GABON

SELECTED ISSUES

March 2016

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**International Monetary Fund
Washington, D.C.**

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CONTENTS

FIGURES

TABLES

APPENDIX

ECONOMIC IMPACT OF THE OIL-PRICE SLUMP[1]

With oil accounting for roughly 40 percent of its GDP, 45 percent of its government revenues, and nearly 85 percent of its exports in 2014, Gabon's economic growth prospects depend on how it copes with the recent oil-price slumps. Past major oil-price declines caused a contraction in non-oil economic activity. Statistical analysis (including regression analysis) indicates that a major deceleration of Gabon's non-oil economy is likely, albeit at a slower pace than in the past.

A. Oil-Price Shocks in Sub-Saharan Africa

1. **Economic performance during major oil-price declines clearly illustrates the vulnerability of Gabon and other oil-dependent countries in Sub-Saharan Africa (SSA).** The impact was more evident during the collapse in oil prices in 1986 (IMF, 2015). Following an oil-price fall of about 66 percent, average growth in real GDP in SSA oil exporting countries contracted 14 percentage points from 1985 to 1987 (from very high growth prior to the collapse in the oil price). In 1998, the 55 percent decline in oil prices was followed by a reduction of 4 percentage points in real GDP growth from 1997 to 1999. In 2008, a short-lived 43 percent reduction in oil prices in 2008 was accompanied by a 3 percentage point deceleration in real GDP growth between 2007 and 2009.

2. **While countries were arguably better prepared to withstand the 2008 oil-price slump, growth decelerated significantly as they simultaneously faced the Great Recession.** In 2008, SSA countries (including oil exporting countries) had more solid fiscal positions than during previous slumps and some had benefited from debt relief or favorable debt restructuring arrangements, With larger fiscal space they were able to provide fiscal impulse to face the contractionary impact of the oil-price decline. In addition, monetary policy frameworks were better designed to avoid ramping up inflation. Some countries implemented more flexible exchange rate policies than in the past, others had increased access to global financing (which had a relatively low cost as a result of expansionary monetary policies in advanced economies), and civil unrest was less common in the region. In contrast, oil exporting countries also had to face the major contraction in world demand during the Great Recession.

B. The Impact on Oil-rich CEMAC

3. **The impact of oil-price slumps on non-oil economic activity in CEMAC countries has been substantial.** While oil production in CEMAC countries does not immediately react to price declines as production plans are not modified in the short run, the non-oil economies of these countries are considerably affected by drastic changes in the oil price. Figure 1 shows that in the 1998 and 2008 episodes of sharp declines in the oil price, non-oil real GDP growth also decelerated rapidly and actually became negative in the aftermath of the 1998 oil-price decline. Nevertheless, non oil economic activity clearly accelerated in periods of rapid increase of the oil price, such as 2000–02, 2007–08, and 2010–12.

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[1] Prepared by Gonzalo Salinas.

Figure 1. CEMAC: Oil Prices, non-oil real GDP, 1990–2014
(Percent and indices)
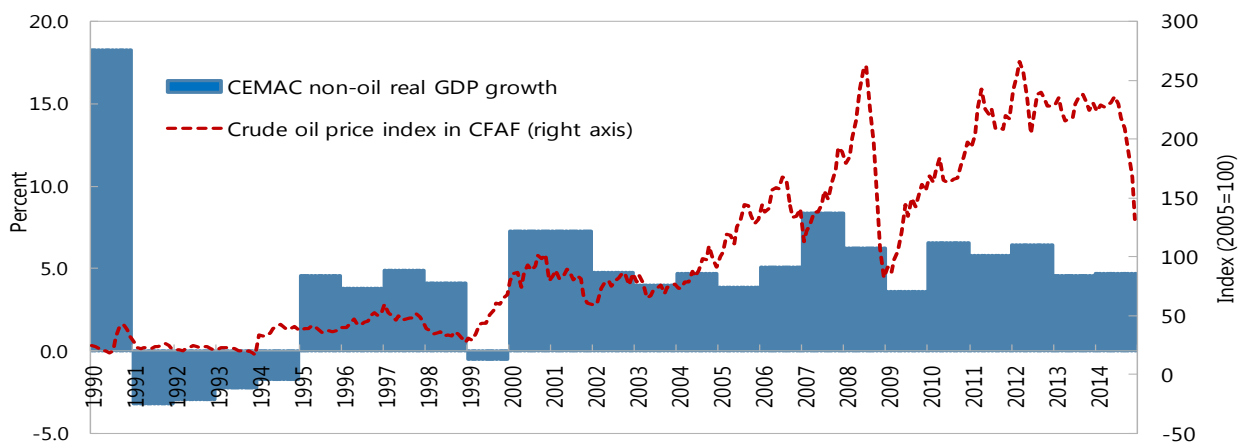
Sources: World Economic Outlook (WEO) database and IMF Staff calculations.

4.   Volatility in government spending related to oil-price fluctuations have been a major transmission channel in CEMAC countries. Governments in most oil producing countries in CEMAC are highly dependent on oil-related revenue and, in the absence of effective smoothing mechanisms, their spending is highly correlated to oil-price movements, as seen in Figure 3 (left chart). In turn, with oil revenues increasing the relative size of government spending, fluctuations in the latter are strongly associated with non-oil GDP growth (right chart in Figure 3). This implies a significant transmission channel that links oil-price fluctuations to non-oil economic activity.

Figure 2. CEMAC: Government Expenditure, Oil Price, and Non-oil GDP Growth 2000–14
(Percent)

CFAF Oil Price Growth vs. Real Government Expenditure
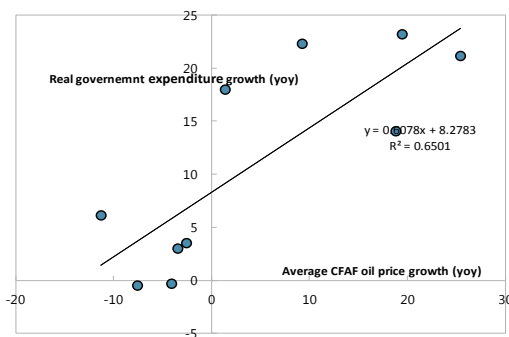
Real Government Expenditure vs. Non-oil GDP Growth
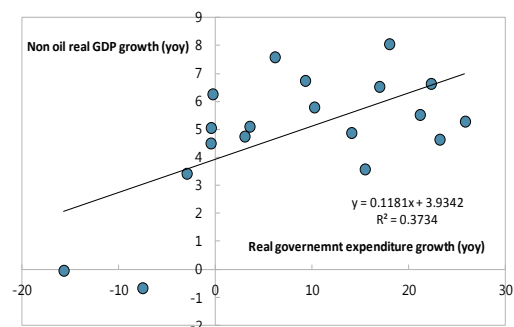
Sources: World Economic Outlook (WEO) database and IMF Staff calculations.

C. Oil-Price Shocks in Gabon

5.   The impact of oil-price fluctuations on Gabon has been particularly strong in the past. Figure 3 shows the evolution of non-oil real GDP growth on CEMAC countries during the 1998 and 2008 oil-price downside shocks. After the 1998 episode, Gabon suffered the strongest deceleration among the CEMAC oil-exporting countries in that period, with non-oil GDP growth contracting by 11 percent in 1999. Again, following the 2008 Gabon non-oil economic activity experienced the largest contraction among CEMAC oil exporting countries of -3.3 percent in 2009.

Figure 3. CEMAC: GDP Growth During Oil-Price Shock Episodes

1998 Oil-Price Shock

Note: "t=0" refers to 1998.

2008 Oil-Price Shock

Note: "t=0" refers to 2008.

