



INDONESIA

SELECTED ISSUES

March 2016

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INDONESIA

SELECTED ISSUES

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Approved By
**Asia and Pacific
Department**

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BANKING SECTOR SOUNDNESS IN INDONESIA¹

Overall, the banking sector appears well capitalized and profitable. However, rising vulnerabilities from corporate foreign currency leverage and challenging financial market conditions have raised concerns. In a less favorable external environment, nonperforming loans (NPLs) could rise as economic growth slows and the rupiah depreciates. Availability of short-term funding including deposits could tighten. The high level of capitalization and profitability, and the large deposit base generally provided buffers. Nonetheless, analyses of both aggregate and bank-by-bank data suggests that a group of smaller banks are vulnerable to deterioration in bank asset quality and liquidity conditions. These pockets of vulnerabilities warrant closer monitoring as econometric analysis suggests that NPLs would continue to rise if economic growth remains subdued and currency depreciation continues.

A. Introduction

1. This paper assesses the soundness of Indonesia's banking system. It first conducts an analysis of aggregate and bank-level data. It then conducts forward-looking scenario analyses of bank asset quality and liquidity.

B. The Landscape

2. Cross-country comparison suggests Indonesia's banking system is well capitalized and profitable. Figures 1.1 and 1.2 show that the capital ratio of 18.7 percent and return on assets (ROA) of 2.7 percent in 2014 were substantially above those for all other major emerging market economies (EMEs) sampled. Through August, the capital ratio remained relatively stable. ROA declined to 2.3 percent on slower growth but remained relatively high.

3. Nonetheless, bank asset quality and liquidity conditions need to be watched closely. Figures 1.3 and 1.4 show that the nonperforming loan (NPL) ratio of 2.1 percent and liquid assets to short-term liabilities of 33 percent in 2014 were much closer to the lower end of the country spectrum. Liquid assets to short-term liabilities rose somewhat in 2015:Q1. However, the NPL ratio rose steadily through August to 2.8 percent, exceeding the 2010 level.

4. Bank level data suggest pockets of vulnerabilities among smaller banks.

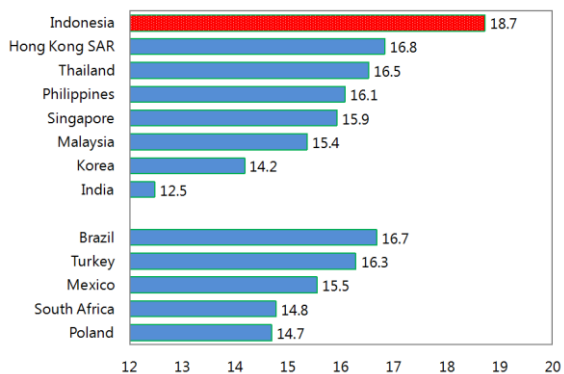
- **High NPLs:** Figure 2.1 shows that some smaller banks have relatively low capital ratios and high NPLs. Profitability tends to be lower for smaller banks due partly to the higher cost of deposit funding. August data show that the largest four banks (Buku 4, mainly state owned banks) enjoyed ROA of 3.3 percent, more than twice the 1.5 percent for small and medium sized banks (Buku1–3).

¹ Prepared by Ken Miyajima.

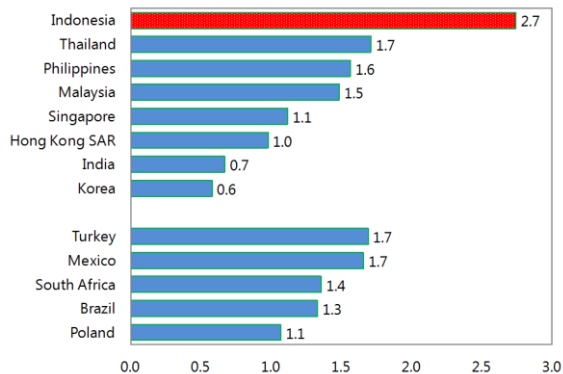
Figure 1. Selected Financial Soundness Indicators, 2014

(In percent)

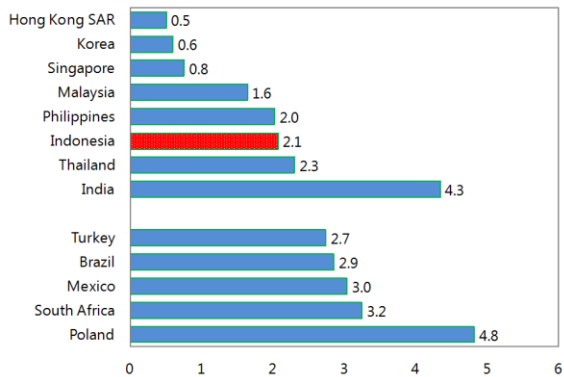
Regulatory Capital



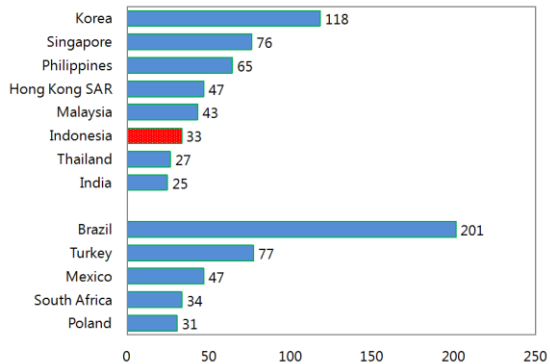
Return on Assets



NPL Ratio



Liquid Assets to Short-Term Liabilities



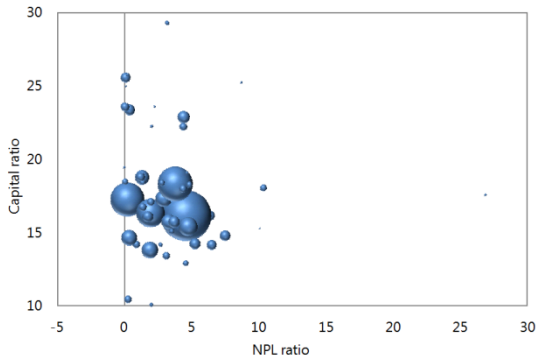
Source: IMF, *Financial Soundness Indicators* database.

Figure 2. Indonesia: Bank Asset Quality and Liquidity

(In percent)

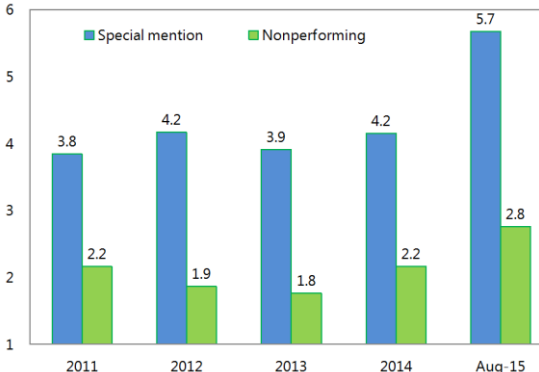
Some smaller banks have relatively low capital ratios and high NPLs.

NPL and Capital Ratios, 2014 1/



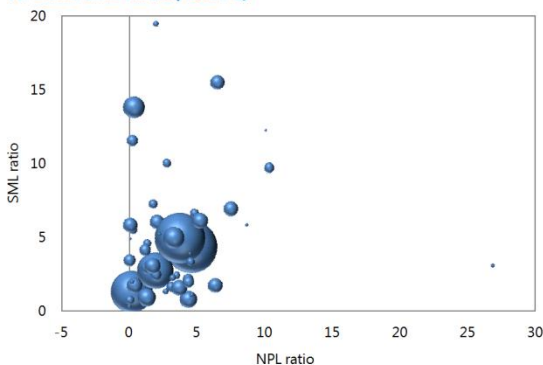
Special mention loans jumped this year.

Nonperforming and Special Mention Loans



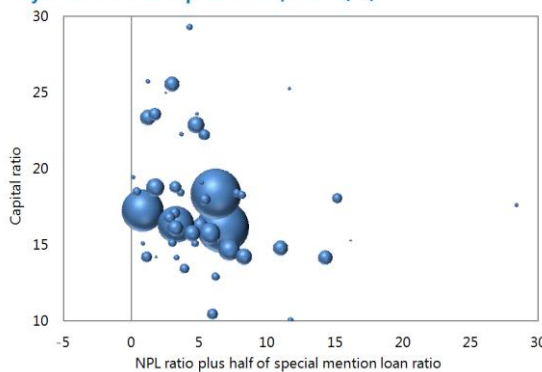
Some banks with relatively low NPLs have high level of special mention loans.

NPL and SML Ratios, 2014 1/



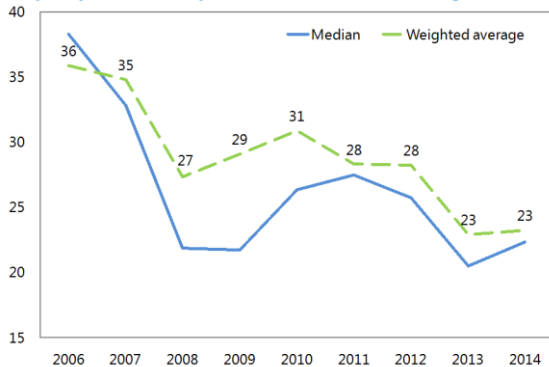
Case study: One half of special mention loans are assumed to migrate to NPLs.

Adjusted NPL and Capital Ratios, 2014 1/ 2/



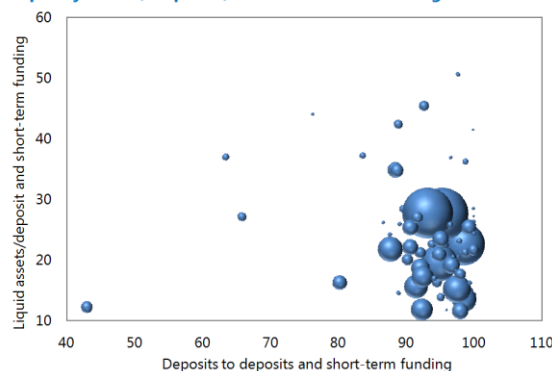
Liquid assets have declined relative to deposits and other short term funding.

Liquidity Assets to Deposits and Short-Term Funding



Some banks with low liquid asset ratios rely more on non-deposit funding.

Liquidity Assets, Deposits, and Short-Term Funding 1/



Sources: Bank Indonesia; Bankscope; IMF, *Financial Soundness Indicators* database; and IMF staff estimates.

1/ Bubble size represents total assets.

2/ One half of special mention loans are assumed to migrate into NPLs.

- **Special mention and restructured loans:** Figure 2.2 shows that special mention loans (SMLs) jumped this year to 5.7 percent of total loans. Figure 2.3 shows that some banks with relatively low NPLs have high level of SMLs, thus vulnerable to potential deterioration of asset quality if, for instance, economic growth remained subdued for a protracted period. And smaller banks are particularly vulnerable to the risk of migration of SMLs to NPLs. Figure 2.4 highlights this when, for illustrative purposes one half of special mention loans is assumed to migrate to NPLs. Restructured loans represent another source of risk. For a sample of banks for which data are available, restructured loans in 2014 represented 2 percent of total loans, compared to NPLs of 3.5 percent of total loans for the same sample of banks.
- **Liquidity risk:** Figure 2.5 shows that liquid assets have declined relative to deposits and other short term funding, from 36 percent in 2006 to 23 percent in 2014. In 2014, the indicator was even below 15 percent for several banks (Figure 2.6). Smaller banks are exposed to larger liquidity risk given their greater reliance than larger banks on term deposits. In Indonesia, term deposits, which look similar to money market instruments, tend to be more volatile than current and savings account (CASA) deposits.

5. Bank soundness varies markedly across different type of banks (Table 2). August 2015 data show that NPLs of regional development banks (4.3 percent) were significantly above those of other types of banks (2.1–2.8 percent). Risks from asset quality for non-foreign exchange banks and foreign/joint venture banks are mitigated by their high capital ratios (23 percent and 34 percent, respectively). State-owned banks outperformed in terms of profitability, with their ROA (3 percent) notably above the industry average (2.3 percent). Funding risk could become an issue for foreign/joint-venture banks as their Loan-to-Deposit (LTD) ratios (131 percent) are significantly above the industry average (89 percent). Moreover, these banks rely more on non-deposit funding (30 percent of total funding) compared to their peers (4–11 percent of total funding).

C. Scenario Analysis

6. Illustrative scenario analyses of bank asset quality and liquidity are conducted. First, key determinants of NPLs are identified by estimating a small-scale satellite model, the result of which is used to project NPLs for a given set of macroeconomic assumptions. Second, a simple simulation is conducted to assess banks' ability to accommodate reduced short-term funding using liquid assets.

Bank Asset Quality²

7. The linkages between NPLs and key macroeconomic and bank balance sheet variables in real terms are estimated. With respect to macroeconomic variables, lower GDP growth reduces

² Bank Indonesia's empirical analysis shows that NPLs are affected by GDP growth, corporates' financial conditions and lending rates in the short run, while GDP growth and lending rates in the long run (Box 1.1, *Financial Stability Report*, March 2015).

corporate profitability. Depreciation of the rupiah against the US dollar increases repayment needs for corporates with foreign currency debts, reducing capacity to service rupiah loans. A rise in the policy interest rate tightens domestic monetary conditions while a lower oil price growth dampens export revenues. Turning to bank level variables, a larger value of the lagged NPL ratio captures greater persistence of NPLs. Lower credit growth leads to slower economic activity. We also control for bank size. Dummy variables are included to control for the potential impact of the Global Financial Crisis on NPLs. The model was estimated applying pooled, fixed-effects, and system General Method of Moments (GMM) approaches (Arellano and Bover (1995), Blundell and Bond (1998)) to annual data spanning 2000–14. All variables are lagged by one period to help reduce reverse causality.

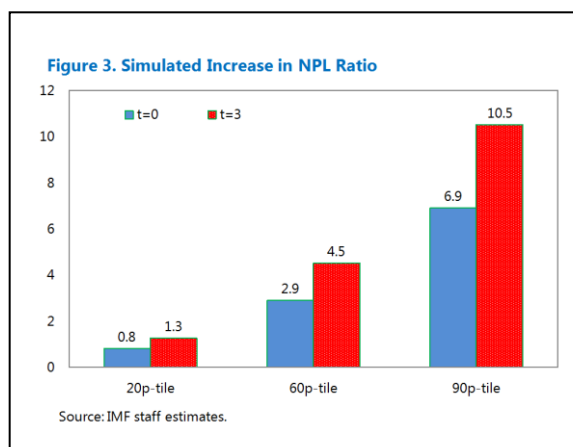
8. NPLs in Indonesia appear to be driven by GDP growth and the rupiah's performance.

Table 1 summarizes key findings from two different specifications—with and without bank level variables except that lagged NPLs were included in both (Table 3 reports the underlying regression results). The lagged NPL ratio is statistically significant, indicating the variable's persistence. The coefficient on GDP growth is negative and statistically significant at the 5 percent level, while that on rupiah depreciation is positive and statistically significant at the 5–10 percent level. Thus, lower GDP growth and greater rupiah depreciation lead to a rise in NPLs. The coefficients on dummy variables for 2008 and 2009 are positive and statistically significant at the 1–5 percent level.

9. In addition, several bank characteristics affect NPLs. First, larger banks tend to have somewhat higher NPL ratios. Larger banks may benefit from economies of scale or take on higher risk for higher returns than smaller banks do, potentially underpinning the observation that larger banks tend to be more profitable than smaller banks (Table 2). Second, a tentative result suggests that NPLs of state-owned banks may be less impacted by both economic activity and rupiah depreciation.³ These banks' loan portfolios could be more diversified.

10. The banking system appears to be able to withstand relatively large shocks to NPLs.

For illustrative purposes, the NPL ratios in the 20th, 60th, and 90th percentile in 2014 are taken as a starting point and the coefficients obtained from the regression results underlying Table 3 are applied. To simulate, real GDP growth is assumed to moderate from 4.7 percent in $t = -1$ to 2 percent in $t = 0, 1, 2, 3$. The rupiah



³ A regression model with macro variables was re-estimated with additional terms capturing the interaction between a dummy variable for state owned banks and GDP growth or rupiah depreciation. The results were less strong than those summarized in Table 1. Log of total assets was dropped as size and bank characteristics can overlap, particularly for state-owned banks, most of which are the largest banks. Similar interaction terms did not indicate systematic effects for other bank groups.

depreciation is assumed to accelerate from 7.4 percent in $t = -1$, to 15 percent in $t = 0, 1, 2, 3$. Figure 3 shows that for banks in the 20th percentile (NPL ratio of 0.8 percent), the NPL ratio would rise by 0.5 percentage point to 1.3 percent in three years. Banks with lower asset quality would witness larger increases. Starting from 2.9 (6.9) percent, the NPL ratio would rise by 1.6 (3.6) percentage points to 4.5 (10.5) percent. Nevertheless, their strong capital buffers and profitability provide an important source of resilience for Indonesian banks.

