP growth * CI	…	…	…	…	…	…	0.172	…	-0.006	…	0.384	Y
							0.634		0.985		0.359	

Concertation

(*continued*)

Table 9.
Determinants of bank credit growth-additional factors

Model number	36	37	38	Concertation 39	40	41	42	43	44	45	46	Lagged
Excess liquidity, ppt chg. * CI	⋯	⋯	⋯	⋯	⋯	⋯	⋯	2.264***	⋯	1.433**	1.038	N
								0.001		*0.041*	*0.400*	
Dummy variables												
Bank	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
2008	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
2009	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
Constant	−5.533	−4.197	−9.117	−5.651	−6.82	−4.751	−12.663	−1.2	−9.045	−2.878	−6.619	⋯
	0.254	*0.303*	*0.108*	*0.232*	*0.222*	*0.249*	*0.144*	*0.816*	*0.242*	*0.555*	*0.334*	
N	118	118	118	118	118	118	118	118	118	118	118	⋯
r2_a	0.362	0.405	0.456	0.471	0.349	0.382	0.429	0.35	0.452	0.46	0.472	⋯

Note(s): Dependent variable is real bank credit growth Using OLS. *, ** and *** indicate statistical significance at the 1%, 5% and 10% level. *p*-values underneath coefficients. See Table A1 for variable definition
Source(s): Author's calculation

Table 9.

| | State ownership | | | | | | |
Model number	47	48	49	50	51	52	Lagged
Bank characteristics							
Capital ratio	0.990**	0.924**	1.145***	1.034***	1.091**	0.996**	Y
	0.033	0.027	0.007	0.007	0.012	0.011	
Provisions growth	−0.114**	−0.142***	−0.109**	−0.139***	−0.113**	−0.143***	Y
	0.022	0.004	0.03	0.006	0.026	0.005	
Deposit growth	0.471***	0.402***	0.419***	0.362***	0.400***	0.343***	Y
	0.002	0.002	0.002	0.003	0.004	0.006	
Net income growth	−0.141	−0.152	−0.168*	−0.192**	−0.168*	−0.192*	Y
	0.159	0.143	0.078	0.05	0.075	0.051	
Macro variables							
Concentration index, ppt chg.	…	…	…	…	…	…	N
Oil prices growth	0.085**	0.093***	0.054	0.064**	0.074*	0.083**	N
	0.01	0.003	0.106	0.043	0.051	0.021	
Nonoil PS GDP growth	…	…	0.814***	0.694***	0.801***	0.697***	Y
			0.002	0.006	0.002	0.005	
Excess liquidity, ppt chg.	…	…	…	…	−0.28	−0.328	N
					0.370	0.296	
Interaction with state ownership							
Capital ratio * SO_broad	−0.743	…	−1.053*	…	−0.953	…	Y
	0.259		0.086		0.122		
Provisions growth * SO_broad	−0.117	…	−0.113	…	−0.111	…	Y
	0.115		0.163		0.176		
Deposit growth * SO_broad	−0.170	…	−0.165	…	−0.144	…	Y
	0.359		0.327		0.396		
Oil prices growth * SO_broad	0.062*	…	0.061*	…	0.061*	…	N
	0.057		0.076		0.08		
Nonoil PS GDP growth * SO_broad	…	…	−0.049	…	−0.013	…	Y
			0.905		0.973		

(*continued*)

Table 10.
Determinants of bank
credit growth-
additional factors

Table 10.

Model number	47	48	49	50	51	52	Lagged
				State ownership			
Excess liquidity, ppt chg. * SO_broad	...	...	...	...	−0.223 0.578	...	N
Capital ratio * SO_narrow	...	−0.865 0.226	...	−1.210* 0.06	...	−1.135* 0.073	Y
Provisions growth * SO_narrow	...	−0.052 0.507	...	−0.038 0.671	...	−0.031 0.727	Y
Deposit growth * SO_narrow	...	−0.096 0.615	...	−0.123 0.514	...	−0.05 0.795	Y
Oil prices growth * SO_narrow	...	0.045 0.185	...	0.039 0.267	...	0.039 0.267	N
Nonoil PS GDP growth * SO_narrow	...	...	...	0.281 0.512	...	0.289 0.489	Y
Excess liquidity, ppt chg. * SO_narrow	...	...	...	...	...	−0.214 0.590	N
Dummy variables							
Bank	Y	Y	Y	Y	Y	Y	N
2008	Y	Y	Y	Y	Y	Y	N
2009	Y	Y	Y	Y	Y	Y	N
Constant	−6.495 0.394	−4.254 0.552	−13.834* 0.051	−9.959 0.135	−12.601* 0.095	−9.094 0.197	N
N	138	138	138	138	138	138	...
r2_a	0.348	0.332	0.406	0.391	0.405	0.39	...