Sources: World Economic Outlook (WEO) database and IMF Staff calculations.
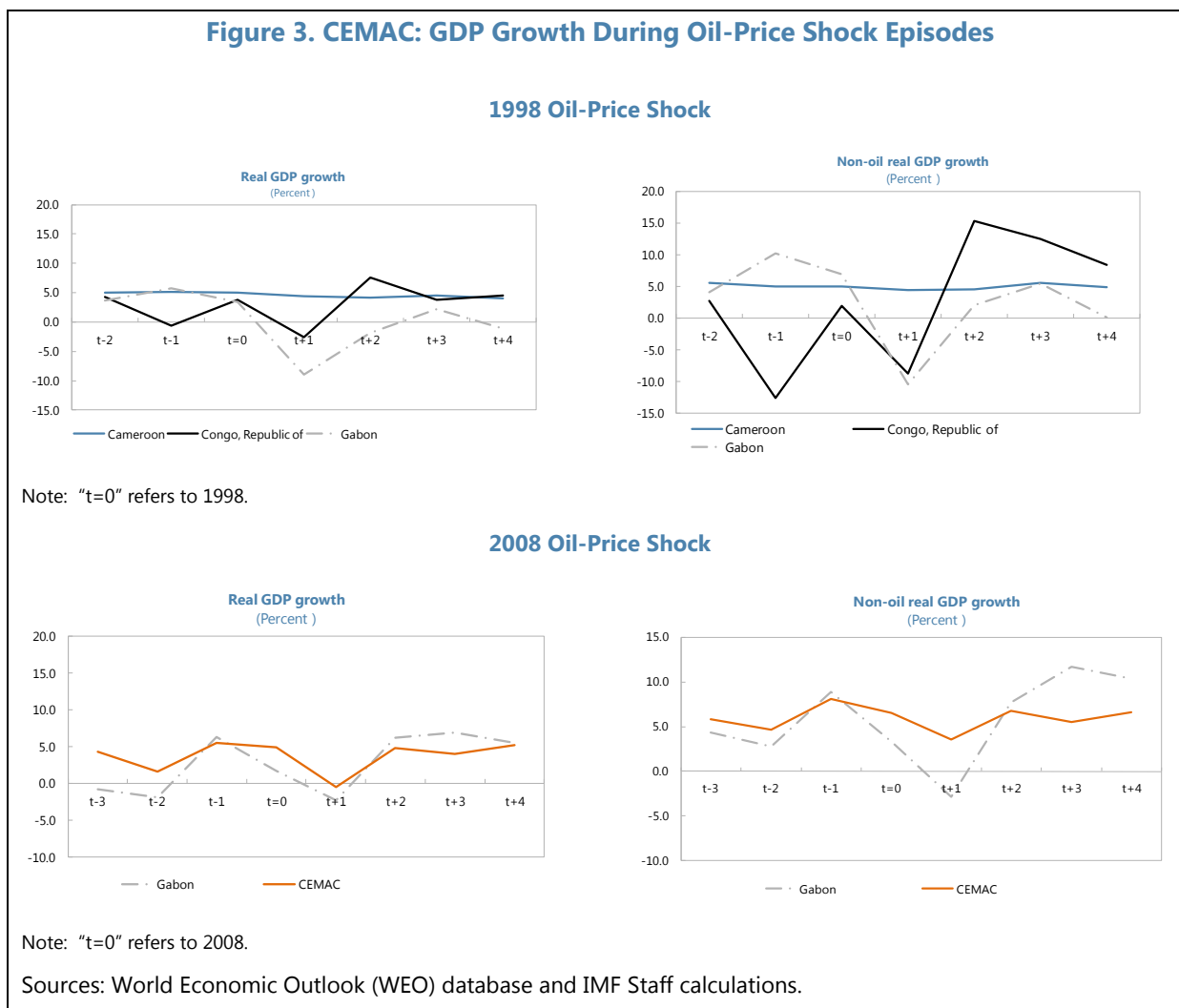
6.   The latest economic statistics also indicate a major impact of the 2014-15 oil-price slumps on Gabonese non-oil economic activity. Following the 32 percent decline in oil exports (in CFAF terms) between 2014 and 2015 several large non-oil sectors indicate a significant contraction in aggregate demand. Statistics up to September 2015 show year-on-year nominal contractions on, construction and public works (-27.3 percent), commerce (-3.7 percent), hotel/lodging (-30.2 percent), and other service categories. Declining broad money and credit to the private sector also indicate weakening economic activity.

D. Assessing Potential Impact on Gabon

7.   Econometric analysis for CEMAC countries finds a significant link between oil-price fluctuations and non-oil economic activity, and implies the current slump could have a major impact on Gabon (IMF, 2015b). Panel regressions including oil exporting CEMAC countries find a significant impact of oil-price changes on non-oil GDP growth the year of the downside shock and two years after (Table 1).

**8.   The regressions have the following general specification:**

$$Y_{i,t} = \beta_1 * Y_{i,t-1} + \beta_2 * WD_{i,t} + \beta_3 * OS_{i,t} + \varepsilon_{i,t}$$

There are three sets of dependent variables (Y): real GDP growth, real non-oil GDP growth, and real government spending growth. OS is the oil (downside) shock defined as the percentage change in international oil price multiplied by the share of oil exports in GDP, where the latter is the moving average of its values in the preceding three years (a similar variable is used in IMF (2012)). WD is changes in the world demand.

Table 1. CEMAC: Oil Shock Impact on Selected Variables[1]/			
	Real GDP growth	Real non-oil GDP growth	Real government spending growth
1-year lagged dependent variable	**0.381***	**0.255***	**0.0823***
	(0.05)	(0.06)	(0.01)
World real GDP growth	**1.002***	**0.970***	**2.598***
	(0.38)	(0.30)	(0.63)
Oil shock	**0.040**	**0.187*	**0.267***
	(0.02)	(0.11)	(0.08)
1-year lagged oil shock	**0.132***	**0.257***	**0.232***
	(0.05)	(0.06)	(0.07)
2-year lagged oil shock	0.034	**0.108*	**-0.242***
	(0.04)	(0.06)	(0.05)
Constant	-0.859	-1.183	-1.156
	(0.86)	(1.10)	(2.77)
Number of observations	149	122	94
LR-Elasticity of Oil Shock	**0.15**	**0.44**	**0.24**
* p<0.10, ** p<0.05, *** p<0.01 Standard errors in parenthesis			
[1]/ Arellano-Bond linear dynamic panel-data estimation			

9.   he magnitude of the coefficients implies a major impact of the current oil-price collapse on non-oil economic activity in Gabon and highlights the importance of government spending as a transmission channel. According to these estimates, the evolution in oil prices (in CFAF terms) experienced between 2014 and 2015 and projected in the IMF *World Economic Outlook* for the medium run could lower non-oil GDP growth in Gabon by almost nine percentage points in 2016 (see Figure 4) with respect to potential growth. On the other hand, the high significance of government spending as a

transmission channel implies that the economic impact of the oil-price slump could be significantly lowered by countercyclical fiscal policy, such as the one being implemented by the authorities.