11. Such an assessment may be somewhat overstated by potential gaps in the area of asset classification. Norms governing restructured loans were tightened in October 2012 but, for instance, loan restructuring could still be repeated. To ensure stability of the banking system, measures to facilitate restructuring of NPLs by banks introduced in July 2015 would need to be accompanied by stronger supervision to ensure adequate enforcement particularly if economic growth remains subdued and the rupiah continues to depreciate.

Bank Liquidity⁴

12. The liquidity risk was assessed under a scenario where banks experience a relatively large reduction in deposits and other short-term funding. The extent to which banks can accommodate reductions in deposits and other short-term funding by selling liquid (and to some extent illiquid) assets within a 30-day window (divided into five periods, six days each) can be investigated. Withdrawal rates vary by the type of deposits, with demand deposits suffering higher “runoff” rates. During times of market stress, banks would not be able to convert all their liquid assets into cash at face value. Moreover, some liquid assets are encumbered in margin calls—a higher amount of assets are encumbered during a more severe scenario to meet greater collateral demand. Parameter values are summarized in Table 4.⁵ They partly mimic a similar exercise in IMF (2014) and are also guided by related work, including Schmieder and others (2012).

13. The banking sector remains in a strong position to withstand shocks. Systemic liquidity risk appears limited as retail deposits represent a large share of overall short-term liabilities (except for some small banks). Based on end-December 2014 data, the total liquidity gap of banks facing liquidity shortages was estimated at Rp 14 trillion (0.34 percent of total funding), comparable to the result reported in the 2014 Indonesia Staff Report.

⁴ Bank Indonesia conducted liquidity stress tests by bank group (Buku 1–4) assuming the U.S. Fed started its monetary policy normalization (Box 4.1, *Financial Stability Report*, March 2015). It found that at the group level banks remain liquid, but warned that some individual banks could face liquidity crunch in the face of large and rapid capital outflows.

⁵ Using the same runoff rates as those in Box 6 of 2014 staff report. Specifically, demand, savings, and term deposits are assumed to decline by 7.1 percent, 4.8 percent, and 3.6 percent, respectively (equivalent to two standard deviation of month-to-month fluctuation). Short-term wholesale funding is assumed to decline to zero. Additional assumptions were made on asset availability (95 and 5 percent of liquid and illiquid assets, respectively), haircut (5 percent and 15 percent for liquid and illiquid assets) and encumbrance (10 percent and 25 percent of liquid and illiquid assets), see Table 4.

14. Pockets of vulnerabilities are highlighted by Figure 4, which shows that a handful of banks can be left with small amounts of liquid assets relative to deposits and other short term funding at the end of the period analyzed. The bottom eight banks consist of foreign-owned/ joint venture banks and smaller private sector banks as well as two medium-sized banks (a domestic private bank and a state owned bank).

D. Concluding Remarks

15. Results from this paper suggest that Indonesia’s banking system appears strong on average but pockets of vulnerabilities warrant close monitoring. The high level of capitalization and profitability, and the large deposit base generally provide buffers to Indonesia’s banks. However, analyses using both aggregate data and bank-by-bank data suggest that a group of smaller banks are vulnerable to deterioration in bank asset quality and liquidity conditions. These pockets of vulnerabilities warrant closer monitoring particular as our econometric analysis suggests that NPLs would continue to rise if economic growth remains subdued and currency depreciation continues.

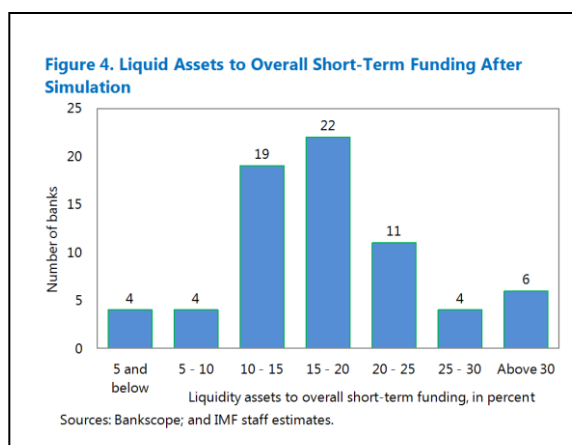


Table 1. Indonesia: Bank Asset Quality and Liquidity 1/

Bank Level Variables?	No	Yes
Bank level variable		
Logit of NPL, lagged	+***	+***
Real credit growth, lagged
log of total assets, lagged	...	+*
Macro variable		
Real GDP growth, lagged	-**	-**
Real rupiah depreciation, lagged	+*	+**
Real policy rate, lagged	.	.
Real oil price growth, lagged	.	.
Time dummy		
Year 2008	+**	+***
Year 2009	+**	+**

Source: IMF staff estimates.

1/ Dependent variable is bank-by-bank (logit transformed) NPL ratio for Indonesian banks spanning 2000-2014 (annual frequency). The table shows the sign of estimated coefficients based on a range of regressions including pooled (without country fixed effects), fixed effects (FE), and system GMM approaches (GMM). ***, **, and * signify significance at the 1%, 5% and 10% levels. "." signifies the coefficient is not statistically different from zero. "..." means the variable in the first column was not included.

Table 2. Indonesia: Bank Financial Soundness Indicators, August 2015

	Overall	Public		Private			Buku4 Largest	Buku1 Smallest
		State own.	Reg. dev.	Forex	Non forex	JV/for-own.		
Number of banks	118	4	26	39	28	21	4	40
Solvency								
NPL to total loans	2.8	2.8	4.3	2.7	2.6	2.1		
SML to total loans	5.7							
CAR	20.7	18.8	17.8	17.8	23.1	33.6	19.1	20.4
Core CAR	18.2	15.6	15.7	15.3	21.6	32.1	16.3	18.7
Profitability								
ROA	2.3	3.0	2.2	1.8	1.9	1.8	3.3	1.5
Funding								
LTD	88.8	86.3	71.9	85.9	91.4	130.5	82.9	77.7
Nondeposits to total funding (excluding equity)	11.0	11.0	4.2	7.9	7.8	30.0		
Liquidity								
Liquid assets/total assets	16.9	15.8	24.3	15.2	12.8	19.7	16.6	21.3
Size								
Assets	100	37	9	37	2	15	44	3
Loans	100	36	8	40	3	12	42	3

Source: Bank Indonesia; and IMF staff estimates.

Table 3. Indonesia: Regression Results 1/

Model number	1	2	3	4	5	6	7	8	9	10
Approach	Pooled	FE	GMM	GMM	GMM	Pooled	FE	GMM	GMM	GMM
Bank level variable										
Logit of NPL, lagged	0.7158***	0.5176***	0.5698***	0.5391***	0.4796***	0.7053***	0.4546***	0.6828***	0.6484***	0.6149***
Real credit growth, lagged	...	...	...	...	...	-0.0001	-0.0005	0.0001	0.0001	0.0000
log of total assets, lagged	...	...	...	...	...	0.0119	0.0712*	0.0319	0.0561**	0.0477*
Macro variable										
Real GDP growth, lagged	-0.0901***	-0.1234***	-0.0707*	-0.0851**	-0.1025***	-0.0946***	-0.1785***	-0.0770**	-0.0972***	-0.1055***
Real rupiah depreciation, lagged	0.0050***	0.0037**	0.0037**	0.0031*	0.0026	0.0049***	0.0018	0.0043**	0.0037**	0.0034**
Real policy rate, lagged	-0.0102	0.0007	0.0070	0.0044	0.0057	-0.0096	-0.0005	-0.0054	-0.0032	-0.0028
Real oil price growth, lagged	0.0006	0.0012	0.0001	0.0003	0.0005	0.0006	0.0019	0.0002	0.0006	0.0006
Time dummy										
d2008	0.2155***	0.2218***	0.1569**	0.1758**	0.1936***	0.2308***	0.2919***	0.2202***	0.2303***	0.2419***
d2009	0.2991***	0.3647***	0.1429	0.2248**	0.2801***	0.3078***	0.4313***	0.1817**	0.2582***	0.3195***
Constant	0.0097	-0.1382	-0.3362*	-0.3060*	-0.3101*	0.0318	0.1329	-0.0855	-0.0160	-0.0318
# of obs.	485	485	455	455	455	435	435	435	435	435
Lag depth of GMM instruments	...	...	1	2	3	...	...	1	2	3
P values										
ar(1)	...	...	0.0000	0.0000	0.0000	...	...	0.0000	0.0000	0.0000
ar(2)	...	...	0.7176	0.7389	0.8142	...	...	0.5394	0.5234	0.5403
hansenp	...	...	0.3946	0.4577	0.5795	...	...	0.8545	0.9993	1.0000

1/ Dependent variable is bank-by-bank (logit transformed) NPL ratio for Indonesian banks spanning 2000-2014 (annual frequency). Using pooled (without country fixed effects), fixed effects (FE), and system GMM approaches (GMM). The coefficients represent non-linear effect that depends on starting levels. ***, **, and * signify significance at the 1%, 5% and 10% levels. 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.

Table 4. Indonesia: Parameter Value for Bank Liquidity Scenario Analysis

Item	Parameter Value (In percent)
Runoff rate	
Demand deposits	7.1
Savings deposits	4.8
Term deposits	3.6
Short-term wholesale funding	100
Availability	
Liquid assets	95
Illiquid assets	5
Haircut	
Liquid assets	5
Illiquid assets	15
Encumbrance	
Liquid assets	10
Illiquid assets	25

Source: IMF staff estimates.

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Schmieder, C., H. Hesse, B. Neudorfer, C. Puhr, S. W. Schmitz, 2012, "Next Generation System-Wide Liquidity Stress Testing," IMF Working Paper No. 12/3 (Washington: International Monetary Fund).

CORPORATE VULNERABILITIES¹

While overall corporate sector risks in Indonesia appear manageable, some corporates are facing higher risks including exchange rate, refinancing, or default, with possible spillovers to the banking system. With a slowing economy and a weakened rupiah, corporate balance sheets are expected to provide smaller buffers against negative macroeconomic shocks going forward. This paper assesses corporate sector vulnerabilities. It first describes the current situation in the corporate sector, and then projects corporate default probabilities under different macroeconomic scenarios. Results from the scenario analyses suggest that if economic growth slows sharply and recovers only slowly, the default probabilities of domestic firms could rise to levels comparable to those during the Global Financial Crisis. While this is a low-probability scenario, policy makers should continue to closely monitor vulnerabilities and step up effort to strengthen contingency plans.

A. Introduction

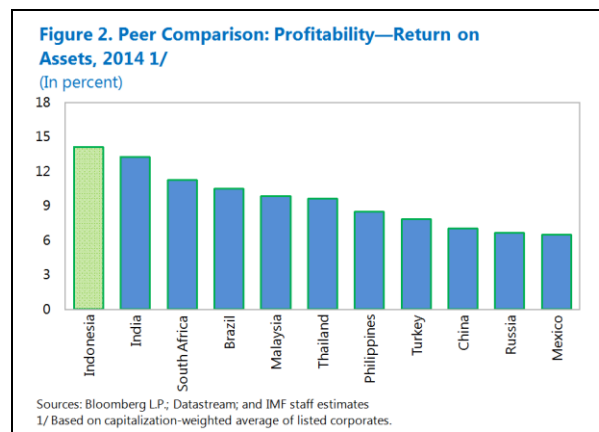
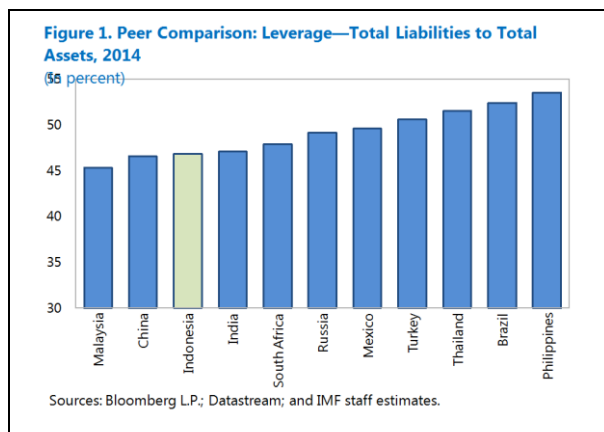
1. This note assesses corporate sector vulnerabilities in Indonesia. It first discusses key facts about the sector exploiting a range of macroeconomic and financial market data. Then, as a way of further assessing corporate vulnerabilities, it projects corporate default probabilities under different macroeconomic scenarios.

B. Corporate Performance and External Debt Risk

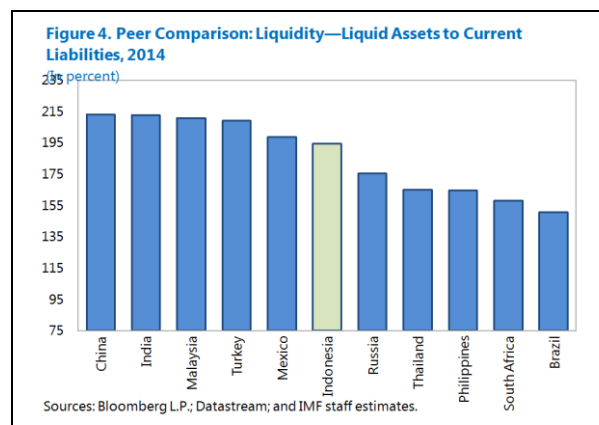
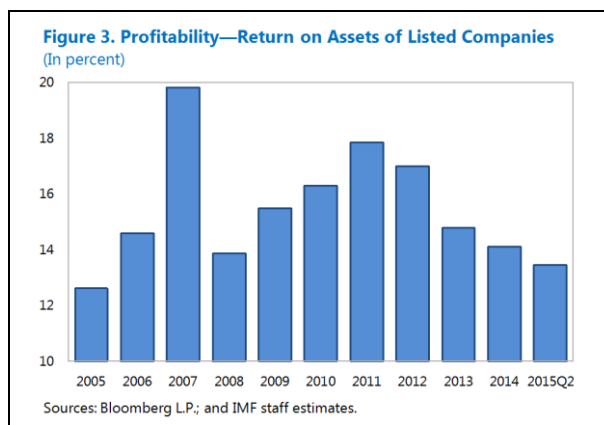
2. Indonesia's corporate sector remains relatively strong and sound compared to its EM peers. Aggregate corporate leverage is comparatively low, with the corporate debt relative to GDP standing relatively small at around 32 percent (compared to around 70 percent on average for Asian EM peers.² The liability-to-asset ratio is low at less than 50 percent (Figure 1), and profitability is highest among peers (Figure 2). Many corporates in Indonesia also tend to rely on internal cash flows for funding rather than external financing.

¹ Prepared by Ken Miyajima and Jongsoon Shin.

² Includes India, Malaysia, Thailand, and the Philippines.

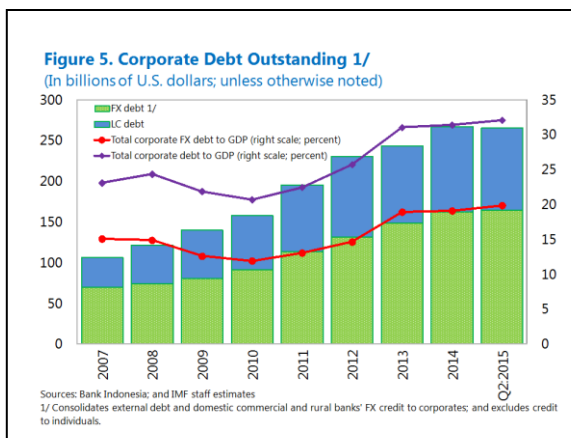


3. Nonetheless, corporates have been impacted by continuing commodity price falls and a weakened rupiah, exacerbated by rapidly increased external debt. The commodity down-cycle and slowing economy have impacted commodity-related corporates (i.e., coal mining), and corporates in non-tradable sectors, reducing their income stream and ability to pass the costs to consumers due to consumers’ reduced purchasing power. Profitability continues to decline and liquidity remains tight, reflecting a weakening operating environment and tighter financial conditions (Figures 3 and 4). Some corporates have been facing debt repayment problems in recent months, notably on foreign currency denominated (FX) bonds. In the coming periods, as external financing conditions tighten, the corporate sector could face difficulties in servicing their high level of FX debt.



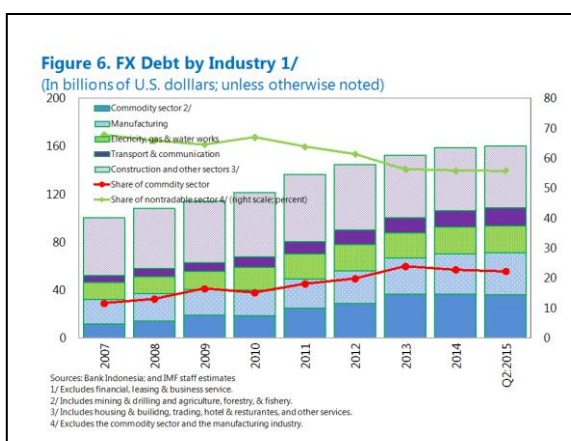
4. Foreign currency (FX) denominated debt of corporates grew rapidly over the past years.

