

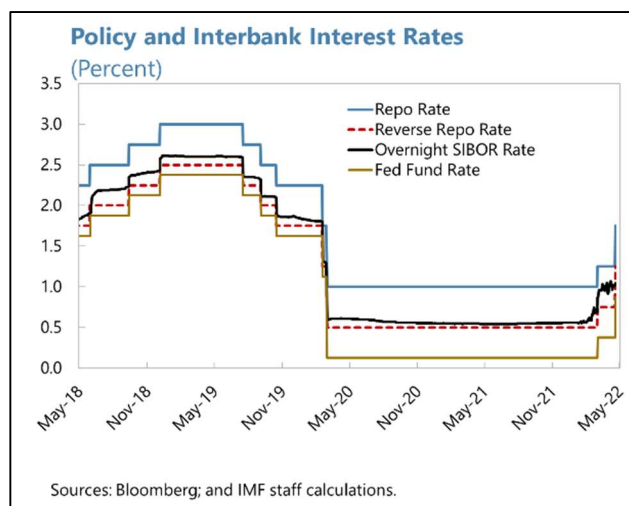
# IMPACT OF U.S. MONETARY POLICY ON THE SAUDI ECONOMY AND BANKING SECTOR<sup>1</sup>

Central bank policy rates in Saudi Arabia follow U.S. policy rates given the pegged exchange rate regime. This can have implications for the overall economy and in particular the banking sector. This paper provides empirical evidence that spillovers from U.S. monetary policy to non-oil GDP growth and banking sector's performance depend on the level of oil prices. We find that U.S. monetary policy tightening is likely to affect banks' profitability positively without hampering credit growth and asset quality. Overall, the results indicate that the ongoing Fed tightening cycle is not expected to adversely impact Saudi Arabia's economy given the current environment of high oil prices and liquidity.

## A. Introduction

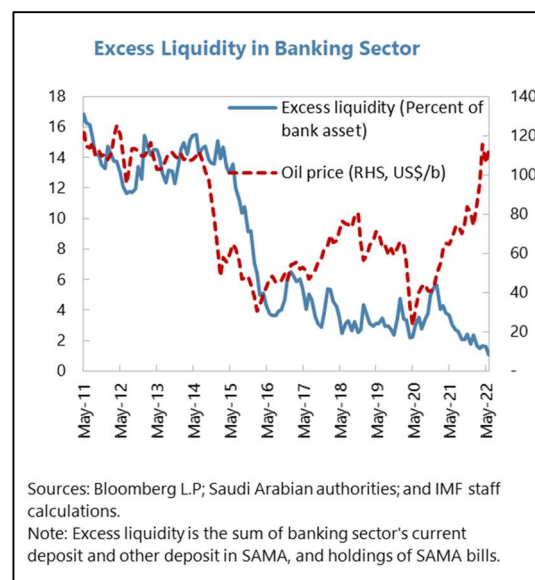
**1. The primary objective of monetary policy in Saudi Arabia is to ensure price and exchange rate stability.** Monetary policy in the Kingdom is anchored by the fixed exchange rate of the Saudi Riyal to the U.S. Dollar. The Saudi Central Bank (SAMA) remains committed to the nominal anchor as its monetary policy objective is to maintain monetary and financial stability to support economic growth.

**2. Monetary policy rates in Saudi Arabia tend to move in line with the federal funds rate.** With open capital accounts and a pegged exchange rate regime, monetary policymakers are faced with the "Mundellian Trilemma" – i.e., SAMA monetary policy cannot substantially deviate from the monetary policy stance in the U.S. From an operational viewpoint, SAMA's monetary policy toolkit includes policy rates, statutory reserve requirements, open market operations, direct deposits, and foreign exchange swaps. The policy rate corridor is comprised of the repo rate (the upper bound) and the reserve repo rate (the lower bound). SAMA determines the range of domestic interest rates by setting the repo and reverse repo rates relative to US policy rates. Within this range, the money market interest rate, i.e., the benchmark Overnight Saudi Inter-Bank Offered Rate (SAIBOR) changes accordingly.



<sup>1</sup> Prepared by Nordine Abidi and Fozan Fared with data support from Tian Zhang (all MCD).

**3. Historically, oil-price driven liquidity fluctuations represented the main challenge to SAMA's monetary policy.** Taking the broad definition of "liquidity" as the subset of SAMA domestic currency liabilities vis-à-vis commercial banks that is readily available for payments purposes (essentially commercial bank excess reserves at SAMA), large external and fiscal surpluses during periods of high oil prices have generally been associated with increases in liquidity, and reversals during times of low oil prices. As a matter of fact, there is a clear relationship between Saudi Arabia's excess reserve ratio and real oil prices. The real oil price was stable around \$25/barrel from 1993 to the early 2000s. It then increased in 2003 and has stayed above \$40/barrel since 2004. Following an almost identical path, excess liquidity in Saudi Arabia was low through most of the 1990s and early 2000s and went up in 2004 and has stayed high since.