Figure 4. Impulse Response of Gabon's Non-Oil GDP Growth

* Based on results of dynamic panel regressions and assuming current WEO Oil Price Forecast.
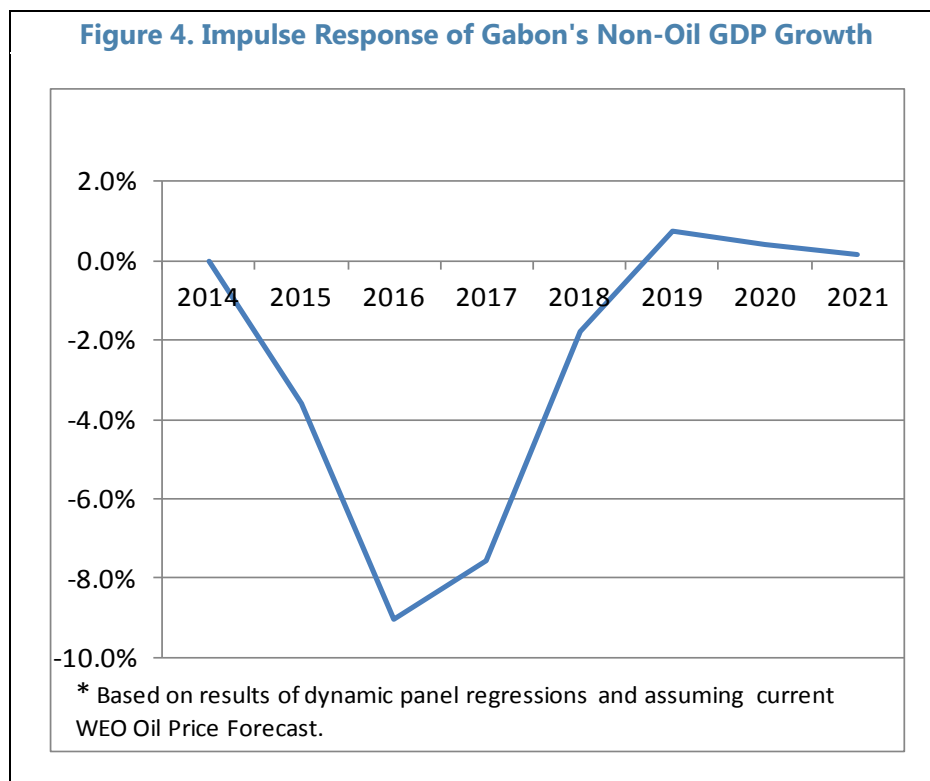
E. Structural Mitigating Factors

10.   Going forward, the impact of the oil-price decline and secularly declining oil production could be mitigated by a number of structural factors. Secularly declining oil production could be at least partly offset thanks to the discovery of new wells and performance improvements. The most important offsetting factor would be effective progress in implementing the government's diversification plan (*Plan Stratégique Gabon Emergent*, PSGE). The PSGE seeks to develop important sector in which Gabon has evident comparative advantages (for example, mining, agriculture, forestry, fisheries, and eco-tourism.)

11.   There has been significant progress lately in supporting the diversification plan as mentioned in the staff report. The authorities are rehabilitating a Trans-gabonais railway line so as to transport wood-related and mineral exports. Olam International (a Singaporean multinational) is developing one of the largest agri-business investments currently underway in sub-Saharan Africa (using 300,000 hectares, of which 46,000 hectares is already under cultivation for oil palm and 7,500 hectares planted for rubber). Olam is also developing Special Economic Zone and port capacity. Also important is the recent creation of an investment promotion agency with support from the World Bank Group.

F. Conclusion

12.   The recent oil-price slump is bound to generate a major deceleration of Gabon's non-oil economy. The experience of previous oil-price collapses on SSA oil producers and on CEMAC countries including Gabon all point to a major reduction in non-oil GDP growth as a result of the recent decline in oil prices. Econometric estimates suggest that non-oil output will be much lower than under a no-oil price slump scenario.

13.   Given the strength of the government transmission channel, the authorities should support economic activity (through productive spending) while ensuring fiscal sustainability. During the current episode the Gabonese government is in a better position to avoid procyclical fiscal policy since it has lower debt levels and higher access to global financial markets before this shock than in previous episodes. It should also carefully monitor the evolution of sectors that could amplify the impact of the oil-price slump such as the financial sector. The next Selected Issues Paper focuses on this issue. Success in accumulating the government's stabilization fund in the future and in implementing the authorities' diversification plan will be key to minimize the potential impact of oil price fluctuations in the medium to long run.

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THE IMPACT OF OIL-PRICE SHOCKS ON GABON'S FINANCIAL SECTOR STABILITY[1]

Gabon's financial sector vulnerability to oil-price shocks is heightened by its relatively high dependence on the oil sector and limited economic and exports diversification. A sharp rise in non-performing loans levels of Gabon's banks coincided with the 2014 global oil-price slump, highlighting the significant vulnerabilities of Gabon's otherwise generally sounds banking system. In recent oil-price shock episodes, these vulnerabilities came to the fore through significant deterioration of fiscal performance and sharp fall in the non-oil GDP, revealing the importance of macro-financial. Based on financial soundness indicators data on 28 oil-exporting countries over 1998–2015 and on sectoral distribution of credit, the paper highlights the impact of oil-price shocks on the stability of the financial sector. In additional to underlying the importance of institutional frameworks, it finds that the magnitude of the impact depends on developments in the oil and non-oil sectors, fiscal and banks' capital buffers, and the level of financial development.

A. Introduction

14.   Gabon's economy is highly dependent on hydrocarbons, with oil production representing about 40 percent of GDP, 45 percent of fiscal revenue and 85 percent of exports. Although Gabon's exports destination is well diversified,[2] its exports product diversification is dominated by oil exports. Non-oil exports, mainly consisting of timber and manganese, have experienced a sluggish growth in recent years. The country is striving to diversify its economy, but the still limited diversification implies a significant vulnerability to oil-price shocks. Large downward swings in oil prices generally translate into substantial deterioration of the government revenues (and in turn spending), slowing economic activity and negatively affecting the profits and the soundness of the corporate and banking sectors. These channels were at play during the 2008 oil-price shock episode, with a significant deterioration of the fiscal balance (from 10 percent of GDP to 5 percent of GDP) and a sharp fall in non-oil GDP growth (from 5 percent to -3.3 percent). Similarly, the most recent oil-price decline has significantly impacted Gabon's financial sector through the government spending and the economic activity channels, as evidenced by a recent sharp rise in non-performing loans (NPLs) and liquidity tensions reported at commercial banks.

[2] In 2015, Trinidad and Tobago, Malaysia, China, Australia, Spain, Italy, Netherlands, United States, and North Korea were the main destinations of Gabon's exports, with exports shares ranging from 14 percent of to 5 percent.

15.   This study draws on recent research on the macro-financial implications of oil-price shocks for oil-exporting countries on financial stability and applies it to Gabon. First, the paper performs a comparison to peer countries of recent developments in Gabon's financial sector during past oil-price shock episodes. Second, the sectoral distribution of credit and NPLs is used to identify and highlight the channels of transmission of oil-price slump to the financial sector. After controlling for financial and macroeconomic conditions, the causality running from oil-price shocks to financial fragility is analyzed, using a dynamic panel analysis of 28 oil-exporting countries over the period 1998–2013. Finally, the paper investigates how the magnitude of the shock is affected by fiscal and financial buffers and the state of development in the oil and non-oil sectors with the view to propose tailored policy recommendations.

## B.   Impact of the Oil-Price Shocks on the Financial Sector: Recent Developments

16.   Oil price and commodity price shocks have been widely documented to have significant adverse impacts on the financial sector, given a country's macro-financial linkages. The general finding of the literature is that oil-price shocks hamper economic growth and deteriorate the soundness of the financial sector, notably NPLs and capital adequacy.[3] After a substantial drop in oil prices, factors such as high unemployment and real interest rates tend to reduce bank profits and deteriorate asset quality.[4] These adverse effects tend to be mitigated by strong institutional frameworks, financial development, sound regulatory and supervisory frameworks. In the case of commodity-price shocks, Kinda et al. (2016) find that negative commodity price shocks tend to weaken the financial sector and increase the probability of banking crises. The financial sector is affected through increased NPLs, reduced profitability, deterioration of capital, and reduction of liquidity. Across commodity-exporters, the negative effects of oil-price shocks are more pronounced for countries with undiversified export base, weak governance, low fiscal buffers, shallow financial systems, and weak macro-prudential framework.[5] As discussed below, commodity price declines' impact depends on the specific macro-financial linkages of the economy, in particular how the oil sector is related to the banking sector, or how reduced government revenues affect commercial banks' balance sheets.