FX corporate debt (including FX debt to domestic banks) reached around 20 percent of GDP as of June 2015, doubling the level seen in 2010, albeit from a low base. FX debt of corporates accounts for around 60 percent of the total corporate debt. However, FX debt growth moderated in 2015, with issuance affected by general risk aversion towards emerging markets and weak private investment.

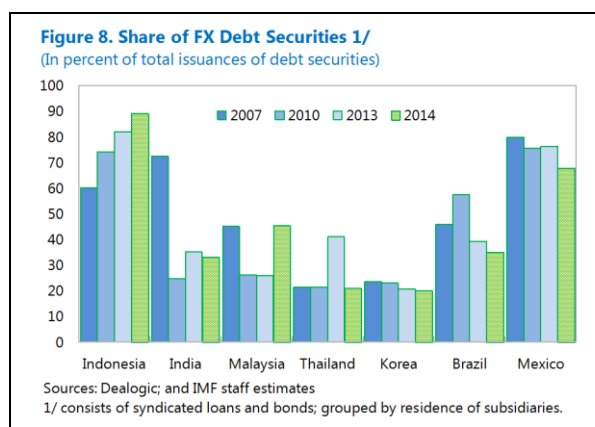
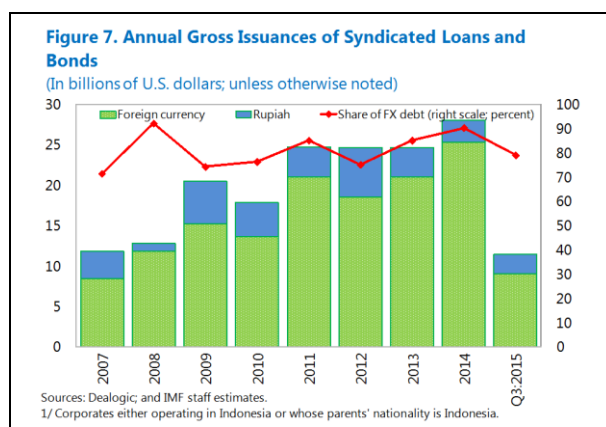


5. FX corporate debt is concentrated in the commodity and some non-tradable sectors, driven by FX debt securities.

- The share of the commodity sector steadily rose to around 30 percent in 2014 from 20 percent in 2007. A group of non-tradable sectors, notably the transport and telecommunication industries, accounts for around 40 percent of FX corporate debt, while these sectors are running a growing risk of currency mismatches between rupiah incomes and FX debt service.



- FX debt securities (i.e., syndicated loans) were the major driver. Around 90 percent of debt securities issued in 2014 were FX denominated. The heavy reliance on FX syndicated loans is in contrast with EM peers where local currency bond markets have increasingly substituted bank loans to corporates (Figure 8).



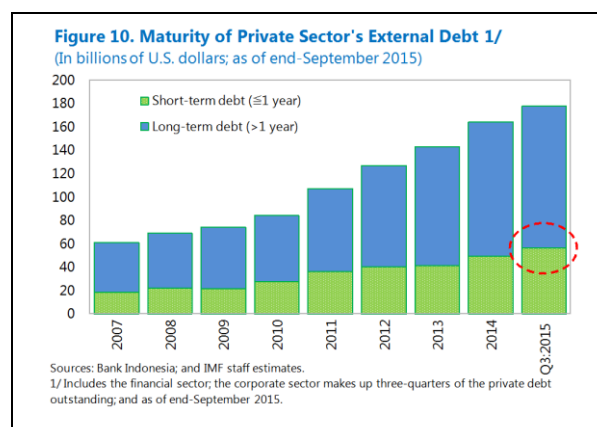
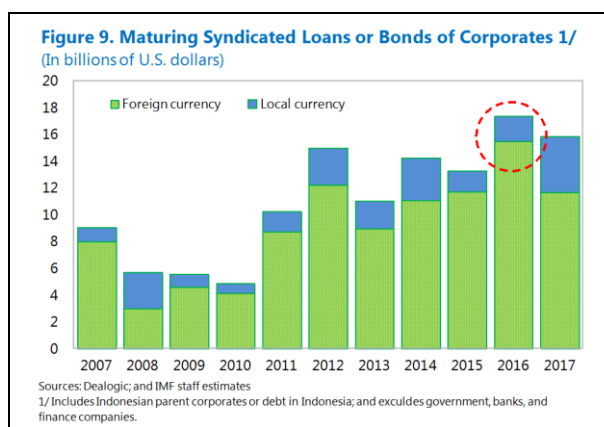
- The rise in FX debt has been led by SOEs (e.g., energy-related SOEs), while FDI-related corporates' borrowing accounts for half of external borrowing (i.e., foreign private corporates

and joint-venture private corporates). The expected rise in infrastructure spending in the coming years suggests that external debt borrowing may continue to rise at a brisk pace.

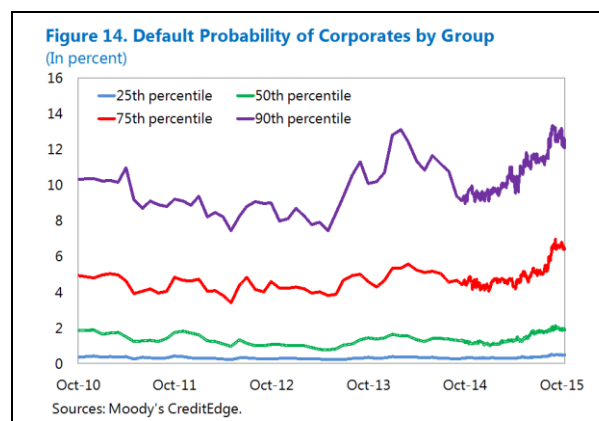
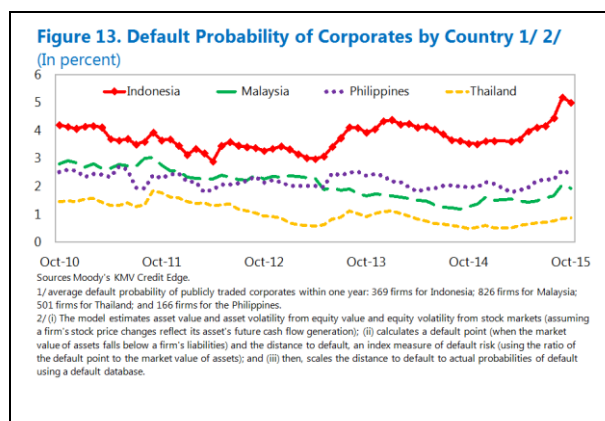
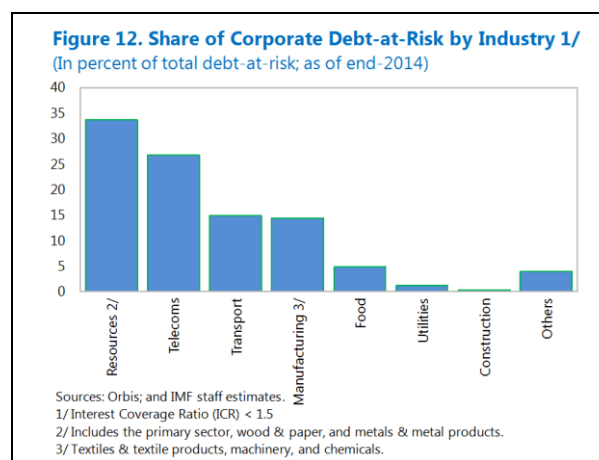
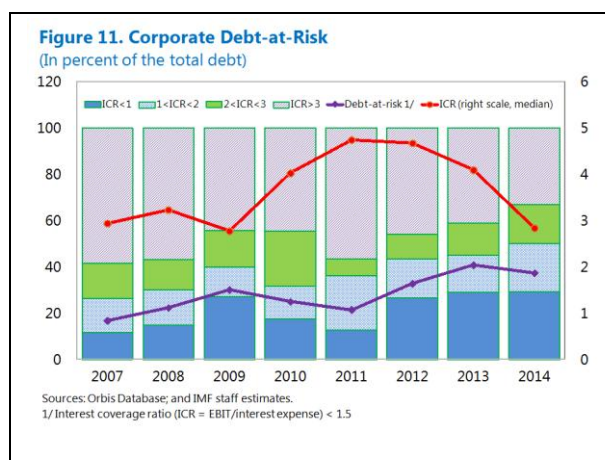
6. The rapid increase in corporate FX borrowing has been driven by both pull and push factors. Corporates tapped low-cost external borrowing under the U.S. Fed monetary easing, which helped create ample liquidity in EM debt markets. With favorable interest rate spreads and commodity booms in 2010-13, corporates borrowed actively from global bond and syndicated loan markets. More structurally, shallow domestic financial markets, particularly thin corporate bond markets, have led corporates to tap offshore debt markets.

7. Some corporates has been facing rising FX exposure, refinancing risk, or default risk.

- **A portion of the FX debt is estimated to be unhedged, making it vulnerable to currency depreciation.** Rupiah depreciation has exposed corporates to losses from the revaluation of their FX debt. Bank Indonesia (BI)'s hedging regulations have helped corporates to manage currency risk (Box 1). However, some corporates do only partial hedging to reduce hedging costs. Since plain vanilla hedging instruments have a high cost, some corporates use hedging instruments with built-in ceiling options. If the rupiah depreciates substantially, FX exposure is likely to jump, causing losses.
- **Refinancing risk is likely to rise, as maturing FX debt securities are set to rise in 2016** (Figure 9). Maturing FX syndicated loans and bonds have a large proportion of debt categorized as leveraged or high-yield, whose ease of rollover could be affected by BI's new requirement for corporate that wants to issue FX debt to be of investment grade credit rating starting from 2016. Still, there are some mitigating factors. Two-thirds of non-bank private corporates' external debt maturing within a year was borrowed from affiliates, which could help mitigate the refinancing risk. Also, the overall amount of maturing debt (including financials) within a year appears manageable (Figure 10).



- Corporates face higher default risks.** The interest coverage ratio has fallen sharply to the level seen during the global financial crisis (Figure 11). Corporates in the resource sector are under the most pressure, with the interest coverage ratio³ below 1.5 for a third of the sector, followed by corporates in the telecommunication industry (Figure 12). Some corporates are running a heightened default risk, stemming from eroding liquidity, worsening revenue and margin compression, while others face an unfavorable debt maturity profile and growing refinancing risks. According to Moody’s KVM Credit Edge model, default probability has picked up, especially in the weakest deciles (Figures 13 and 14). This is mirrored in a recent rise in nonperforming loans (NPLs) and special mention loans in the banking system.



8. A disorderly default of a large systemically-connected corporate could create negative spillovers to the banking system and weaken confidence. Given the banking sector’s large exposure to corporates, tightening of corporate FX borrowing conditions could have an impact on domestic banks’ loan quality and liquidity, while forcing corporates to borrow from domestic banks. Risks are mainly on linkages with mid-sized banks, which are vulnerable to shocks. Also, an abrupt

³ Interest coverage is EBIT/Interest Expense, where EBIT stands for Earnings Before Interest and Tax.

downgrade of corporate credit rating could quickly weaken investor confidence in the corporate sector.

C. Bottom-Up Scenario Analysis of Corporate Default Probability in Indonesia

9. This section provides a forward-looking assessment of corporate sector vulnerabilities.

In particular, it projects corporate default probabilities under different macroeconomic assumptions in several steps as explained below.

10. The model maps macroeconomic scenarios to probabilities of default (PDs) of individual firms (Figure 15).⁴ A forward intensity model is a reduced form model in which the PD is computed as a function of different input variables. The model accounts for exits of firms due both to defaults and reasons other than defaults.⁵ Two sets of independent factors—**common risk factors** and **firm specific factors**—are used as input variables. Common and firm specific factors are assumed to be influenced by a set of **macroeconomic factors**.

11. The variables used for the scenario analysis are summarized in Table 1. Macroeconomic conditions are characterized by variables commonly used in the literature of stress testing. GDP growth proxies for the growth in incomes and earnings of firms. Unemployment rate affects the consumption and spending of households and, in turn, corporate sales. Inflation can signal macroeconomic uncertainty. High inflation raises costs and impairs credit quality but also reduces real debt burden. Exchange rate performance affects firms through net exports and balance sheet channels. Short-term interest rates are an indicator of the cost of funding for corporates. Common risk factors are the domestic equity price index and short-term interest rates, which define the market conditions and in turn affect the state of individual firms. Firm specific factors for more than 400 corporates (both financial and nonfinancial) capture characteristics including liquidity, profitability, and size.⁶

⁴ The model was developed by staff of National University of Singapore (NUS) in collaboration with IMF staff with the active support by NUS Risk Management Institute's Credit Research Initiative team. For further information see Duan et al (2012), Duan and Fulop (2013) and Duan et al (2014).

⁵ In the forward intensity model, a firm's default is signaled by a jump in a Poisson process. The probability of a jump in the Poisson process is determined by the intensity of the Poisson process. With forward intensities, PDs for any forecast horizon can be computed knowing only the values of the input variables at the time of prediction, without needing to simulate future values of the input variables.

⁶ Idiosyncratic volatility represents the standard deviation of the residuals obtained from a regression of the daily returns of the firm's market capitalization on those of the economy's stock index, for the previous 250 days. Firms with more variable cash flows and therefore more variable stock returns relative to a market index are likely to have a higher probability of bankruptcy.

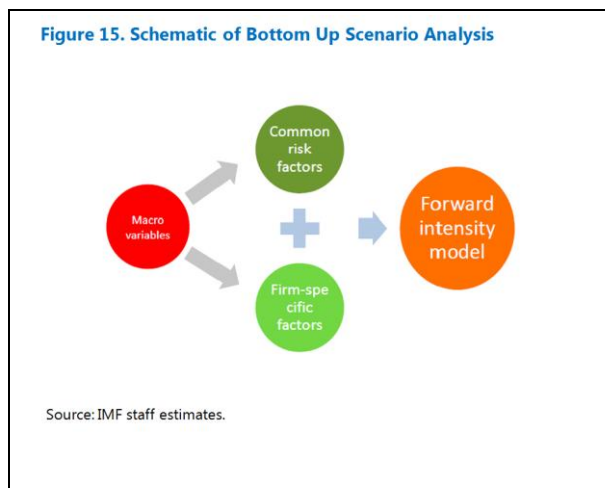


Table 1. Indonesia: Data for Simulating Corporate Probability of Default

Macroeconomic	
Indonesia specific	Real GDP growth Unemployment CPI inflation NEER Short-term interest rate
Common	Jakarta Composite Index SBI yield, 3 months
Firm specific	Distance-to-default Liquidity (Cash/Total Assets) Profitability (Net Income/Total Assets) Size (relative to median) Market-to-book value Idiosyncratic volatility

Sources: NUS and IMF.

12. The simulation starts by assuming two different paths of quarterly macroeconomic variables through 2017 (Figure 16).⁷ The trajectories of macroeconomic variables are in turn used to project common risk factors and firm specific risk factors. Finally, these risk factors are used as inputs to a forward intensity model, which is simulated to generate a distribution of PDs.

- **The baseline scenario** assumes GDP growth would moderately increase to around 5.3 percent. The unemployment rate would decline gradually to 5.7 percent, while inflation would fall to 4.4 percent. The rupiah's movement would range between –3 percent to 4 percent year-on-year (y/y) every quarter and the one-month JIBOR interest rate decline moderately to 6.7 percent.
- **The downside scenario** is characterized by a sharp drop in GDP growth to below two percent y/y and a vigorous V-shape recovery. The unemployment rate would jump to nine percent and return to somewhat above eight percent. Inflation would surge to above ten percent but return to 6 percent. The rupiah would depreciate by 14–20 percent y/y for three quarters. The JIBOR interest rate would jump to exceed 12 percent for three quarters and return to 9 percent.

13. Several key observations emerge from estimated results.⁸

- First, the firm-specific factors may have recently taken less supportive values than in previous periods, after growth slowdown and rupiah depreciation have weakened corporate balance sheet conditions amid rising corporate foreign currency leverage. Under the baseline scenario, the median corporate PD is projected to rise to levels somewhat higher than those during the taper tantrum in 2013 and moderate somewhat toward the end of 2017 (Figure 17, upper panel,

⁷ The actual simulation is based on quarter-on-quarter percent or percentage point changes implied by the year-on-year data presented in Figure 16.

⁸ The model performs generally well. For the ASEAN-5 economies, macroeconomic variables explain a large share of variation in the common risk factors (R^2 is around 0.6) and the firm specific risk factors (R^2 is around 0.3–0.4). Accuracy of in-sample prediction of PDs is high.

red broken line).⁹ This is the case despite projected macro fundamentals being broadly comparable to those in 2013—GDP growth is somewhat lower, but the rupiah’s performance is more favorable and inflation is lower.

