

Assessing the Importance of Oil and Interest Rate Spillovers for Saudi Arabia

Prepared by Goblan Algahtani, Nayef Alsadoun (both SAMA), Tim Callen
Ken Miyajima, Dirk Muir, and Ben Piven (all IMF)

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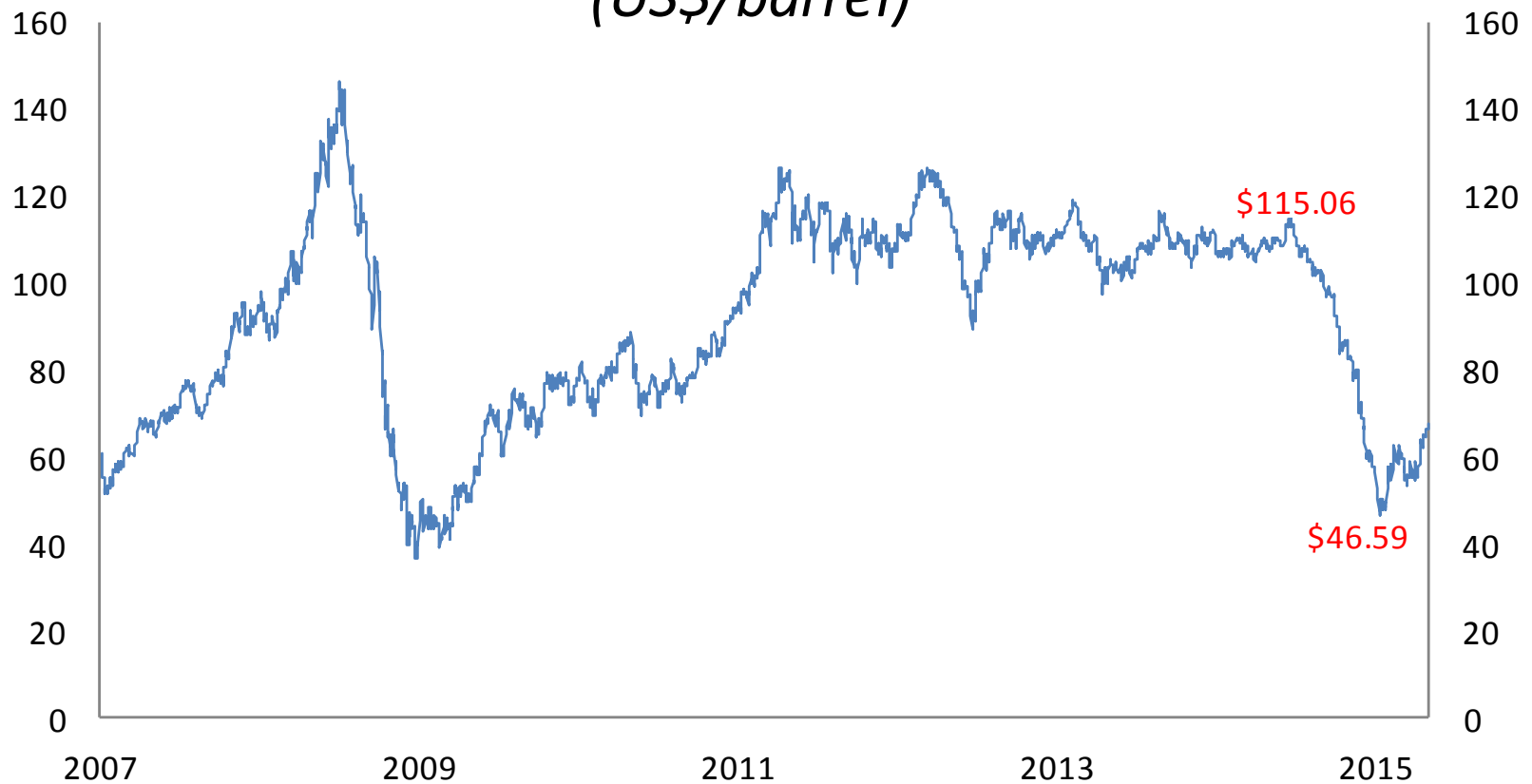
SAMA Quarterly Workshop, Riyadh

Overview

- Motivation for paper
- Results from a VAR analysis
- Event studies of oil price drops/interest rate increases
- Results from the IMF's G-20MOD
- Looking in greater depth at the financial sector impact

Oil prices have fallen by 40 percent since June...

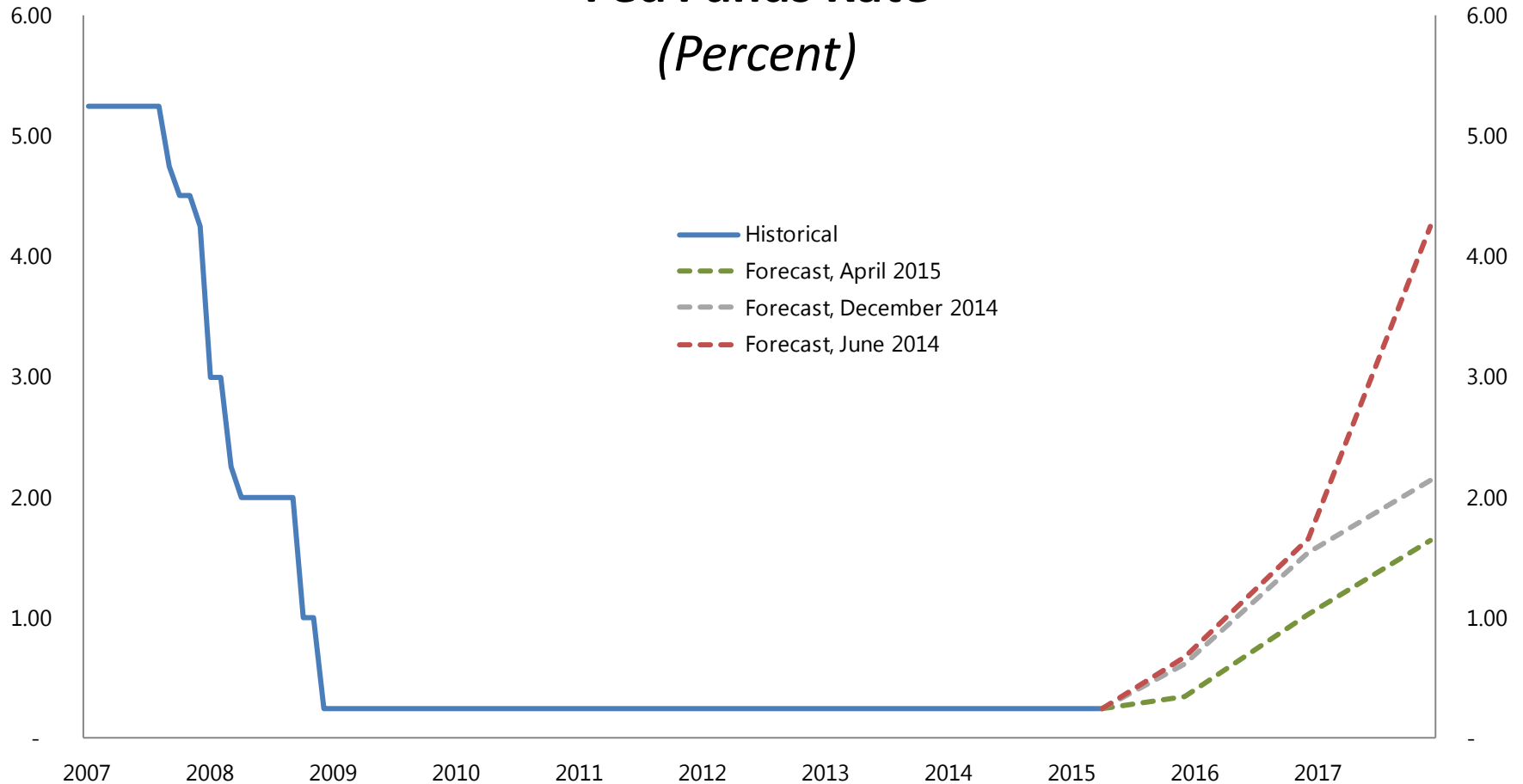
Brent Crude Price, 2007-Current (US\$/barrel)