17.   The 2014 oil-price shock was associated with a sudden deterioration of the banking sector's asset quality in Gabon and other CEMAC countries. The sudden surge in NPLs coincided with the fall of the oil price in mid-2014 (Figure 1). The evolution of NPLs following the shock was characterized by an increase in levels across CEMAC countries. The average level of NPLs consistent with a stable financial sector appears to vary across countries. For instance, under a stable economic and financial environment, a NPLs ratio (NPLs to total loans) of 10 percent is observed in Cameroon

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[3]See Babihuga (2007) who examined 96 countries over the period 1998–2005; or De Bock and Demyanets (2012) who studied 25 emerging countries during 1996–2010.

[4] In emerging markets, non-performing loans are mainly determined by GDP growth rates, exchange rates, portfolio and bank flows, and changes in terms of trade.

[5] Holding sovereign wealth funds (SWF) that supplement fiscal buffers help mitigate weak fiscal buffers.

compared to 3 percent in Gabon. Therefore, cross-sectional comparisons of the evolution of asset quality are only meaningful when based on growth in NPLs ratio. Capital and liquidity levels appear stable and above their required levels[6] with a mild on-off fall in December 2014. In the last quarter of 2014, banks' profitability experienced a 22 percent drop before recovering.

Figure 1. CEMAC: Recent Developments in the Financial Soundness Indicators (FSIs)

CEMAC: Nonperforming loans to total gross loans

(Percent)

Gabon: Capital, liquidity and profitability of the banking sector

(Percent)

Source: COBAC and IMF staff calculations.

Notes: Liquidity is measured by liquid assets to short-term liabilities; capital adequacy by ratio of regulatory capital to risk-weighted assets; and profitability is measured by return on assets.

18.   High frequency observations from 2010 to February 2015 indicate a negative correlation between changes in oil prices and NPLs ratios in Gabon (Figure 2). The correlation between current and lagged changes in oil prices and NPLs is significant. The correlation with the lagged oil prices is more pronounced, in line with the persistence observed in NPLs and could also reflect the feedback loop between the government and economic activity channels that appears with some delay. [7] As opposed to asset quality, the effects of the price slump on capital and liquidity ratios are mixed, with almost no effects appearing at the aggregate levels, as suggested by the flat regression line. Although recent data suggest substantial liquidity pressures in Gabon's individual banks, these pressures are likely to be hidden at the aggregate level by a few highly liquid players that represent the bulk of the banking system.[8] Access to BEAC's credit standing facility by most banks or to parent companies' financing also helped mitigate liquidity pressures.

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[6] The minimum capital adequacy ratio required is at 8 percent and takes into consideration only credit risks. The COBAC is considering revising its capital regulation upward, so that banks can better absorb shocks.

[7] Similarly, the negative effect was observed on profitability in recent months (Figure 1). The related scatter plot is not presented because of its short series and also for the sake of clarity.

[8] In 2013, out of ten banks, the biggest bank in Gabon represented 43 percent and three biggest banks 65 percent of the banking sector, in terms of total assets.

Figure 2. Gabon: Financial Stability and Changes in Oil Prices, 2010–15
(Percent)

Capital to RWA ratio vs. Changes in oil prices

Liquid assets ST liabilities vs. Changes in oil prices

NPLs ratio vs. Changes in oil prices

NPLs ratio vs. Lagged changes in oil prices

Source: COBAC and IMF staff calculations.

Notes: RWA stands for risk-weighted assets.
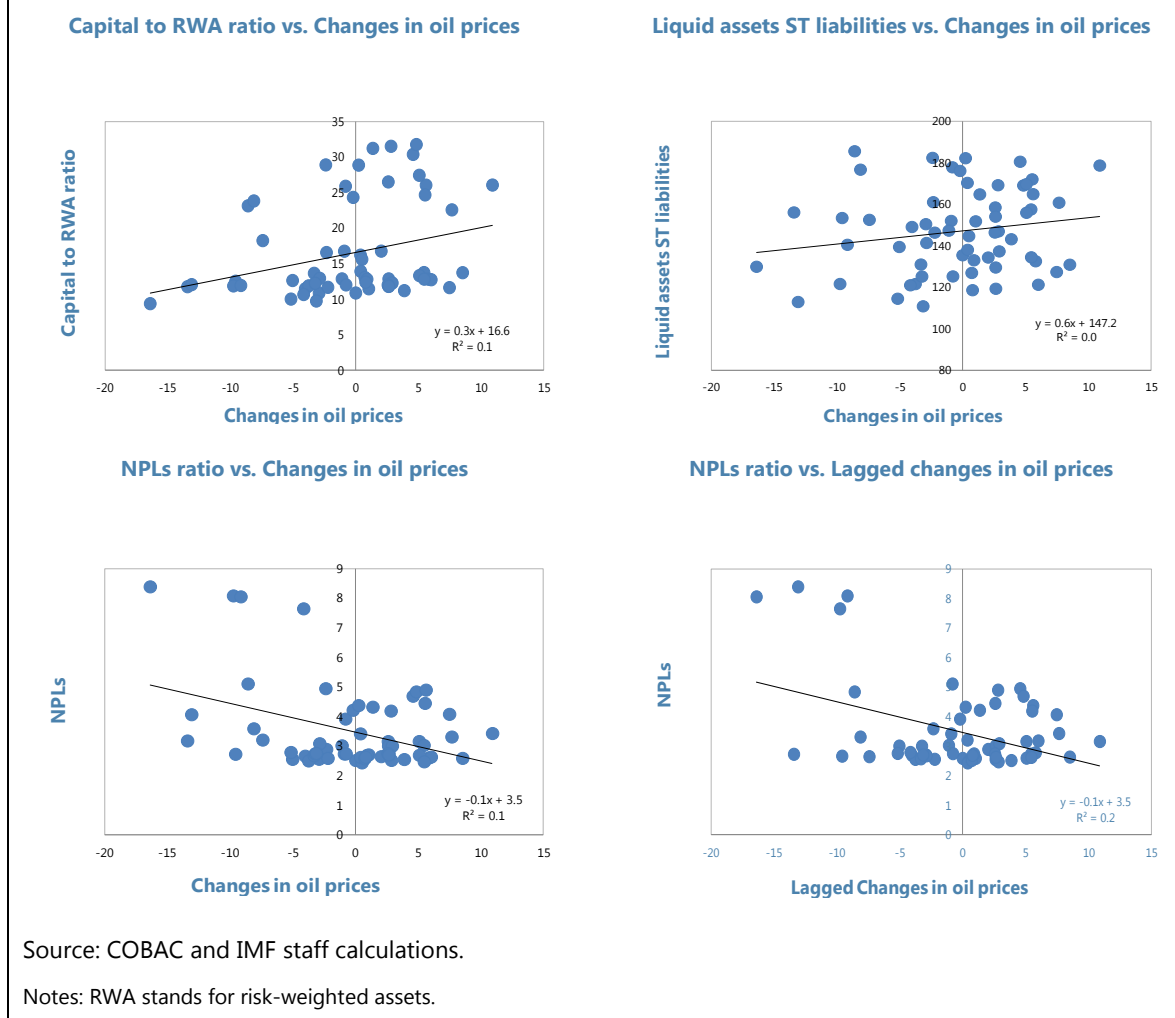
C.   Channels of Transmission of the Impact of Oil-Price Shocks on the Financial Sector

19.   Past oil-price shocks have affected financial sector stability through the government and economic activity channels (Figure 3). The 2008 episode led to a 39 percent decline in government oil revenue whereas the 2014 shock induced a 31 percent drop. The economic activity channel was also triggered during the 1998 and 2008 oil -price shocks, leading to contractions of 11 and 3 percent, respectively. The effect of the 2014 shock on the real economy was relatively mild, with only a deceleration of one percentage point (from 5 to 4 percent). This increased resilience of the non-oil economy to the oil-price shock is attributable to stronger initial fiscal and external buffers and ongoing strategies in support of structural transformation. Nevertheless, as economic activity contracts, the government, some firms, and households are more likely to experience reduced liquidity. This could lead to defaults and rising NPLs, potentially threatening financial stability. These trends are in line with the findings of many authors (e.g., Kinda et al., 2016) who identified GDP growth, fiscal performance,

savings, and debt in foreign currency as the most prominent channels of transmission of commodity-price shocks to the financial sector.