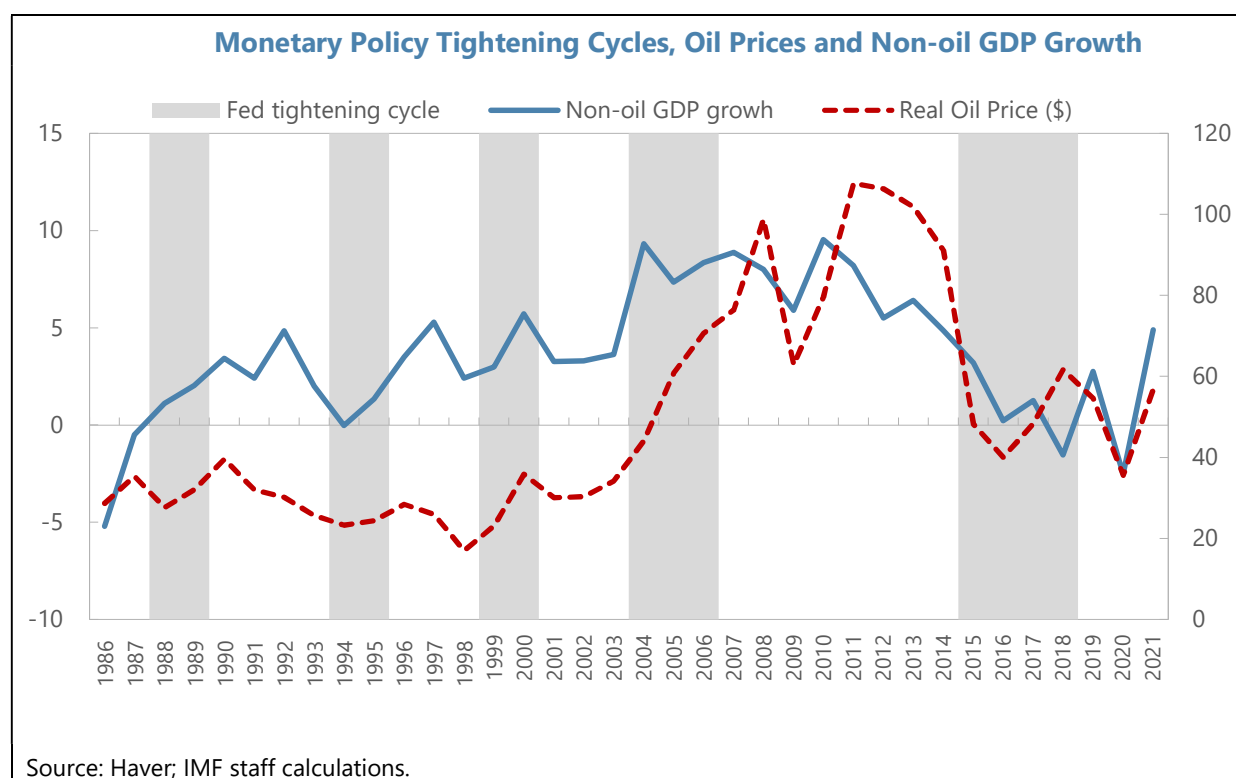


**4. In the recent episode, SAMA adjusted its policy rate in line with the U.S. Federal Reserve normalization.** While inflation in Saudi Arabia is currently lower than in the U.S., SAMA adjusted its nominal policy rates in line with the Fed given the currency peg framework. In particular, the central bank has raised policy rates by 125 basis points since March 2022. An important question is how these changes will affect the economic outlook in Saudi Arabia. Depending on oil price dynamics, risks to growth could be affected by the fast pace of interest rate hikes, and Saudi Arabia monetary policymakers should prepare for potential bouts of economic turbulence.

**5. The main objective of this paper is to provide empirical evidence on the impact of U.S. monetary policy decisions on the Saudi economy and its banking sector.** We analyze the impact of monetary policy decisions on non-oil GDP growth, equity prices and sovereign yields using panel VAR regressions. Furthermore, we conduct a thorough assessment of how the Saudi banking sector is impacted by the U.S. monetary policy decisions by exploiting bank-level panel data to isolate the impact on banks funding costs, asset rates, credit growth, profitability and asset quality. The rest of the paper is structured as follows. Section B discusses stylized facts about past U.S monetary policy tightening cycles and how they have interacted with Saudi Arabia's economic growth and oil prices. This section also provides stylized facts about the banking sector and highlights the substantial variations in banks' funding structures. Section C discusses our empirical strategy and presents the main results. Section D finishes with our concluding remarks.

## B. Stylized Facts: U.S. Monetary Policy and the Saudi Economy

**6. Historically, non-oil GDP growth in Saudi Arabia appears to be more sensitive during U.S. monetary tightening episodes when oil prices are low.** The level of oil prices – through its effect on domestic liquidity – could potentially dampen or amplify the impact of nominal policy rate changes on non-oil GDP growth. Specifically, depending on liquidity conditions – associated with oil prices – market interest rates may deviate from policy rates (Adedeji, 2019). Too abundant liquidity due to high oil prices could lead banks to supply more loans to other financial institutions. This in turn could put downward pressure on banks' funding costs and prompt them to pass it on to borrowers in the form of lower lending rates. Therefore, oil price driven liquidity fluctuations can generate an undesired divergence with policy rates and impede monetary policy transmission. In this regard, monetary policy tightening that coincides with increased liquidity associated with higher oil prices could tend to have a more limited growth impact. While the opposite would be the case if monetary tightening is accompanied by lower oil prices and less liquidity.