Source: Bloomberg

....and U.S. interest rates are expected to increase

Fed Funds Rate (Percent)



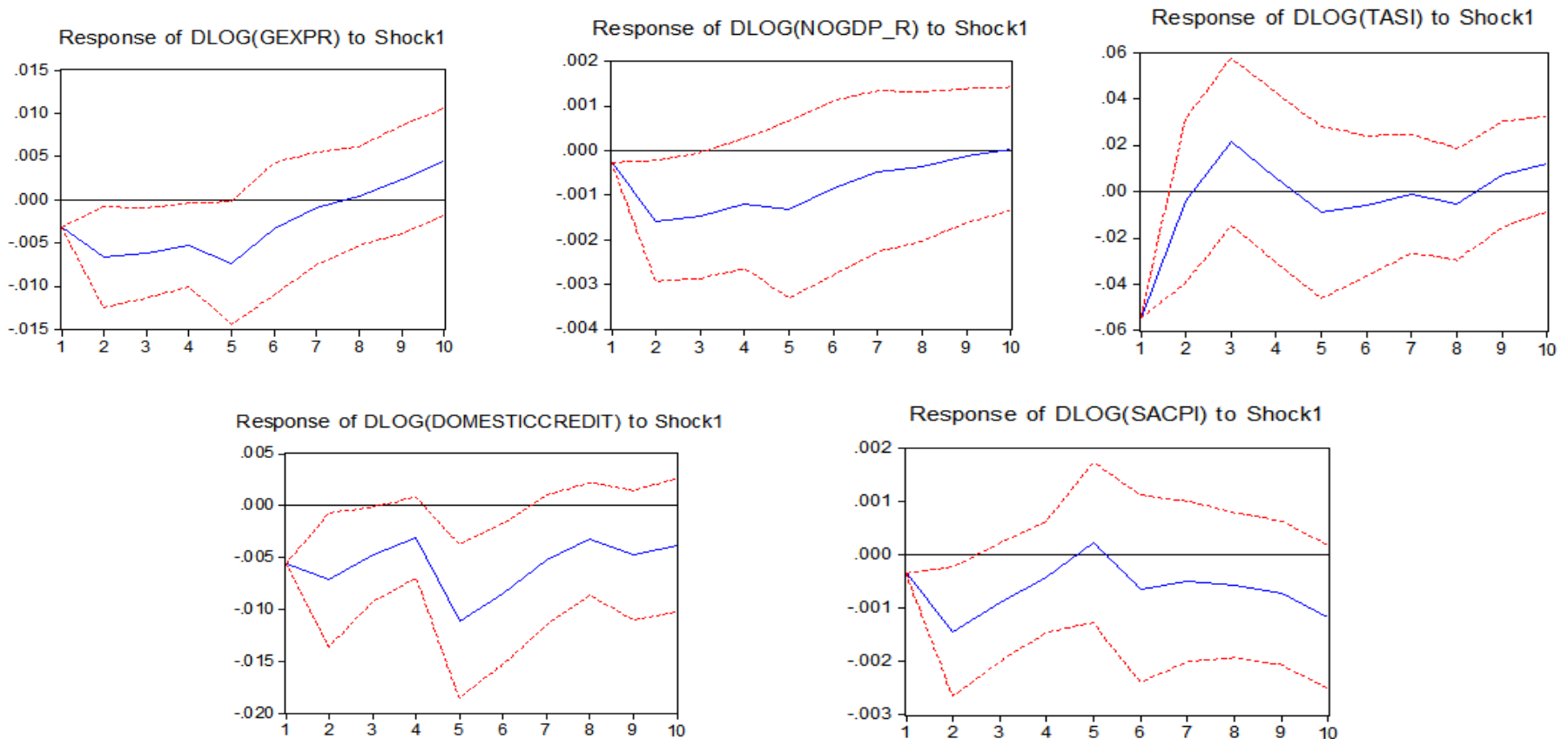
Source: Bloomberg

Background

- Oil key for Saudi economy (over 80 percent of external revenues, 90 percent of fiscal revenues).
- Peg means Saudi interest rates move closely with U.S. rates.
- Past studies of oil exporters have found that government spending and equity prices are key transmission channels for oil prices.
- Little impact found for an interest rate channel.