Figure 3. Oil-Price Slumps Through the Years—How they impact Gabon

Source: IMF Staff estimates

Note: *t=0* represents the shock year, for the 1998, 2008 and 2014 episodes. Figures following 2014 are Staff projections.
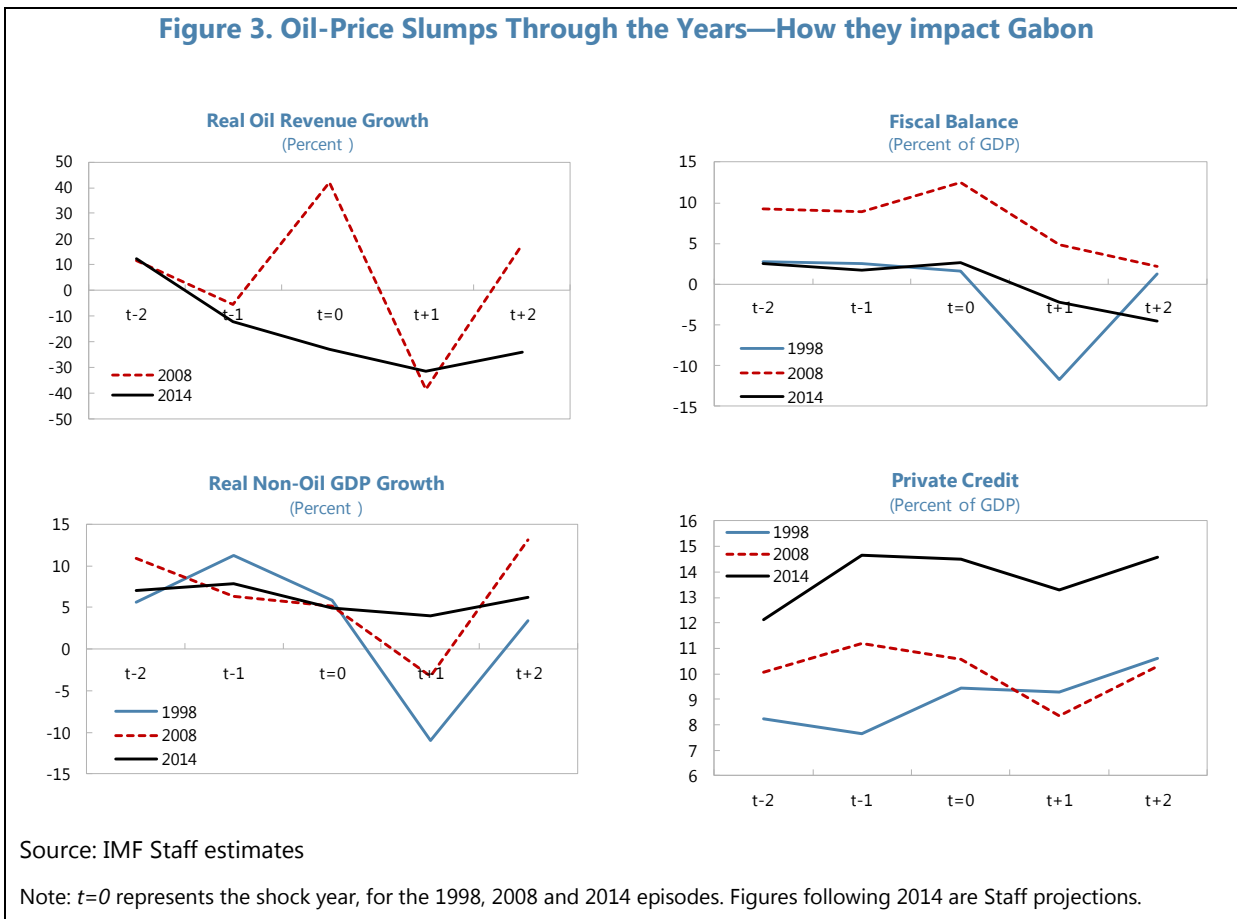
20.   Gabon's financial system is tightly connected to government operations, which amplifies the fiscal channel and increases banks' exposure to oil-price shocks. On the one hand, in the event of oil-price shock, declining oil revenue and widening deficits[9] reduce the government's ability to service its loans and could force it to accumulate arrears on its liabilities to suppliers or contractors executing public projects. These risks were recently exacerbated by a surge in commercial banks' claims on the government (Text figure 1). Similarly, the

Text figure 1. Gabon: Claims of Banks on the Government and Private Sector
(Billions of CFAF)

Sources: BEAC and Staff calculations.

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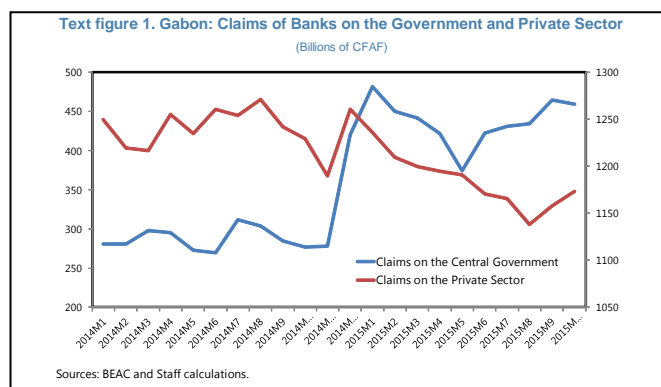
[9] Gabon's fiscal balance went from a surplus of 0.3 percent of GDP in 2013 to a deficit of 4.8 percent of GDP in 2014, following the 2014 shock.

recent sharp decline in credit to the private sector leaves government contractors with little room to roll over existing debt, which could deteriorate asset quality.[10] On the other hand, Gabon's large public sector and the public wage bill[11] imply that Gabon's banks are exposed to developments in the government sector indirectly through their lending to government employees[12] or to employees of government-linked contractors, for instance via mortgage lending. Shrinking fiscal revenue could also trigger the government or public sector entities to reduce their deposits in the banking system to finance widening fiscal deficits, thereby posing funding risks to commercial banks. The government channel can therefore lead to a vicious cycle, whereby weak economic activity reduces firm profits and household income, as well as their ability to repay their debt. This in turn further deteriorates banks assets quality[13] and weakens fiscal performance due to lower tax receipts.