Note(s): Dependent variable is real bank credit growth. Using OLS. *, ** and *** indicate statistical significance at the 1%, 5% and 10% level. *p*-values underneath coefficients. See Table A1 for variable definition

Source(s): Author's calculation

	Institution							
Model number	53	54	55	56	57	58	59	Lagged
Bank characteristics								
Capital ratio	0.664*	0.618*	0.560*	0.381	0.667*	0.691*	0.680*	Y
	0.059	*0.066*	*0.061*	*0.254*	*0.061*	*0.06*	*0.068*	
Provisions growth	−0.151***	−0.116**	−0.139***	−0.101***	−0.149***	−0.152***	−0.153***	Y
	0.002	*0.033*	*0.004*	*0.006*	*0.004*	*0.002*	*0.001*	
Deposit growth	0.297***	0.301***	0.264***	0.200**	0.298***	0.305***	0.301***	Y
	0.000	*0.001*	*0.000*	*0.011*	*0.000*	*0.000*	*0.000*	
Net income growth	−0.138	−0.037	−0.105	−0.264**	−0.131	−0.122	−0.13	Y
	0.230	*0.820*	*0.319*	*0.022*	*0.324*	*0.351*	*0.283*	
Macro variables								
Oil prices growth	0.101**	0.068	0.086*	0.122**	0.105**	0.098*	0.109**	N
	0.030	*0.133*	*0.055*	*0.017*	*0.020*	*0.055*	*0.028*	
Nonoil PS GDP growth	0.755**	1.021***	0.849***	0.919***	0.790**	0.789**	0.718**	Y
	0.012	*0.002*	*0.005*	*0.004*	*0.022*	*0.023*	*0.018*	
Excess liquidity, ppt chg.	−0.431*	−0.071	−1.027***	−0.351*	−0.479**	−0.463**	−0.457***	N
	0.058	*0.722*	*0.003*	*0.088*	*0.028*	*0.011*	*0.023*	
Institution variables								
Voice and accountability	…	0.022***	…	…	…	…	…	Y
		0.004						
Political stability	…	…	0.015**	…	…	…	…	Y
			0.021					
Government effectiveness	…	…	…	0.022**	…	…	…	Y
				0.018				
Regulatory quality	…	…	…	…	−0.001	…	…	N
					0.742			
Rule of law	…	…	…	…	…	−0.003	…	Y
						0.719		
Control of corruption	…	…	…	…	…	…	−0.001	N
							0.768	

(*continued*)

Table 11.

				Institution					Lagged
Model number	53	54	55	56	57	58	59	
Dummy variables									
Bank	Y	Y	Y	Y	Y	Y	Y	N
2008	Y	Y	Y	Y	Y	Y	Y	N
2009	Y	Y	Y	Y	Y	Y	Y	N
Constant	−5.865	−8.758	−1.933	0.335	−6.343	−7.051	−6.011	N
	0.339	*0.188*	*0.72*	*0.957*	*0.353*	*0.336*	*0.348*	
N	138	138	138	138	138	138	138	⋮
r2_a	0.423	0.479	0.448	0.467	0.418	0.419	0.418	⋮

Note(s): Dependent variable is real bank credit growth. Using OLS. *, ** and *** indicate statistical significance at the 1%, 5% and 10% level. *p*-values underneath coefficients. See Table A1 for variable definition

Source(s): Author's calculation

performance. As oil prices increase, lending by banks with high state ownerships tend to rise more than lending by other banks. One interpretation is that when oil prices decline and the fiscal balance becomes strained, banks with high state ownership tend to purchase government bonds and reduce lending more than other banks do.

Another tentative finding relates to the capital ratio (Table 10). For banks with high state ownership, credit growth is little affected by the capital ratio. The coefficient on the interaction term between the capital ratio and the high state ownership dummy broadly cancels the coefficient on the capital ratio. One interpretation is that banks with larger state ownership are less constrained by capital. For instance, in 2015, banks with high state ownership had a higher average capital ratio compared to other banks by 1%–1.5% points.