**Table 1. Saudi Arabia: Overview of Past Fed Tightening Actions**

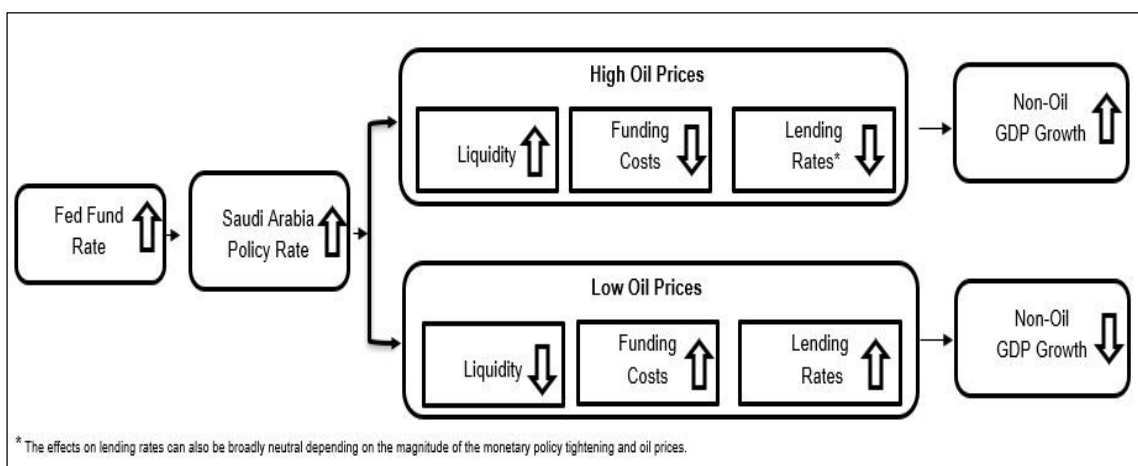
First Tightening Action	Initial FFTR Target (%)	Final Tightening Action	Final FFTR Target (%)	Total Tightening (percentage points)	U.S. Business Expansion Peak	Saudi Average Non-Oil GDP response *	Saudi Median Non-Oil GDP response *
31-Mar-1983	8.5	Aug. 9, 1984	11.5	3	N/A	-2.13	-0.57
29-Mar-1988	6.5	16-May-1989	9.81	3.31	Jul-90	2.62	2.40
Feb. 4, 1994	3	Feb. 1, 1995	6	3	N/A	3.38	3.50
30-Jun-1999	4.75	16-May-2000	6.5	1.75	Mar-01	4.09	3.31
30-Jun-2004	1	29-Jun-2006	5.25	4.25	Dec-07	8.41	8.36
Dec. 16, 2015	0.00-0.25	Dec. 19, 2018	2.25-2.50	2.25	Feb-20	-0.44	-1.54

SOURCES: Federal Reserve Board of Governors, Federal Reserve Bank of St. Louis and NBER.

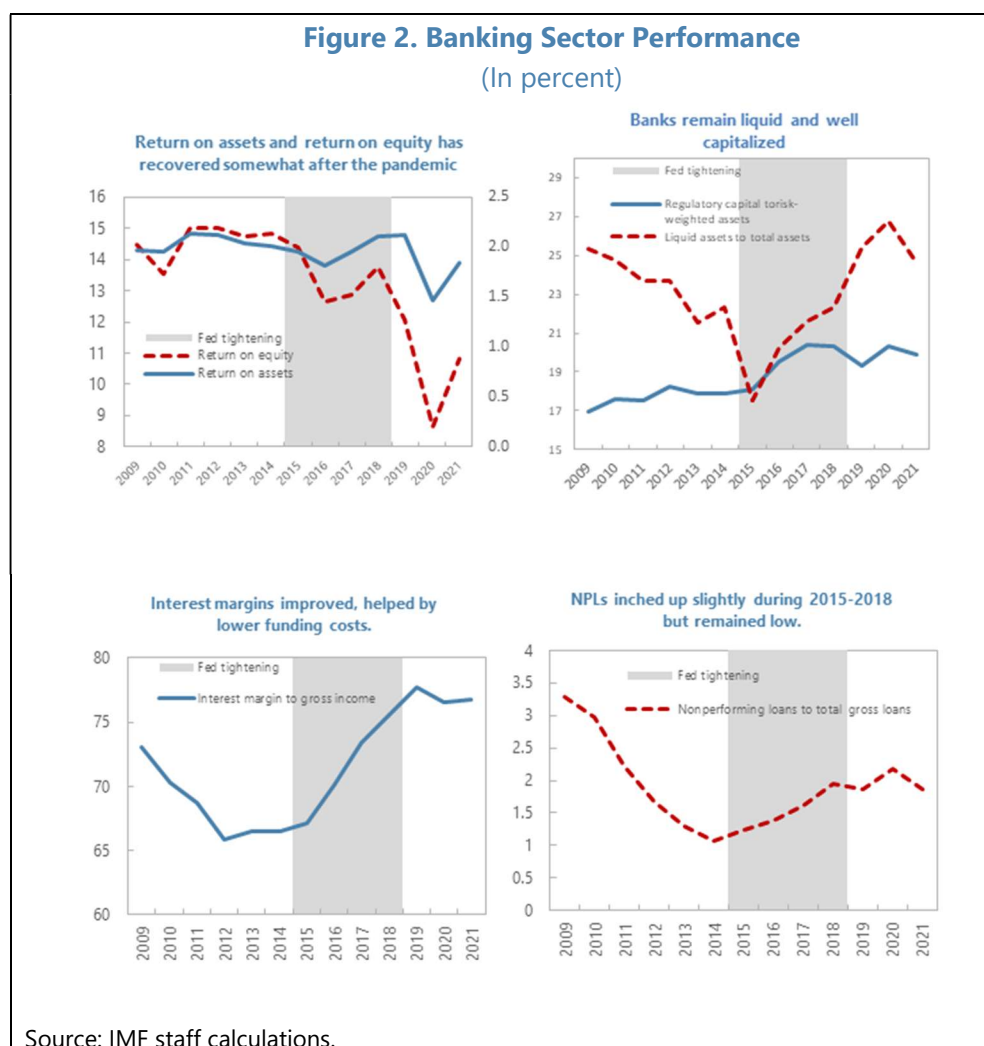
NOTE: "N/A" indicates that a recession didn't follow the tightening episode.