21.   The contraction in credit following oil-price shocks reveals the most vulnerable sectors and lends support to the government and economic activity channels. A substantial deceleration in credit growth from 20 percent in 2013 to 4 percent in 2014 (Text table 1); and a contraction of

5.7 in 2015 suggest adverse developments in real and government sectors following the fall in oil prices. Credit growth slowed due to a combination of a rising risk aversion—following substantial deterioration of asset quality—and sluggish demand. The most affected sectors in 2014 and 2015 are primary activities,[14] extractive industries, construction, commerce and tourism, and housing, which all are linked to the government channel described above. Falling credit supply also reflects the reduction of investment spending by

Text table 1. Gabon: Sectoral credit growth				
Sectors	2012	2013	2014	2015
Primary sector	17.7	15.1	**-18.9**	**-47.1**
Extractive industries	-1.9	-2.0	3.4	**-18.7**
Manufacturing	73.8	42.5	3.2	25.0
Utilities	100.3	50.1	**-28.3**	20.4
Construction	72.5	42.0	**-14.5**	0.4
Commerce and tourism	2.1	2.0	**-1.3**	**-18.9**
Tansport and communication	17.8	15.1	28.9	**-5.6**
Housing	52.1	34.2	**-5.4**	0.4
Non-resident	-23.6	-30.8	**-41.3**	15.5
Others	74.7	42.8	4.5	**-5.8**
Total	25.0	20.0	4.0	**-5.7**

oil companies that also cut down on employment, to reduce the operational costs and tackle the negative effects of the protracted oil-price shock.[15]

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[10] Banks' claims on the central government increased by 70 percent from June 2014 to October 2015.

[11] Gabon's wage bill is unsustainable and grew from CFAF 226 billion in 2005 to CFAF 732 billion in 2015. In 2015, the wage bill accounted for 35 percent of total spending and was more important than investment spending (25 percent of total spending). Besides, the wage bill represented 53 percent of tax receipts, well above the 35 percent criteria set by the CEMAC Commission.

[12] The number of civil servants significantly grew from 62594 in 2010 to 82544 employees in 2014.

[13] Sustained losses lead to financial instability, depending on the intensity and duration of the oil price shock, and on prevailing policy and institutional frameworks.

[14] The primary sector includes agriculture, farming, hunting, forestry and fishing.

[15] This reduced credit supply is also related adverse developments and outlook in the manganese sector.

22.   The lending portfolio of the banking sector is highly concentrated and substantially exposed to the government and oil sectors. Owing to weak economic diversification, Gabon's sectoral distribution of credit is highly concentrated, with more than 60 percent credit supply directed to transport and communication and to the "other category" that include public companies (Figure 4). Sectors with the more pronounced linkages with government tend to experience the biggest drop in credit and increase in NPLs, suggesting difficulties experienced by the government in servicing its debt. The substantial economic activity slowdown, correlated with domestic credit contraction is likely to have affected bank profits in Gabon (Figure 1), which threatens financial stability.

Figure 4. Gabon: Sectoral Distribution and Evolution of Credit and NPLs, 2011–15

Evolution of credit 2011–15
(Billions of CFAF)

Credit shares 2011–15
(Percent of total credit)

Sectoral NPLs ratios
(Percent)

Sectoral NPLs ratios *(continued)*
(Percent)

Source: COBAC and IMF staff calculations.
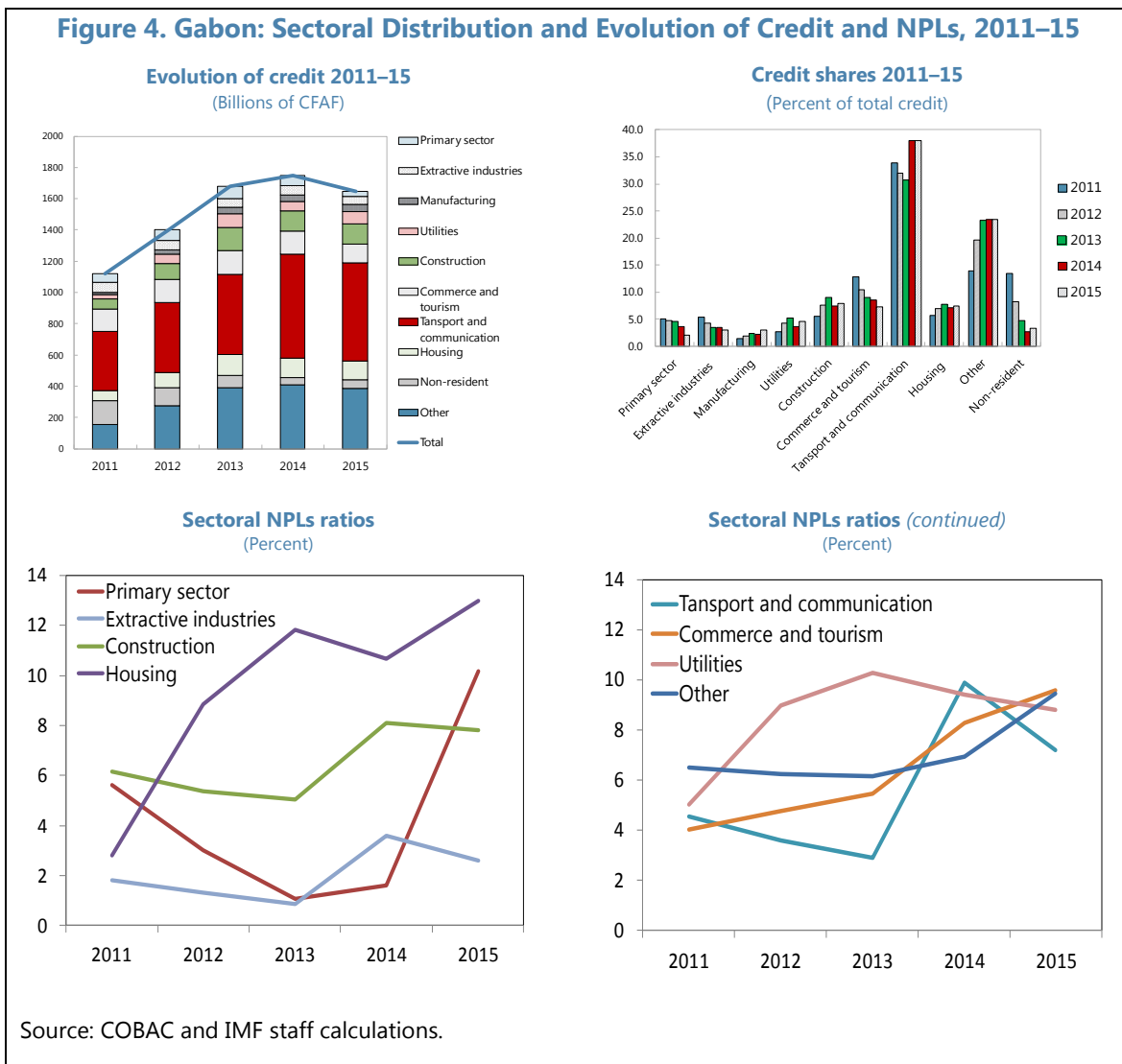
23. **The maturity structure of the banking sector's lending portfolio may worsen existing vulnerabilities.** [16] Short- and medium-term domestic bank financing in Gabon, as in other CEMAC countries, represent the bulk of the domestic credit, amounting to 16 and 52 percent of total credit respectively (Text figure 2). Medium-term financing seems, however, to be relatively higher importance than those generally seen LICs. The share of long-term financing is extremely low (2.2 percent as of October 2015). The reliance of the economy on short- and medium-term financing also point to significant rollover risks, which exacerbates the country's vulnerability to protracted shocks.