VAR: Impulse responses to oil price shocks

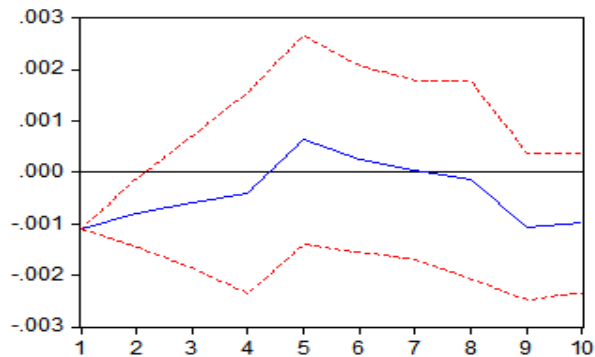
- Impact of one standard deviation negative shock to oil prices (i.e. a decline of 14.3 percent)
- Domestic credit growth and equity prices decline
- Government spending contracts
- Inflation and real non-oil GDP growth also decline



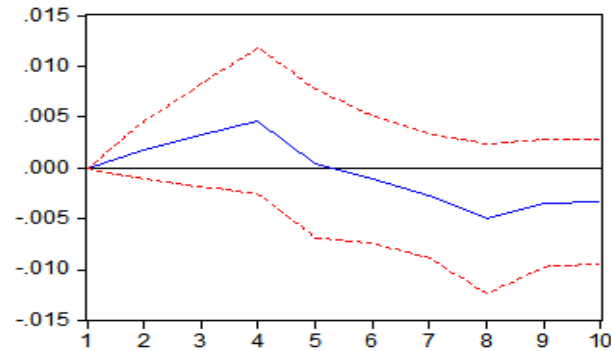
VAR: Impulse responses to Fed Funds shock

- Impact of one standard deviation positive shock to the Fed Funds rate (i.e., an increase of 35 basis points)
- Inflation and real non-oil GDP growth both decline. Small initial negative impact on equity prices
- No significance on other variables

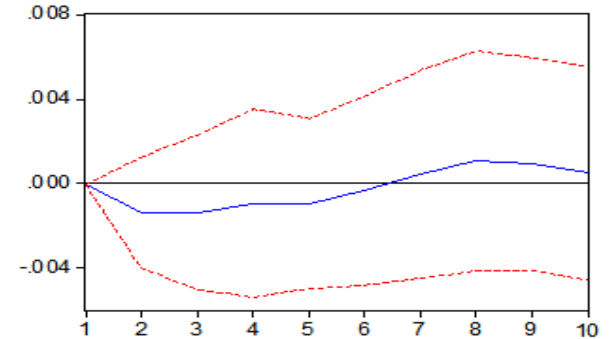
Response of DLOG(NOGRDP_R) to Shock2



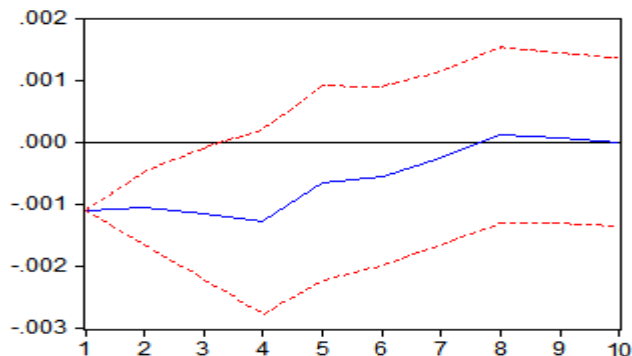
Response of DLOG(GEXPR) to Shock2



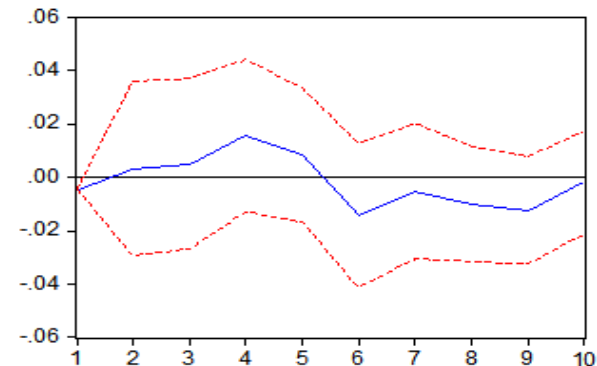
Response of DLOG(DOMESTICCREDIT) to Shock2