- Second, weaker macroeconomic performance would naturally lift corporate PD to higher levels. The median PD under the downside scenario would rise to about one half of the maximum registered during the Lehman crisis (Figure 17, upper panel, green solid line). This reflects a sharp GDP growth slowdown and deterioration in other macro variables. However, the PD would decline as economic activity regains momentum.
- Third, corporate distress can worsen materially if weak macroeconomic performance is accompanied by severe financial market jitters. Under the downside scenario, the 95th percentile estimate, with remote chance of occurrence, rises to very close to the maximum registered during the global financial crisis (Figure 17, lower panel, light green broken line). Meanwhile, cross-border spillovers of a negative shock could be large in an environment of elevated uncertainty and financial market volatility. Under such circumstances, what is considered as a low-probability outcome (with a high impact) could become a real threat.

D. Concluding Remarks

14. Overall, the risk from the corporate sector remains manageable, and the authorities have strengthened the monitoring framework. The aggregate corporate debt-to-GDP ratio remains small, and on a system wide basis, near-term refinancing risk appears manageable. The authorities are monitoring corporate vulnerabilities closely, and the implementation of the BI’s hedging regulations has helped corporates manage currency risks. Authorities’ ongoing work to upgrade the framework and inter-agency coordination on corporate surveillance is also in the right direction.

15. Nonetheless, close monitoring and granular analysis on maturing FX debt are warranted. Even though the overall risk of the corporate sector is manageable, a group of corporates is facing heightened debt risks, some of which are connected to large business groups. The results of the empirical analysis in Section B confirm these observations. Close monitoring, therefore, is required for FX debt of corporates with rupiah income, as well as unhedged, non-affiliated, or maturing FX debt, together with bank linkages. Strengthening policy coordination should also continue, coupled with data analysis to assess the dimensions of the debt problems of specific corporates in vulnerable groups. The authorities should consider reviewing the corporate resolution framework (including the bankruptcy regime) to ensure that it is capable of dealing with large and systemically connected conglomerates. In the medium-term, deeper financial markets will help reduce the costs of hedging and develop domestic corporate bond issuance and trading.

⁹ Based on 10,000 simulations.

Box 1. Bank Indonesia's Foreign Exchange Regulations on Corporates

FX regulations. To encourage corporates with external debt to enhance risk management, BI introduced a set of prudential measures in October 2014.

- Hedging ratio.** The hedging ratio is defined as the ratio between the total value hedged and the net short-term foreign liability position. The minimum hedging ratio is 20 percent for 2015 and 25 percent for 2016, and is applied to the net foreign currency liabilities with a maturity period up to three months, and those that mature between three and six months. Exemptions are made for export-oriented corporates—corporates with a ratio of export revenue to total revenue exceeding 50 percent of the previous calendar year—with financial statements issued in U.S. dollars.
- Liquidity ratio.** The liquidity ratio is defined as the ratio between short-term foreign currency assets and short-term foreign currency liabilities. The minimum ratio is 50 percent for 2015 and 70 percent for 2016.
- Credit rating requirement.** Nonbank corporates should have a credit rating of no less than BB or equivalent issued by an authorized rating agency, including Moody's (Ba3), S&P (BB-), and Fitch (BB-). The validity of the credit rating is up to 2 years. Corporates can use a parent company's credit rating for the external debt of parent companies or external debt secured by parent companies. Exemptions are made for external debt related to infrastructure projects, external debt secured by multilateral institutions, refinancing, and trade credit.

Indonesia: BI's FX regulations on corporates 1/

	Phase 1 2015	Phase 2 2016	Phase 3 2017 onward
Object of regulation	Governs all foreign currency debt		
Hedge ratio			
≤ 3 months	20 percent	25 percent	
3-6 months	20 percent	25 percent	
Liquidity ratio			
(≤ 3 months)	50 percent	70 percent	
Credit rating	Not applicable	Minimum rating of BB-	
Counterpart of hedging transaction	Not necessarily be done with a bank in Indonesia		Must be done with a bank in Indonesia
Sanctions	As of 2015:Q4	Administrative sanctions will be imposed	

Source: Bank Indonesia

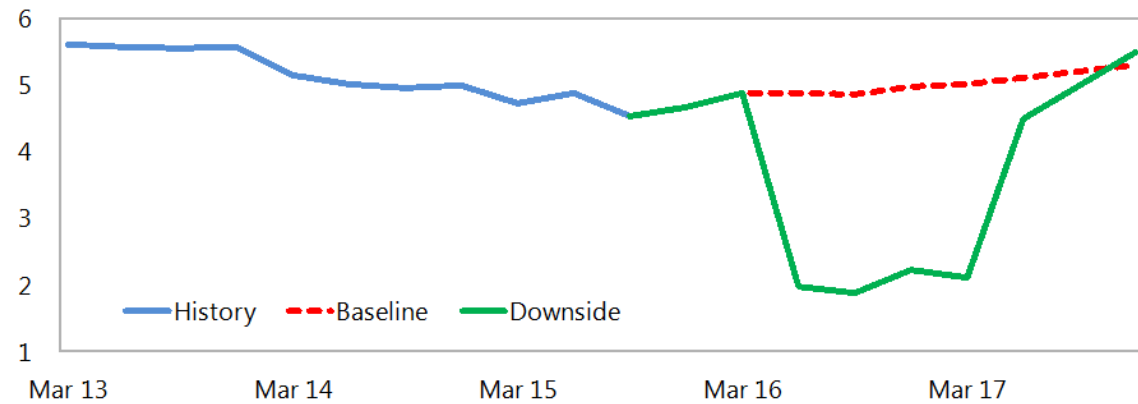
Reporting requirement. BI has also strengthened monitoring on external borrowing of corporates. Corporates with external borrowing should submit quarterly reports to BI regarding their hedging and liquidity ratios for each quarter, starting from 2015. The report covers a corporate's hedging ratio, liquidity ratio, and credit rating, and all supporting documentation.

Sanctions. To implement these regulations effectively, BI will impose administrative sanctions from 2015:Q4, in the form of warning letters to "related parties" in the transactions, including to the lenders which are providing the non-compliant debt, the Ministry of Finance, the Minister of State Owned Enterprises (in the case of borrowers that are state-owned enterprises), the Financial Services Authority (OJK) and the Indonesia Stock Exchange (in the case of listed-company borrowers).

Figure 16. Projected Macroeconomic Variables

GDP Growth

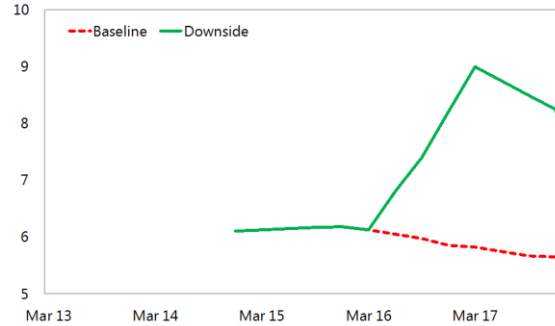
(In percent, year-on-year)



Sources: Haver Analytics Inc.; and IMF staff estimates.

Unemployment Rate

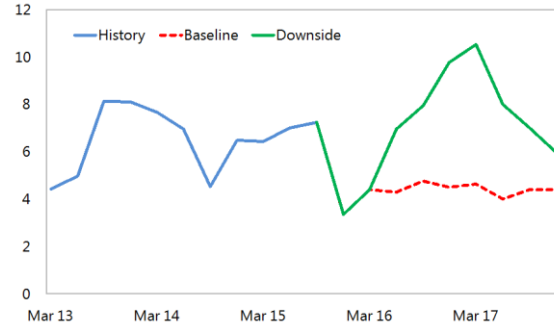
(In percent)



Sources: Haver Analytics Inc.; and IMF staff estimates.

Inflation

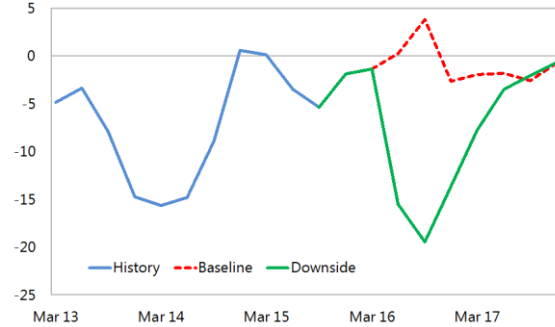
(In percent, year-on-year)



Sources: Haver Analytics Inc.; and IMF staff estimates.

NEER

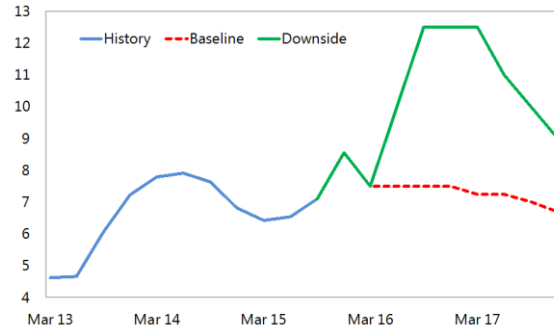
(In percent, year-on-year)



Sources: Haver Analytics Inc.; and IMF staff estimates.

One Month Interest Rate

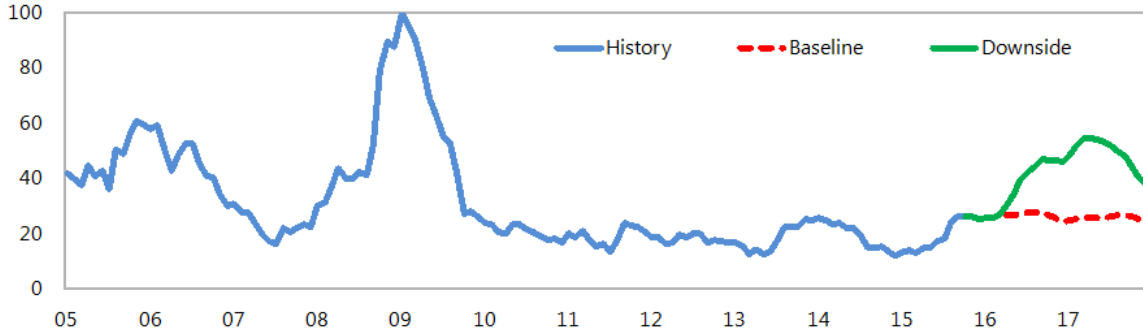
(In percent)



Sources: Haver Analytics Inc.; and IMF staff estimates.

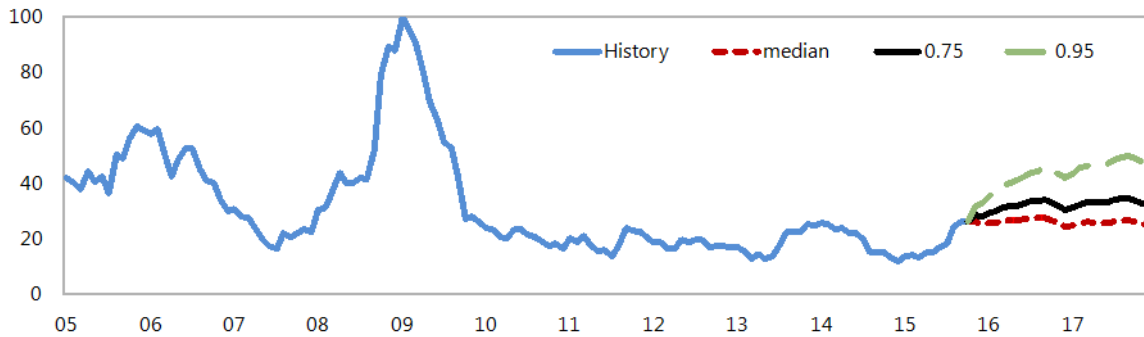
Figure 17. Indonesia: GDP Growth and Corporate Default Probability
(Lehman peak = 100)

Median PD Under Baseline and Downside Scenarios



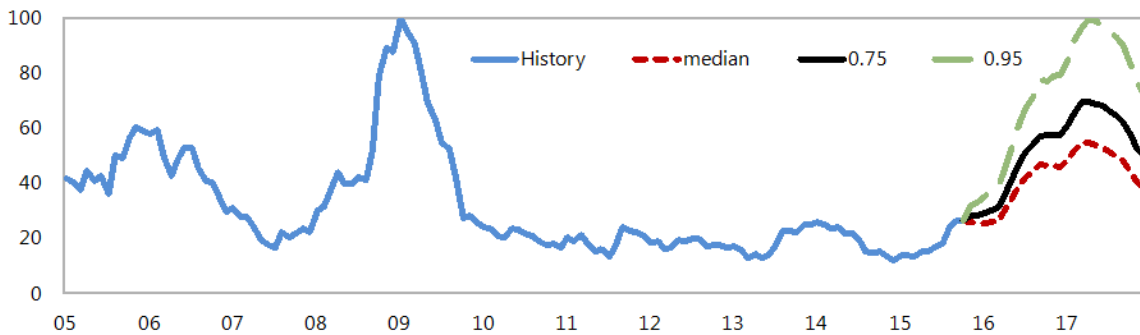
Sources: National University of Singapore; and IMF staff estimates.

PD Under Baseline Scenario: Mean, 75th and 95th Percentile



Sources: National University of Singapore; and IMF staff estimates.

PD Under Downside Scenario: Mean, 75th and 95th Percentile



Sources: National University of Singapore; and IMF staff estimates.

Appendix 1. Technical Background

This appendix provides a brief description of two steps for the scenario analysis: (i) project common risk factors and firm-specific risk factors given the assumed paths of macroeconomic variables, and (ii) map these risk factors to PDs.

Generating the Paths of Common Risk Factors and Firm-Specific Factors

Given the assumed and projected paths of macroeconomic variables $Z_{k,t}$ ($k = 1, 2, 3$), both common risk factors $X_{m,t}$ ($m = 1, 2$) and risk factors specific to firm j , $Y_{j,t}$ ($j = 1, 2 \dots, 6$) can be predicted.

$$\Delta X_{m,t} = \beta_{m,0}^X + \sum_{k=1}^n \beta_{m,k}^X Z_{k,t} + \gamma_{m,1}^X X_{m,t-1} + \gamma_{m,2}^X X_{m,t-2} + \varepsilon_{m,t}^X, \quad (\text{A1})$$

$$\Delta \bar{Y}_{i,j,t} = \beta_{i,j,0}^Y + \sum_{k=1}^n \beta_{i,j,k}^Y Z_{k,t} + \gamma_{i,j,1}^Y \bar{Y}_{i,j,t-1} + \gamma_{i,j,2}^Y \bar{Y}_{i,j,t-2} + \varepsilon_{i,j,t}^Y, \quad (\text{A2})$$

The equations above include first and second order lags to capture auto-correlation. Subscript i represents country, which in our case is Indonesia.

Mapping Risk Factors to PDs

Given the paths of risk factors $X_{m,t}$ ($m = 1, 2$) and $Y_{j,t}$ ($j = 1, 2 \dots, 6$), multivariate regressions are used to map them to PDs. The PD of firm i at time t for the prediction horizon of $(t, t + \tau)$ can be written as:

$$p_{i,t}(\tau) = P_{\tau}(X_t, Y_{i,t}) \quad (\text{A3})$$

where $P_{\tau}(\cdot)$ is the PD function for horizon τ , X_t is the common risk factors at time t , and $Y_{i,t}$ is the firm specific risk factors for firm i at time t . By simulating the model for many times (10,000 times in our case) one can create a distribution of each $p_{i,t}(\tau)$. The results presented in the main text represent the average of the observations corresponding to the specific percentile (median, 75th and 95th) of the individual firms' probability distributions.

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ANALYSIS OF MACRO-FINANCIAL LINKAGES IN INDONESIA¹

Macro-financial linkages in Indonesia are analyzed using two complementary approaches: a sector-level balance sheet analysis and a panel vector autoregression approach. These analyses confirmed the importance of external funding in Indonesia, particularly through nonfinancial corporations (NFC). In this connection, negative external shocks could propagate through NFCs to the domestic banking system, which replaces some of the reduction in NFC's foreign financing. In addition, we empirically identify linkages among global risk sentiment, economic activity, bank credit and deposits, and the exchange rate that warrant close monitoring.

A. Introduction

1. This paper presents evidence about macro-financial linkages in Indonesia using two complementary approaches. The first approach is the Balance Sheet Analysis (BSA) which extracts information from annual data on sector-level balance sheets. Within this approach, we demonstrate four different ways of exploiting the same set of data. The second approach is a panel vector autoregression approach which relies on a combination of macroeconomic data and bank-level balance sheet data.

B. Balance Sheet Analysis

2. Sectoral balance sheet data are used to construct a balance sheet matrix that supports a range of different balance sheet analyses (BSA). A BSA matrix provides a snapshot of outstanding gross and net balance sheet positions (stocks) of each sector in the economy vis-à-vis other resident sectors.² As such, it can be used to study the evolution of exposures and vulnerabilities in individual sectors, as well as cross-sectoral linkages. A matrix can be constructed from monetary and financial statistics (MFS, drawn from the IMF's standardized report forms), international investment position (IIP), and government finance statistics (GFS). To analyze the Indonesian economy, we use data covering the period 2001–14 for seven sectors:³ (i) Government; (ii) Central bank; (iii) Banks; (iv) Nonbanking financial institutions; (v) Nonfinancial corporations (NFCs); (vi) Households (HHs);⁴ and (vii) Non-resident (or rest of the world, ROW). We use the BSA to support four types of analysis: matrix, network, sensitivity, and a vector-autoregression (VAR).