We find evidence that stronger institution facilitates bank lending (Table 11). Results suggest that improvements in the indicators of voice and accountability, political stability and government effectiveness all contribute to greater credit extension. Some of the indicators of institution, such as regulatory quality, may be already captured by bank balance sheet conditions [22].

Finally, tentative evidence suggests that lending by Islamic banks may be more responsive to economic activity compared to other banks (Table 12). However, those analyses whereby banks are separated into Islamic and non-Islamic following the classification presented by data provider Bankscope yielded few statistically significant coefficients for Islamic banks due probably to the relatively small number of observations used in this paper. Results were weaker when all banks were included in a panel and the key variables were interacted with Islamic bank dummies.

| Model number | Islamic abnks | | | Other banks | | | Lagged |
	60	61	62	63	64	65	
Bank Characteristics							
Capital ratio	0.598	0.353	0.5	0.651*	0.674**	0.650**	Y
	0.508	0.679	0.566	0.061	0.04	0.046	
Provisions growth	−0.158	−0.174	−0.151	−0.155***	−0.149***	−0.152***	Y
	0.13	0.168	0.24	0	0.001	0.001	
Deposit growth	0.193	0.265	0.322	0.365***	0.319***	0.303***	Y
	0.525	0.276	0.141	0.001	0.002	0.003	
Net income growth	−0.273	−0.51	−0.512	−0.097	−0.119	−0.119	Y
	0.400	0.168	0.150	0.334	0.219	0.214	
Macro variables							
Oil prices growth	0.053	0.011	−0.048	0.109***	0.080***	0.104***	N
	0.588	0.891	0.626	0.000	0.005	0.002	
Nonoil PS GDP growth	. . .	2.071**	2.051**	. . .	0.730***	0.741***	Y
	. . .	0.015	0.017	. . .	0.001	0	
Excess liquidity, ppt chg.	. . .	. . .	0.908*	. . .	. . .	−0.457*	N
	. . .	. . .	0.077	. . .	. . .	0.084	
Dummy variables							
Bank	Y	Y	Y	Y	Y	Y	N
2008	Y	Y	Y	Y	Y	Y	N
2009	Y	Y	Y	Y	Y	Y	N
Constant	5.639	−3.411	−6.398	−1.789	−6.66	−5.956	N
	0.731	0.827	0.64	0.772	0.253	0.317	
N	21	21	21	138	138	138	. . .
r2_a	0.044	0.453	0.476	0.334	0.386	0.393	. . .

Note(s): Dependent variable is real bank credit growth. Using OLS. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level. *p*-values underneath coefficients. See Table A1 for variable definition.
Source(s): Author's calculation.

Table 12.
Determinants of bank credit growth - additional factors

6. Concluding discussion

This paper investigated determinants of bank credit growth in Saudi Arabia. The results, relying on bank level balance sheet data, suggest that, consistent with the literature, bank lending is influenced importantly by bank balance sheet conditions and macroeconomic developments. A rise in the capital ratio and deposit growthand a reduction in bank holdings of "excess liquidity" all lead to higher credit growth. But greater NPL provisioning reduces it. Bank lending growth rises with stronger oil prices and domestic economic activity. Interest rates, either domestic or foreign, do not systematically affect bank lending. In 2015, bank credit growth remained robust despite oil prices having declined as banks maintained strong balance sheet conditions and reduced holdings of excess liquidity.

The benchmark model was extended to assess the impacts of Saudi Arabia–specific characteristics on bank lending. A rise in bank holdings of government bonds diversifies bank asset portfolios but also crowds out bank lending. Lending by SCIs does not lead to higher bank lending. The recent decline in bank concentration should have helped strengthen bank lending. Tentative results suggested that banks with relatively large state ownership may have been lending procyclically with respect to oil price performance (the higher is oil price growth, the higher is lending growth) and that their lending is less sensitive to the capital ratio. This is likely because when oil prices are low, those banks may be buying government bonds than other banks do. Also, lending by banks with higher state ownership may be less constrained by the capital ratio, which is on average higher than that of other banks. Stronger institution appears to support credit extension. Finally, consistent with the literature, lending by Islamic banks may be more responsive to economic activity compared to lending by other banks.