\*Average three-year growth (from the year of final tightening plus two years)

**7. The transmission channels from U.S. monetary policy to Saudi Arabia are likely to depend on oil prices.** Indeed, liquidity swings – due to oil price volatility – could complicate the implementation of SAMA monetary policy, with liquidity imbalances reducing the pass-through of policy rates to market rates. For instance, market interest rates may to a larger extent increase more than normally entailed by policy rates if oil prices and liquidity decline, with banks in turn charging higher rates for loans, slowing down the demand for credit and consequently economic growth.

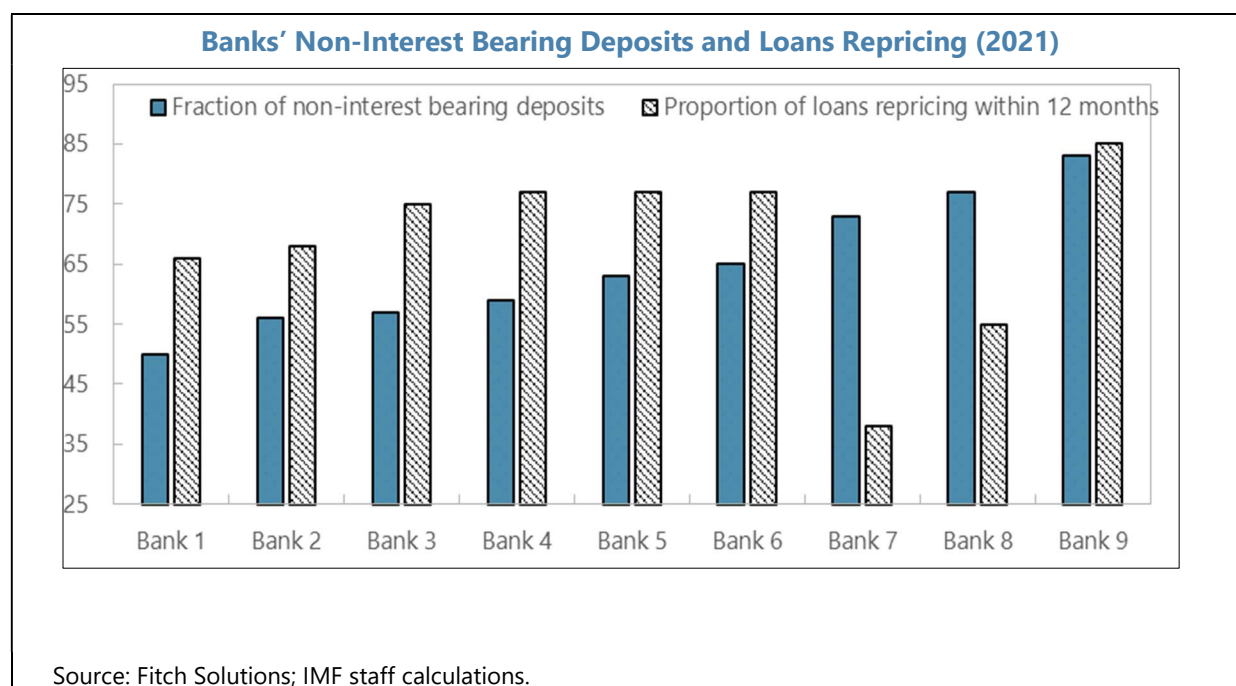
**Figure 1. Oil Prices and Monetary Policy Transmission Channel**

**8. The financial sector in Saudi Arabia is dominated by banks which have grown significantly over the past decade.** Banks' total assets reached about 104.9 percent of GDP at the end of 2021, up from 67.6 percent of GDP in 2013. The banking sector is dominated by large banks with the top 6 banks accounting for 75 percent of total assets. During the Fed tightening cycle of 2015-2018, interest margins of the banks improved, helped mainly by lower funding costs. Currently, banks are well capitalized and liquid, and their profitability rebounded strongly in 2021 after falling in 2020 because of the covid-19 pandemic.



### 9. The banking sector in Saudi Arabia relies heavily on non-interest-bearing deposits.

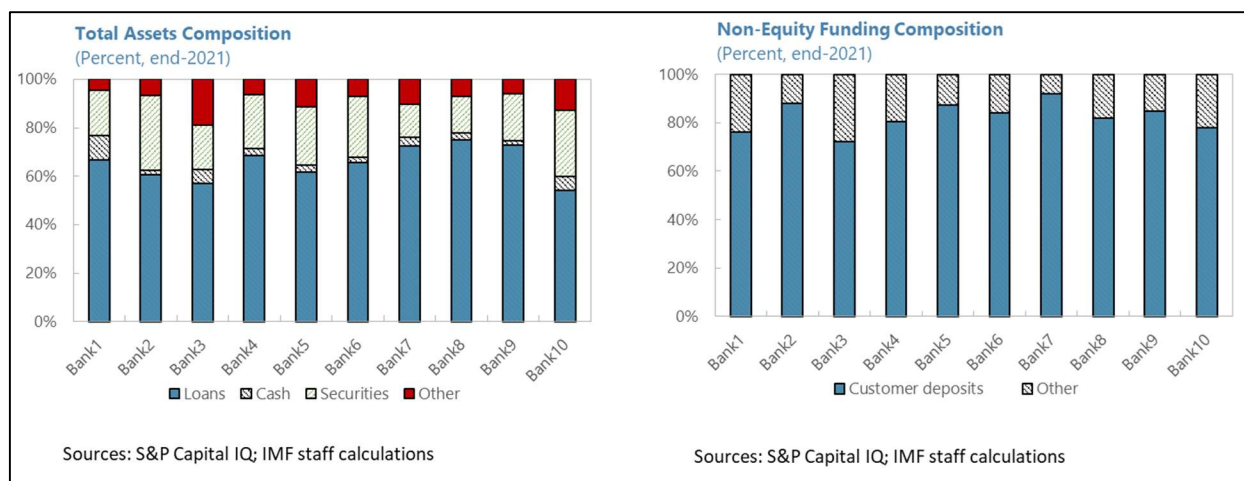
About 65 percent of the banks' deposits are non-interest bearing, mainly to comply with Islamic banking principles. However, there is quite a lot of heterogeneity across banks as the fraction of interest-bearing deposits for some banks is around 50-55 percent while for others it is about 80 percent. Banks with a high proportion of non-interest-bearing deposits are likely to be well positioned to benefit from the interest rate hikes. Similarly, banks with a low proportion of loans repricing is more likely to be adversely affected by the U.S. monetary policy tightening.<sup>2</sup>