¹ Prepared by Elena Loukoianova (APD), Ken Miyajima (MCM), and Giovanni Ugazio (STA).

² For more details on the recent work on BSA see Caprio (2011), and IMF (2014, 2015).

³ See IMF (2016) for a discussion on how to construct the BSA matrix. GFS data are available for selected recent periods only (2009 until 2013).

⁴ Data for NFCs and HHs are generally less comprehensive than those for the other sectors.

3. Analysis of NFC exposures to ROW calculated from the IIP warrants some caveats.

From the point of view of NFCs **external assets**, the residency concept used in the construction of the BSA may lead to underestimating the actual funds available to NFCs, as NFCs operating in the country sometimes hold their funds abroad (e.g. Singapore) through an affiliate or subsidiary company. Further, **external liabilities** of NFCs include indistinguishably both equity and debt funding, without a currency breakdown (they are assumed to be all denominated in foreign currency).

Matrix Analysis

4. **Table 1 (first panel) shows the matrix in the fourth quarter of 2014.** The net values in columns represent net assets and those in rows represent net liabilities. For example, the HH sector was a net creditor to the banking sector (Rp 683 trillion) while the NFC sector was a net debtor to both ROW (Rp 4,933 trillion) and banks (Rp 698 trillion). Reflecting its nature as an open economy, the overall external funding represented the largest share of total inter sectoral net credit—about 33 percent of total allocated liabilities, equivalent to about 60 percent of GDP (Table 1, second panel).

	Government	Central Bank	Banks	NBFIs	NFCs	HHs	ROW
(In trillions of rupiah)							
Government		9	113	0	-854	0	1,530
Central bank	-9		835	1	0	-6	-1,353
Banks	-113	-835		107	-698	683	246
NBFIs	0	-1	-107		-62	-257	111
NFCs	854	0	698	62			4,933
HHs	0	6	-683	257			0
ROW	-1,530	1,353	-246	-111	-4,933	0	
(In percent of GDP, highlighted if > or < 30% of GDP)							
Government		0.11%	1.32%	0.00%	-9.97%	0.00%	17.85%
Central bank	-0.11%		9.75%	0.02%	0.00%	-0.07%	-15.79%
Banks	-1.32%	-9.75%		1.25%	-8.15%	7.97%	2.87%
NBFIs	0.00%	-0.02%	-1.25%		-0.73%	-2.99%	1.30%
NFCs	9.97%	0.00%	8.15%	0.73%		0.00%	57.57%
HHs	0.00%	0.07%	-7.97%	2.99%	0.00%		0.00%
ROW	-17.85%	15.79%	-2.87%	-1.30%	-57.57%	0.00%	

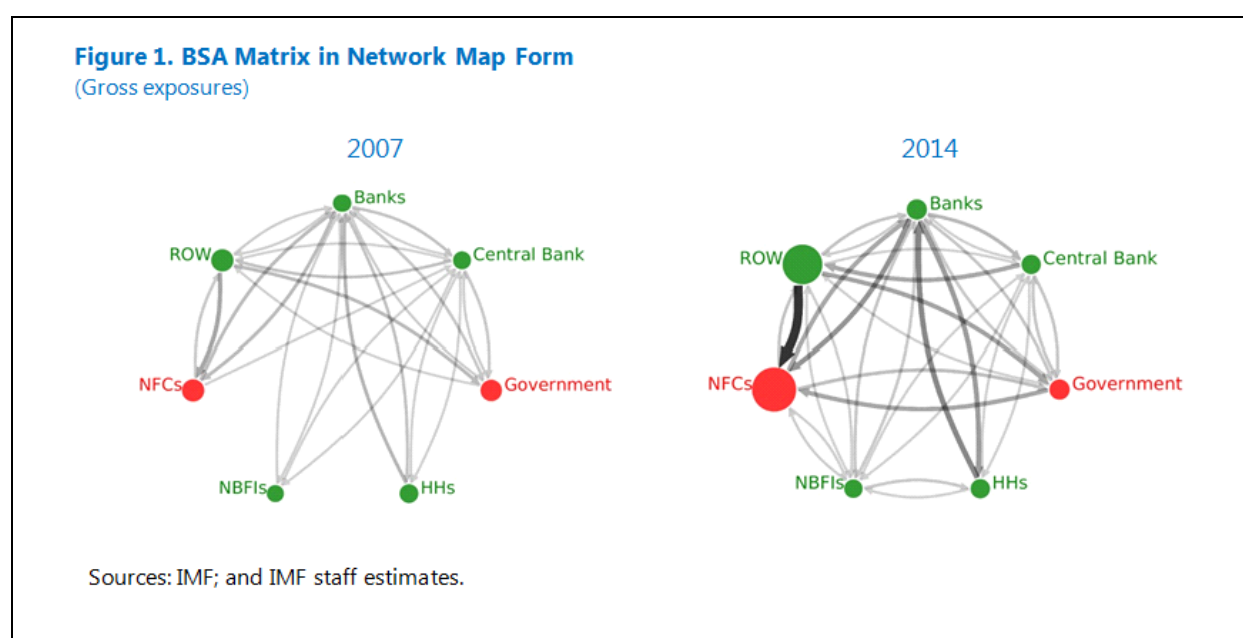
Source: IMF; and IMF staff estimates.

5. **The matrix results suggest two areas of vulnerability for Indonesia.** First, NFCs' large reliance on cross border funding potentially exposes them to risks from both currency mismatches and sudden withdrawal of funding. Second, the banking sector is mostly exposed to NFCs and thus

vulnerable to a shock to NFCs balance sheets (e.g. higher nonperforming loans (NPLs)).⁵ The net exposure of banks to the nonfinancial sector (NFCs and HHs combined) is slightly negative, as banks are net borrowers from HHs. Indeed, loan to deposit ratio in Indonesia is relatively low as banks fund their assets relying mainly on customer deposits.

Network Analysis

6. Network maps provide a graphical presentation of the BSA matrix. They can be used to visualize the evolution of financial exposures among sectors over time. Figure 1 shows gross cross-sectoral exposures along different dimensions in 2007 and 2014.⁶ The thickness of the arrow indicates the size of gross exposure, while the color of the nodes distinguishes net creditors (green) from net debtors (red).



7. Three key messages emerge from the analysis of the network maps. In particular, net creditors in 2007 remained so in 2014; the size of both gross exposures (thickness of the arrows) and net exposures (size of the nodes) has generally become larger over the period; and the NFC sector's borrowing from ROW represented the largest exposure in both 2007 and 2014.

Sensitivity Analysis

8. The BSA matrix is used to assess the sensitivity of the NFC sector to exogenous shocks. Importantly, the analysis allows propagation of a shock from other sectors to NFC. The analysis is

⁵ Higher NPLs would be reflected in the BSA matrix when a write-off reduces the stock of loans.

⁶ Missing links in the 2007 map reflect the data gaps discussed above, which however do not materially constrain the BSA.

conducted using two scenarios: Scenario 1—an exchange rate depreciation of 25 percent, and Scenario 2—an exchange rate depreciation of 25 percent and a capital flow reversal, in which NFCs are forced to replace 10 percent of their foreign funding with domestic funding either by drawing from their funds in banks, or by obtaining new credit from banks. Either assumption has the same implication in the BSA, specifically an increase of net assets (or exposure) of banks with respect to NFCs. The sensitivity analysis, however, does not capture second-round effect. For instance, it does not show if the deterioration of the NFC balance sheet has implications on bank lending or NPLs.

Table 2. Indonesia: Sensitivity Analysis Using the BSA—Difference of Intersectoral Net Positions

	Government	Central Bank	Banks	NBFIs	NFCs	HHs	ROW
(In percent of GDP, after 25 percent depreciation shock)							
Government		-0.05%	0.11%	0.00%	0.00%	0.00%	4.46%
Central Bank	0.05%		0.44%	0.00%	0.00%	0.00%	-3.95%
Banks	-0.11%	-0.44%		-0.03%	-0.63%	0.58%	0.62%
NBFIs	0.00%	0.00%	0.03%		-0.16%	0.00%	0.23%
NFCs	0.00%	0.00%	0.63%	0.16%			14.39%
HHs	0.00%	0.00%	-0.58%	0.00%			0.00%
ROW	-4.46%	3.95%	-0.62%	-0.23%	-14.39%	0.00%	
(In percent of GDP, after combined shocks)							
Government		-0.05%	0.11%	0.00%	0.00%	0.00%	4.46%
Central Bank	0.05%		0.44%	0.00%	0.00%	0.00%	-3.95%
Banks	-0.11%	-0.44%		-0.03%	-6.90%	0.58%	0.62%
NBFIs	0.00%	0.00%	0.03%		-0.16%	0.00%	0.23%
NFCs	0.00%	0.00%	6.90%	0.16%			8.12%
HHs	0.00%	0.00%	-0.58%	0.00%			0.00%
ROW	-4.46%	3.95%	-0.62%	-0.23%	-8.12%	0.00%	

Source: IMF; and IMF staff estimates.

9. There are several key takeaways from the results summarized in Table 2:

- **In Scenario 1 (Table 2, first panel), external indebtedness of NFCs increases by about 14 percent of GDP.** Following exchange rate depreciation, all assets and liabilities denominated in foreign currency increase in value proportionally. Therefore, sectors that are net-borrowers in foreign currency become further indebted, particularly the government and NFC sectors, due to their reliance on borrowing from nonresidents.
- **In Scenario 2 (Table 2, second panel), external indebtedness of NFCs increases by about eight percent of GDP, and the exposure of banks to NFCs increases by about seven percent of GDP.** NFCs indebtedness initially increases by the same 14 percent due to the exchange rate depreciation shock. However, due the additional capital flow reversal shock, the external borrowing is now partially replaced with borrowing with the banking sector.

Vector Autoregression (VAR) Analysis

10. The BSA matrix is complemented by macroeconomic variables to implement a VAR analysis to identify exposures of the NFC sector. In particular, a VAR model and its impulse-response functions are estimated to a one standard deviation negative shock to capital inflows.

Table 3. Indonesia: BSA VAR Analysis

	DVIX(-1)	stdev	t-stat	G_XRATE(-1)	stdev	t-stat	G_NFCIIP(-1)	stdev	t-stat	G_ODCNFC(-1)	stdev	t-stat	C	stdev	t-stat
DVIX	0.17	0.35	0.49	0.21	0.31	0.69	0.02	0.15	0.17	-0.02	0.02	-0.83	0.04	3.59	0.01
G_XRATE	0.39	0.44	0.89	0.24	0.39	0.63	-0.01	0.18	-0.04	0.03	0.03	1.00	1.57	4.50	0.35
G_NFCIIP	-0.95	0.52	-1.83	0.34	0.46	0.73	0.31	0.22	1.44	0.05	0.04	1.49	12.69	5.34	2.38
G_ODCNFC	10.01	4.18	2.39	-3.13	3.70	-0.85	1.71	1.73	0.99	0.02	0.28	0.07	25.75	42.82	0.60

Source: IMF staff estimates.

11. The definition of the VAR is the following:

$$y_t = B_0 + B_1(L)y_t + u_t, \quad (1)$$

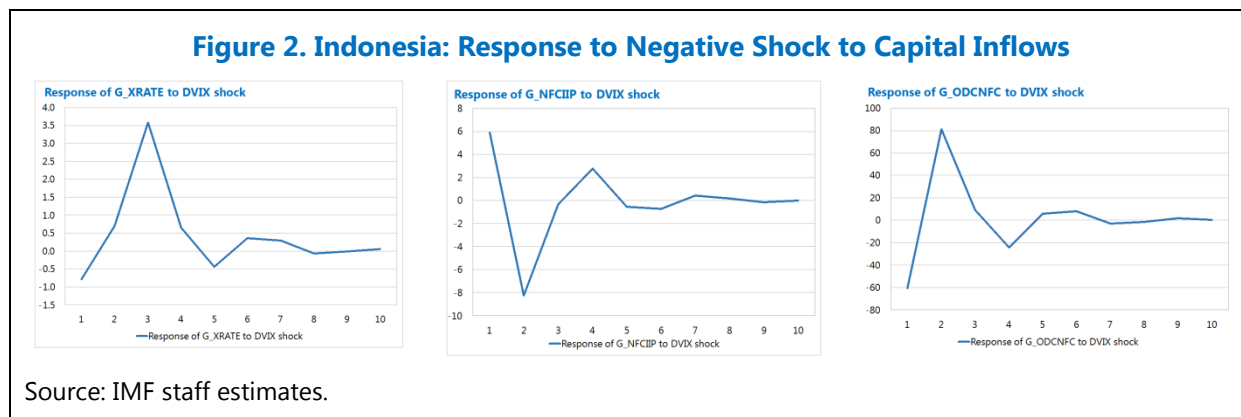
where y is the vector containing the BSA and macroeconomic variables, B_0 is the vector of constants, B_1 is the vector of coefficients, L is the lag operator (we use a single lag) and u is the vector of residuals.

12. The model includes two macroeconomic and two BSA variables, respectively. The BSA variables are the growth rate of NFC net positions (i) with banks (G_ODCNFC) and (ii) with ROW (G_NFCIIP). The macroeconomic variables are (i) the first differences of VIX (DVIX) (used as a proxy for capital flows – a higher VIX is associated to lower capital inflows) and (ii) exchange rate depreciation against the U.S. dollar (G_XRATE). Due to first differencing, data are available for periods 2002–14.

13. Impulse-response functions are calculated based on Choleski decomposition. The four variables are stacked to reflect the assumed sequence of propagation of the initial shock: the VIX is at the top of the matrix, followed by the BSA variables, and the exchange rate. Table 3 shows the VAR estimates, which in particular highlights the significance of the coefficients of VIX in the equations for the BSA variables.

14. The result confirms that NFCs could be a source of vulnerability, transmitting external shocks to the domestic economy. A one standard deviation increase in VIX, representing a negative shock to capital inflows, leads to exchange rate depreciation (Figure 2, left panel), a decrease of foreign funding for NFCs (Figure 2, middle panel) and an increase in the exposure of the domestic banking sector to NFCs (Figure 2, right panel). This supports the assumption in our sensitivity analysis conducted earlier that NFCs may replace some of their foreign funding with

domestic bank lending, creating a channel for transmitting balance sheet vulnerabilities. Nonetheless, the relatively few number of observations and the somewhat restrictive assumptions in constructing the BSA matrix call for further robustness analysis as new information becomes available.



C. Panel Vector Autoregression Analysis⁷

15. Weaker macroeconomic conditions, including growth slowdown and rupiah depreciation can negatively affect bank balance sheets. Vulnerabilities from rising corporate foreign exchange leverage are rising.⁸ Evidence suggests that weaker real GDP growth and higher rates of rupiah depreciation tend to increase bank NPLs. If there are spillbacks to the macroeconomy, a vicious feedback loop can develop. This note attempts to identify existence of such macro-financial linkages, exploiting information on bank-by-bank heterogeneity.

16. The paper estimates a panel vector autoregression (VAR) model that accounts for bank-level heterogeneity, to identify a positive feedback loop between the macroeconomic and bank-level balance sheet variables:

$$y_{i,t} = B_0 + B_1(L)y_{i,t} + u_{i,t} \quad (2)$$

where $y_{i,t}$ is a vector of macroeconomic and bank-level variables, B_0 is the deterministic component, (L) is a lag operator and $u_{i,t}$ is the residual. The model was estimated using a panel VAR routine *pvar* developed by Love and Zicchino (2006), which exploits a System-General Method of Moments (GMM) estimator as in Arellano and Bover (1995).⁹

⁷ Similar work published recently by IMF staff includes Espinoza and Prasad (2010), Nkusu (2011), De Bock and Demyanets (2012), Love and Turk (2013), and Callen et al (2015).

⁸ See accompanied SIP on corporate vulnerabilities for more details.

⁹ As the fixed effects are correlated with the regressors due to lags of the dependent variables, the mean-differencing procedure commonly used to eliminate fixed effects would create biased coefficients. The orthogonality between transformed variables and lagged regressors is preserved by forward mean-differencing (the Helmert procedure in

(continued)

Table 4. Indonesia: Estimated Panel VAR Coefficients and t-Statistics 1/

	<i>vix</i>		<i>ryg</i>		<i>rdpg</i>		<i>rcrg</i>		<i>rdpr</i>	
	coeff.	t-stat.	coeff.	t-stat.	coeff.	t-stat.	coeff.	t-stat.	coeff.	t-stat.
<i>L.vix</i>	0.055	1.405	-0.019	-5.790	-0.037	-0.490	-0.141	-2.101	-0.171	-3.332
<i>L.ryg</i>	-4.855	-4.158	0.523	5.905	-0.690	-0.336	2.231	1.200	-8.183	-5.057
<i>L.rdpg</i>	0.006	0.213	0.005	2.178	0.028	0.517	0.082	1.554	-0.075	-1.486
<i>L.rcrg</i>	-0.055	-1.861	0.007	3.091	0.045	0.810	0.212	3.682	-0.069	-1.206
<i>L.rdpr</i>	0.056	1.031	-0.018	-4.923	-0.020	-0.209	-0.354	-3.976	0.495	9.700

Source: Bankscope; Haver Analytics; and IMF staff estimates.