Response of DLOG(SACPI) to Shock2



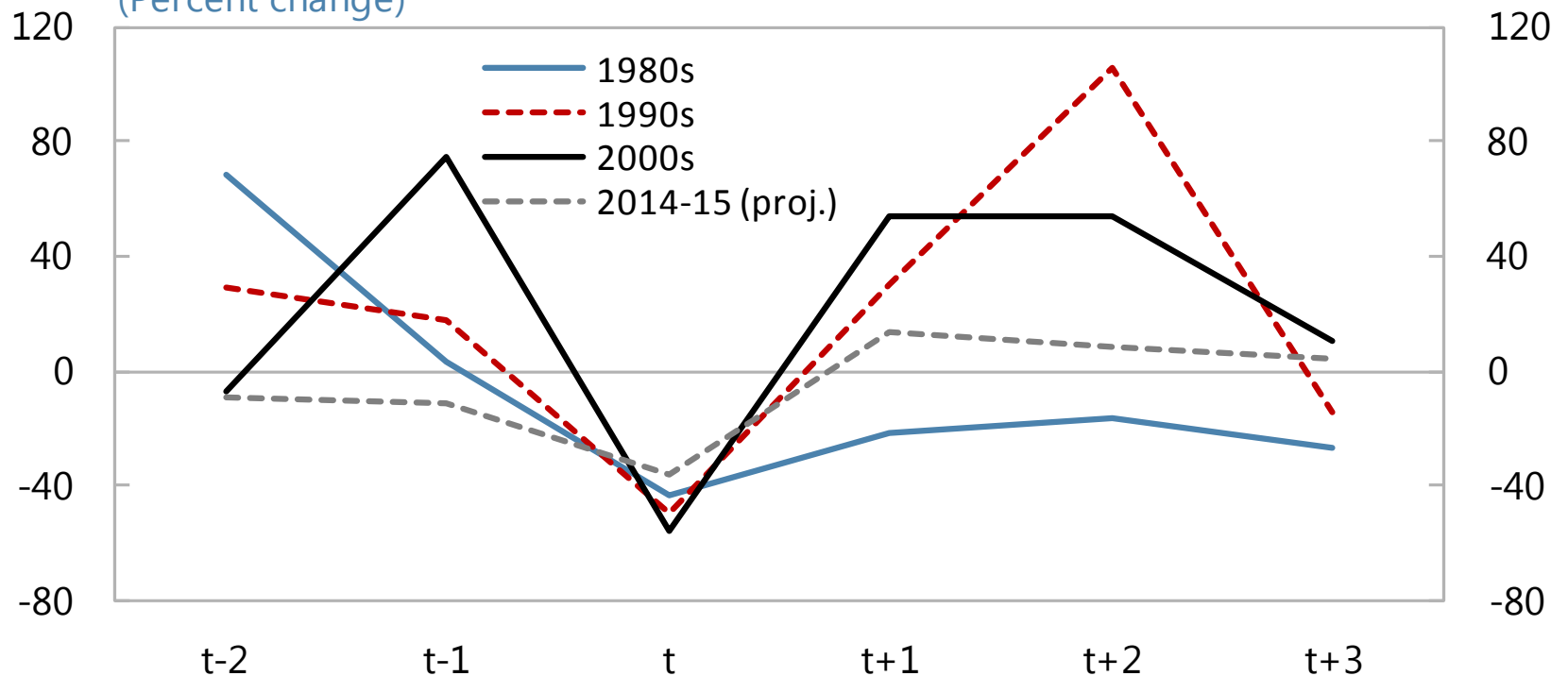
Response of DLOG(TASI) to Shock2



Oil revenue declines during historical oil price slumps

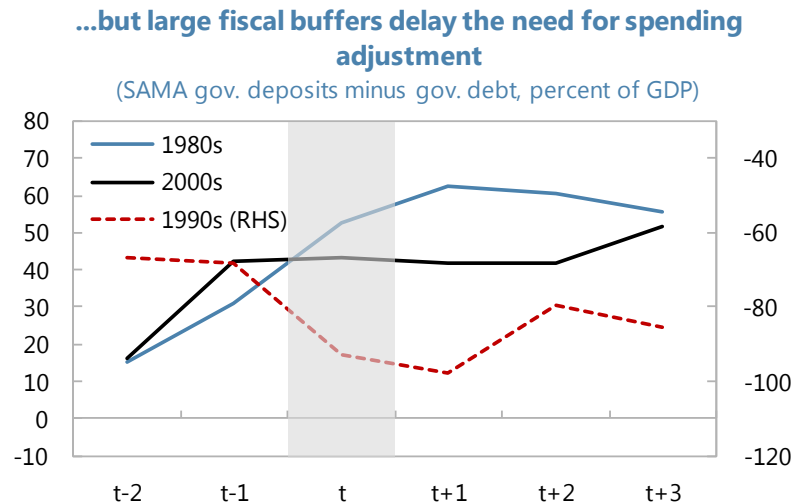
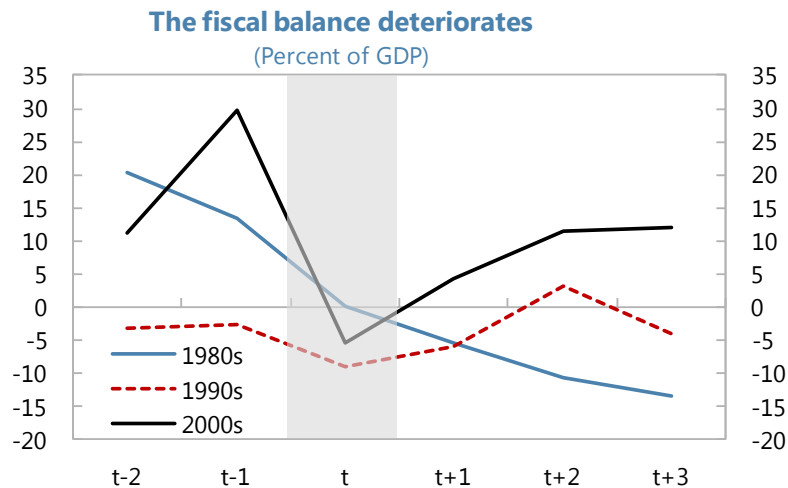
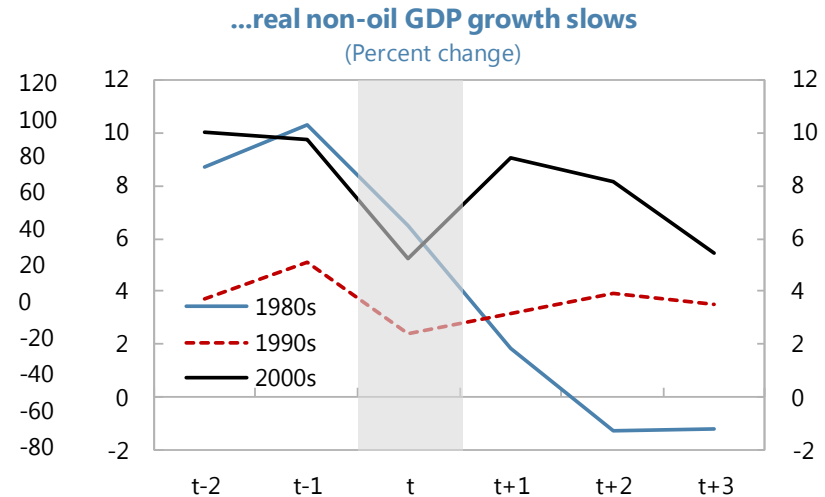
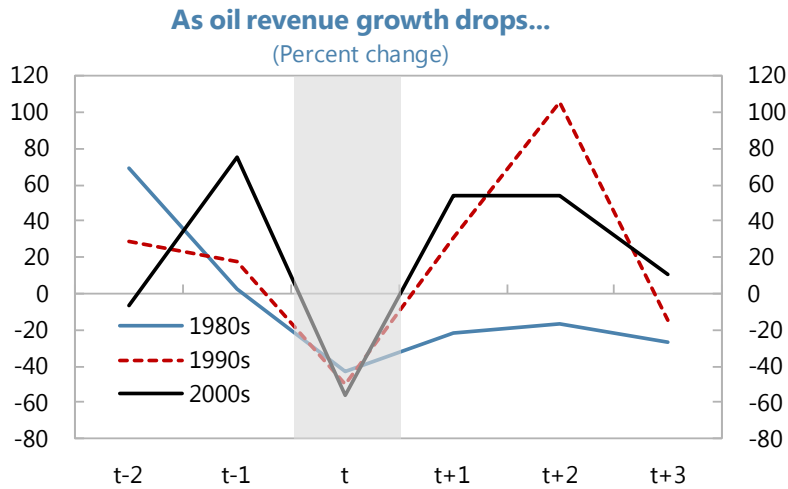
Oil Revenue Declines During the Three Historical Episodes and Current Price Decline

(Percent change)



Note: Year t=0, corresponds to 1982, 1998, 2009 and 2014 for the '1980s,' '1990s,' '2000s,' and '2014-15' price decline events, respectively.