Text figure 2. Gabon: Maturity Composition of the Banking Sector Portfolio
(Billions of CFAF)

Sources: COBAC and Staff calculations
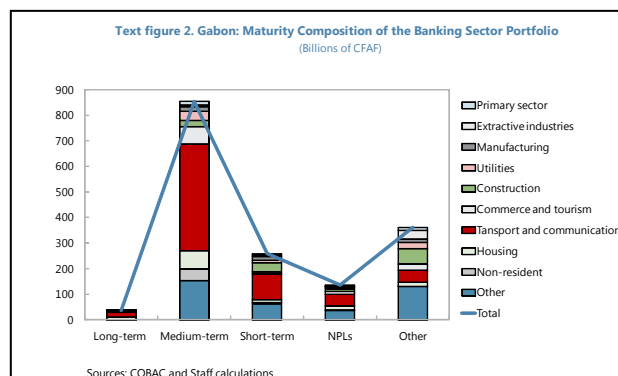
D. Testing the Impact and Magnitude of Oil-price Shocks on the Financial Sector[17]

24. **The above stylized facts provide valuable information for formal econometric tests of the impact of price shocks on asset quality across oil-exporting countries**. Rigorous analysis of the causal links should accommodate for the observed stylized facts of the persistence of the NPLs and the noticeable difference in the average levels of NPLs across countries. We use panel analysis of oil-price shocks to establish causality and analyze the determinants of the magnitude of the oil-price shock (see Appendix I for the dataset and estimations procedure). For Gabon and CEMAC countries, changes in NPLs are considered a good proxy for financial instability, given that the financial sector is dominated by banks, and other core FSIs have been relative stable in recent years. Following the methodology in IMF (2012), we define oil-price shock (OS) to accommodate for both the price and volume dimensions and effectively captures oil-exporters' exposure.[18]

25. **The dynamic panel analysis results confirm a significant impact of oil-price shocks on NPL growth after controlling for macroeconomic and financial sector variables.** The effect of the shock is statistically significant and its magnitude is maintained, irrespective of the conditioning variables. As suggested by initial data observations, the coefficient on the lagged dependent variable is significant and positive, reflecting considerable inertia. Precisely, we have the following results:

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[16] Short-term is used for a maturity that is less than a year; medium-term (1–5 years) and long-term (over five years).

[17] To tackle limited availability of bank level data, we consider additional oil-exporting countries. Although the results of the analysis only apply to the average country in the sample, the purpose was to establish causality and identify amplifying factors.

[18] Other definitions of the oil-price shock have been investigated in recent research (e.g., shock as unanticipated fall in oil prices, (see Kinda et al. (2016) for a review).

- ***The negative impact of oil-price shocks on the financial stability of oil-exporters is verified[19]***
  (Table 1), with a negative impact on the overall asset quality, after controlling for factors[20] that
  could induce a rise in NPLs, such as economic activity, fiscal buffers, credit conditions, and financial
  development.[21] In terms of magnitude, the estimations suggest that a country with oil exports
  equivalent to 50 percent of GDP hit by a 40 percent decline experiences a 40 percent deterioration
  of asset quality in the year of the shock, mirroring trends observed in CEMAC countries (Figure 1).

- ***The banking sector's assets quality growth is a persistent but convergent process,*** as reflected
  by the significant (and lower than one) coefficient on the lagged dependent variable. This reflects
  the difficulties involved in resolving the deterioration in assets when they occur.

Table 1. Oil-Exporting Countries: Effect of Oil-price Shocks on NPLs

| Dependent variable | NPLs to gross loans ratio Growth | | | | | | | | |
| Controls | Macroeconomic factors | | | | Financial development factors | | | | All |
Dynamic panel estimates (Diff. GMM)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Growth in NPL ratio, lagged	0.342***	0.416***	0.620***	0.351***	0.363***	0.343***	0.339***	0.343***	0.367***
	(0.09)	(0.10)	(0.16)	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)	(0.10)
Oil Shock	-0.021***	-0.012*	-0.021*	-0.021***	-0.021***	-0.021***	-0.021***	-0.021***	-0.013**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Non-Oil Real GDP Growth, lagged		0.704							0.021
		(1.20)							(1.51)
Credit growth (%), lagged			62.336						34.486
			(87.69)						(22.82)
Government debt (% of GDP), lagged				-0.116					-0.065
				(0.09)					(0.11)
FD index, lagged					0.063				-0.102
					(0.12)				(0.20)
FID index, lagged						-0.066			
						(0.07)			
FIA index, lagged							0.207***		
							(0.07)		
FIE index, lagged								0.155	
								(0.21)	
Constant	7.156***	1.309	-4.901	12.021***	5.284	8.911***	1.178	-2.264	3.990
	(2.09)	(8.20)	(16.99)	(3.74)	(4.93)	(2.96)	(2.81)	(13.07)	(16.61)
Observations	289	140	275	286	286	286	286	286	129
Number of countries	28	21	27	28	28	28	28	28	20
Hansen test p-value	0.878	0.993	0.217	0.913	0.397	0.688	0.643	0.574	0.567
AR(1)	0.0453	0.0139	0.0325	0.0439	0.0594	0.0452	0.0458	0.0450	0.0203
AR(2)	0.492	0.725	0.721	0.526	0.561	0.497	0.501	0.508	0.965
Instruments	6	7	6	7	6	7	7	7	10

Note: NPLs = Non-performing loans; FD=Financial development; FID=Financial institutions depth; FIE=Financial institutions efficiency. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

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[19] The instruments are validated by the Hansen test and effectively tackle endogeneity issues including that stemming from the inclusion of the lagged dependent variable at the origin of the Nickel bias (1981), whereas the Arellano–Bond supports the introduction of the lagged dependent variable.

[20] Most coefficients on control variables are not significant except for FIA, which may suggest that increased access financial services could increase the vulnerabilities of banks' assets.

[21] The analysis used Sahay et al. (2015) financial development indicators. These authors define financial development as a combination of depth (size and liquidity of markets), access (ability of individuals to access financial services), and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets).

26.   The magnitude of asset quality deterioration caused by oil-price shocks is driven by developments in the oil and non-oil sectors, and existing fiscal and financial buffers. We model the size of the impact as a function of oil production, non-oil GDP, capital and liquidity ratios and financial development variables (Table 2). The estimations provide the following additional insights.[22]

- *Structural factors in the real sector are important determinants of the effects of oil-price shocks on the financial sector.* High non-oil growth, especially if most of this activity relies on the oil sector, tends to amplify the negative effect of the oil sector. An increase in oil production can help mitigate the shortfall in government revenue—and dampen oil-price shocks—but it is not always feasible, especially in a context of a secularly declining oil production and maturing oil fields.

- *Sufficient fiscal buffers could mitigate negative effects of the government's revenue shortfall and spending cuts on the economy.* Insufficient fiscal buffers tend to exacerbate the adverse effects of a shock as the government is forced to engage in fiscal consolidation. We proxy buffers using the growth in government debt in the previous period, as a rapid increase of debt in previous periods leaves the government with less room to increase debt, especially under much reduced revenue.

- *Adequate financial buffers reflecting sound macro-prudential policies are critical to mitigate the exposure of the banking sector to changes in economic activity.* The results are in line with role of financial buffers as shock absorbers, and imply that higher capital and liquidity ratio tend to mitigate the magnitude of oil-price shocks. Adequate financial buffers proxy for sound macro-prudential policies that limit risk appetite, absorb potential risk exposures and mitigate downward movements in business cycle, and create the enabling environment required for the financial intermediation.

- *Paradoxically, financial deepening does not seem to reduce the impact of oil-price shocks.* This effect is mostly driven by private sector credit to GDP, with little contribution from financial access and efficiency. It may be that the deeper the financial sector, the more closely it is linked to the economy, facilitating the propagation of shocks, potentially amplified by the lack of credit diversification and the high exposure to the government and the oil sectors (Figure 4).

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[22] The focus of this section is on macroeconomic and financial factors, although institutional and governance variables are also determining (see Kinda *et al.* (2016)).