1/ Estimated using a panel VAR routine with one lag. Annual data spanning 2000-14. Bank level data for real credit and deposit growth for [45] banks. "L." is a lag operator indicating the first lag. *vix* is the VIX index (in first difference), *ryg* is real GDP growth, *rdpg* is real deposit growth, *rcrg* is real credit growth, *rdpr* is the rate of rupiah depreciation against the US dollar in real terms.

17. Five macroeconomic and bank level variables were included. Among macroeconomic variables, the VIX index captures global risk sentiment, commonly found in the literature to be a key determinant of cross-border capital flows. Domestic economic activity is captured by real GDP growth. Real rupiah depreciation against the US dollar affects profits and balance sheet conditions of domestic agents, such as corporates, impacting broader economic activity. Real growth rates of credit and deposits for the individual banks represent the channel through which shocks propagates back to the real economy.

18. The identification of shocks is based on Choleski decomposition, where the variables are stacked to explore how macroeconomic shocks affect bank-level variables first, and how the latter affect the former in the second round. In particular, two macroeconomic variables {*VIX*, *real GDP growth*} are stacked at the top. The bank-level variables {*real deposit growth*, *real credit growth*} are stacked below the macro-level variables. Real rupiah depreciation against the U.S. dollar is stacked at the bottom as commonly done in the literature. The model is estimated with one lag in view of the short time series dimension (2000–14).

19. The estimated results are summarized as follows. Table 4 presents the estimated coefficients from the system GMM approach in the panel VAR model. The estimated coefficients are mostly statistically significant, except for those of the deposit growth equation.¹⁰ Figure 3 visually

Arellano and Bover, 1995), which removes the mean of the future observations. Then, lagged regressors are used as instruments to estimate the coefficients by system GMM.

¹⁰ The counterintuitive response of real deposit growth to several variables may be due to lack of statistical significance of the estimated coefficients in the deposit growth equation. In particular, real deposit growth rises due to a rise in the VIX index or a decline in real GDP growth.

summarizes the directions and magnitude of responses, which are broadly consistent with findings in the literature.¹¹

20. The results illustrate the macro-financial linkages in Indonesia. Starting from a shock to the VIX index, a rise in this variable, which represents lower risk appetite for emerging market assets, leads to weaker GDP growth, slower credit growth, and a greater rate of rupiah depreciation. When the VIX rises by ten percentage points (equal to one standard deviation), real GDP growth declines by 0.3 percentage point, real credit growth declines by four percentage points, and the rate of rupiah depreciation rises by nine percentage points.

21. Weaker economic activity leads to lower real credit growth and greater rupiah depreciation. When real GDP growth rises by one percentage point (slightly above one standard deviation), the rate of credit growth declines by about seven percentage points and that of rupiah depreciation rises by 11 percentage points, both in real terms.

22. Bank balance sheet variables create feedback effects within the balance sheets and spillback to a broader real economy. First, lower deposit growth dampens GDP and credit growth, but leads to rupiah appreciation after rupiah liquidity in the banking system declines. A ten percentage point decline in real deposit growth (about $\frac{1}{2}$ of one standard deviation) leads to a five percentage point reduction in real credit growth as funding conditions tighten. It also leads to a 0.1 percent decline in real GDP growth. The rate of rupiah depreciation *declines* (i.e., less depreciation or greater appreciation) by one percentage point. Second, credit growth moderation does not systematically affect deposit growth but weakens economic growth and accelerates rupiah depreciation. A ten percentage point decline in real credit growth (about $\frac{3}{4}$ of one standard deviation) leads to a 0.1 percentage point reduction in real GDP growth and a one percentage point increase in the rate of rupiah depreciation.

¹¹ Figure 1.1 in Appendix 1 presents time series plots of the values presented in Table 1.1 (after normalizing by the size each variable's one standard deviation shock)

Figure 3. Indonesia: Macro-Financial Linkages 1/

<i>Adverse shock to</i>	VIX	Real GDP growth	Real deposit growth	Real credit growth	Real rupiah depreciation
<i>Response of</i>					
Real GDP growth	↓ -0.03		↓ -0.01	↓ -0.01	↓ -0.02
Real deposit growth	↑ 0.20	↑ -4.0			
Real credit growth	↓ -0.40	↓ -6.7	↓ -0.5		↓ -0.40
Real rupiah depreciation	↑ 0.90	↑ -11	↓ -0.1	↑ 0.1	
<i>Memo: one st. dev. shock</i>	10.0	0.8	17.5	14.5	14.1

Source: Bankscope; Haver Analytics; and IMF staff estimates.

1/ Panel VAR with one lags Annual data 2000–14. Bank level data for real credit and deposit growth. Numbers represent a percent response to a 1 percent adverse shock. VIX is used in percentage point difference.

23. The finding that rupiah depreciation leads to lower economic growth overall warrants further analysis. Taking at face value, a ten percentage point increase in the rate of rupiah depreciation in real terms leads to a 0.2 percentage point reduction in real GDP growth and a four percentage point decline in real credit growth. Rupiah depreciation does not systematically affect deposit growth. One interpretation is that rupiah depreciation captures a negative terms of trade shock, which leads to weaker economic activity. Another interpretation is that the model captures correlation between lower economic growth and the resultant capital outflows and rupiah depreciation. The macroeconomic effects of exchange rate depreciation warrants further research.¹²

¹² Another interpretation is that the “risk taking” channel has a stronger impact than the net export channel on economic growth. The growing literature on the risk taking channel in emerging economies finds that currency depreciation weakens bank lending and asset price performance domestically, and creates another round of currency depreciation (Borio and Zhu, 2008; Adrian and Shin, 2009; Chung, Lee, Loukoianova, Park and Shin, 2014; and Hofmann, Shim and Shin, 2016). The mechanism creates a positive feedback loop, which slows domestic economic activity. The effect of the risk taking channel would be stronger in EMs with larger reliance on portfolio capital inflows. Meanwhile, the effect of currency depreciation through the net export channel on economic growth may be less pronounced in economies exporting mainly commodities priced internationally in US dollars because local

(continued)

D. Concluding Remarks

24. The results of the BSA analysis highlight NFC's large reliance on foreign funding and, as a result, a potential source of vulnerability for the Indonesian economy. A depreciation shock or a negative shock to global risk sentiment may affect NFC's foreign funding. In the case of a negative shock to capital inflows, the shock may propagate the vulnerability to the domestic banking sector, for instance if NFCs are to replace a part of foreign funding with domestic credit.

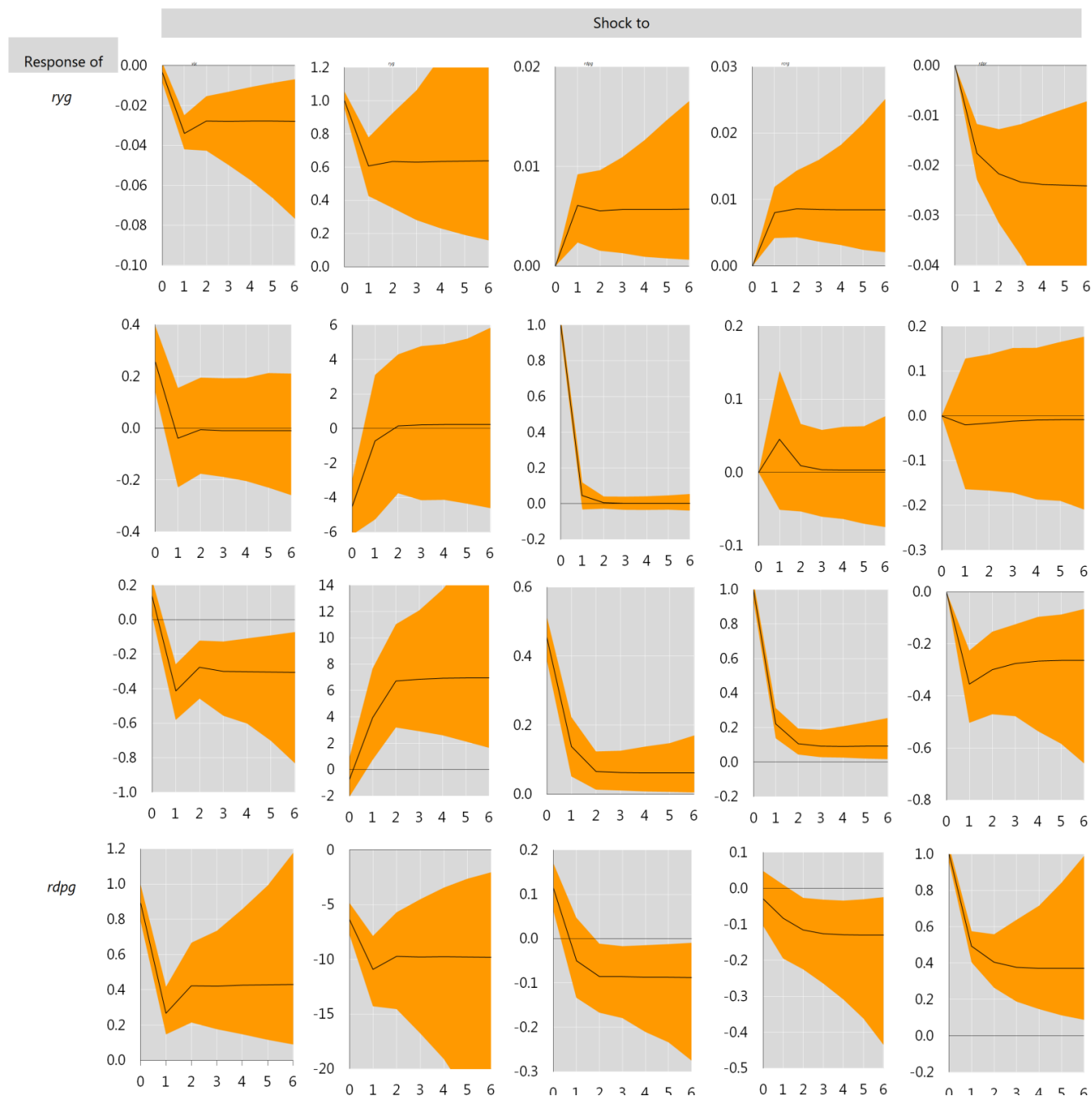
25. The results from the panel VAR approach using a combination of macroeconomic and bank level data point to the macro-financial linkages in Indonesia. In particular, worsening global risk sentiment, which tends to lower appetite for emerging market assets, leads to moderation in GDP growth, credit growth and a greater rate of rupiah depreciation. Weaker economic activity leads to lower real credit growth and greater rupiah depreciation. Bank balance sheet variables create feedback effects within the balance sheets and spillback to a broader real economy. Finally, rupiah depreciation puts pressure on profits and currency mismatches on balance sheets, leading to lower economic and credit growth.

26. Looking ahead, the authorities should continue to monitor macro-financial linkages and maintain strong macroeconomic fundamentals. In particular, the resilience of the NFC sector is of primary importance, as their funding structure could transmit external shocks to the domestic economy partly through the banking system. This is particularly the case if global and domestic conditions remained unfavorable for a protracted period (e.g. global risk sentiment remained weak, economic growth stuck at low gear, and rupiah depreciation continued). The first line of defense for Indonesia against adverse shocks is to keep its house in order. In other words, the country should maintain strong and credible monetary and fiscal policy and sustain the resilience of the domestic financial and corporate sector partly by continue upgrading the financial stability safety net.

currency depreciation would not improve competitiveness much, particularly when import content of the trade balance is large. Therefore, greater rupiah depreciation could lead to lower economic growth in Indonesia.

Appendix 1. Indonesia—Macro-Financial Impulse Responses

Figure 1.1. Indonesia: Response to Macro and Bank Level Variables 1/



Sources: Bankscope; Haver Analytics; and IMF staff estimates.

1/ *vix* is the VIX index (in first difference), *ryg* is real GDP growth, *rdpg*, is real deposit growth, *rcrg* is real credit growth, *rdpr* is the rate of rupiah depreciation against the U.S. dollar in real terms. Relying on a pvar routine with one lag and using annual data spanning 2000–14. The area around the solid line represents the 95 percent confidence interval.

Table 1.1. Indonesia: Impulse-Response

	time	<i>vix</i>	<i>ryg</i>	<i>rdpg</i>	<i>rcrg</i>	<i>rdpr</i>
<i>vix</i>	0	9.97	0.00	0.00	0.00	0.00
<i>vix</i>	1	1.13	-3.97	-0.23	-0.82	0.78
<i>vix</i>	2	2.08	-3.11	-0.71	-0.85	1.90
<i>vix</i>	3	1.85	-3.22	-0.66	-0.83	2.13
<i>vix</i>	4	1.85	-3.22	-0.66	-0.82	2.22
<i>vix</i>	5	1.85	-3.23	-0.66	-0.82	2.24
<i>vix</i>	6	1.85	-3.24	-0.67	-0.82	2.26
<i>ryg</i>	0	-0.03	0.76	0.00	0.00	0.00
<i>ryg</i>	1	-0.34	0.46	0.11	0.12	-0.25
<i>ryg</i>	2	-0.28	0.48	0.10	0.12	-0.31
<i>ryg</i>	3	-0.28	0.48	0.10	0.12	-0.33
<i>ryg</i>	4	-0.28	0.48	0.10	0.12	-0.33
<i>ryg</i>	5	-0.28	0.49	0.10	0.12	-0.34
<i>ryg</i>	6	-0.28	0.49	0.10	0.12	-0.34
<i>rdpg</i>	0	2.54	-3.47	17.55	0.00	0.00
<i>rdpg</i>	1	-0.39	-0.55	0.81	0.66	-0.28
<i>rdpg</i>	2	-0.06	0.11	0.08	0.14	-0.23
<i>rdpg</i>	3	-0.09	0.16	0.04	0.05	-0.17
<i>rdpg</i>	4	-0.10	0.17	0.04	0.04	-0.14
<i>rdpg</i>	5	-0.10	0.17	0.04	0.04	-0.13
<i>rdpg</i>	6	-0.10	0.18	0.04	0.04	-0.12
<i>rcrg</i>	0	1.38	-0.58	7.99	14.51	0.00
<i>rcrg</i>	1	-4.11	3.02	2.42	3.23	-4.98
<i>rcrg</i>	2	-2.76	5.15	1.16	1.54	-4.20
<i>rcrg</i>	3	-2.99	5.25	1.10	1.33	-3.87
<i>rcrg</i>	4	-3.01	5.30	1.08	1.32	-3.74
<i>rcrg</i>	5	-3.03	5.31	1.09	1.33	-3.71
<i>rcrg</i>	6	-3.04	5.33	1.09	1.34	-3.71
<i>rdpr</i>	0	8.88	-4.86	2.02	-0.42	14.07
<i>rdpr</i>	1	2.66	-8.36	-0.87	-1.21	6.96
<i>rdpr</i>	2	4.20	-7.43	-1.50	-1.68	5.70
<i>rdpr</i>	3	4.19	-7.47	-1.50	-1.83	5.30
<i>rdpr</i>	4	4.26	-7.47	-1.53	-1.87	5.22
<i>rdpr</i>	5	4.27	-7.49	-1.53	-1.88	5.22
<i>rdpr</i>	6	4.29	-7.51	-1.54	-1.89	5.23

Source: IMF staff estimates.

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INFRASTRUCTURE DEVELOPMENT IN INDONESIA¹

This paper discusses macro-fiscal issues surrounding infrastructure development in Indonesia and assesses the institutional framework for public investment, including state-owned enterprises (SOEs) and public-private partnerships (PPPs). The government has attempted to address Indonesia's large infrastructure gap by setting up an ambitious plan and demonstrated early successes in boosting infrastructure spending. Nevertheless, structural impediments remain to be addressed going forward. Fiscal space to increase government infrastructure spending should be created by increasing revenue through an efficient package of tax measures. There is scope to improve public investment institutions in Indonesia, in particular for better coordination across ministries and local governments, as well as for enhanced implementation of infrastructure projects. Finally, while SOEs and PPPs can play a bigger role in reducing the infrastructure gap, there is a need to carefully manage fiscal risks from contingent liabilities. This calls for gradual implementation of the infrastructure plan, supported by steady progress in structural reforms.