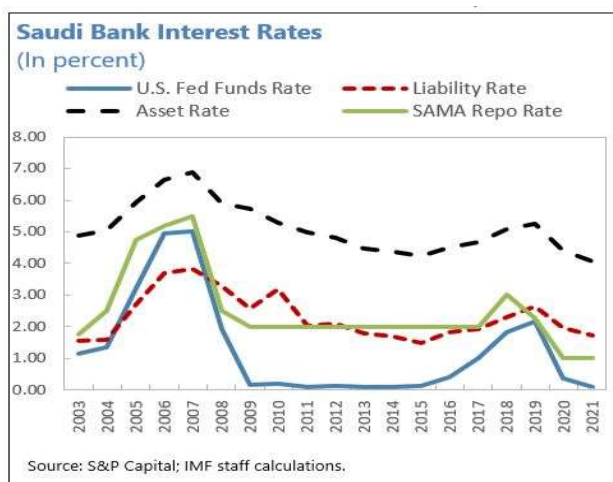
### 10. The assets composition of banks is relatively similar with loans comprising about 64 percent of assets, whereas non-equity funding is mostly comprised of customer deposits.

Certain banks hold a larger proportion of investments, but their investment portfolios are generally quite conservative, mainly comprising Saudi government bonds and other investment-grade securities. The foreign currency book of banks is also relatively small. On the other hand, banks are funded mainly by customer deposits as they account for more than 80 percent of total non-equity funding in 2021. The share of wholesale funding remains low. Funding costs of banks have also benefitted from large government deposits at 0 percent interest rate in 2020.

<sup>2</sup> Banks with a high proportion of mortgage lending at fixed rates are more likely to be impacted by Fed tightening. Mortgage lending has been rapidly growing over the past two to three years to reach about 22 percent of sector loans by the end of 2021 as compared to 9 percent at the end of 2017 (Fitch, 2022).



**11. The banks' liability and asset rates tend to move strongly with policy rates.** The liability rate is defined by interest expense scaled by interest-bearing liabilities whereas the asset rate is measured as total interest income scaled by interest earning assets. The Saudi banking system is not isolated from the changes in the SAMA monetary policy as both rates tend to move in line with nominal policy rates. The spread between these rates (asset and the liability rate) underlines the dynamics behind the margins of banks.



## C. Empirical Evidence of Monetary Spillovers on Saudi Economy

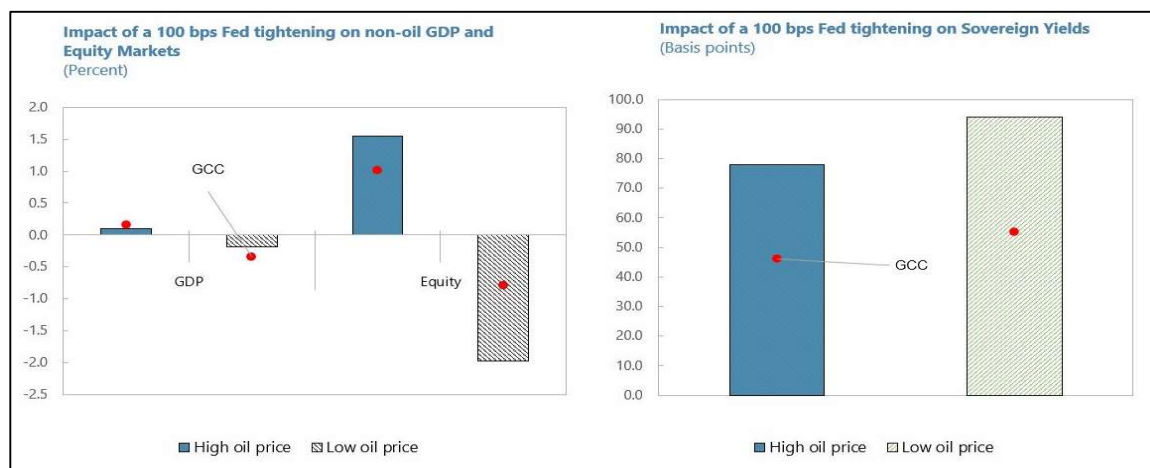
**12. We analyze the impact of U.S. monetary policy tightening on GCC and Saudi Arabia's economic and financial variables using a panel vector autoregression.** In the baseline specification, following IMF's 2014 Spillover Report (IMF, 2014), the dependent variables include non-oil GDP growth, stock market indices and long-term sovereign bond yields. Control variables in this specification include the U.S. effective Fed Fund rates, the Chicago Board Options Exchange volatility index (VIX- as a measure of global uncertainty), domestic inflation and oil prices. The dynamic relationship between the dependent variables (Y) and control variables (X) is modeled as follows:

$$Y_{i,t} = \sum_{l=1}^{l=L} A_l Y_{i,t-l} + \sum_{l=0}^{l=L} B_l X_{t-l} + u_{i,t} \quad (1)$$