Oil price slumps through the years – how they impact Saudi Arabia



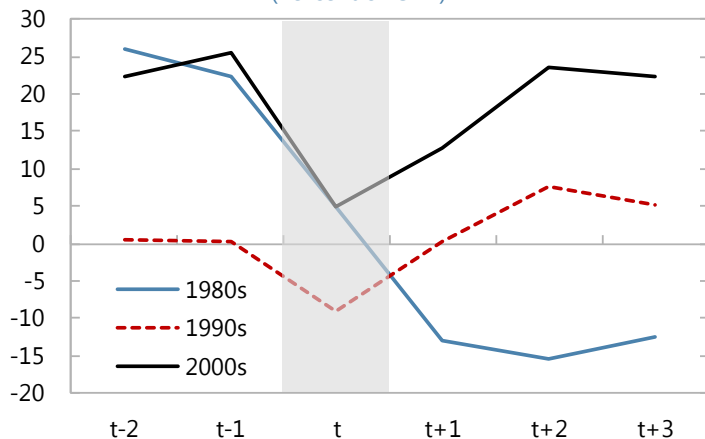
Source: IMF staff estimates.

Note: The trough year for oil revenues, time $t=0$, corresponds to 1982, 1998 and 2009 for the "1980s," "1990s" and "2000s" events, respectively.

Oil price slumps through the years – how they impact Saudi Arabia (cont'd)

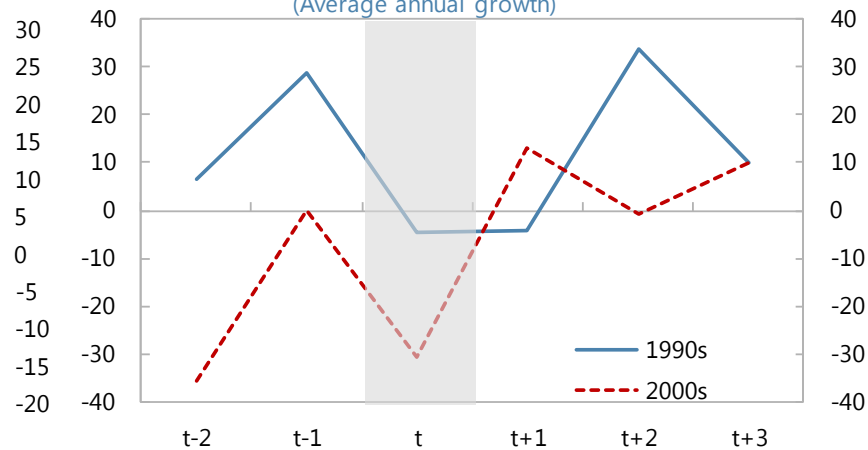
The current account balance also weakens

(Percent of GDP)



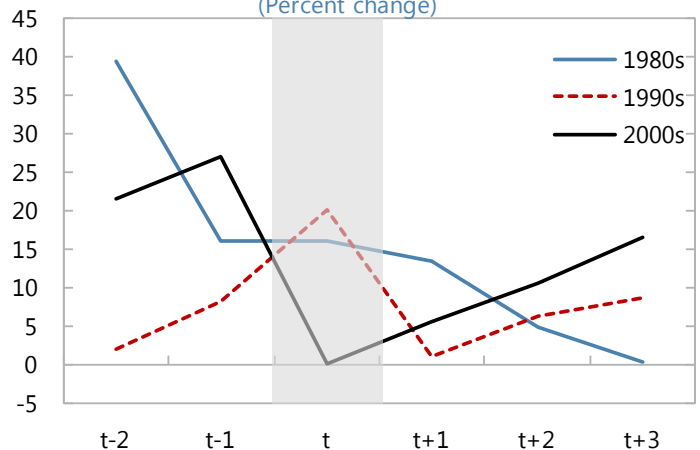
Equity prices fall...

(Average annual growth)



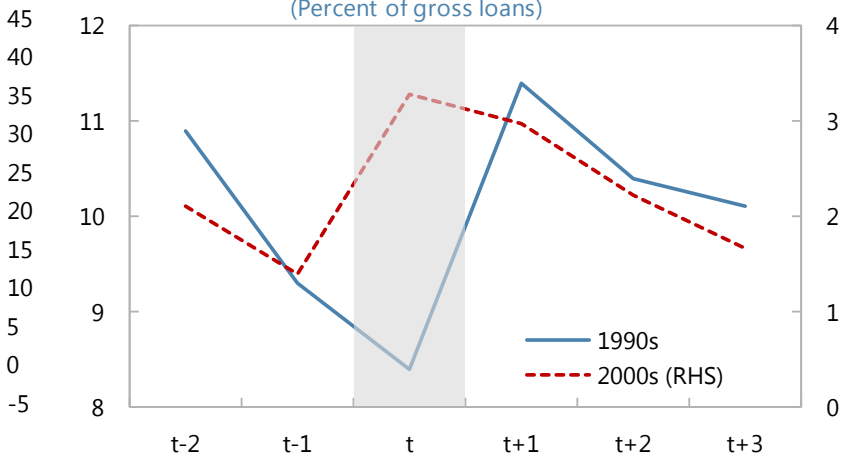
...and credit growth slows

(Percent change)



Non-performing loans rise

(Percent of gross loans)