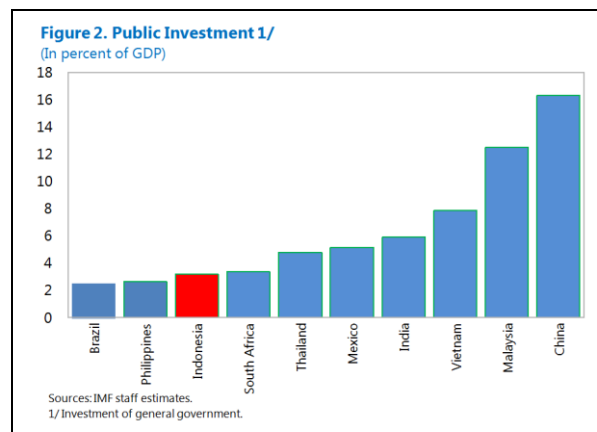
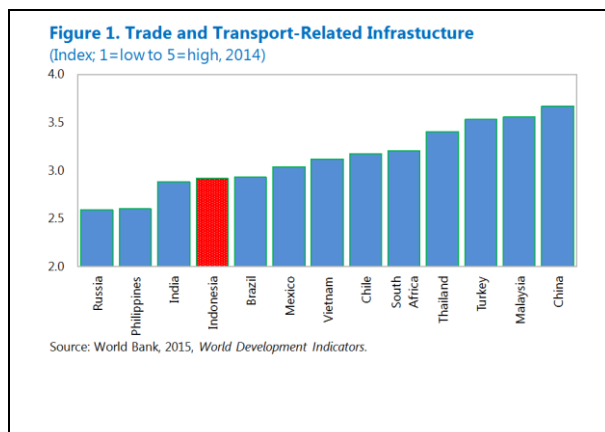
A. Introduction

1. Indonesia's infrastructure gap remains wide compared to its peers, particularly in transport and power (Figure 1). Logistics costs are among the highest in Asia, estimated at 25 percent of GDP a year (vs. peers' 13–20 percent), reflecting poor connectivity among islands and a limited national road network. Electricity production is also insufficient, at 20–60 percent per capita of its peers. According to the World Economic Forum in 2014, Indonesia ranked 56th out of 144 countries on infrastructure, compared with Malaysia (25th), China (46th), and Thailand (48th) in 2014.² The large infrastructure gap has increased distribution costs and inhibited industry competitiveness and weakened macroeconomic conditions. This has limited FDI flows and weakened export competitiveness.

2. Despite the gap, infrastructure investment was limited over the past years, constrained by limited budget space and structural bottlenecks. In Indonesia, capital spending by general government was low, at 3¼ percent of GDP on average in 2011–14, one of the lowest among EM peers (Figure 2). During this period, fiscal space for capital spending was constrained by a low revenue-to-GDP ratio as well as large energy subsidies, which reached one-fifth of the central government's budget in 2014. Also structural problems delayed infrastructure projects, including limited capacity of central and local governments to execute the capital budget; multiple layers of regulations; and protracted land acquisition procedures. Under-investment has affected growth by catalyzing less private investment and dampening productivity gains.

¹ Prepared by Teresa Curristine, Masahiro Nozaki, and Jongsoo Shin.

² World Economic Forum, 2014, *The Global Competitiveness Report 2014–2015*.

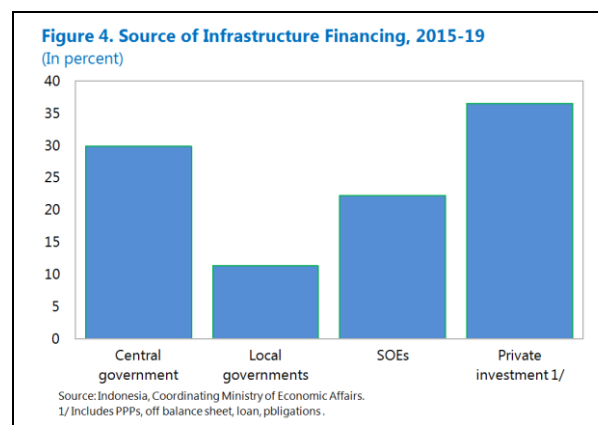
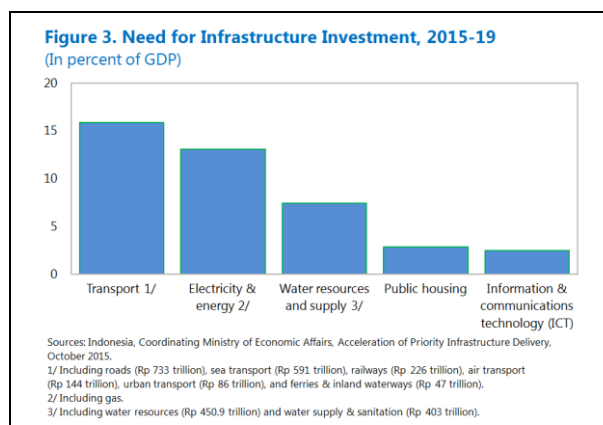


3. To close the infrastructure gap, the government has set ambitious plans for infrastructure development. The government is targeting to spend around US\$ 480 billion (about 50 percent of GDP) for infrastructure investment during 2015–19.³ The plans center on transport and energy, including an ambitious plan to increase capacity of electricity generation by 35GW, which is estimated to cost around nine percent of GDP (Figure 3). The public sector will provide funding for two-thirds of the total investment (around 30 percent from the central government, 11 percent from local governments, and 22 percent from SOEs). The rest is to be financed by the private sector, mainly through Public-Private Partnerships (PPPs) (Figure 4).

4. While the government has recently accelerated capital spending supported by a number of reform measures, challenges remain. Capital spending of the central government increased from 1.4 percent of GDP in 2014 to 1.9 percent in 2015. The budget execution dramatically increased in the second half of 2015, reflecting concerted efforts by the government.⁴ Local governments have been encouraged to ramp up capital spending, supported by an increase in transfers linked to infrastructure spending. To strengthen investment capacity and provide confidence, the government has injected equity to SOEs, totaling 0.6 percent of GDP in 2015, while aiming to accelerate PPP projects. Nevertheless, the scope to further increase capital spending at the general government level would be limited in the absence of revenue mobilization. While the government has begun a series of structural reforms including streamlining fragmented regulations and developing a new legal framework to facilitate land acquisition, the effectiveness of these reforms will be tested in coming years (Box 2).

³ Coordinating Ministry of Economic Affairs, *Acceleration of Priority Infrastructure Delivery*, October 2015.

⁴ President Jokowi, for instance, established an inter-government team dedicated to budget realization evaluation and monitoring, which reports to the President every 2 weeks.



5. Against this background, this paper discusses macro-fiscal issues surrounding infrastructure development in Indonesia and evaluates the institutions for public investment.

The paper proceeds as follows. Section B analyzes macro-fiscal impact of implementing the plan to ramp up infrastructure spending using the Global Integrated Monetary and Fiscal (GIMF) model. Section C assesses institutions for public investment management, while Section D evaluates the government's plan to increase the role of SOEs and PPPs in infrastructure development. Section E concludes by summarizing key findings and policy implications.

B. Macro-Fiscal Implications of Infrastructure Development

6. Ramping up infrastructure spending has significant macro-fiscal implications. First, it raises output growth by boosting aggregate demand as well as production capacity of the economy. Second, it will affect the fiscal account, as the higher government spending would need to be financed by revenue-raising measures, expenditure cuts, and/or higher deficit. Third, these shocks would affect corporate and household sectors through changes in macroeconomic variables such as inflation, wages, the interest rate, and the exchange rate. Finally, in an open economy, these shocks will also affect external balance, possibly resulting in higher external current account deficit.

7. A macro-fiscal simulation model for Indonesia is constructed to analyze quantitatively macro-fiscal implications of infrastructure spending ramp-up. The model is the Global Integrated Monetary and Fiscal (GIMF), a multicountry Dynamic Stochastic General Equilibrium (DSGE) model with optimizing households and firms (Anderson and Others, 2013). The non-Ricardian features of the model such as sticky prices and liquidity-constrained households provide for non-neutral impact of fiscal policy shocks. To analyze macro-fiscal impact of infrastructure ramp-up, a steady state is constructed to mimic the current macroeconomic conditions in Indonesia, and then is shocked by an increase in public investment by three percentage points of GDP over 2016–20 (an increase of 0.6 percent of GDP in each year).

8. Macro-fiscal implications would differ depending on how the spending increase is financed. In this regard, four scenarios are considered: the increase in public investment is financed by (i) a consumption tax rate increase; (ii) increases in corporate and labor income tax rates; (iii) an increase in lump sum taxes; and (iv) government borrowing (i.e., higher deficit). The third scenario is

presented to examine an option with the least distortionary tax measure. The fourth scenario is presented for illustrative purpose, even though it would not be consistent with the reality in Indonesia, where the fiscal rule caps general government deficit at 3 percent of GDP. Similarly, in each of the tax-financed scenarios, the idea of raising the needed revenue with a single tax measure may be unrealistic, but they are intended to highlight differences in macroeconomic impact of various tax measures.

9. The main simulation results presented in Table 1 suggests the importance of financing infrastructure ramp-up not by borrowing, but by a well-designed, efficient tax package.

- In all scenarios, the increase in public investment boosts annual output growth by 0.2–0.6 percentage points over 2016–20. In the tax-financed scenarios (Scenarios 1–3), the positive growth impact from higher public investment, through both demand and supply channels as discussed above, is dampened by the negative impact of tax increases on private consumption or investment, or both. The dampening effect on consumption and investment is pronounced in the scenarios with income- and consumption-tax increases (Scenarios 1 and 2), limiting the increase in growth to 0.2–0.3 percentage points. The lump sum tax scenario (Scenario 3) achieves the largest growth impact (0.6 percentage point), as this is the least distortionary tax option. The deficit-financing scenario (Scenario 4) achieves relatively high growth impact (0.5 percentage point). Here, the boost in aggregate demand is muted by a decline in net exports.
- Fiscal balances would be preserved in the tax-financed scenarios. By construction, general government deficit is not affected under these scenarios, while the ratio of public debt to GDP decreases slightly reflecting higher output growth. In the deficit-financed scenario, fiscal deficit and public debt rise by 3.4 percentage points of GDP and 8.4 percentage points of GDP by 2020, respectively.
- The changes in external current account balance largely reflect the savings and investment balance. In the deficit-financed scenario, the reduction in net savings in the fiscal sector is only partially offset by an increase in net savings in household and corporate sectors. As a result, the current account balance would have to deteriorate by as much as 3.1 percent of GDP by 2020. On contrary, the deterioration in current account balance is much lower in the tax-financed scenarios, as the domestic saving-investment balance is not disrupted by fiscal imbalance.

Table 1. Indonesia: GIMF Model—Simulation Results

(Deviations from baseline)

	Scenario 1 Financed by Consumption Tax	Scenario 2 Financed by Corporate and Income Tax	Scenario 3 Financed by Lumpsum Tax	Scenario 4 Financed by Deficit
Public investment, in percent of GDP in 2020	3.0	3.0	3.0	3.0
Public sector deficit, in percent of GDP in 2020	-0.1	-0.1	-0.1	3.4
Public sector debt, in percent of GDP in 2020	-1.0	-0.3	-1.2	8.4
GDP growth, in percent (average for 2016-20)	0.3	0.2	0.6	0.5
Contribution by:				
Private consumption	-0.2	-0.2	-0.1	0.4
Private investment	0.1	-0.2	0.2	0.2
Government spending	0.6	0.6	0.7	0.7
Net exports	-0.2	-0.1	-0.1	-0.7
Current account deficit, in percent of GDP in 2020	-0.8	-0.3	-0.7	-3.1

Source: IMF staff estimates.

10. The simulation results should be viewed with caution, because the GIMF model would not be able to fully mimic the reality of Indonesia. In the tax-financed scenarios with consumption or income tax, tax rates would need to be raised significantly, exerting a large negative influence on domestic private demand. Alternatively, if revenue could be raised by less distortionary measures such as base-broadening reforms of consumption and income taxes, the negative impact on demand could be less pronounced. In addition, raising additional revenues of three percent of GDP from lump sum tax would be unrealistic. In the context of Indonesia, an option akin to lump sum tax would be property taxes and excises, which would not likely have potential to raise additional revenues of three percent of GDP.

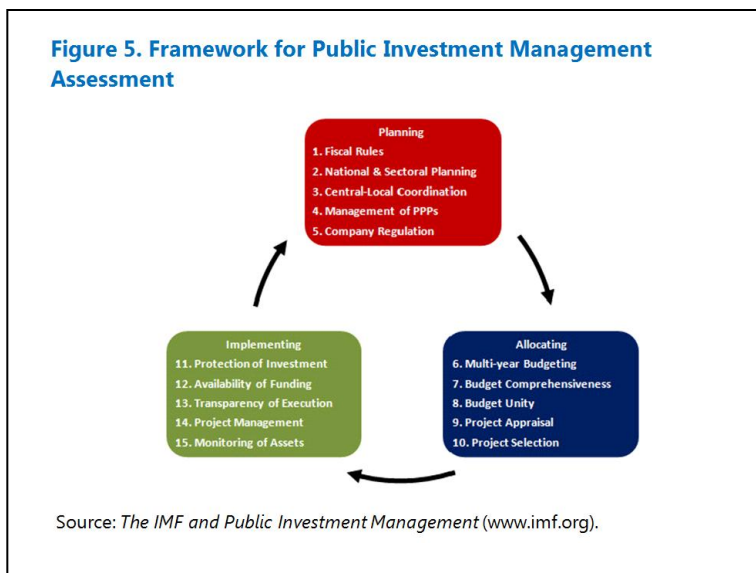
C. Institutions for Public Investment Management in Indonesia

11. Countries with stronger public investment management institutions have more predictable, credible, efficient, and productive investments. To help countries evaluate the strength of the public investment management practices, the IMF has developed a new Public Investment Management Assessment (PIMA).⁵ The PIMA evaluates 15 institutions that shape public investment decision-making at three key stages (see Figure 5): first, *planning* sustainable investment across the public sector; second, *allocating* investment to the right sectors and projects; and third, *implementing* projects on time and on budget. This enables to cover the full public investment cycle, including national and sectoral planning, investment budgeting, project appraisal and selection, and managing and monitoring of project implementation.

⁵ For more information, visit <http://www.imf.org/external/np/fad/publicinvestment/>.

12. According to preliminary PIMA assessment, there is scope to improve public investment institutions in Indonesia, in particular for coordination and implementation (Box 1).

- On the planning phase, Indonesia has well-developed national and sector planning processes. However, there appears room to improve coordination among ministries and with local governments on planning. Specifically, each spending ministry develops its own medium-term strategic plan, which is not necessarily in line with the national plan. Also, central-local coordination for land acquisition and regulations could be improved.



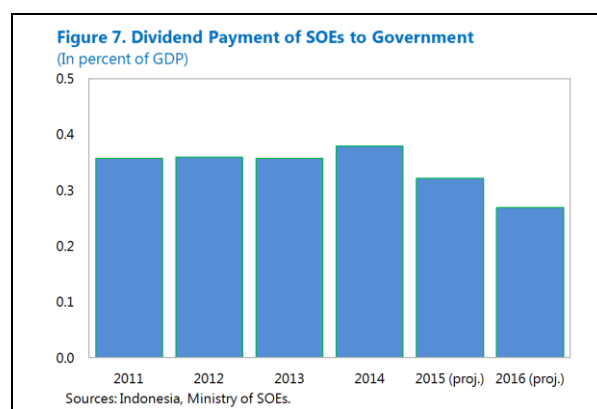
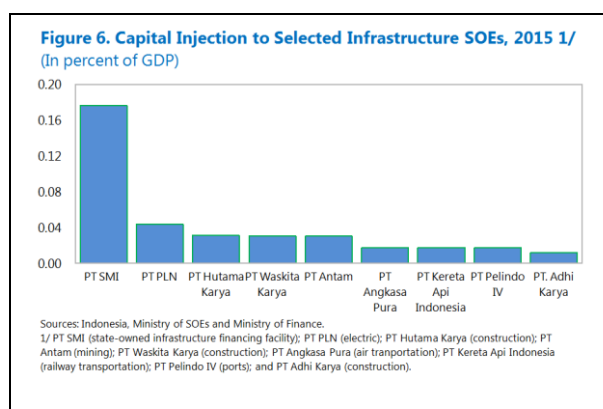
- The institutions for the allocation phase are mixed. The medium-term plans appropriately include resource envelope with breakdown across ministries and programs. However, project appraisal and selection are largely devolved to spending ministries, and there are limited central guidelines and oversight on feasibility studies for infrastructure projects. This is also the case for projects implemented by local governments and SOEs.
- Indonesia scores relatively poorly on the implementation phase. In particular, multiyear capital budgeting would need to be further developed, and within a year, budget execution would need smoothing through better planning. Also, the procedure for monitoring individual projects varies across ministries and local governments. There is limited use of systematic ex-post evaluations.

D. The Role of SOEs and PPPs in Infrastructure Development

Stated-Owned Enterprises (SOEs)

13. The government envisages a greater role for SOEs in infrastructure development. With a view to pushing SOEs to ramp up infrastructure investment, the government has taken a multi-pronged approach, including capital injection, limiting dividend payments, and upgrading the financing framework.