These results suggest that to support bank credit provision in the period ahead, bank balance sheets need to remain strong. This is particularly the case as the commitment to increase the role of the private sector in the economy under the National Transformation Program and Vision 2030 would present many opportunities for lenders. Generally, banks in Saudi Arabia are profitable, liquid and well-capitalized. SAMA's regulation and supervision of the banking system continued to strengthen in recent years, including through the early adoption of Basel III capital and liquidity standards. Looking ahead, banks need to maintain sufficient capital even as low oil prices start putting bank balance sheets under pressure. Provisioning for NPLs reduces credit extension but is essential for safeguarding financial stability. Greater confidence in the banking system also helps attract customer deposits and support credit supply. A reduced reliance on the banking system to finance the budget deficit would also support credit provision to the private sector.

First, one could analyze the composition of lending and its implications for growth. The impact of lending on growth would differ by borrower (retail or corporate; wealthier or not) or use of funds (consumption or investment). Second, the impact of bank lending on financial inclusion and stability is another useful area of research. This involves the role of formal banking system in facilitating financial inclusion, while paying due attention to financial stability risk. The role of informal lending could be also assessed if data are available.

Notes

1. The 3-months SIBOR ended 2016 at 2.035%, marginally up from its low registered in mid-December.

2. The authors argue that underdeveloped financial systems in the MENA region hamper economic growth and that more needs to be done to improve the institutional environment and functioning of the banking sector.

3. We also considered specifications with time dummies for each year in which case all variables were statistically insignificant, likely reflecting the importance of common shock related to global oil price movements. In order to generate policy-relevant results, where bank-level and macro variables capture transmission of shocks, the paper limited time dummies to those in 2008 and 2009 to capture identifiable potential shocks (defaults of a large domestic conglomerate).

4. Data on the international investment position and the BIS banking statistics suggest that the Saudi banking system' cross-border exposures are small.

5. Bank credit, deposits, NPL provisions, net income, are deflated by domestic inflation. Oil prices (in dollar terms) are deflated by US inflation. Non-oil private sector GDP is available in real terms. Capital and excess liquidity are expressed in terms of ratios.

6. Growth of NPL provisions is a more direct and likely a better measure of banks' capacity to extend credit than NPLs in Saudi Arabia. This is because in Saudi Arabia, banks have been provisioning for NPLs counter-cyclically, weakening the linkage between NPL ratios and credit growth. Indeed, the author did not find plausible results using NPL ratios instead of growth of NPL provisions.

7. A panel fixed-effects approach suffers from a downward Nickell bias when a lagged dependent variable is included in the right-hand side of the regression equation. In such circumstances, a system Generalized Method of Moments (GMM) approach proposed by Arellano and Bover (1995) and Blundell and Bond (1998) is used commonly.

8. Given the Saudi riyal's peg to the US dollar, we do not include the US Fed funds rate and the 3-months SIBOR together in regression models. Some of the deposit base in Saudi Arabia is interest free.

9. More than 100% is considered as very prudent. When 160% of NPLs are provisioned, when all NPLs default, the bank can fully write of the loans and still maintain another 60% of NPLs worth of reserves.

10. The 3-month SIBOR spread to US dollar 3-months LIBOR is not significant in bivariate nor multivariate specifications.

11. Key messages in sections III and IV were generally unchanged when a dummy variable for 2006 was introduced to capture a large decline in domestic stock prices.

12. The estimated coefficient appears low despite bank credit in Saudi Arabia being primarily funded by deposits. However, the value of the estimated coefficient (i) doubles when real credit growth is regressed on contemporaneous real deposit growth and (ii) increases to around unity when median values of bank-level data (as shown in Figure 3) are used to regress real credit growth on contemporaneous real deposit growth.

13. Treating bank-level variables and nonoil private sector GDP growth as endogenous. To help reduce the number of instruments and avoid over-fitting the model, we follow Roodman (2009) and limit lag depth and "collapse" the matrix, or drop zeros from the instrument matrix. Nonetheless, the Hansen statistics of 1 could indicate over-fitting as warned by Roodman (2009).

14. Predicted credit growth using regression results without 2008 and 2009 time dummies is not shown.

15. Information from Bloomberg on the amounts issued is scant. In 2007, the Saudi government issued two 10-years bonds for SAR 200 million each and one 10-years bond for SAR 2 billion.