**13. We estimate this model using quarterly data covering the period 2018Q1-2021Q4.**

With a small sample size and limited time dimension, we report 6-month average responses, instead of average responses over a longer horizon. The time span is determined by the availability of sovereign yield data. Long term sovereign bond yields in GCC are proxied by bonds ranging from 5- to 13-year maturity. The average time to maturity of sovereign bonds in the sample is less than 10 years.<sup>3</sup>

**14. The VAR estimates suggest that when oil prices are less than \$45 per barrel, monetary spillovers to Saudi Arabia get amplified<sup>4</sup>.** When oil prices are low, non-oil GDP growth declines by about 0.16 percent in Saudi Arabia. In contrast, the effect of Fed tightening is negligible when oil prices are high. The effect is slightly higher for GCC countries on average. Similarly, equity prices drop by about 2 percent when oil prices are low and increase by 1.5 percent when oil prices are above the \$45 threshold. Sovereign yields amongst GCC countries increase by about 55 basis points when oil prices are low (94 basis points in Saudi Arabia) and only by 46 basis points when oil prices are high (78 basis points in case of Saudi Arabia). This result should be interpreted as that there is a level of oil price above which the impact from the U.S. monetary policy cycle becomes economically insignificant for Saudi Arabia. These findings are similar to the ones found by Adedeji et al. (2019). Therefore, in the current environment, high oil prices will likely mitigate spillovers from U.S. monetary policy normalization to Saudi Arabia.



## D. Implications for the Banking Sector

**15. There are substantial variations in banks' funding structures that can help tease out the impact of U.S. policy rate decisions.** With a banking structure with low wholesale funding and a high percentage of unremunerated demand deposits, some banks finance their operations almost entirely through uncompensated deposits while others see their cost of funding oscillate with policy rates. We begin our analysis by using bank-level panel analysis, which covers the period from 2003-

<sup>3</sup> This method was also used in the recent REO, April 2022. This is similar to Adedeji et al. (2019) and Giovanni and Shambaugh (2008) who use foreign interest rates as exogenous variables. IMF (2014) decomposes the drivers of the US 10-year Treasury yield into money and real shocks.

<sup>4</sup> For the choice of the threshold, see IMF (2019).



2021. In the baseline equation (2), the main dependent variables are changes in liability and asset rates, return on equity, credit growth and asset quality. The main explanatory variable is the change in the U.S. Federal Funds Rate. All specifications included bank fixed effects and several controls to take into account macroeconomic fluctuations. Standard errors are clustered at the bank level.<sup>5</sup>

$$\Delta Y_{i,t} = \alpha_0 + \alpha_1 \Delta MP_t + \Gamma X_{i,t} + FES + u_{i,t} \quad (2)$$

**16. Our estimates suggest a significant pass through from U.S. interest rates to Saudi banks' liability and asset rates.** Results in Table 2 suggest that when U.S. rates rise by 100 basis points, Saudi banks' liability rates rise by 51 basis points and their asset rates by close to 57 basis points. This could be explained by the fact that banks in Saudi Arabia have a relatively high share of variable-rate loans, which allow increases in banks' funding costs to be swiftly passed on to customers. Also, Saudi Arabia's banking system exhibits large proportion of deposits not receiving interest (i.e., for compliance with Islamic principles) but there is quite a lot of heterogeneity as discussed earlier.

VARIABLES	(1) Δ Liability Rate	(2) Δ Liability Rate	(3) Δ Liability Rate	(4) Δ Liability Rate	(5) Δ Asset Rate	(6) Δ Asset Rate	(7) Δ Asset Rate	(8) Δ Asset Rate
Δ Federal Funds Rate	0.488***	0.491***	0.550**	0.512**	0.461***	0.467***	0.581***	0.574***
	(0.128)	(0.133)	(0.170)	(0.189)	(0.044)	(0.048)	(0.074)	(0.082)
Δ Oil Price (\$)			-0.163	-0.120			-0.283*	-0.274
			(0.147)	(0.150)			(0.142)	(0.150)
Log (Uncertainty Index)			0.326	0.330			0.657**	0.658**
Crisis Dummies			(0.308)	(0.308)			(0.247)	(0.247)
				-0.382*				-0.073
				(0.202)				(0.124)
Bank Fixed Effects		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
		Yes	Yes	Yes		Yes	Yes	Yes
Clustering	Banks	Banks	Banks	Banks	Banks	Banks	Banks	Banks
Observations	169	169	169	169	170	170	170	170
R-squared	0.176	0.178	0.185	0.193	0.211	0.231	0.268	0.268

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**17. Despite substantial differences in funding structures, banks' profitability seems to be insulated from shifts in U.S. policy rates.** Our preliminary results suggest that the impact of tighter U.S. monetary policy on banks' profitability is positive and statistically significant. Regressions controlling for bank time-invariant characteristics, oil prices and the Chicago Board Options Exchange Volatility Index (VIX), which reflects global uncertainty, confirm that an upward shift in