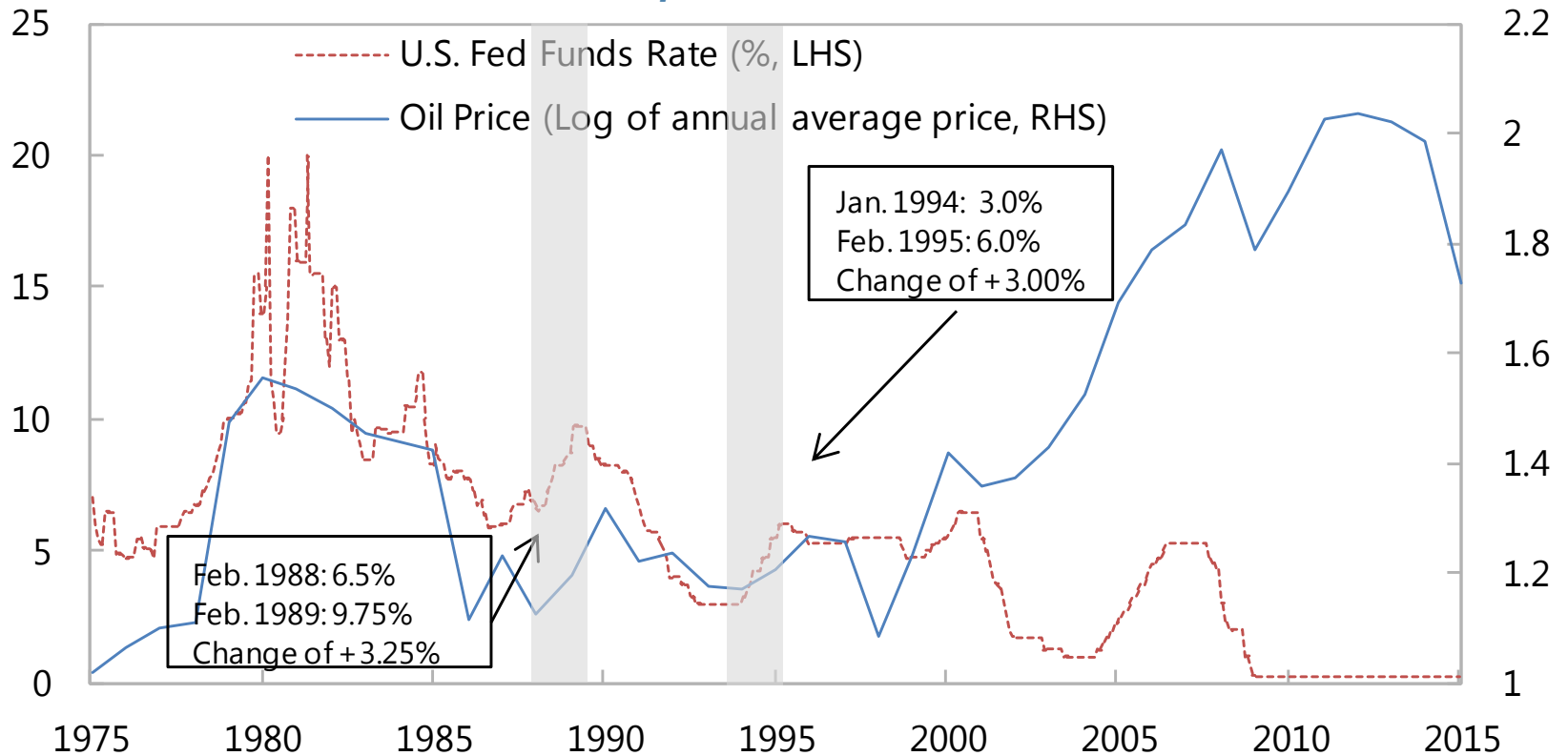


Source: IMF staff estimates.

Note: The trough year for oil revenues, time $t=0$, corresponds to 1982, 1998 and 2009 for the "1980s," "1990s" and "2000s" events, respectively.