- **Capital injection.** To expand investment capacity and provide confidence, the government has injected new capital to SOEs, focused on electricity, construction, and transportation SOEs.⁶ In 2015, the injected funds amounted to around 0.6 percent of GDP, and for 2016, another capital injection of around 0.3 percent of GDP has been planned (Figure 6). To ensure the proper use of the funds, the government has limited the use of the funds to specific priority infrastructure projects.⁷
- **Limiting dividend payments.** To encourage capital spending and send a strong signal of its intention, the government has allowed SOEs to lower dividend payments, as long as the retained earnings are channeled into infrastructure investment. Also, asset revaluation has been allowed to expand SOE's balance sheets (Figure 7).
- **Financing framework.**⁸ The role of SOEs has strengthened, with the improved financing framework. PT SMI is envisaged to become an infrastructure bank, supported by the large capital injection (0.2 percent of GDP). Direct borrowing by SOEs from international financial institutions (IFIs) has been allowed, under a sovereign guarantee. The scope of Indonesia Infrastructure Guarantee Fund (IIGF) has been also expanded to guarantee SOE's borrowing.

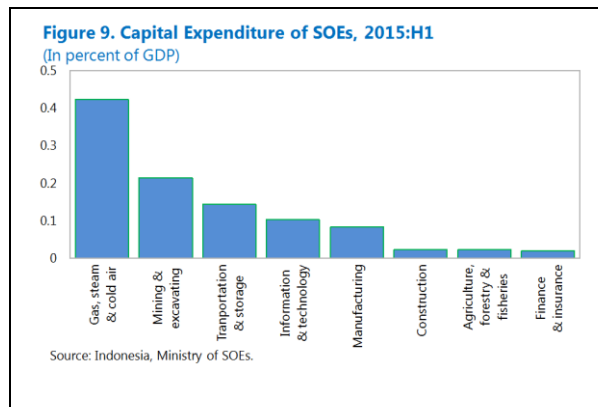
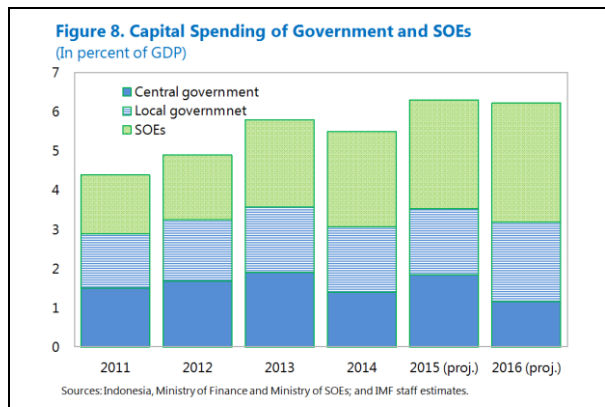


14. On the back of the strengthened balance sheets, SOEs are set to accelerate infrastructure investment. The government projects capital expenditure of SOEs to rise to 2.7 percent of GDP in 2015 and 3.1 percent of GDP in 2016, from 2.4 percent of GDP in 2014 (Figure 8). This is in contrast with a modest rise in the government's capital spending envisaged in the staff baseline, to 3.2 percent in 2016 from 3.1 percent in 2014. By sector, spending on electricity generation accounts for the largest part of the spending as of 2015:H1, followed by the mining and construction industries (Figure 9).

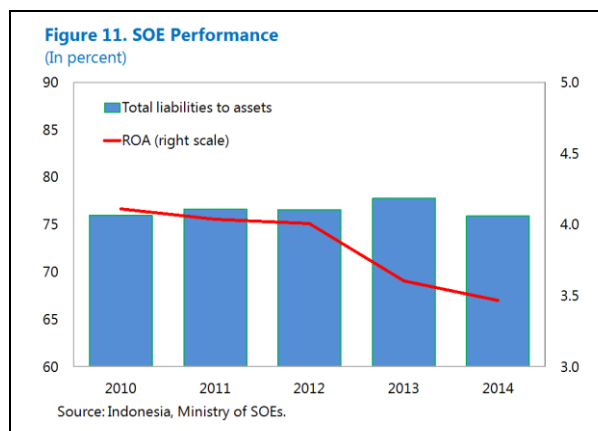
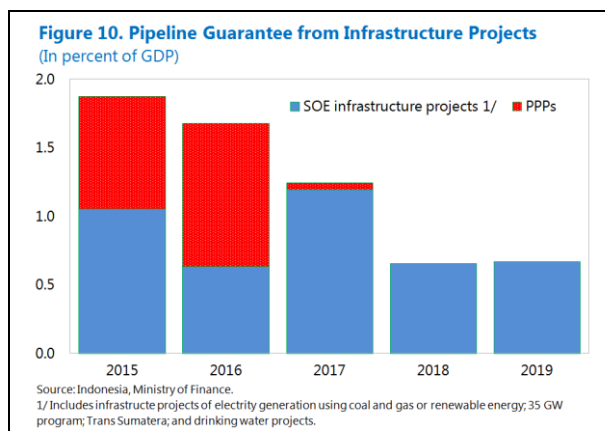
⁶ Including PT PLN (electricity), PT Hutama Karya (construction), PT Waskita Karya (construction), PT Angkasa Pura (air transportation), and PT Kereta Api (railway transportation)

⁷ The government has incentivized the management of SOEs to take a proactive role in infrastructure investment, by holding regular discussions on the implementation of their expenditure plans and evaluating execution results in key performance indicators.

⁸ Asian Development Bank, 2015, *Highlights of Selected Infrastructure Reforms*.



15. A close motoring of contingent liabilities and financial performance of SOEs is warranted, together with the gradual implementation of infrastructure plans. Fiscal risk appears moderate, as guaranteed debt for SOEs is estimated at around 0.8 percent of GDP per annum into 2019 (Figure 10).⁹ The government has also limited the use of the injected equity and retained earnings to specific priority projects, and has put in place a supervisory scheme.¹⁰ Nevertheless, close monitoring of SOE's infrastructure projects is warranted, in view of the expected rapid increase in investment and rising external debt, as well as weakening performance of SOEs (Figure 11).¹¹ Given the need to ensure high quality investment and weak execution capacity, the gradual implementation of infrastructure projects is recommended. This will help minimize potential adverse effects of increased public borrowing on interest rates (i.e., crowding out private investment) and of higher contingent liabilities.



⁹ Based on the estimates of the Ministry of Finance.

¹⁰ SOEs are required to prepare quarterly reports to SOEs where the usage of funds is closely monitored. An audit committee also supervises the expenditure of SOEs.

¹¹ "Managing Fiscal Risks in Indonesia," in *Indonesia—Selected Issues*, IMF Country Report No. 15/75.

Public-Private Partnerships (PPPs)

16. Notwithstanding an initiative to promote PPPs since the early 2000s, implementation of PPP projects have been slow until recently. The slow progress has been in stark contrast with other peers, particularly Mexico and Chile, where PPPs contributed to more than 20 percent of public infrastructure investment (Table 2).¹² Indonesia saw a few successful cases of PPP projects in toll roads and power sectors, while many projects in the water and transportation sectors made little progress.

Table 2. Indonesia: Amount of PPP Relative to Public Infrastructure Investment, 2010

PPP Relative to Public Infrastructure Investment	Country
0-5 percent	Austria, Germany, Canada, Denmark, France, Netherlands, Hungary, Norway, Spain
5-10 percent	United Kingdom, Czech Republic, Slovak Republic, Greece, Italy, South Africa, Ireland
10-15 percent	Korea
20 percent	Mexico, Chile

Source: Public Governance of Public-Private Partnerships, May 2012

17. The slow progress was due to complex regulations, lack of coordination, and weak execution capacity. Delayed land acquisition (Box 2) and complex regulations (i.e., several layers of national and local regulations) were the major bottleneck. Lack of leadership and coordination (e.g., duplication of evaluation) across line ministries and local government was also the major barrier. On financing, weak capacity to execute complex financing projects was a drag, together with a low base of institutional investors which has limited appetite for long-term investments. Restrictions on foreign participation remain relatively high in the infrastructure sector.

18. To accelerate PPP projects, the government has improved the institutional and regulatory framework, particularly on prioritizing and monitoring projects:

- **KPPIP (The Committee for Accelerated Infrastructure Delivery) was established as a coordinating body to focus on the delivery of priority projects, including PPP projects.** The setup of KPPIP has strengthened coordination across line ministries and government agencies.¹³

¹² OECD, *Public Governance of Public-Private Partnerships*, May 2012.

¹³ The committee is chaired by the Coordinating Minister for Economic Affairs, with members from the Minister of Finance, Minister of National Development Planning/Head of National Development Planning Agency (BAPPENAS) and Head of National Land Agency (BPN).

KPPIP has identified 22 priority projects so far, with the amount totaling eight percent of GDP. KPPIP has also expanded the evaluation expertise, by bringing in financial experts from the private sector.

- **The PPP Unit was set up in the Ministry of Finance, as a one-stop-shop for PPP coordination and facilitation.** Currently, eight PPP projects are in the pipeline, totaling around two percent of GDP. The PPP unit has strengthened the review process to assess contingent liabilities.
- **PPP modality has expanded to social infrastructure and availability-based PPP.** Adding to economic infrastructure, a PPP modality can be used for social infrastructure, including facilities for education, sports, arts, tourism, and health, public housing, as well as for commercial facilities. In addition to user-pay PPP, availability-based PPP (i.e., the source of payment is the government) and hybrid PPP (a mix of the user-pay and availability-based PPP) are allowed.
- **Restrictions on foreign ownership were eased in some of the transport and energy sectors.** In the transport sector, the foreign ownership limit for a seaport facility increased to 50 percent from 49 percent. The 100 percent of foreign ownership for a power plan (greater than 10 MWV) has been allowed, up from 95 percent previously.
- **The regulatory framework on PPP has improved,**¹⁴ together with other deregulations to stimulate investment, including streamlining licensing process and time.

19. The government needs to monitor contingent liabilities closely, with the prudent implementation of projects. The enhanced institutional framework contributes to screening projects, and the amount of pipeline guarantees for PPP appears to be moderate, at around 0.3 percent of GDP per annum into 2019.¹⁵ Nevertheless, since a greater number of PPPs will likely be launched with a potential increase in fiscal risk, the authorities need to closely monitor contingent liabilities as well as proper risk sharing between the private and public sectors. The pace of implementation will need to be prudent and gradual, given the long-standing implementation problems such as institutional and regulatory weakness (i.e., land right issues) and the constrained execution capacity (i.e., local governments), as well as the need to prioritize high impact projects. In addition, it would be important to set up uniform guidelines for project selection and feasibility studies for infrastructure projects by SOEs, as discussed in the previous section.

20. Financial deepening would also promote infrastructure development. Mobilizing savings to finance infrastructure is key to sustaining infrastructure investment. Deepening of financial markets, including growing the pension and insurance companies as well as developing

¹⁴ (i) In addition to a tender mechanism, a direct appointment of concessionaire is allowed under certain conditions; and (ii) bundling of projects is allowed to accommodate projects that extend beyond the boundary of one agency or local government; and; and (iii) private sector and IFIs can support preparation of PPP projects.

¹⁵ Based on the estimates of the Ministry of Finance.

corporate bond markets, is highly conducive to creating demand and supply of long-term infrastructure financing. Diverse financing vehicles should be developed, including infrastructure bonds and securitized instruments, which could benefit from a sound legal framework.¹⁶ Efforts should continue to expand capacity of the fiscal authorities to prepare a complex financing scheme, particularly at the local government level.

E. Conclusion

21. The main findings and policy implications of this chapter are summarized as follows.

- The government's ambitious plans for infrastructure development would rightly address infrastructure bottleneck in Indonesia. The government has achieved early successes in accelerating capital spending, supported by a number of reform measures.
- Going forward, structural impediments remain to be addressed, including revenue capacity as well as the regulatory and institutional framework, with due consideration for fiscal risks. These would call for gradual implementation of the infrastructure plan, supported by steady progress in structural reforms.
- A macro-fiscal simulation suggests that ramping up public investment will have positive impact on growth. Maximizing the growth impact in the context of macroeconomic stability would require a well-designed and least-distortionary package of tax measures. While hypothetical, ramping up public investment without revenue mobilization would lead to large fiscal and current account deficit, giving rise to funding risks.
- There is scope to improve public investment institutions in Indonesia. Coordination across ministries could be enhanced, for example by establishing central guidelines and oversight on feasibility studies for infrastructure projects. Also, central-local coordination could be improved in the area of land acquisition and regulations. Indonesia's institutions for implementing infrastructure projects are relatively weak, and there is need for further improvements in multiyear capital budgeting and smooth within-year budget execution.
- The increasing role of SOEs and PPPs could help reduce the infrastructure gap, while fiscal risks appear to be moderate at this juncture. Nevertheless, the authorities should closely monitor potential fiscal risks, and implement the ambitious infrastructure development plans in a orderly manner, in light of long-standing fundamental constraints, such as the institutional and coordination weakness, the limited execution capacity, and the reduced fiscal space. The prudent implementation will also help ensure high quality of infrastructure development.

¹⁶ Infrastructure funds were introduced in 2013 in Thailand. The funds are listed instruments to facilitate infrastructure development, launched by corporates which plan infrastructure development, including in the telecom and utilities sectors (Mandiri Institute and Oliver Wyman, *Financing deepening in Indonesia*, 2015).

Box 1. Indonesia: Assessment of Public Investment Institutions

Planning stage

- Public investment planning is guided by national and sectoral planning. The national long-term development plan 2011–25 is broken down into a series of five-year medium-term development plans (RPJMN). At the start of each Presidential term a new RPJMN is prepared by the Ministry for Planning (BAPPENAS) reflecting inputs from spending ministries, local governments, and Parliament.
- However, each spending ministry develops its own medium-term strategic plan (*Renstra*) containing medium-term outputs although not necessarily the same as in RPJMN.
- There appears scope to improve central-local coordination in the areas of land acquisition, regulations (e.g., environmental protection), integrated planning, and capacity development.

Allocating stage

- The RPJMN is developed within a medium-term resource envelope and provides details on the allocation of funds across ministries and programs. Each ministry's annual work plan and annual budget proposal contain three-year forward estimates at the program and activity level.
- Budget unity has improved. The size of extra budgetary operations is not significant. The majority of capital projects are included in the annual budget.
- Nevertheless, when making allocative decisions on capital projects, recurring costs and medium-term implications are not clearly presented.
- Project appraisal and selection are largely devolved to spending ministries, while there are limited central guidelines and oversight. BAPPENAS sets and monitors aggregate capital spending ceilings and output targets, while spending ministries appraise and select individual projects to meet these outputs. This is also the case for infrastructure projects implemented by local governments and SOEs.

Implementing stage

- While information on total projects costs covering multiple years is included in planning documents, outlays are approved by Parliament on an annual basis. The government has recently changed the regulations to allow unspent budget to be carried forward to the next fiscal year in certain cases.
- Although the budget is approved to allow sufficient time to plan execution, capital budget execution is concentrated in the last quarter. Although the budget is approved two months before the start of the year and detailed cash forecasts are prepared, project execution is typically slow. Recently the government has taken steps to address this delay. For example, procurement has been allowed to be initiated before the start of the year.
- The quality of project management and the transparency of execution appear weaker at local levels. The procedures for monitoring individual projects are not standardized and vary widely across ministries and local governments. With the exception of externally financed projects, there appears limited use of systematic ex-post evaluations.

Box 2. Indonesia: Recent Reforms on Land Acquisition Procedures

The government has taken important steps to address the barriers of land acquisition:

- **The revised land acquisition law came into effect, early in 2015.** The law has clarified, *inter alia*, that (i) all the ongoing projects would benefit from the new law,¹ which can force relevant parties to sell their property for public infrastructure projects with fair compensation; and (ii) land acquisition procedures should be complete within a maximum of two years. Under the new law and recently revised regulations, total days needed for land acquisition could be as fast as 3–4 months. Other deregulation has been also delivered.
- **National Land Agency's (BPN) function** has been revamped, through a setup of special deputy for land acquisition acceleration and a dedicated team for priority infrastructure projects, as well as developing standard operating procedure.
- **Direct land procurement by a private entity:** (i) a private entity can obtain an authority or proxy in land procurement from a relevant government institution or SOE and act as a proxy; and (ii) with the authority/proxy mandate, a private entity can carry out compensation payment as well as all the preceding stages (i.e., preparation, consultations, valuation, and negotiation).

The legal framework has improved, but thorough implementation is essential, particularly at the local administration level. Improvement has been gradually felt on the ground. The new law has been successfully applied to the South Sumatera Project. Another successful case is a rail project in Bojonegoro, where the land acquisition process for the Java North Line Double Track Rail project took less than 2 years. During this process, the civil society was early socialized to the new law. Nonetheless, there are numerous cases that have been stalled due to land issues.² It would be important for the government to establish demonstrate their ability to push ahead with the new law and build trust, creating stable investment flows to infrastructure projects.

1/ Previously, infrastructure projects that had acquired three-quarters of the required land were subject to the old 1960 law. Also projects whose land-acquisition process was less than 75 percent complete had to start again, if a relevant entity wants to acquire land under the new law.

2/ For instance, development of the light rail transit (LRT) project in Jakarta was hampered by land acquisition problems. The state developer asked the local administration to help purchase lands along the route from residents. Cutting trees on the route also required approval from the local administration.

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