16. SCIs are unlevered nondeposit taking entities that rely mainly on budgetary support by the MoF. They target lending to, for instance, housing, critical industrial projects, and SMEs, some of which do not have access to bank lending. The Saudi Industrial Development Fund (SIDF) finances industrial projects, the Public Investment Fund (PIF) large scale government and private industrial projects, the Real Estate Development Fund (REDF) individual/corporate residential and commercial real estate, and the Saudi Agricultural Development Fund (SADF) farmers and agricultural projects. The Saudi Credit and Saving Bank (SCSB) provides interest-free loans to small and emerging businesses and professions. Al-sadig (2013) finds that private domestic investment is positively associated with SCI lending.

17. Banks offer bridge financing to construction projects financed by SCIs. One SCI provides SME credit guarantees in collaboration with banks (kafala). Another SCI offers top-up financing for mortgage borrowers to meet the recent 70% LTV limit.

18. Bankscope's classification of state ownership include "General Investment Funds" and "Government of Saudi Arabia via various funds" which are interpreted as the PIF and remaining ownership by the government.

19. Voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption. The point estimates are subject to uncertainty.

20. This is consistent with the result from Alhumaidah et al. (2016). The chapter uses an asset-liability management framework to discuss the benefits and risks as well as the macroeconomic implications of different financing strategies for the fiscal deficit, and illustrates some of these aspects through a simulation analysis. It also reviews a number of policies that will help expand the investor base and reduce financing costs, while having broader positive implications for the economy.

21. The author is grateful to an anonymous reviewer for the suggestion on the specification following Brambor et al. (2006).

22. The indicators are expressed in terms of the distance from historical average in the number of standard deviation (so-called Z score), and introduced in the model in percent change.

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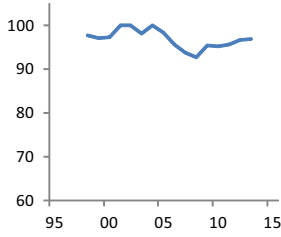
Appendix

2010

2011

2012

2013

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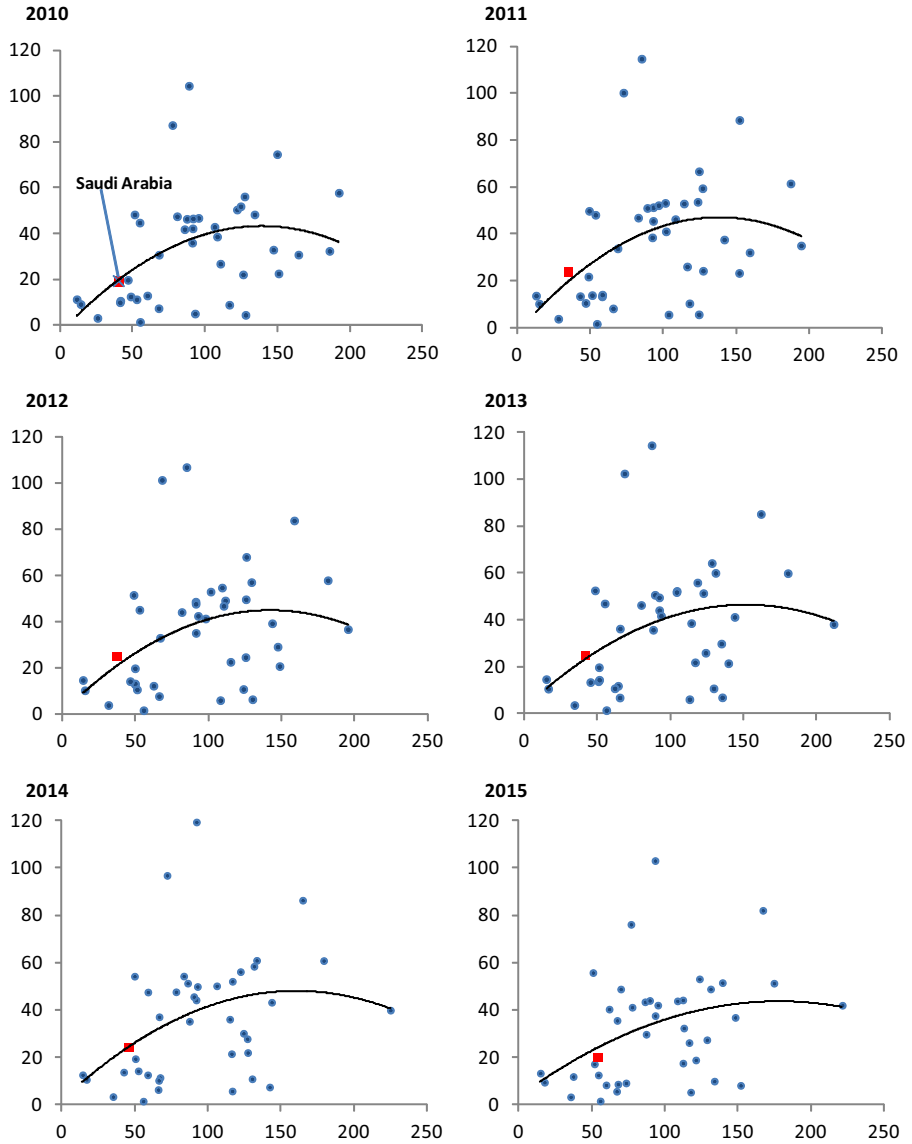
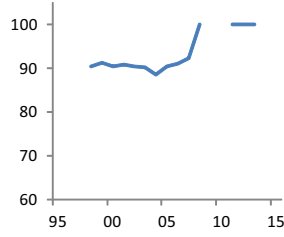**Figure A1.**
Financial Deepening
and Economic
Development