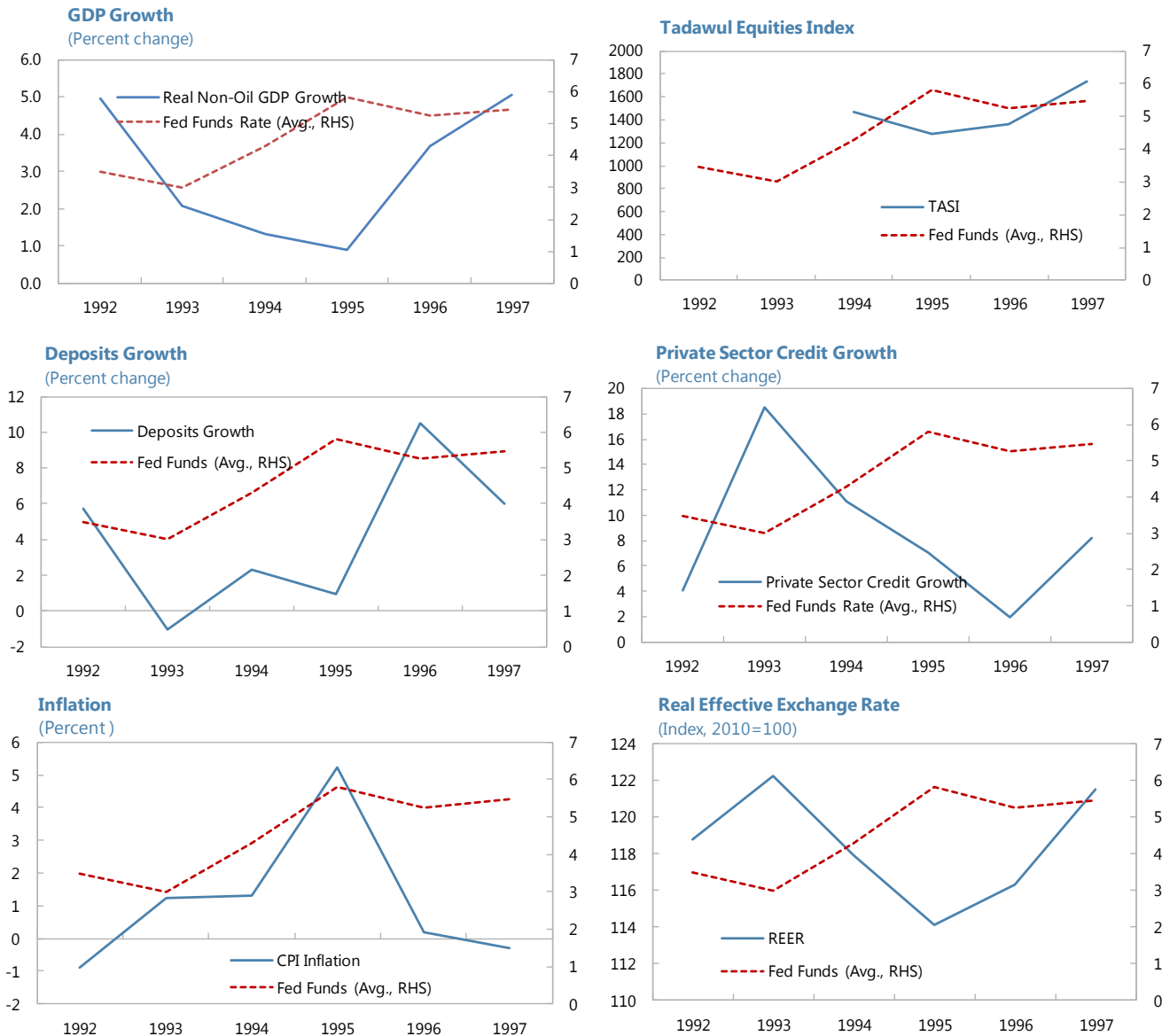
U.S. Fed Funds Rate and Oil Prices

Oil Price and Interest Rates, 1975-2015



Sources: St. Louis Fed, Federal Reserve Economic Data (FRED); Bloomberg

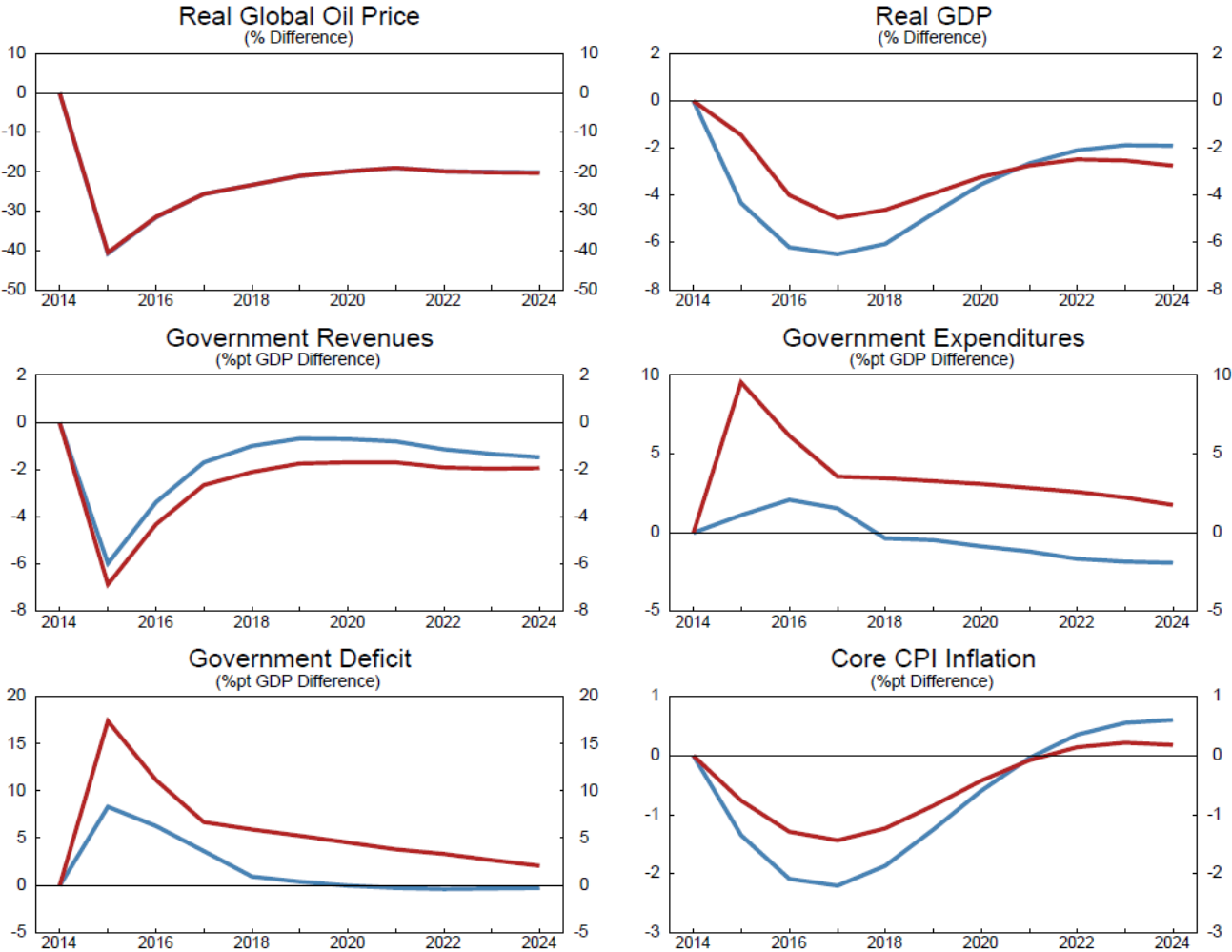
Economic and Financial Developments Around the 1994-95 Tightening of U.S. Monetary Policy



G-20MOD: Permanent Decline in Global Oil Prices

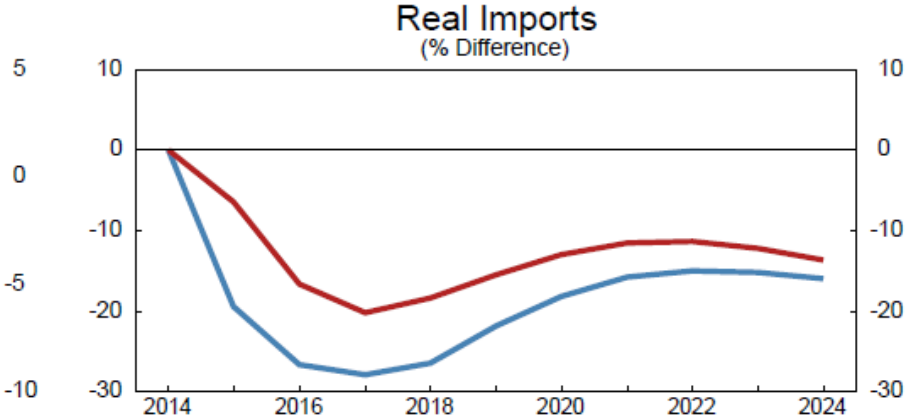
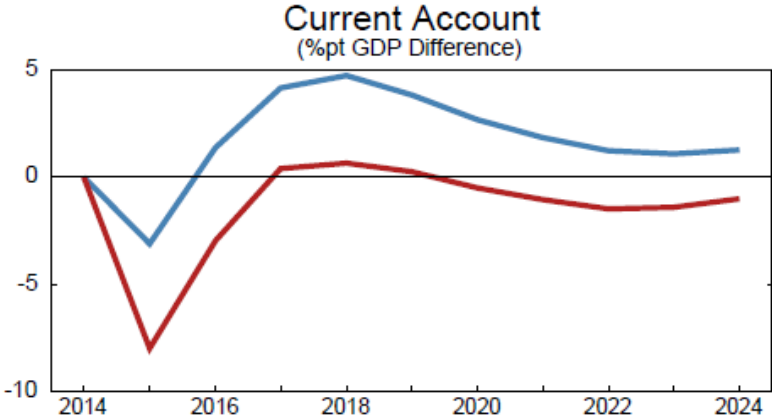
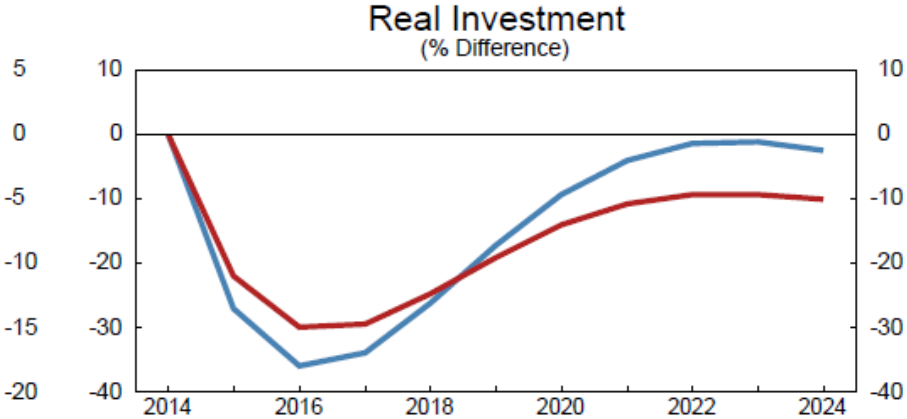
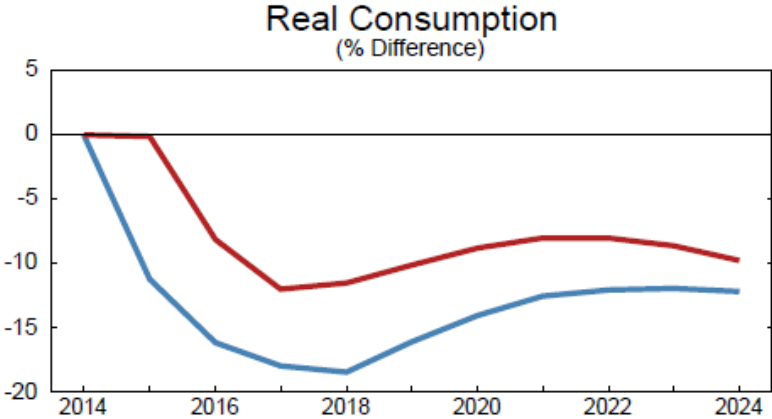
Upfront Fiscal Adjustment