Table 2. Magnitude of Oil-price Shocks as a Function Macro-financial factors

Dependent variable	NPLs to gross loans ratio Growth					
Panel within FE estimates	(1)	(2)	(3)	(4)	(5)	(6)
Oil Shock	-0.003	-0.043***	-0.014**	-0.099**	-0.042***	-0.005
	(0.01)	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)
Shock * Non-Oil Real GDP Growth	-0.172**					
	(0.08)					
Shock * Oil Production		0.055**				
		(0.02)				
Shock * Growth in government debt			-2.835***			
			(0.71)			
Shock * Capital to RWA				0.447**		
				(0.20)		
Shock * Liquidity to ST liabilities					0.062***	
					(0.02)	
Shock * Financial development						-0.041**
						(0.02)
Constant	10.840***	12.110***	11.440***	10.250***	9.734***	11.210***
	(4.05)	(3.43)	(1.77)	(1.43)	(1.65)	(1.60)
Observations	131	312	280	286	309	312
R-squared	0.080	0.055	0.057	0.090	0.062	0.048
Number of Countries	19	28	28	26	27	28

Note: NPLs = Non-performing loans. Robust standard errors are in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

E.   Conclusion and Policy Recommendations

27.   The paper shows that oil-price shocks have a significant negative on financial stability in Gabon and other oil-exporting countries. The analysis of FSIs and sectoral distribution of credit (i) illustrates the economic activity and government channels of transmission; and (ii) reveals a weak diversification of the banking sector's lending portfolio, suggesting that losses occurring in 2014 and 2015 are concentrated in sectors that are the most exposed to the government and the oil economy. A statistically meaningful causal link from oil-price shocks to financial sector fragility is verified after controlling for the persistence of non-performing loans, and macroeconomic and financial factors. Across oil-exporting countries, the magnitude of the effects of negative oil-price shocks is higher for countries with high non-oil growth, declining oil production, and weak fiscal buffers.

28.   Increasing the resilience Gabon's financial sector to future oil-price shocks and coping with the current shock will require tackling the channels of transmission. The reduction of the prominence of the government channel could be achieved through improved public financial management, in particular by having sufficient fiscal buffers, which would potentially enable the government to deploy counter-cyclical policies. At the same time, an acceleration of the structural transformation process would help diversify the banking sector's lending portfolios and mitigate the impact of the economic activity channel. Sound regulatory and supervisory practices that ensure adequate liquidity, capital, and provisions for NPLs requirements, are also crucial to safeguard the financial systems and promote macroeconomic resilience to oil-price shocks.

Table 3. Oil-Exporting Countries[1]

Lower Middle Income		Upper Middle Income		High Income	
Country	Export to GDP ratio	Country	Export to GDP ratio	Country	Export to GDP ratio
Cameroon	10.5	Algeria	30.2	Bahrain	46.5
Congo, Republic of	60.7	Azerbaijan	40.8	Brunei Darussalam	61.1
Ghana	8.1	Belarus	16.0	Equatorial Guinea	85.3
Nigeria	17.3	Bulgaria	7.1	Kuwait	61.7
Yemen	11.3	Colombia	8.4	Netherlands	11.8
		Ecuador	14.9	Norway	18.6
		Gabon	48.3	Oman	48.5
		Kazakhstan	24.7	Russian Federation	13.6
		Malaysia	8.4	Saudi Arabia	43.3
		Tunisia	5.5	Singapore	33.0
		Turkmenistan	43.5	U.A.E.	33.4
		Venezuela	39.2		

[1]Our sample of oil-exporting countries consists of countries that produce oil and with value of oil exports to GDP greater than 5 percent. These criteria allows us cope with limited data availability. A standard and more conservative classification of oil exporters is used by the Standard International Trade Classification (SITC). The SITC categorizes economies as oil-exporter when their oil-export earnings exceeded 50 percent of total exports on average between 2009 (see http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=14).

Table 4. Dimensions of Financial Development

	FINANCIAL INSTITUTIONS	FINANCIAL MARKETS
DEPTH	1. Private sector credit (% of GDP) 2. Pension fund assets (% of GDP) 3. Mutual fund assets (% of GDP) 4. Insurance premiums, life and non-life (% of GDP)	1. Stock market capitalization to GDP 2. Stocks traded to GDP 3. International debt securities government (% of GDP) 4. Total debt securities of non-financial corporations (% of GDP) 5. Total debt securities of financial corporations (% of GDP)
ACCESS	1. Branches (commercial banks) per 100,000 adults 2. ATMs per 100,000 adults	1. Percent of market capitalization outside of top 10 largest companies 2. Total number of issuers of debt (domestic and external, NFCs and financial corporations)
EFFICIENCY	1. Net interest margin 2. Lending-deposits spread 3. Non-interest income to total income 4. Overhead costs to total assets 5. Return on assets 6. Return on equity	1. Stock market turnover ratio (stocks traded/capitalization)

Source: Sahay et al. (2015)

Appendix I. Panel Analysis of the Impact and Magnitude of Oil-Price Shocks

1.   The initial descriptive analysis of Sections D and C is complemented by a panel analysis of the link between NPLs and oil-price changes across oil exporters. The effect of price shocks is analyzed after controlling for both macroeconomic and financial development variables.[1] The regressions are performed on oil-exporting countries using the following dynamic panel specification:

$$Y_{i,t} = \alpha + \beta Y_{i,t-1} + \gamma OS_{it} + X_{i,t}^{'}\delta + v_{i,t} \qquad (1)$$

where i is the country index and t is the period index; $Y_{i,t}$ represents a proxy of financial stability; OS_{it} is the variable measuring the oil-price shock; $X_{i,t}^{'}$ represents the set of macroeconomic and financial sector variables; while $v_{i,t}$, the disturbance term, is the sum of three orthogonal components: an economy-specific fixed effect n_i, period fixed effects u_t, and idiosyncratic shocks, $\xi_{i,t}$ ($v_{i,t} = n_i + u_t + \xi_{i,t}$).

2.   The oil shock (OS) variable accommodates both the price and volume dimensions,[2] and effectively captures oil-exporters' exposure. Following the methodology in IMF (2012), the shock variable is defined as the percentage change in international oil prices multiplied by the economy's reliance on oil, expressed as a lagged three-year moving average of net oil exports to GDP. The model is estimated using economic and financial data from the IFS database and FinStats over the period 1998–2013, and high frequency FSI data covering 2010-2015 from COBAC. Additional sources for macroeconomic and financial sector data used to control for the effect of oil-price shocks are Sahay et al. (2015), the World Development Indicators (WDI) and the World Development Outlook (WEO). The main econometric findings are robust to various dynamic panel techniques, including fixed effects and the Generalized Method of Moments (GMM) estimations.

3.   The magnitude of the oil-price shock is modeled as a linear function of a set of conditioning variables. Equation (1) is augmented with cross-products of the shock OS and a set of variables suspected to influence the shock magnitude ($Z_{i,t}$):

$$Y_{i,t} = \alpha + \beta Y_{i,t-1} + \gamma_1 OS_{it} + \gamma_2 OS_{it} * \mathbf{Z}_{i,t} + X_{i,t}^{'}\delta + v_{i,t}, \qquad (2)$$

so that the marginal effects of the price shock is a linear function of $Z_{i,t}$:

$$\frac{\partial Y_{i,t}}{\partial OS_{it}} = \gamma_1 + \gamma_2 \mathbf{Z}_{i,t}. \qquad (3)$$

Thus the coefficient γ_2 measures the effect of conditioning variables on the oil-price shock's magnitude. Conditioning variables considered are real sector variables and financial and fiscal buffers variables. An estimated negative value for γ_2 for equation (2) suggests an amplification effect of declining oil prices on financial stability.

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[1] Our approach is mostly similar to the approach used in Kinda *et al.* (2016). The main difference lies in our focus on oil exporters and oil shocks and our definition of oil-price shock.

[2] Other definitions of the oil-price shock have been investigated in recent research (e.g., shock as unanticipated fall in oil prices, (see Kinda *et al.* (2016) for a review).

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