Note(s): The *x*-axis represents bank credit to the nonfinancial private sector as a share of
GDP, the *y*-axis represents GDP per capita in current US$ thousand
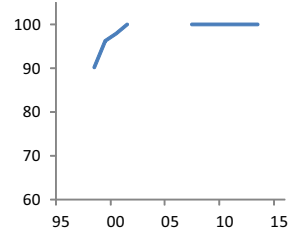**Source(s):** BIS Table F2.4, IMF WEO, and IMF staff calculations
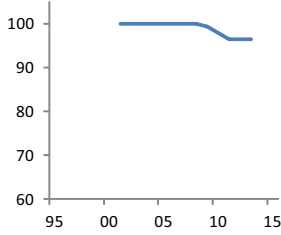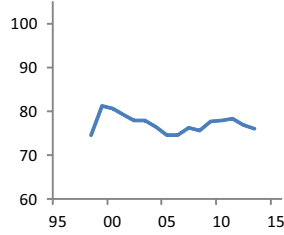
Bahrain

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Saudi Arabia

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United Arab Emirates

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Source(s): IMF staff calculations

154

| Variable name | Description | Unit | Sources | | | Wolrd bank | Aggregation level | |
			Bank scope	Haver	SAMA		Bank level	Macro level
Credit growth	Year on year growth of gross loans deflated by Saudi CPI index	Percent	x	x			x	
Capital ratio, Tier1	Tier 1 capital to risk weighted assets	Percent	x				x	
NPL provisions growth	Year on year growth of NPL provisions deflated by Saudi CPI index	Percent	x	x			x	
Deposit growth	Year on year growth of total customer deposits deflated by Saudi CPI index	Percent	x	x			x	
Net income growth	Year on year growth of net interest income deflated by Saudi CPI index	Percent	x	x			x	
Nonoil private sector GDP growth	Year on year growth of non oil private sector real GDP	Percent		x				x
Oil price growth	Year on year growth of Brent oil prices deflated by US CPI index	Percent		x				x
US Fed funds rate	US Fed funds interest rate effective minus US CPI inflation detrended by linear trend	Percent		x				x
Domestic 3 months interest rate	Saudi 3 months SIBOR minus Saudi CPI inflation detrended by linear trend	Percent		x				x
Excess liquidity	Sum of bank holdings of (1) current and other deposits at SAMA and (2) SAMA bills. Year on year differences divided by bank assets in the base year	Percent		x				x

Table A1.
Data description

Variable name	Description	Unit	Sources			Wolrd bank	Aggregation level	
			Bank scope	Haver	SAMA		Bank level	Macro level
Bank holdings of government bonds, change	Year on year difference in bank holdings of government bonds scaled by bank total assets	Percent	x	x				x
SCI lending growth	Year on year growth of lending by Specialized Credit Institutions deflated by Saudi CPI index	Percent	x					x
Bank concentration index, change	Assets of five largest banks as a share of total commercial banking assets, year on year percentage point change	Percent				x		x

Note(s): SAMA = Saudi Arabian Monetary Authority
Source(s): Author

Table A1.

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