Gradual Fiscal Adjustment



G-20MOD: Permanent Decline in Global Oil Prices (Cont'd)

Upfront Fiscal Adjustment
Gradual Fiscal Adjustment



NPLs and their macro-financial effects

Hypothesis:

1. NPLs can increase when ...

- ... lower oil prices impact the oil economy
- ... output growth slows due to fiscal tightening
- ... equity prices decline as economic activity slows
- ... interest rates increase

2. Macro-financial effects

- Weaker bank balance sheets lead to slower activity
- Liquidity risk (lower deposits) can amplify this

Determinants of bank NPLs in Saudi Arabia

Model number	1	2	3	4	5	6	7	8	9
Logit of NPL ratio (L1)	0.944***	0.911***	0.957***	0.895***	0.845***	0.954***	0.855***	0.852***	0.964***
Real oil prices, % change (L1)	-0.011***	-0.010***	-0.011***	-0.010***	-0.009***	-0.011***	-0.009***	-0.009***	-0.011***
Nonoil private sector GDP growth, % (L1)	-0.132***	-0.127***	-0.004	-0.113***	-0.098**	-0.002	-0.100**	-0.101*	-0.001
Real credit growth, % (L1)		-0.001			-0.001			-0.001	
Real equity price growth, % (L1)			0.002			0.002			0.003**
2008/09 dummy	0.434**	0.436**	1.045***	0.448**	0.489**	1.048***	0.493**	0.485**	1.061***
Number of observations	126	126	126	126	126	126	126	126	126
Lag depth of GMM instruments	1	1	1	2	2	2	3	3	3
P values									
AR(1)	0.012	0.012	0.024	0.012	0.019	0.029	0.023	0.025	0.021
AR(2)	0.317	0.591	0.774	0.344	0.609	0.830	0.461	0.511	0.850
Hansen	0.160	0.609	0.041	0.063	0.103	0.123	0.766	1.000	0.203

Note: Dependent variable is bank-by-bank (logit transformed) NPL ratio for 9 Saudi Arabian banks spanning 1999-2014 (annual frequency). Relying on a system GMM approach. The coefficients represent non-linear effect that depends on starting levels. ***, **, and * signify significance at the 1%, 5% and 10% levels. L1 signifies one period lag. 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.

Sources: Bankscope, Haver, Bloomberg, and staff estimates.

Caveats to the analysis

- **First**, the information content of publicly available bank-level balance sheet data is relatively limited compared with the regulatory data typically used for FSAP assessments.
- **Second**, any analysis based on historical data might not always account for the effects of recent changes in policy frameworks.
- **Third**, the data spanning 1999–2014 may not capture a sufficient number of oil price and financial cycles.
- **Fourth**, there is considerable parameter uncertainty surrounding the estimated relationship between macroeconomic shocks and NPL ratios.

Macro-financial feedback loop in Saudi Arabia

<i>Shock to</i>	Real oil price growth		Real nonoil private sector		Real credit growth		NPL ratio		Real deposit growth		
<i>Response of</i>											
Real nonoil private sector GDP growth	↑ 0.1	↑ 0.1	[Grey Box]		↑ 0.05	↓ -0.4		[Grey Box]			
Real credit growth	↑ 0.41	↑ 0.26	↑ 3.1	↑ 2.1	[Grey Box]		↓ -4.4	↑ 0.5		[Grey Box]	
NPL ratio	↓ -0.03	↓ -0.02	[Grey Box]		↓ -0.02	↓ -0.03	[Grey Box]		[Grey Box]		
Real deposit growth	↑ 0.2	↑ 0.1	[Grey Box]		↑ 0.6	↑ 0.7	↓ -1.1	↓ -2.0	[Grey Box]		
<i># of lag</i>	1	2	1	2	1	2	1	2	1	2	

Note: Panel VAR with one and two lags. Annual data 1999-2014. Bank level data for NPL, deposits, and credit. Numbers represent a percent response to a 1 percent shock, except for NPL ratio where shock and response are in percentage point.

Conclusions

- Analysis suggests oil prices have a significant effect on the Saudi economy through multiple channels.
- Even with substantial fiscal buffers in place, we would expect non-oil growth to slow.
- Interest rate impact is much harder to find.
- Would still, however, expect some impact on economy as interest rates rise, but seems unlikely to be significant if rates rise gradually.