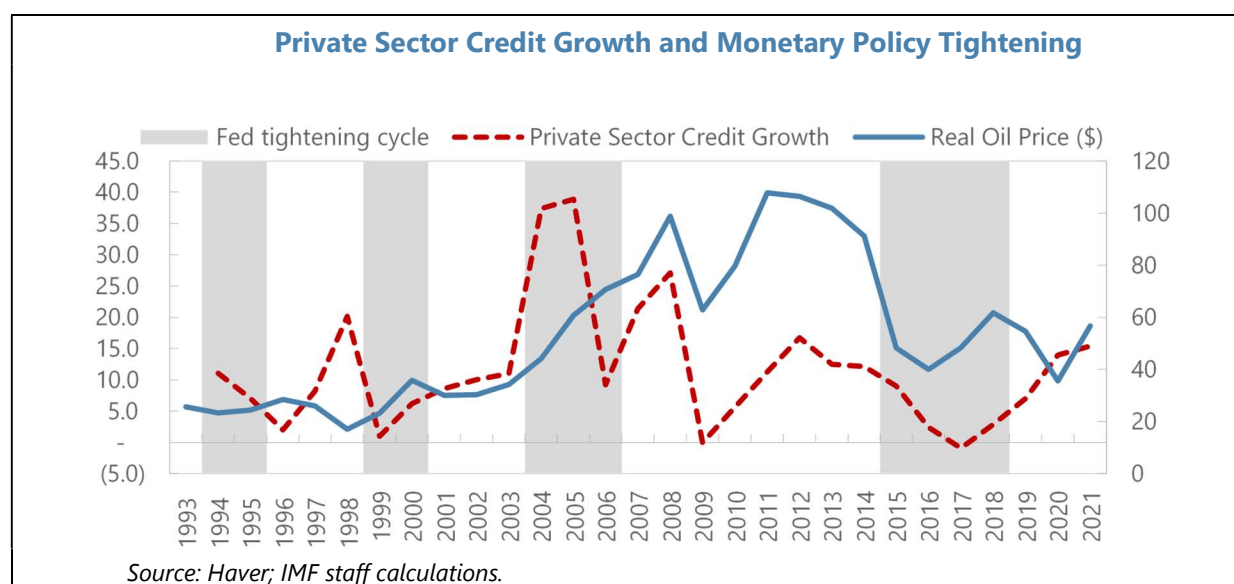
<sup>5</sup> See Appendix A for a detailed description of variables.

interest rates is associated with a rise in return on equity <sup>6</sup>. Overall, notwithstanding differences in funding structures, bank profitability is likely to remain insulated from shifts in nominal policy rates.

VARIABLES	(1)	(2)	(3)	(4)
	$\Delta$ ROE	$\Delta$ ROE	$\Delta$ ROE	$\Delta$ ROE
$\Delta$ Federal Funds Rate	0.020*** (0.005)	0.020*** (0.005)	0.021*** (0.006)	0.018** (0.006)
$\Delta$ Log (Oil Price)			0.021 (0.015)	0.025 (0.018)
$\Delta$ Log (Uncertainty Index)			0.014 (0.011)	0.014 (0.011)
Crisis Dummies				Yes
Bank Fixed Effects		Yes	Yes	Yes
Clustering	Banks	Banks	Banks	Banks
Observations	180	180	180	180
R-squared	0.078	0.386	0.393	0.408

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

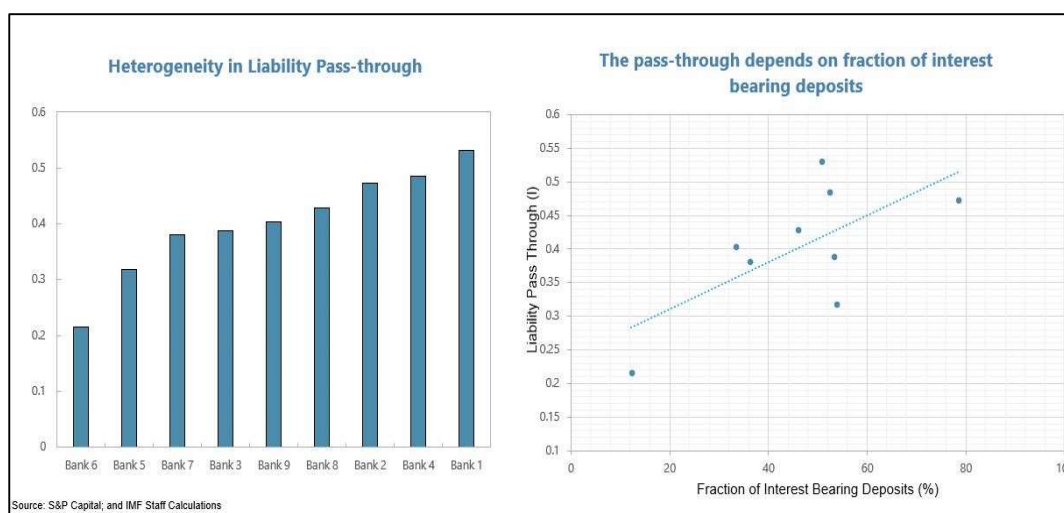
**18. Historically, there has been a limited impact of monetary policy tightening episodes on credit growth in periods when oil prices were high.** Despite tightening episodes during 2004-2007 and 2015-2018, credit growth remained strong during these time periods as oil prices were at relatively high levels. At the aggregate level, the relationship between credit growth and monetary policy tightening is not quite visible. However, tightening episodes combined with low oil price levels seem to negatively impact credit growth.



<sup>6</sup> As shown in IMF (2019), the positive impact on profitability ratios is likely to reflect the high proportion of non-interest-bearing deposits or the ability of some banks to pass through rates to customers.

**19. While at the aggregate level the impact of monetary policy tightening on credit growth might be muted, certain banks could be adversely affected.** Therefore, we construct a measure of the overall sensitivity of bank liabilities to changes in U.S. monetary policy at the bank level: liability pass-through (LPT)<sup>7</sup>. Using bank level panel regressions, we estimate LPT in which the dependent variable is the change in the bank's liability rate, and the independent variable is the change in the U.S. Federal Funds Rate. The estimated coefficient  $\alpha_1$  is a measure of how sensitive a bank is to monetary shocks. For banks with a coefficient close to 1, liability rates respond almost one to one with U.S. monetary policy and these banks can be classified as sensitive banks. On the other hand, banks with a coefficient close to 0, liability rates do not respond strongly to U.S. monetary policy and can be classified as insensitive banks. We use LPT as our main measure of cross-sectional variation across banks.

**20. The results of the liability pass-through suggest that some banks are more sensitive to U.S. monetary policy tightening.** In line with our expectations, LPT is closely associated with the interest-bearing fraction of deposits as shown below. It is important to note that banks with similar fractions of interest-bearing deposits can have different LPTs. For instance, deposits may account for different fractions of liabilities and the strength of deposit franchises or market power may also vary.



**21. The findings suggest that Fed tightening does not impact credit growth and asset quality.** We find that credit growth is not affected even for banks with a higher passthrough. However, in an environment of low oil prices, monetary policy tightening can hamper credit growth for banks with high LPTs. Put differently, our findings support the idea that the fast pace of US interest rate hikes could hamper credit growth but only in an environment where oil prices are low. However, in the current context of high oil prices, the Saudi banking system is likely to easily absorb the higher rates and generate credit growth. Moreover, regarding asset quality as measured by the change in non-performing-loans, we do not find any significant impact of U.S. monetary policy tightening. This result holds even for banks with a higher liability passthrough. In equation (3) below,  $MP_t$  is the measure of U.S. monetary policy, LPT is a dummy that is equal to one if the bank has an

<sup>7</sup> We rely on the same methodology as in Adedeji et al. (2019).

estimated liability passthrough above the sample median value and Oil Price is a dummy that is equal to one if real oil prices are higher than \$45 cutoff. The key coefficient of interest is  $\alpha_1$  which represents the triple interaction term.

$$\Delta Y_{i,t} = \alpha_0 + \alpha_1 \Delta MP_t * LPT_{i,t} * Oil\ Price + \Gamma X_{i,t} + FEs + u_{i,t} \quad (3)$$

**Table 4. Saudi Arabia: Pass-through from US Rates to Banks' Credit Growth**

VARIABLES	(1) $\Delta \ln(\text{Credit})$	(2) $\Delta \ln(\text{Credit})$	(3) $\Delta \ln(\text{Credit})$
$\Delta MP$	-0.042	-0.080	-0.156
$(\Delta MP) * (\text{LPT Dummy})$		0.097	-0.762***
$(\Delta MP) * (\text{LPT Dummy}) * (\text{Oil})$			0.981***
Additional Controls	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
Observations	138	138	138
R-squared	0.023	0.025	0.087

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 5. Saudi Arabia: Pass-through from US Rates to Banks' Asset Quality**

VARIABLES	(1) $\Delta(\text{NPLs})$	(2) $\Delta(\text{NPLs})$	(2) $\Delta(\text{NPLs})$
$\Delta MP$	-0.074	0.031	0.009
$(\Delta MP) * (\text{LPT Dummy})$		-0.243	0.061
$(\Delta MP) * (\text{LPT Dummy}) * (\text{Oil})$			-0.338
Additional Controls	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
Observations	154	154	154
R-squared	0.044	0.057	0.065

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**22. Additional robustness checks confirm our main findings.** First, to account for quantitative easing in the aftermath of the financial crisis, we replace effective federal funds rate with Wu-Xia shadow Federal Funds rate when the federal funds rate hit the zero-lower bound, and the results confirm our main findings. Second, we also look at the increase in U.S. 10-year Treasury yields as a proxy for change in U.S. monetary policy decisions and our results remain robust. Third, we also add additional controls such as government spending and U.S. growth rate to control for potential endogeneity bias arising from omitted variable bias. Our main results still hold.

## E. Concluding Remarks

**23. This paper has looked at the impact of U.S. monetary policy decisions on the Saudi economy and the banking sector, with emphasis on the role of oil prices.** Policy rates in Saudi Arabia broadly follow the U.S. policy rates, and the liability and asset rates of banks also tend to move strongly with the U.S. policy rates given the peg. Our results highlight that the level of oil prices play an important role in determining how changes in the U.S. interest rates affect non-oil GDP growth and banking sector's performance in Saudi Arabia. Liquidity fluctuations driven by oil prices could influence the impact of monetary policy tightening on non-oil growth. Our analysis indicates that the expected changes in the U.S. policy rates are not expected to negatively affect Saudi Arabia's economy given the current environment of high oil prices and liquidity.

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## Appendix I. List of Variables and Definitions

Variable	Definition	Source
Federal Funds Effective Rate	The federal funds rate is the interest rate at which depository institutions trade federal funds (balances held at Federal Reserve Banks) with each other overnight.	FRED database
Shadow rate	The shadow rate is the interest rate which reflects nominal policy rates when they are close to the zero lower bound.	Wu-Xia shadow rate
10 Year U.S. treasury yield	Market yield on U.S. Treasury Securities at 10-Year constant maturity.	FRED database
Liability Rate	The liability rate is interest expense scaled by interest-bearing liabilities.	S&P Capital data; IMF staff calculations
Asset Rate	The asset rate is total interest income scaled by interest earning assets.	S&P Capital data; IMF staff calculations
Non-interest-bearing deposits	Proportion of total deposits at the bank which are unremunerated.	S&P Capital data
Real Oil Price (\$)	Brent oil price deflated by US CPI inflation.	Bloomberg
The Chicago Board Options Exchange volatility index (VIX- as a measure of global uncertainty)	VIX measures market expectation of near-term volatility conveyed by stock index option prices.	FRED database